國際人口學會
會議參加報告書

1989. 10.

International Population Conference,
25-29 Sep. 1989,
International Union for the Scientific Study of Population

經濟企劃院 調査統計局

National Bureau of Statistics
Economic Planning Board

目　　次

第21次 IUSSP 總會

1. 出 張 者

   經濟企劃院 調査統計局 人口課長 金 日 炫

2. 出張 期間: 1989. 9. 20 ~ 9. 25

3. 出張 場所: 印度 뉴델리(Vigyan Bhavan Hall)

4. 出張 目的

   • 國際人口學會(Internation Union for the Scientific Study of Population) 및 印度人口硏究協會 (Indian Association for the Study of Population)가 共同主管한 第21次 國際人口會議에 參席하여 人口關聯硏究結果 發表 및 相互討論

5. 會議 主題: 別添 參照

6. 向後措置計劃

   • 同 會議는 人口關聯分野에 있어 重要한 會議로서 人口部門에 經驗이 있는 2~3名이 계속 同 會議를 參席하여 人口關聯 資料 蒐集 및 經驗과 技術習得의 機會를 마련하여 주는 것이 妥當하다고 사료됨.

添附 1 : 會議 主題

1. 公式主題: 91 편

1) 아시아地域에서의 出產力 變化 推移: 2 편

2) 中國의 人口 硏究: 4 편

3) 東南아시아國家에서의 人口資料蒐集方法: 4 편

4) 東南아시아에서의 人口成長 政策: 3 편

5) 社會構造와 出產力 變動: 4 편

6) 出產力 抑制와 關聯된 主要問題: 4 편

7) 出產力 分析: 4 편

8) 幼兒 死亡: 4 편

9) 保健의 人口學的 側面: 4 편

10) 最近의 人口資料 蒐集方法: 4 편

11) 人口分析을 위한 間接的 分析 技法: 4 편

12) 海外 移民: 4 편

13) 大都市의 人口成長推移 및 問題: 4 편

14) 人口移動흐름의 變化推移: 3 편

15) 人口와 農村開發: 4 편

16) 前近代的 經濟開發狀況에 있어서 人口와 長期展望: 2 편

17) 先進國에서의 家族構造 및 勞動力 市場 變化: 1 편

18) 保健, 敎育, 雇傭政策과 人口: 4 편

19) 人口의 老齡化: 4 편

20) 家族構造의 變化: 3 편

21) 結婚制度의 變化: 4편

22) 人口 政策: 1편

23) 先進國에서의 人口推移: 4편

24) 先進國에서의 人口問題: 2편

25) 考古學的 人口學: 4편

26) 歷史學 人口: 3편

27) 人口學 發展을 위한 考察: 3편

2. 非公式 主題: 22편

添附2：蒐集資料目録

* CONTENTS *

1

THE CONDITIONS OF FERTILITY TRANSITION IN EAST AND SOUTH-EAST ASIA AND PROSPECTS FOR THE 1990s

M. Badrud DUZA
International Centre for Diarrhoeal Disease Research
Dhaka, Bangladesh

I. BACKGROUND AND PERSPECTIVE

The magnitude and tempo of fertility transition and their underlying mechanisms in many parts of East and South-East Asia in recent times have been truly unique. This was attained often through distinctly different routes by countries placed along a widely varied social, cultural, economic, political, and ideological spectrum. The present paper examines this process, and reflects on the prospects for the 1990s. For reasons of data and space limitations, the analysis is addressed primarily to nine selected countries—China, Hong Kong, Japan, and the Republic of Korea in East Asia; and Indonesia, Malaysia, Philippines, Singapore, and Thailand in the other region.

A broad socio-economic profile, besides population size, of the selected countries is sketched in Table 1. China alone among them is rated by the World Bank as a low-income country, but in view of distributive equity and various social and economic securities, the overall quality of life of China's population is at a much higher level than that of most other countries with the same income level. Indonesia, Philippines and Thailand—in progressively higher order of GNP per capita—belong to the lower middle-income category; while Malaysia, Republic of Korea, Hong Kong and Singapore—in a similar order—belong to the upper middle-income group. Japan in the category of industrial market economies enjoys a GNP per capita that is exceeded by few countries of the world. It is noted that except for the Philippines, recent growth rate of GNP per capita in all these countries has been high by global standards, especially so in the Republic of Korea and Singapore.

In terms of growth of urban and non-agricultural population, Singapore, Hong Kong, Japan and the Republic of Korea are well ahead of others. However, in all the countries female primary enrolment has now become universal; and considerable progress in female secondary education has been attained everywhere other than China and Indonesia.

TABLE 1

Socio-economic profile of selected countries of East and South-East Asia

Region/ Country	Population (millions)	GNP per capita		%pop. urban		%non-agr. pop.		Female enrolment(%)			
	1988	US $ 1986	Annual growth rate(%) 1965-86	1965	1985	1965	1985	Primary 1965	Primary 1985	Secondary 1965	Secondary 1985
East Asia											
China	1087.0	300	5.1	18	22	19	26	—	114	—	32
Hong Kong	5.7	6910	6.2	89	93	94	98	99	104	25	72
Japan	122.7	12840	4.3	67	76	74	89	100	102	81	97
Rep. of Korea	42.6	2370	6.7	32	64	45	64	99	96	25	91
South-East Asia											
Indonesia	177.4	490	4.6	16	25	29	43	65	116	7	34
Malaysia	17.0	1830	4.3	26	38	41	58	84	99	22	53
Philippines	63.2	560	1.9	32	39	42	48	111	106	40	66
Singapore	2.6	7410	7.6	100	100	94	98	100	113	41	73
Thailand	54.7	810	4.0	13	18	18	29	74	—	11	—

Source : For 1988 population, PRB (1988); all other columns, World Bank (1988).

On the demographic side, phenomenal reduction in mortality has taken place. Japan, Hong Kong, and Singapore are among the few countries of the world with an infant mortality rate of less than 10 per 1,000. By contrast, in Indonesia the estimated figure now is still high—about 74; in Thailand, 39; and the Philippines, 45. The figure for China is 32, followed by that of Malaysia (26) and Republic of Korea (24). There has been a corresponding rise in overall life expectancy at birth, with Japan at the top (77.2) at present, followed by Hong Kong (75.7), Singapore (72.8), China and Republic of Korea (69.4), Malaysia (68.6), Thailand (64.2), and the Philippines (63.5), with Indonesia at the bottom (56.0). Even a generation ago, Japan, Hong Kong and Singapore registered figures exceeding 60. Everywhere else it was less than 50; in China and Indonesia, around 40. Persistent development in these respects is envisaged for the 1990s, with the projected Indonesian life expectancy of 61.0 by the year 2000, and correspondingly better levels over current ones for the other countries (for details, see United Nations, 1988).

II. FERTILITY LEVELS AND TRANSITION

What kind of fertility profile would one expect under the above scenario of socio-economic development and mortality decline? Past trends and future possibilities (UN medium variant projections) in this respect are reflected in Tables 2 to 5.

CBR

The South-East Asian countries all reflected CBR levels (Table 2) ranging in 40s throughout the 1950s and most of them through the 1960s. Indonesia persisted at

the level through 1975. Overall, the East Asian countries in the table recorded lower CBR levels than in the other region.

As early as in the early 1950s, *Japan* had a figure lower than 24. It stands at about half that level at present. *China's* CBR declined moderately up to the mid-1970s and then fast. In the former, CBR dropped by 50 per cent—from 34.3 to 17.2 during the 10 years between 1947 and 1957. Such a magnitude of decline within 10

TABLE 2

Crude birth rate (CBR) per 1000 for selected countries of East and South-East Asia, 1950–2000

Years	East Asia				South-East Asia				
	China	Hong Kong	Japan	Rep.of Korea	Indo-nesia	Malay-sia	Philip-pines	Singa-pore	Thailand
1950–55	43.6	33.1	23.7	37.0	43.0	45.2	49.3	44.4	46.6
1955–60	35.9	36.3	18.1	45.9	45.4	45.4	47.4	41.6	44.3
1960–65	37.8	33.1	17.2	39.6	42.9	43.2	43.6	34.0	43.5
1965–70	36.9	23.5	17.8	31.9	42.6	38.5	40.2	24.9	41.8
1970–75	30.6	19.5	19.2	28.8	41.4	34.7	36.9	21.2	35.1
1975–80	21.5	18.6	15.4	23.9	36.4	30.4	36.4	17.2	31.6
1980–85	19.0	16.7	13.1	23.1	32.1	30.9	33.3	17.0	28.0
1985–90	18.4	16.5	12.3	23.2	28.6	27.1	30.8	16.5	23.5
1990–95	18.0	15.3	12.6	20.2	26.4	24.0	28.3	15.4	23.7
1995–2000	17.6	13.6	13.3	17.9	23.5	20.6	25.4	13.9	22.8

Source: United Nations (1988) and Populaiton Council (1988) (Based on UN Population Division estimates).

years, at the time unprecedented, was repeated in China 22 years later, where CBR fell by nearly half—from 34.1 in 1969 to 17.8 in 1979 (Kuroda, 1987: 17–18). *Hong Kong*, with an initial low figure in the 30s until the mid-1960s, was able to halve that level in two decades. The transition for *the Republic of Korea* also started since the mid-1960s. Despite a steep fall, her fertility today remains higher than in the other three countries of East Asia.

Within South-East Asia, *Singapore's* journey toward lower fertility started about the same time as in Hong Kong. Her CBR today is the lowest in the region; lower than that of China and higher than that of only Japan, among the nine countries concerned. Here, as in the four East Asian countries above, the decline has plateaued in recent years. *Thailand* started a sharp decline since the yearly 1970s, and has already reached the level of the Republic of Korea. The transition in the Philippines started about the same time and from about the same level as in Thailand, while *Indonesia* did so latest of all—starting from the mid-1970s. Even so, CBR of Indonesia today is lower than that of the Philippines. Meanwhile *Malaysian* decline also started since the mid-1970s, and today her CBR is lower than that of Indonesia.

Relatively modest decline in CBR has been observed since the 1960s in the Democratic People's Republic of Korea and Mongolia, both in East Asia. In the other region, Burma and Vietnam have demonstrated slightly steeper decline in recent CBR figures but little decline is yet marked for Kampuchea, East Timor and Laos (see Rele and Alam, 1988).

TFR and NRR

Basically the same profile is discerned for TFR (Table 3) and NRR (Table 4). Since the mid-1950s *Japan* reached a replacement-level fertility; and since the mid-1970s has fallen below that level. Of the other East Asian countries, *Hong Kong* has fallen below the replacement level since the 1980s. *China* has now touched NRR unity, while the *Republic of Korea* is fast approaching that. In the other region, *Singapore* fell below replacement level since the mid-1970s, despite a far later initiation of the process. *Thailand* is fast approaching that level, followed by *Indonesia*, *Malaysia* and finally by the *Philippines*.

TABLE 3

Total fertility rate (TFR) per woman for selected countries of East and South-East Asia. 1950–2000

Years	East Asia				South-East Asia				
	China	Hong Kong	Japan	Rep. of Korea	Indo-nesia	Malay-sia	Philip-pines	Singa-pore	Thai-land
1950–55	6.2	3.6	2.8	5.2	5.5	6.8	7.3	6.3	6.6
1955–60	5.4	4.7	2.1	6.0	5.7	6.9	7.1	5.9	6.4
1960–65	5.9	5.3	2.0	5.4	5.4	6.7	6.6	4.9	6.4
1965–70	6.0	4.0	2.0	4.5	5.6	5.9	6.0	3.4	6.1
1970–75	4.7	2.9	2.1	4.1	5.5	5.1	5.3	2.6	5.0
1975–80	2.9	2.3	1.8	3.1	4.8	4.1	4.9	1.8	4.3
1980–85	2.4	1.9	1.8	2.6	4.1	3.9	4.4	1.7	3.5
1985–90	2.1	1.9	1.8	2.5	3.5	3.3	3.9	1.6	2.7
1990–95	1.9	1.9	1.9	2.3	3.1	2.9	3.5	1.7	2.6
1995–2000	1.9	1.9	1.9	2.2	2.7	2.5	3.1	1.8	2.5

Source: United Nations (1988) and Population Council (1988) (Based on UN Population Division estimates).

In the process, China has been able to reduce her TFR by two-thirds between 1965 and the present; Hong Kong has done nearly so between 1960 and 1985; while the Republic of Korea has halved it between 1960 and the present. The fall in Singapore has been the most pronounced. Her current level represents only a fourth of the observed level in the early 1950s.

The process of TFR decline since the 1960s is discernible in various other countries of the two regions as well—most notably in Vietnam and to a modest extent in the Democratic People's Republic of Korea, Burma and Kampuchea. The situation in Mongolia, East Timor, and Laos appears to be rather stagnant (see Rele and Alam, 1988).

TABLE 4

Net reproduction rate (NRR) per woman for selected countries of East and South-East Asia, 1950-2000

Years	East Asia				South-East Asia				
	China	Hong Kong	Japan	Rep of Korea	Indo-nesia	Malay-sia	Philip-pines	Singa-pore	Thai-land
1950–55	1.9	1.6	1.2	1.8	1.6	2.4	2.5	2.7	2.3
1955–60	1.8	2.1	1.0	2.3	1.7	2.6	2.6	2.6	2.4
1960–65	2.1	2.4	0.9	2.1	1.7	2.6	2.6	2.2	2.5
1965–70	2.5	1.8	1.0	1.8	1.9	2.5	2.4	1.6	2.5
1970–75	2.0	1.4	1.0	1.7	1.9	2.2	2.2	1.2	2.1
1975–80	1.3	1.1	0.9	1.4	1.8	1.8	2.1	0.9	1.8
1980–85	1.1	0.9	0.9	1.2	1.6	1.8	1.9	0.8	1.5
1985–90	1.0	0.9	0.9	1.2	1.4	1.5	1.7	0.8	1.2
1990–95	0.9	0.9	0.9	1.1	1.3	1.3	1.6	0.8	1.2
1995–2000	0.9	0.9	0.9	1.0	1.1	1.2	1.4	0.8	1.2

Source: Population Council (1988) (Based on UN Population Division estimates).

Relative Change in CBR and TFR

The period between the mid-1960s to the mid-1980s seems to have proved most crucial in fertility transition of the East Asian countries as well as Singapore in the other region (Table 5). As for the other countries, the process ensued in a significant way in the 1970s and continues to date.

Being free from distortion of the age-sex structural effect, TFR is a more genuine index of fertility transition, reflecting long-term changes in the two regions. Under conditions of falling fertility which reduces the proportion of children and declining mortality which increases the population of surviving women in the child-bearing ages, CBR would tend to decline slower than TFR, and conceal the full impact of declines in TFR till reduced cohorts of women resulting from lower fertility themselves begin to enter the reproductive span (cf. Rele and Alam, 1988). The implications of these mechanisms are borne out by Table 5, which reflects relatively higher magnitude of decline in TFR, compared to corresponding figures in CBR for a particular country and time period.

III. CONDITIONS OF FERTILITY TRANSITION

Conceptual Issues

The international debate on the determinants of fertility decline has often centred around the relative importance of the level of socio-economic development, regional or geographical setting and pertinent government policy in shaping the trajectory of demographic transition (cf. United Nations, 1987: 2). Holding the level of development constant, however, strong political commitment and national family planning programmes prove most crucial in defining the timing, magnitude and tempo of fertility transition (Lapham and Mauldin, 1985). Various subtleties in the process have been identified in the recent literature—including those in terms of the demand

TABLE 5

Per cent change in CBR and TFR in selected countries of East and South-East Asia, 1950—2000

Period	East Asia				South-East Asia				
	China	Hong Kong	Japan	Rep. of Korea	Indonesia	Malaysia	Philippines	Singapore	Thailand
CBR									
1950—55 to 60—65	—13.3	0.0	—27.4	+7.0	—0.2	—4.4	—11.6	—23.4	—6.7
60—65 to 70—75	19.0	—41.1	+11.6	—27.3	—3.5	—19.7	—15.4	—37.6	—19.3
70—75 to 80—85	—37.9	—14.4	—31.8	—19.8	—22.5	—11.0	—9.8	—19.8	—20.2
80—85 to 90—95	—5.3	—8.4	—3.8	—13.0	—17.8	—22.3	—15.0	—9.4	—15.4
90—5 to 95—2000	—2.2	—11.1	+5.6	—11.4	—11.0	—14.2	—10.2	—9.7	—3.8
TFR									
1950—55 to 60—65	—4.8	+47.2	—28.6	+3.8	—1.8	—1.5	—9.6	—22.2	—3.0
60—65 to 70—75	—20.3	—45.3	+5.0	—24.1	+1.9	—23.9	—19.4	—46.9	—21.9
70—75 to 80—85	—48.9	—34.5	—14.3	—36.6	—25.5	—23.5	—17.0	—34.6	—30.0
80—85 to 90—95	—20.8	0.0	0.0	—11.5	—24.4	—25.6	—20.5	0.0	—25.7
90—95 to 95—2000	0.0	0.0	0.0	—4.3	—12.9	—13.8	—11.4	+5.9	—3.8

Source : Tables 2 and 3 of this paper.

theories of value and costs of children (Easterlin, 1986); intergenerational reversing of the flow of wealth (Caldwell, 1982), which incorporates elements of relative parental investments in and return from children; and the recent challenge of the conventional demand theories of fertility transition and explanation of the transition essentially in terms of ideational change (Cleland and Wilson, 1987).

These formulations will help us understand the process of fertility transition identified above. By and large, indices of socio-economic development and mortality decline laid out at the outset of the paper would appear to have offered an environment where high fertility has proved increasingly less necessary and desirable. Various proximate determinants of fertility have been activated in the process—higher age at marriage and fewer married; growing acceptance of contraception as a means of conception control; and resort to fertility control through abortion.

Age at Marriage

Recent female singulate mean age at marriage in all the nine selected countries has been noted to be rather high—ranging from the lower 20s in Indonesia, China, and the Philippines to mid-20s or above in Thailand, Malaysia, Republic of Korea, Japan, Hong Kong and Singapore (arranged in order of higher age at marriage). In all the East Asian countries and Singapore the proportion of females married in the age group 15–19 is now negligible (see United nations, 1988: 323). Increasing female education and employment in monetised sectors outside home, cost of marriage and establishing new households and in the case of China, legal as well as societal pressures, have contributed to the process (see, for example, Duza and Baldwin, 1977; Jin and Duza, 1981; McNicoll and Singarimbum, 1982; Rele and Alam, 1988; and Tien, 1984).

Fertility Regulating Policies and Contraceptive Prevalence

China, the Republic of Korea, Indonesia, Philippines and Thailand rate the current level of fertility to be too high; Japan—without explicit antinatalist policy—and Malaysia rate this to be satisfactory; Singapore is the only country in our list which considers the level too low (PRB, 1988). All the first sets of countries have systematic interventions for fertility decline, while Singapore has recently initiated efforts toward reversing the present state of below-replacement fertility. Changing the earlier policy, Malaysia since 1982 (Hirschman, 1986) is also looking for a modest population growth throughout the next century.

Five of the nine countries under review emerge as strong in terms of family planning programme efforts—with China at the top, followed by Indonesia, Republic of Korea, Singapore and Hong Kong; three as moderate—with Thailand at the top, followed by the Philippines and Malaysia; and none below these levels (Lapham and Mauldin, 1985; Population Council, 1988).

Corresponding expansion of contraceptive prevalence rates (CPR) among currently married women of reproductive age has been evidenced. CPR (per cent)

figures available for the most recent years of the present decade are highest for China and Singapore (74), followed by those for Hong Kong (72), Republic of Korea (70), Thailand (68), Japan (64), Malaysia (51), Indonesia (48), and Philippines (45) (see United Nations, 1989). With elaborate abortion facilities available, fertility regulation is much more complete in such countries as China, Japan, Singapore and Hong Kong. The implications of these mechanisms—marriage, contraception and abortion for relative fertility decline—in the countries under review are obvious.

Fertility Motives and Dynamics

At the macro level, the developmental features and mortality decline discussed in Section I of this paper certainly provided a positive environment for diffusion of low fertility norms and behaviour. The strength of official policies for fertility reduction was an additional crucial element for the outcome. Singapore, Hong Kong., Republic of Korea and Taiwan—all with fast growing market economies—emerged as the first 'success stories' in this field (see Fawcett and Khoo, 1980; Hwan, 1988; Wong, 1977). The city-states of Hong Kong and Singapore, with heavy migrant populations, have been characterised by receptiveness to continual change, competitiveness, mobility, economic rationality and materialism (Wong, 1977). In the latter respects, these countries provide considerable parallel with the Korean (Hwan, 1988)—and even more so, the Japanese (Kuroda, 1987)—situation of rising aspirations, economic and social pressures and investment in children vis-a-vis potential returns, exerting strong motivations for fertility control.

The route for China—despite a socialistic framework and low per capita income was different, initially surprising most observers. Equity in socio-economic and health sectors and rigorous execution of a strong antinatalist policy were her eminent strengths, representing a comprehensive blueprint of delayed marriage, family planning, and abortions. Strong incentives and disincentives were built in for an 'induced fertility transition' (Tien, 1984) —first in the 'later-longer-fewer' programme introduced in the early 1970s, and then in implementing the 'one-child' policy since 1979. Besides, positive popular response was engineered at the micro level, raising aspirations, and involving the local-level organisational setting for mobilisation, planning, and programme execution (Poston and Gu, 1987; Whyte and Gu, 1987). There still remains considerable differential in rural and urban fertility (higher in the former) (Coale and Shenli, 1987); the implementation of the one-child policy also has been less rigorous in rural areas (Whyte and Gu, 1987). Despite growing lack of salience of other conventional socio-economic differentials of fertility in the egalitarian China context (Jin and Duza, 1981: 453), per capita income and level of education—apart from rural-urban residence—still appear to exert some influence.

Thailand seems to be taking a similar route to fertility decline and other comparable situations as the Republic of Korea did a few years ago—viz., structural changes from a fast growing market economy in conjunction with aggressive fertility limitation programmes (Robinson and Rachapaetayakom, 1988). Indonesia's situation is somewhat distinct. Her fertility transition is taking place in the context of relatively lower socio-economic development and higher mortality level. An administratively

strong family planning programme, involvement of the local community in the 'Indonesian traditions of consultative-consensus decision-making', and promotion of an equitable distribution of social infrastructure have proved crucial (Hull and Hatmadji, 1988). These have led to a success level that has posed a challenge to 'conventional wisdom', generating, among others, a hypothesis of poverty-driven fertility decline—which could be a combination of Malthusian pressures and difficulty of the poor to resist strong official pressures to meet mandated goals for local areas (Freedman et al., 1981).

Recent retardation of overall fertility decline in Malaysia seems to be associated with the shift of her population policy from antinatalism to pronatalism in 1982. While in the face of relative modernisation and pressures of excessive competition, fertility decline among the Chinese and Indian communities remains unabated, there is currently at least a temporary lull in Malay fertility transition (Hirschman, 1986; Leete and Ann, 1988). Recent deceleration of the Philippines' fertility decline might be attributed to the 'timing change' in first births resulting from increase in premarital sex and conception (Cabigon, 1988).

IV. OUTLOOK FOR THE FUTURE

Given the momentum of recent fertility trends and their underlying dynamics, no drastic change in the patterns can be anticipated in the foreseeable future. Possible trends for the 1990s are presented in Tables 2 to 5 in terms of United Nations medium variant projections.

China seems destined to join Hong Kong, Japan, and Singapore for below-replacement level fertility in the coming decade. All the three latter countries—including Singapore, despite current policy concerns should continue in this phase. The Republic of Korea could touch NRR unity by the end of the century. The other four countries in the tables—including Malaysia with its present pro-natalist policy—should move close to replacement-level fertility by then.

Retardation in decline should take place in all the countries where fertility transition is already complete, or is likely to be complete soon. The steepest declines should take place in Indonesia, Malaysia, and Philippines throughout the 1990s; and also in Thailand up to the mid-1990s. Overall, because of age-sex structural effects, CBR declines would continue to lag behind TFR declines in most of the countries.

As for countries where systematic fertility decline is taking place—and particularly in those that have or will have completed the transition to the replacement level—the likelihood of any reversal would be increasingly difficult, as evidenced in a number of European countries. For, once low fertility regime is in operation, institutional and related forces at the macro level as well as pertinent ramifications of low fertility determinants at the micro level gain deep roots in society. Thus, raising of fertility will perhaps have to be a more spectacular revolution than the drama enacted in the process of fertility decline in the erstwhile traditional societies.

REFERENCES

Cabigon, Josefina V., 1988. Retardation of fertility decline in the Philippines and its causes, paper presented to the IUSSP Seminar on Fertility Transition in Asia, March, Bangkok.

Caldwell, J.C., 1982. *Theory of Fertility Decline*, London: Academic Press.

Cleland, J. and Wilson, C., 1987. Demand theories of the fertility transition: an iconoclastic view, *Population studies,* Vol. 41, No. 1.

Coale, A.J. and Shenli, Chen, 1987. *Basic Data on Fertility in the Provinces of China, 1940-1982,* Honolulu: East-West Centre.

Duza, M. Badrud and Baldwin, C.S., 1977. *Nuptiality and Population Policy: An Investigation in Tunisia, Sri Lanka, and Malaysia,* New York: Population Council.

Easterlin, R.A., 1986. Economic preconceptions and demographic research, *Population and Development Review,* Vol. 12, No. 3.

Fawcett, J.T. and Khoo, S., 1980. Singapore: rapid fertility transition in a compact society, *Population and Development Review,* Vol. 6, No. 4

Freedman, R., Khoo, S. and Supraptilah, B., 1981. Use of modern contraceptives in Indonesia: a challenge to conventional wisdom, *International Family Planning Perspectives,* Vol. 7, No. 1.

Hirschman, C., 1986. The recent rise in Malay fertility: new trend or a temporary lull in fertility transition? *Demography,* Vol. 23, No. 2.

Hull, T.H. and Hatmadji, S.H., 1988. Regional fertility differentials in Indonesia: causes and trends, paper presented to the IUSSP Seminar on Fertility Transition in Asia: Diversity and Change, March, Bangkok.

Hwan, K.T., 1988. Exploring socio-cultural explanations of fertility transition in Korea, paper presented to the IUSSP Seminar on Fertility Transition in Asia, March, Bangkok.

Jin, Wei and Duza, M. Badrud, 1981. *Fertility Transition in a Chinese Community: Determinants of Fertility in Some African and Asian Countries,* Research Monograph Series No. 10, Cairo Demographic Centre.

Kuroda, T., 1987. Population aging in Japan, with reference to China, *Asia-Pacific Population Journal*, Vol. 2, No. 3.

Lapham, R.J. and Mauldin, W.P., 1985. Contraceptive prevalence: the influence of organized family planning programmes, *Studies in Family Planning,* Vol. 16, No. 3.

Leete, R. and Ann, T.B., 1988. Retardation of fertility decline in Malaysia and its causes, paper presented to the IUSSP Seminar on Fertility Transition in Asia, March, Bangkok.

McNicoll, G. and Singarimbum, S., 1982. Fertility decline in Indonesia, Working Papers Nos. 92 and 93, New York: Center for Policy Studies, The Population Council.

Population Council, 1988. Data-Bank (Compilations from various sources), New York: Population Council.

PRB (Population Reference Bureau, Inc.,) 1988. World Population Data Sheet, Washington, D.C.: Population Reference Bureau, Inc.

Poston, D.L. and Gu, B., 1987. Socio-economic development, family planning, and fertility in China, *Demography*, Vol. 24, No. 4.

Rele, J.R. and Alam, I., 1988. Empirical evidence of fertility transition in Asia, paper presented to the IUSSP Seminar on Fertility Transition in Asia, March, Bangkok.

Robinson, W.C. and Rachapaetayakom, J., 1988. The role of government population and development planning activities in the Thai fertility decline, paper presented to the IUSSP Seminar on Fertility Transition in Asia, March, Bangkok.

Tien, H.Y., 1984. Induced fertility transition: impact of population planning and socio-economic change in the People's Republic of China, *Population Studies*, 38.

United Nations, 1989. *Levels and Trends of Contraceptive Use as Assessed in 1987*, New York: United Nations.

United Nations, 1988a. *World Population Trends and Policies: 1987 Monitoring Report*, New York: United Nations.

United Nations, 1988b. *World Demographic Estimates and Projections, 1950–2025*, New York: United Nations.

United Nations, 1987. *Fertility Behaviour in the Context of Development: Evidence from the World Fertility Survey*, New York: United Nations.

Whyte, M.K. and Gu, S.Z., 1987. Popular response to China's fertility transition, *Population and Development Review*, Vol. 13, No. 3.

Wong, A.K., 1977. Some observations on the fertility transition and transitional society in Hong Kong and Singapore, in Caldwell, J.C. (ed.), *The Persistence of High Fertility: Population Prospects in the Third World* (Family and Fertility Change Series No. 1), Canberra: Australian National University.

World Bank, 1988. *World Development Report, 1988*, New York: Oxford University Press.

2

OVERSEAS CHINESE: TOWARDS A ONE-CHILD FAMILY NORM?

Richard LEETE
Economic Planning Unit
Kuala Lumpur, Malaysia

INTRODUCTION AND BACKGROUND

China's one-child family policy, being enforced through a range of incentive and disincentive measures, has been widely reported. There is also a conspicuous trend towards a one-child family, without policy measures to support it, among the overseas Chinese living in many countries throughout East and South-East Asia. The overseas Chinese, most of whom are first or second-generation descendants of immigrants from mainland China, have undergone a remarkable transition from high to low fertility in a much shorter period of time than did populations in Western Europe or North America. This has taken place in differing socio-economic and political contexts with differing population policies. A feature is the continuation of fertility rates significantly below replacement level such that there is likely to be a sharp increase in the proportion of women among those currently passing through childbearing ages with no children or just one child. This paper describes this transition, with particular reference to the Chinese living in Hong Kong, Malaysia, Singapore and Taiwan (some 33 million people), examines the factors behind it and makes a few speculative comments about its future direction.

The broad contours of the fertility transition among four overseas Chinese populations can be seen in the top left quadrant in Figure 1. In 1965 each group still had a level of fertility such that generations of mothers were being replaced by generations of daughters who were at least twice as numerous. Over the next two decades fertility fell rapidly and in 1987 only Malaysian Chinese mothers were

The author thanks the Statistical Offices in Hong Kong, Malaysia and Taiwan, and the Ministry of Health in Singapore for supplying some of the data used here. The views expressed in this paper are the author's alone.

reproducing sufficiently to replace themselves. Fertility was significantly lower elsewhere, it was almost 40 per cent below replacement in Hong Kong where there has been no active antinatalist population policy.

Hong Kong's fertility is now around the same level as that of the Chinese in the lowest fertility provinces of the mainland, that is Shanghai, Beijing and Tianjin (upper right quadrant in Figure 1). Given the strength of China's commitment to family planning and the intensity with which measures to promote family planning in general, and the one-child-per-couple policy in particular, have been implemented, it is not surprising that the fertility declines in the mainland provinces have been more rapid than those of the overseas Chinese.

The overseas Chinese fertility declines have occurred in countries where they constitute virtually the entire population, as in Hong Kong and Taiwan, as well as in the multi-ethnic communities of Malaysia and Singapore (lower half of Figure 1). In Malaysia, the rapid fertility decline of the largely urbanised Chinese, who in 1986 constituted slightly less than one-third of the population (Government of Malaysia, 1986), has not been followed by a similar trend among the majority Malays. Among the Malays, who are much less urbanised, fertility has not changed markedly over the past 20 years in spite of enormous progress in socio-economic development. Recent population policy in Malaysia, which since 1982 has been in favour of increasing the country's population, has not encouraged fertility decline. Conversely, against a background of a strong antinatalist population policy which persisted until the mid-1980s , fertility of the minority Malays in Singapore fell rapidly but did not go as far as that of the majority Chinese and since 1980 has remained around replacement level, whereas that of the Chinese is significantly lower.

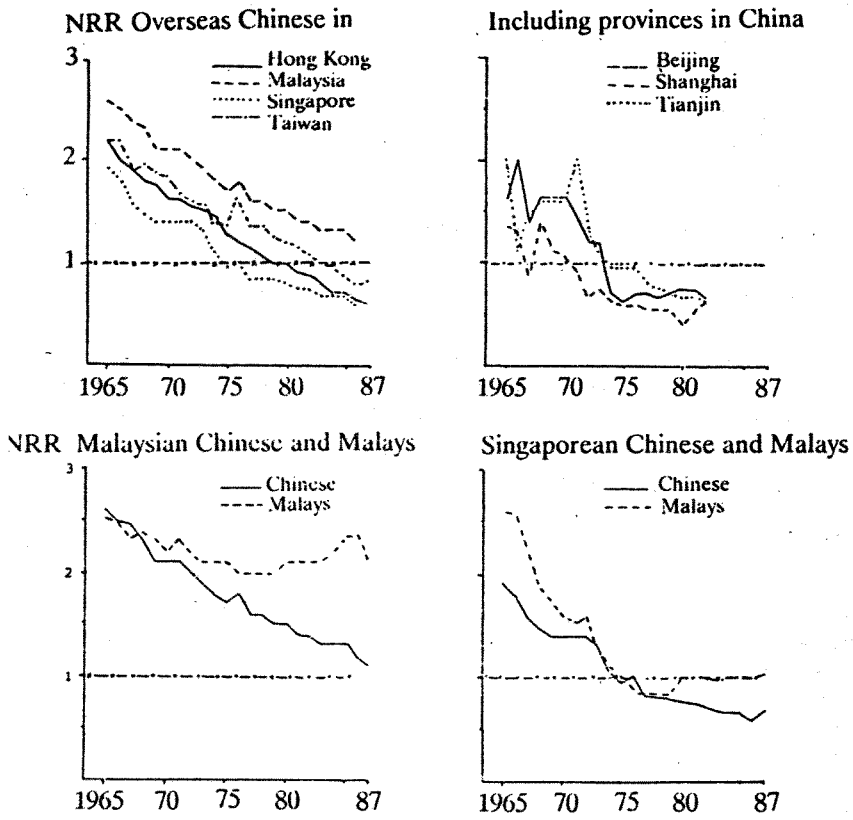
CHANGES IN MARRIAGE

Lower proportions of overseas Chinese women are marrying and those doing so are getting married at ever later ages. As in Europe and North America, efficient contraception (including sterilisation) is readily available and facilitates premarital sexual relations, with induced abortion available for women who have an unwanted pregnancy. But, unlike in some countries in those two continents, there is no evidence yet of a significant trend towards cohabitation, or of rising proportions of births outside of marriage.

Few overseas Chinese women now marry before their twentieth birthday and less than two-thirds are married by ages 25–29 (Table 1). Over the past 15 years the mean age at first marriage of women has risen by almost two years such that the average age of women marrying is now between 25 and 26. The trend to ever later marriage has not merely caught up with those populations where marriage was somewhat later 15 to 20 years ago, but has gone further, except in countries where formal marriage age conceals the fact that high proportions of couples live together in consensual unions for extended periods before eventually marrying.

FIGURE 1

Net reproduction rates per woman for selected countries, communities and provinces in East and South-East Asia, 1965–88



Sources: The fertility data relating to the various populations were obtained or computed from, for Hong Kong, Census and Statistics Department, 1984. *Demographic Trends in Hong Kong 1971-82, An Analysis Based on Vital Registration Statistics of Births, Marriages and Deaths and on Census Results,* for Malaysia, Department of Statistics, Malaysia, issues of *Quarterly Review of Malaysia Population Statistics,* for Singapore, Singapore Family Planning and Population Board, *1983, Population Projections for Singapore 1980—2030;* for Taiwan, Directorate-General of Budget, Accounting and Statistics, issues of *Statistical Yearbook of the Republic of China;* rates for years not shown in these publications were obtained through correspondence with the Statistical Offices in the respective countries, for China, Coale, A. J. and Chen Sheng, Li, *1987, Basic Data on Fertility in the Provinces of China, 1940-82.* Papers of the East-West Population Institute, No. 104, Hawaii.

The overseas Chinese pattern of relatively low marriage rates below age 30 is remarkably similar to the pattern found by Hajnal (1965) in much of Europe between the seventeenth century and the period immediately before the Second World War. After the war years, marriage age fell dramatically in Europe, and although on the increase since the early 1970s it is still below pre-war levels.

Women in the more developed provinces of mainland China also marry relatively late, but that pattern is partly induced as part of the government's population policy. For the overseas Chinese later marriage has been a spontaneous and voluntary phenomenon associated with widespread social and economic changes, particularly through changes in education and employment opportunities.

TABLE 1

Percentages of women ever married at given ages and mean age at first marriage 1970–71, 1980–81 and 1985–86, selected overseas Chinese populations

Country/Year	Age of women						Mean age at
	15–19	20–24	25–29	30–34	35–39	40–44	first marriage
Hong Kong							
1971	2.9	32.4	79.9	94.4	97.0	97.1	23.6
1981	3.4	28.7	69.7	89.0	95.5	97.3	24.4
1986	2.1	21.3	62.5	85.5	92.6	96.2	25.9
Malaysian Chinese							
1970	6.2	40.9	78.8	90.6	94.4	96.6	23.7*
1980	4.7	37.1	72.1	87.0	92.6	94.3	24.8*
1984–85	3.2	35.0	71.3	85.4	90.7	96.9	25.8*
Singaporean Chinese							
1970	3.5	30.5	74.7	88.9	94.2	96.4	24.3
1980	1.5	22.6	63.7	82.1	90.1	94.9	24.7
1987	0.8	13.8	56.6	78.8	86.7	92.7	25.8
Taiwan							
1970	7.8	48.3	91.7	93.4	92.6	93.4	22.1
1980	5.0	38.9	77.2	88.6	96.1	97.8	23.8
1987	2.5	29.0	73.7	89.8	93.7	96.0	25.1

*Computed indirectly as the singulate mean age at first marriage.

The rise in marriage age and lower proportions of women married among the overseas Chinese has definitely not resulted from any shortage of potential husbands. Thus, for example, in Hong Kong where sex-selective migration has led to a serious imbalance between the number of men and women in the marriageable ages there have been no signs of the so-called marriage squeeze (Census and Statistics Department, Hong Kong, 1984). Much of the imbalance has resulted from the influx of poorly educated male migrants from the mainland. Such persons are generally not attractive marriage partners for women with relatively higher socio-economic status. In general, Chinese men tend not to want to marry better educated women, and well educated women are reluctant to marry men less educated than themselves.

Among older generations shown in Table 1, the proportion ever marrying is still relatively high. However, it is highly probable that the proportion ultimately marrying among those aged 30–34 and below in the first half of the 1980s will be significantly smaller than for older generations. The growth in the proportion of tertiary educated Chinese women, who often experience difficulty in finding suitable marriage partners, or who are sometimes reluctant to do so because of the alternatives to marriage, is a key factor in explaining the rising proportions of women unmarried.

Later marriage and declining proportions of women marrying will undoubtedly contribute towards lower fertility. Among Chinese women marrying there is a tendency to want to continue with paid employment, or simply to interrupt it for a minimum period. Women who first marry in their thirties may increasingly find that they prefer lifestyles without raising families. Based on current norms it is unlikely that Chinese women who remain single will have children outside of marriage.

CHANGES IN CHILDBEARING

The changes in marriage behaviour have undoubtedly been important in lowering period fertility indicators. But declines in childbearing within marriage have been even more crucial. The broad details are revealed through decomposition analysis of the factors behind changes in the birth rate over the period 1970 to 1980 (Table 2). Despite being cross-sectionally based and centred on arbitrary years for which data are available this type of analysis gives orders of magnitude of the factors involved.

Between 1970 and 1980 declines in birth rates among the overseas Chinese ranged from 14 to 23 per cent (Table 2). These figures considerably underestimate the real decline in fertility because of sharp upward pressures on birth rates caused by age structures that were highly favourable to childbearing. The figures show that while the continued rise in marriage age played a part in the decline of birth rates the major factor was the spectacular fall in fertility within marriage. In all four countries the contribution of the fall in marital fertility was markedly greater than the contribution of the decline in marriage rates.

TABLE 2

Crude birth rates and their decomposition, 1970–71 and 1980–81: selected overseas Chinese populations

Country	Crude birth rate		Per cent change	Per cent change due to		
	1970	1980	1970–80	Age str.	Proportion of women married	Fertility decline
Hong Kong	19.7	16.9	—14	29	—6	—37
Malaysian Chinese	30.3	25.0	—17	23	—6	—34
Singapore	22.1	17.1	—23	21	—14	—29
Taiwan	27.2	23.4	—14	21	—14	—21

For each of the Chinese populations marital fertility has fallen markedly. The index of fertility control, m, rose substantially in each country over the period 1970–80, indicating much greater use of birth control within marriage (Leete, 1987). Resort to birth control within marriage was both to reduce family size and to regulate the timing of births.

Chinese families with three or more children are becoming more and more uncommon among generations of women passing through the peak ages of childbearing since the mid-1970s. Trends in period total fertility rates (TFRs) by birth order show that births of fourth order and above have almost disappeared, while those of third order are also much less frequent than in the past. Third and higher order birth rates now make up less than 20 per cent of total fertility, compared with more than 50 per cent in the early 1970s. The magnitude and momentum of the declines in higher order birth rates cannot be explained as a mere transitory feature of period fertility. The declines represent a real change associated with the movement towards a one-child family norm.

The very low levels of the first birth order rates, and to a lesser extent those of second order, shown in Table 3 suggest that part of the explanation behind low levels of total fertility in the 1980s stems from the postponement of lower order births at younger ages, in addition to the cancellation of higher order births at older ages.

Fertility rates have fallen at all ages such that childbearing at ages below 20 and above 40 is now extremely uncommon (Table 4). Childbearing has become compressed into a smaller number of years, although there are interesting age pattern differences between on the one hand the Chinese in Hong Kong, Malaysia and Singapore, and on the other the Chinese in Taiwan. In Taiwan fertility is characterised by an earlier pattern and a higher level of fertility control at ages above 30 than is the case for the other group of countries (Table 4). The effect of this is that Taiwan has a longer mean length of generation and, in the context of below replacement fertility, a higher negative intrinsic growth rate.

There is evidence to suggest that the strikingly low levels of total fertility current in Hong Kong and Singapore will be followed elsewhere by the overseas Chinese. The evidence comes from a regression analysis, using a semi-log function, of trends between 1970 and 1987 in overseas Chinese TFRs in the four countries in East and South-East Asia (Table 5). The results showed that despite significant differences in the intercept values, reflecting geographic variations in the levels of fertility, there were striking similarities in the slope values of, on the one hand, Hong Kong and Singapore, and on the other, Malaysia and Taiwan, reflecting similar paths of decline. Not surprisingly the slopes of the declines are faster in the two city states. The analysis was extended to the Chinese living in the different states in Malaysia and in the major cities in Taiwan (Leete and Tan, forthcoming). The pattern of the figures strongly suggested that for the Chinese in Malaysia and Taiwan there will be further declines over the coming years on account of (a) further reductions in 'lag' fertility areas (the

TABLE 3

Total fertility rates per woman by birth order: selected overseas Chinese populations for selected years between 1970 and 1987

Year	Order of birth				
	1st	2nd	3rd	4th or above	All orders
Hong Kong					
1971	0.77	0.78	0.61	1.25	3.41
1975	0.91	0.70	0.44	0.65	2.70
1980	0.79	0.67	0.35	0.27	2.08
1987	0.55	0.48	0.18	0.07	1.27
1987/1971	0.71	0.62	0.30	0.06	0.37
Malaysian Chinese					
1970	0.84	0.75	0.69	2.35	4.62
1975	0.83	0.77	0.61	1.44	3.64
1980	0.89	0.79	0.59	0.87	3.13
1987	0.63	0.61	0.47	0.53	2.25
1987/1970	0.75	0.81	0.68	0.23	0.49
Singaporean Chinese					
1970	0.77	0.69	0.51	1.05	3.03
1975	0.67	0.67	0.39	0.34	2.06
1980	0.69	0.58	0.27	0.11	1.66
1987	0.62	0.57	0.22	0.05	1.48
1987/1970	0.81	0.83	0.43	0.05	0.49
Taiwan					
1970	N.A	N.A	N.A	N.A	N.A
1975	0.82	0.71	0.56	0.66	2.76
1980	0.85	0.76	0.52	0.38	2.51
1987	0.71	0.61	0.28	0.11	1.71
1987/1975	0.87	0.86	0.50	0.17	0.62

N.A.: Not available

more rural states of Malaysia and parts of Taiwan) as they continue the catching up process and (b) further reductions in the 'lead' fertility areas within these countries such as Penang in Malaysia and Taipei in Taiwan as they follow in the footsteps of the Chinese in Hong Kong and Singapore. In both countries rates of urbanisation continue to increase and, more importantly, so does the fraction of highly educated women in the prime childbearing ages. Overall trends point to a levelling of total fertility significantly below two and nearer to one child per woman.

TABLE 4

Age-specific fertility rates (per 1,000 women) for selected years between 1970 and 1987, for Singaporean Chinese and Taiwan

Year	Age group of women						Total fertility
	15–19	20–24	25–29	30–34	35–39	40–44	
Singaporean Chinese							
1970	21	128	215	141	70	25	3.00
1975	13	95	161	99	36	8	2.06
1980	9	70	136	84	27	5	1.66
1987	5	42	117	94	32	5	1.47
1987/1970	0.23	0.33	0.54	0.67	0.46	0.20	0.49
Taiwan							
1970	40	238	293	147	59	20	4.00
1975	37	194	215	83	2	8	2.83
1980	33	180	200	69	16	4	2.52
1987	18	112	139	52	12	2	1.68
1987/1970	0.45	0.47	0.47	0.35	0.25	0.10	0.42
	Percentage distribution of rates						
Singaporean Chinese							
1970	3.5	21.3	35.8	23.5	11.7	4.2	100
1975	3.2	23.1	39.1	24.0	8.7	1.9	100
1980	2.7	21.1	41.1	25.4	8.2	1.5	100
1987	1.7	14.2	39.7	31.9	10.8	1.7	100
Taiwan							
1970	5.0	29.9	36.8	18.4	7.4	2.5	100
1975	6.9	36.0	39.9	15.4	0.4	1.5	100
1980	6.6	35.9	39.8	13.7	3.2	0.8	100
1987	5.4	33.4	41.5	15.5	3.6	0.6	100

TABLE 5

Regression coefficients of trends between 1970 and 1987 in total fertility rates of selected overseas Chinese populations

	Hong Kong	Malaysian Chinese	Singaporean Chinese	Taiwan
Intercept	1.290	1.534	1.126	1.320
Slope	−0.057	−0.040	−0.061	−0.040
R^2	0.99	0.97	0.94	0.81

It is almost certain that there will be a big increase in childlessness among overseas Chinese women born since the mid-1950s. This will occur both because some will not enter marriage, and choose not to give birth outside marriage, and some of those who do will not want to give birth. There is also a small proportion of couples who are unable to conceive. However, the current levels in first birth order rates, shown in Table 2 above, should not be used to assess the possible future level of permanent childlessness. These annual period figures can be badly distorted by changes in the timing of first births. At a time when first births are occurring at ever later ages they will give an exaggerated picture of future childlessness. It is much more insightful to study childlessness among different birth cohorts of women.

Table 6 illustrates trends in childlessness among generations of women born in the postwar era in Hong Kong and Singapore. In general, at any given age the younger the cohort the higher is the proportion still childless. For example, by age 31 just 10 per cent of women in Hong Kong who were born in 1945 were still childless whereas the corresponding figure among those born in 1956 was 29 per cent. Similar trends are shown to have occurred in Singapore. Comparable data to make this type of analysis are not available for Malaysia or Taiwan but evidence from survey data for

TABLE 6

Proportions (per 1,000) of women in selected cohorts still childless at given ages: Hong Kong and Singapore

Birth cohort	Exact age								
	21	23	25	27	29	31	33	35	40
Hong Kong									
1945	786	623	446	299	163	95	65	45	25
1950	868	736	254	381	248	170	128	107	
1952	880	738	570	408	285	208	165		
1954	875	749	595	441	322	246	211		
1956	881	765	621	470	359	289			
1958	888	782	638	506	400				
1960	904	805	686	569					
1962	920	845	746						
1964	937	880							
Singapore									
1945	759	601	414	285	179	121	89	69	47
1950	874	752	603	477	374	307	267	241	
1952	851	722	588	457	347	275	233		
1954	857	747	614	480	365	290			
1956	882	783	656	517	404				
1958	913	816	687	561					
1960	921	831	712						
1962	926	850							
1964	933								

Malaysian Chinese shows the proportion of women still childless among younger generations of women is increasing sharply (Arshat et al., forthcoming). The high proportion still childless at ages over 30, although affected by later marriage and later first birth, appears certain to foreshadow increasing fractions of women from generations passing through the prime childbearing ages in the 1980s remaining permanently childless. Lifelong childlessness among the overseas Chinese is likely to be far more prevalent than in the past.

FACTORS BEHIND LOW CHINESE FERTILITY

The explanatory propositions of demographic transition theory could have predicted that the overseas Chinese would have experienced a rapid fertility decline. The three preconditions for substantial fertility decline identified by Coale (1973), namely that (a) fertility is within the calculus of conscious choice; (b) reduced fertility is perceived to be advantageous; and (c) effective techniques of birth control or prevention are available, were already met in the mid-1960s. The underlying causal mechanisms and the speed with which the transitions occurred are more difficult to explain. Explanation should be consistent across countries because of the close similarity of trends and inherited culture.

It is probable that economic considerations were uppermost in the minds of Chinese couples when fertility declines got under way and gained momentum with rapid socio-economic development in the 1970s. The pace of that development was conspicuous both for its rapidity and its intensity. It is not unlikely that the Chinese fertility decline has itself had its own positive feedback effect on socio-economic development. Rising economic aspirations and expectations have been powerful in sustaining ever lower levels of fertility.

The provision of readily available contraception was instrumental in helping Chinese couples control their reproduction. Religious prescriptions of the Chinese do not constrain the practice of birth control for limiting family size. Even in Malaysia, the country where Chinese fertility is the highest, the 1984–85 Malaysian Population and Family Survey found that 88 per cent of currently married Chinese women had ever used contraception (Arshat et al., forthcoming). Similar levels of ever-use of birth control among the overseas Chinese are observed elsewhere (for example, see Singapore Family Planning and Population Board, 1984). Leaving aside the newly marrieds, ever-use of birth control is universal, and where contraceptive failure occurs induced abortion facilities are widely available. Both induced abortion and sterilisation have been increasingly used by the Chinese (for example, see Chang et al., 1987). Of course, in a context where socio-economic conditions and motivation are favourable for curtailing family size and the means are readily available, it is to be expected that ever-use of efficient birth control methods will be virtually universal among married couples.

It is likely that the spread and upgrading of education was the catalyst that affected the demographic behaviour of the Chinese in several interrelated ways. It increased age at marriage and enhanced perceptions about the opportunity costs of the alternatives to early marriage and childbearing, particularly with respect to paid

employment. Further, education increased the couples' ability to understand the importance of practising family planning efficiently. Education also increased awareness of the importance of acquiring skills for upward social and economic mobility both of which are universal ideals and goals in Chinese communities.

CONCLUSION

Recent fertility declines of the overseas Chinese have been much sharper than expected from the experiences of the more industrialised countries in Europe and North America. Family planning programmes have facilitated these declines in contexts where the motivation for achieving a small-sized family is high. It is likely that much of the fertility decline in these rapidly changing societies would have resulted irrespective of the prevailing population policies.

Looking into the future it is highly probable that overseas Chinese women born since the mid-1950s, who are currently of childbearing age, will have too few children to replace themselves. This implies that total period fertility will continue between one and two births per woman, or more probably nearer to one. This is in fact the view taken by the Hong Kong government in its recent 1986-based set of population projections. Although some fluctuations are foreseen, total fertility is not expected to rise above 1.4 over the next 20 years. It is contended that people will continue to delay marriage and married women will continue to fulfil roles in society other than just being a mother, ultimately achieving a small family size which will be far from adequate to sustain the replacement of the population (Census and Statistics Department, Hong Kong, 1988).

It is likely that some governments will not want to see fertility sustained below replacement level for a very extended period because of concerns, in particular about future labour supply, its composition and an ageing population. This was the view taken by the Singapore government and expressed in the official 1980-based population projections (Singapore Family Planning and Population Board, 1983). In those projections it was assumed that after further falls in the short term, total fertility would rise and eventually level around replacement. Similarly the official projections for the Chinese in Malaysia envisage fertility levelling at replacement level fertility (Department of Statistics, Malaysia, 1987).

The official projections for Taiwan made in the mid-1980s envisaged that the TFR would decline to a low of 1.9 by 1991 (Manpower Planning Department, 1984). A low variant had fertility continuously falling and reaching 1.6 by 2011. In assessing these projections Freedman (1986) considered that the central variant was more plausible given a traditional Chinese preference for male children: son preference can be expected to exert an upward pressure on fertility.

While Freedman adduces empirical survey evidence to support the contention about preference for male children, it is likely that these preferences will diminish and may even change among younger generations of couples currently of peak childbearing ages. Such changes have already been noted among the Chinese in Shanghai (Zeng Yi and He Fenggin, 1988). Such couples are better educated and accustomed to a much more urbanised lifestyle than their parents. Preferences for the sex of children are

likely to be of lesser practical importance than considerations about quantum and opportunity costs. Sex preferences are unlikely to have much impact on total fertility in contexts where couples are moving towards a one-child family norm.

While Chinese family size expectations have fallen markedly over time, evidence from surveys taken in the 1980s suggests that above-replacement-level fertility remains the norm. However, changes in family size expectations have tended to lag behind actual behaviour. Moreover, young married women in the various KAP-type surveys are not a representative sample of all women from the generations to which they belong.

Most official projections embody an implicit assumption that the government will eventually take measures to try to increase fertility to replacement level, as has happened recently in Singapore. In practice it is likely that just as policy measures in the past played only a marginal role in inducing lower fertility among the overseas Chinese, pronatalist measures will be marginal to any future fertility increase, if and when such an increase occurs.

REFERENCES

Arshat, H., Tan Boon Ann, Tey Nai Peng and Subbiah, M., forthcoming. *Marriage and Family Formation in Peninsular Malaysia*, Analytic report on the Population and Family Survey of Malaysia, 1984-1985, Kuala Lumpur: National Population and Family Development Board.

Census and Statistics Department, Hong Kong, 1988. *Hong Kong Population: A 20-Year Projection.*

Census and Statistics Department, Hong Kong, 1984. *Demographic Trend in Hong Kong 1971-82: An Analysis Based on Vital Registration Statistics of Births, Marriages and Deaths and on Census Results.*

Chang, M-C., Freedman R. and Sun T-H., 1987. Trends in fertility, family size preferences, and family planning practice: Taiwan, 1961-1985, *Studies in Family Planning*, Vol. 18, No. 6, Part 1.

Coale, A.J., 1973. The demographic transition reconsidered, *International Population Conference*, Liege, Vol. 1, Liege: IUSSP.

Department of Statistics, Malaysia, 1987. *Population Projections Malaysia, 1980-2000.*

Freedman, R., 1986. Policy options after the demographic transition: the case of Taiwan, *Population and Development Review*, Vol. 12, No. 1.

Government of Malaysia, 1986. *Fifth Malaysia Plan 1986-90.* Kuala Lumpur: National Printing Department.

Hajnal, J., 1965. European marriage patterns in perspective, in Glass D.V. and Eversley, D.E.C (eds.), *Population in History*, London: Edward Arnold.

Leete, R., 1987. The post-demographic transition in East and South-East Asia: similarities and contrasts with Europe, *Population Studies*, 41.

Leete, R. and Tan, Boon Ann (forthcoming). Fertility trends among ethnic groups in Malaysia in Alam, I., Hull, T. and McDonald, P. (eds.), *The Revolution in Asian Fertility*, Oxford University Press.

Manpower Planning Department, Republic of China, 1984. *Projections of the Population of Taiwan Area, Republic of China, 1984 to 2011.* Council for Economic Planning and Development.

Singapore Family Planning and Population Board, 1984. *Third National Family Planning and Population Survey in Singapore 1982.*

Singapore Family Planning and Population Board, 1983. *Population Projections for Singapore 1980-2030.*

Zeng Yi and He Fenggin, 1988. A comparative study of fertility in Hong Kong and Shanghai, *IUSSP Seminar on Fertility Transition in Asia: Diversity and Change*, Bangkok, 28–31 March.

3

THE PROSPECTS OF POPULATION GROWTH IN CHINA

Yeun-chung YU
Population Division
United Nations
New York, USA

INTRODUCTION

Between the 1982 population census and the 1987 one per cent population sample survey, the total population on the mainland of China increased by 62,984,500 persons, from 1,008,180,700 to 1,071,165,200 persons. The growth rate of the population dropped from 1.45 per cent in 1982 to a low of 1.08 per cent in 1984 and rose back to 1.44 per cent in 1987. Prior to 1982, the growth rate had dropped to 1.16 per cent in 1980, lower than the rate of 1982 (Table 1).

TABLE 1

The growth of population of China, 1980-87

Year	Population (year-end) (000)	Natural increase rate(0/00)	Crude rates		Total fertility rate(women)
			Birth (0/00)	Death	
1980	987,050	11.87	18.21	6.34	2.24
1981	1,000,720	14.55	20.91	6.36	2.63
1982	1,015,900	14.49	21.09	6.60	—
1983	1,027,640	11.54	18.62	7.08	—
1984	1,038,760	10.81	17.50	6.69	2.00
1985	1,050,440	11.23	17.80	6.57	2.29
1986	1,065,290	14.08	20.77	6.69	2.41
1987	1,080,730	14.39	21.04	6.65	—
1987A	—	16.16	23.26	7.10	—

Sources: SSB(1983—88); The 1987A rate is given in SFPC (1988).

The views expressed in this paper are those of the author's, not those of the United Nations.

This trend of population growth was obtained from a series of national population surveys conducted by various government agencies in the 1980s, including the 1982 population census, the 1982 one per thousand national fertility survey (CPIC, 1984), the 1985 and 1987 two phases of the in-depth fertility survey (SSB, 1986, 1988b), the annual survey of population changes, which began in 1983 (SSB, 1983–88), the 1987 one per cent population sample survey (SSB, 1988a) and the 1988 national fertility and family planning survey (SFPC, 1988). There were also surveys to learn more about various characteristics of the population including the 1984-85 survey of migration among urban areas, the 1986 survey of the basic conditions of aged population and the 1987 national sample survey on disability.

Many smaller demographic surveys have also been conducted by local statistical offices, universities and research institutions. Population data became abundant. However, not all of these surveys were based on random samples and not all survey data were collected following the same statistical concepts and procedures or using common classifications. Many, including some of the national surveys, have not been compiled adequately and are not available to users. Methods and procedures of data compilation, processing, dissemination and utilisation need to be improved and unified in order that the data can be better accessed and utilised by users.

This paper examines population growth in China in the 1980s and beyond, using information available from the major surveys. It discusses the large fluctuation of fertility in the 1980s and the possible fertility changes in the 1990s in relation to the current programme of family planning. It further discusses the prospect of population growth from now until 2025 if alternative family planning programmes are introduced.

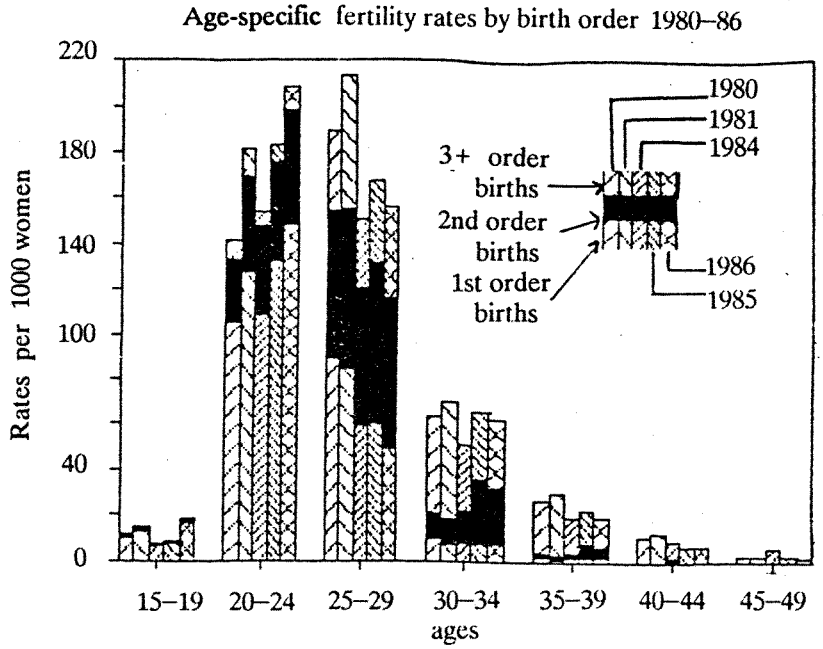
THE GROWTH OF POPULATION IN THE 1980S

Much of the fluctuation in the population growth rates mentioned in the beginning of this paper was a result of fertility change. In the past decades, the total fertility of Chinese women dropped from a high of 5.8 children in 1970 to 2.2 in 1980, jumped back to a peak of 2.6 in 1981, declined to a low of 2.0 in 1984, and rose again to 2.4 in 1986 (Table 1). Fertility rates increased significantly in age groups 20–24 and 25–29 during 1980–81 and the peak fertility age was shifted from age 25–29 in 1981 to age 20–24 in 1984. Other large increases of birth rate are found in ages 15–19, from 8.7 per 1,000 to 18.9 per 1,000 and in ages 20–24, from 183.0 per 1,000 to 208.0 per 1,000 between 1984 and 1986 (Figure 1). These increases were significant because they were observed primarily among zero-parity women, indicating a surge of first-order births at much younger ages than before. Combining with the entrance of a relatively large 1960 birth cohort into the active reproductive ages, the crude birth rate rose from 18 per 1,000 in 1984 and 1985 to 21 per 1,000 in 1986 and 1987.

The 1982 census and the 1983–88 annual population surveys suggest that the crude death rates have fluctuated between 6.4 and 7.1 per 1,000 during 1980–87 (Table 1), resulting mainly from the changing age composition of the population. According to the 1987 one per cent population sample survey, the life expectancy at

birth computed from data on deaths by age in 1986 was 69.7 years for males and 73.2 years from females for 1986 (SSB, 1988a: Table 10-1). Compared with the 1981 life expectancy at birth of 66.4 years for males and 69.4 years for females estimated from the 1982 population census (Jiang, Zhang and Zhu, 1984), life expectancy increased by more than three years between 1981 and 1986. Although this increase appears rather high, mortality is believed to have declined between the two surveys.

FIGURE 1



Comparing the 1982 population census and the 1987 one per cent survey, the former population had a median age of 22.7 years, an age distribution showing 33.4 per cent of the population under 15 years of age, 20.1 per cent of youths aged 15-24 and 7.6 per cent of elderly aged 60 and over (PCO, 1985: Table 34). The 1987 population had a median age of 24.1 years, an age distribution showing only 28.8 per cent children, 23.4 per cent youths and 8.5 per cent of elderly (SSB, 1988a: Table 3-2). An increase of two years in median age in five years, if the data are correct, would suggest an extremely rapid ageing of the Chinese population. Although the population of China is ageing very rapidly, the large drop in the proportion of children (4.6 percentage points) and increase in the proportion of youths (3.3 percentage points) in a five-year interval are obviously too large for any population under normal circumstances.

A closer examination of the age data shows certain apparent anomalies in the 1987 survey data. For example, in 1987, males aged 5–7, 10, 12, 14, 24–26, 28, and

females aged 5–7, 12, 14, 20, 25, 26, 40, 47 are greater than the same age cohorts in 1982 (PCO, 1985: Table 34; SSB, 1988a: Table 3-2), the 1982–87 life expectancy at birth computed from the 1982 and 1987 age distributions gives 69 years for females but only 56 years for males, the 1986 crude death rate given by the 1987 survey is only 5.5 deaths per 1,000 population, and the death rate for age 0 is only 22 per 1,000. It is not clear what has caused such anomalies. A careful examination of the survey weighting procedure may be needed to determine the possible sources of errors in the 1987 survey. For this reason, the 1982 data are used as the bench-mark data in the analysis below.

THE FAMILY PLANNING PROGRAMME AND ITS EFFECT ON POPULATION GROWTH TO 2000

Before the family planning programme was introduced in 1970, the Chinese women generally bore an average of 5.8 children in their reproductive life. They got married at age 20, over half (52.5 per cent) gave birth to a child in the same or the second year of their marriage, only 1.2 per cent of them never had a birth (Ran and Xie, 1984: 71). The mean age of childbearing was close to 30 years (29.8) (Chen, 1984: 57), women aged 25–29 had the highest fertility rate (313 per 1,000) and 62.2 per cent of all births were of the third or higher birth order (Song, Shi and Zhang, 1984: 62). The introduction of the family planning programme which promoted late marriage, late births, spacing births, and fewer births had effectively reduced the fertility level. By 1980, the total fertility rate was reduced to 2.24 births, women aged 25-29 still had the highest fertility rate but was at two-thirds of the 1970 level (190 per 1,000) and only 35.8 per cent of all births were of the third and higher order (Figure 1). The mean age of childbearing has, however, declined by two years to 27.4 as the fertility of older women has drastically declined.

Encouraged by the success of the family planning programme, the government, in 1979, began to reward couples who chose to have only one child and subsequently enlarged the practice and made 'one child per couple' the central theme of the family planning programme (the current programme). It further set a demographic target to control the total size of the population to within 1.2 billion by the year 2000. It was a very optimistic target and its fulfilment requires a continuous success of the current programme for about 20 years. Unexpectedly, a number of events that occurred in the late 1970s and early 1980s have slowed down the fertility decline. The first was the promulgation of the new marriage law in 1980 which permits women to get married at age 20 instead of age 24 or 25 as stipulated in earlier government decrees. The second was the introduction of the rural production responsibility system and the abolishment of the people's commune to stimulate the growth of rural economy as well as the more recent fundamental changes in the economic system in both the rural and urban sectors. The third was the entrance of the large birth cohorts of the 1960s into the active reproductive ages contributing directly and indirectly to the increase of fertility. The political, economic and social environment, which was developed under a strict centrally planned system and effectively assisted and implementation of the family planning programme in the 1970s has now been transformed, in some cases, very

rapidly, to a different environment generated by the newly introduced partially planned and partially market-oriented system. The new environment aimed at improving the standard of living and encouraged peasants and industrial workers to make their own decisions on economic pursuits. The new policies have been very successful and as a result, couples also decided to get married earlier and have more than one child. Consequently the mean age of first marriage dropped from 23.1 years in 1979 to 22.7 years in 1982 and the total fertility rate rose back to 2.41 in 1986.

Because of the decline of age at first marriage, the proportion of the first-order birth increased to 52 per cent and the proportion of the third and higher-order birth declined to 17 per cent in 1986. Nevertheless, that nearly half of all births were still of second or higher orders seven years after the introduction of the current programme (1979–86) clearly demonstrates the difficulties of programme implementation.

The new economic and social initiatives are expected to continue in the 1990s and the policy to control the growth of population will also continue. Therefore, the fertility level is expected to decline again after the current new height but may rise again and fluctuate above the replacement level as it has been in the early 1980s if the current programme remains unchanged. This is expected because the in-depth fertility survey indicates that the ideal size of most Chinese families is two children or more (SSB, 1988b: 35–41).

THE LATE, SPACING, AND FEWER BIRTHS ALTERNATIVE

There are other alternatives that can be introduced to regulate the future growth of population and in the long run may be more effective in the control of population growth than the current programme. One of the alternatives is the 1970s 'Wan, Xi, Shao' (WXS) or the 'late marriage, late births, spacing births, and fewer births' programme which had successfully achieved the reduction of the total fertility rate from about 6 to just above the replacement level. When the WXS programme was first introduced in the 1970s, it encouraged couples to get married late, have their first birth at a late age, have a second birth, if they so wished, and have fewer births. However, late marriage now is not likely to be followed by many women, particularly rural women since the new marriage law of 1980 permits women to get married at age 20. Nevertheless, if WXS is to be reintroduced, late marriage should still be promoted vigorously. The new WXS programme should place its highest priority in promoting the postponement of the first birth to age 24 or 25 and encouraging couples to have one child just like the current programme. If some couples wish to have the second child, they may do so only in four or five years after the first birth. It is believed that many women will follow the new WXS programme in order to obtain the opportunity of having a second child. The goals of the WXS programme should be to achieve the following: first, to shift the peak fertility age from ages 20–24 back to ages 25–29 and maintain it there; second, to reduce gradually first-order births for women under age 20 and second-order births for women under age 25 until their elimination and third, to reduce the third and higher-

order births. It can be shown that, under this programme, the total fertility rate will first increase from the current (1986) level of 2.4 to 2.5 in the first year after the programme is introduced because the birth rate at age 25–29 is expected to increase. The birth rates of ages under 25 will decline but those of ages above 30 may not change in any significant way. Fertility is expected to decline to around 2 in 8–9 years if the current highest first-parity fertility rate of ages 20–24 is shifted gradually to ages 25–29 in 4–5 years and slowly decline further afterward even if the third and higher-order births remain at the current level. If the higher-order births can be reduced by a quarter to a half, the fertility level will decline to below replacement in 5–6 years and further to a total fertility rate of 1.8 in the eighth or ninth year (see Annexe).

PROSPECTS OF FUTURE GROWTH TO 2000 AND BEYOND

At the end of 1987, the total population of mainland China was estimated to have reached 1,080,730,000 persons (SSB, 1983–88). If the earlier government growth target of 1.2 billion by the year 2000 (the year end) is to be reached, the growth of population cannot exceed 9.2 million persons per year, an impossibility according to the current trend of growth. However, if the average annual growth in the next 13 years can be controlled at the 1984 level, i.e., the lowest level in 1980–87, which was 11.1 million persons per year, the total population size in 2000 would be 1.23 billion, which is still doubtful. If the annual growth is the same as the average of 1980–87, which was 13.2 million persons, the total size at the end of 2000 would be 1.32 billion persons, a target the government may consider too high. To reduce the current annual growth by some 2.1 million, i.e., from 13.2 to 11.1 million or about 17 per cent of the total annual growth, is an extremely difficult, if not an impossible task.

Any reasonable projections for the mainland of China to 2000 prepared at the present would give the population total at around 1.25 billion persons. Looking at the seven projections prepared by various authors, despite their different projection assumptions each has at least one of their projections close to or higher than 1.25 billion (Table 2). If the total size of the Taiwan province is added, the total will then be about 1.3 billion. A projection of 10 to 15 years is a rather short-term projection. However, since the fertility of China is likely to drop to below the replacement level during the next 12–15 years, changes in fertility and mortality in this period will have very important impacts on the long-term growth of population.

How the population of China will grow in the next decade and beyond depends mostly on the changes in the level and pattern of fertility, which in turn depends on how the family planning programme will be implemented. Using the technique of population projection, the prospect of population growth can be examined. If the current family planning programme remains more or less unchanged, the fertility trend in the next decade, as discussed earlier, may fluctuate in such a way that the average total fertility rate for 1985–2000 will remain at the 1986 level of 2.41 children (The 1988 fertility survey suggests much higher fertility level for 1986 than that obtained from the 1987 one per cent survey and therefore the 1987 survey fertility level is used in the present exercise). However, if the WXS programme is reintroduced

TABLE 2

Projected population totals for the year 2000 by various authors

Sources	Population (in billions)				
	A	B	C	D	E
United Nations (1989)*	1.305	1.286	1.259		
World Bank (1987)	1.282	1.196	1.167		
Tian Xue-Yuan (1984)	1.282	1.211	1.162		
Song Jian et al (1982)	1.420	1.286	1.222	1.130	1.050
Banister, Judith (1987)	1.242				
Ogawa, Naohiro (1988)	1.283	1.275	1.260	1.253	
State Statistical Bureau (1988)	1.320	1.286	1.250		

*Including the province of Taiwan in the projections.

Sources: See Ogawa (1988), United Nations (1989) and unpublished projections from the State Statistical Bureau.

in the 1990s, the total fertility rate is expected to drop to just below replacement at the end of this century when it reaches 2 children. The decline of fertility after 2000 is expected mainly in the age groups under 20 and above 45 assuming that the numbers of births in these ages will become negligible by 2010–2015. By then total fertility rate is expected to reduce to 1.6. After 2015, fertility is assumed to remain at 1.6 since it is not known how women in the twenty-first century will react to various economic and social changes.

The present projection begins in 1985 and ends in 2025. International migration is assumed negligible because the volume of migration will be relatively too small to the size and growth of the Chinese population. Mortality is assumed to improve continuously and the assumptions used by the United Nations in its projections for China which follow the general trend and pattern of mortality improvement for countries at a similar mortality level are adopted. Therefore, life expectancy at birth is expected to increase from 69.4 years (both sexes) in 1985–90 to 73.2 years in 2000–5 and slowly to 76.8 years in 2020–25. The base population for 1985 used by the United Nations in its 1988 revision of population estimates and projections for China, which gives a population total of 1,059,522,100 persons for mid-1985, is also adopted (United Nations, 1989).

If the current family planning programme is to remain more or less unchanged (the constant fertility projection), the population of China may grow to 1.333 billion by mid-2000 (Table 3). During 1985–2000, the growth rate of the population may increase from 1.54 per cent for 1985-90 to 1.62 in 1990-95 but then drop to 1.14 per cent in 2000–5. This is because the crude birth rate is expected to increase from 22.1 per 1,000 to 22.8 but decline to 17.8 in the corresponding periods and the crude death

rate is expected to remain around 6.5–6.7 per 1,000 in all periods. The decline of crude birth rate is a result of the decline of the proportion of the female population in the childbearing ages of 15–49, which is expected to drop slowly but steadily from 56.2 per cent in 1990 to 53.3 per cent in 2000. Therefore, the growth rate of the population may begin to decline again after 1995 even without a decline in fertility.

After 2000, the total population may increase further to 1.564 billion in 2015 and 1.737 billion in 2025 while the rate of growth will fluctuate between 1.1 and 1.0 per cent in 2000–25. Crude birth rate will fluctuate between 16 and 17 per 1,000 but crude death rate will increase to above 7 because of the ageing of the Chinese population (Table 3).

TABLE 3

Selected demographic indicators under WXS and constant fertility variants, 1985-2025

WXS projection	1985	1990	1995	2000	1005	2010	2015	2020	2025
Population (000)									
Total	1059522	1144329	1235379	1304390	1356847	1395278	1426879	1458997	1485160
Aged 0-14	315052	306402	334645	348742	325812	283472	257320	249603	251785
Aged 15-24	237117	252890	220228	188058	207397	240516	231107	199479	176108
Aged 25-59	420480	483871	563173	635474	677629	702033	729150	767749	767871
Aged 60+	86873	101167	117333	132116	146010	169258	209302	242167	289397
Median age (years)	24.0	25.6	27.5	29.7	32.0	34.3	36.0	37.3	38.7
Sex ratio (/100 F)	106.2	106.0	105.7	105.4	105.0	104.6	104.1	103.6	102.9
Dependency ratio (/100 aged 15–64)	539	483	501	508	460	396	375	399	429

	1985–90	1990–95	1995–2000	2000–05	2005–10	2010–15	2015–20	2020–25
Growth rate (0/0)								
Total	1.54	1.53	1.09	0.79	0.56	0.45	0.45	0.36
Aged 0–14	—0.56	1.76	0.83	—1.36	—2.78	—1.94	—0.61	0.17
Aged 15–24	1.29	—2.77	—3.16	1.96	2.96	—0.80	—2.94	—2.49
Aged 25–59	2.81	3.04	2.42	1.28	0.71	0.76	1.03	0.00
Aged 60+	3.05	2.97	2.37	2.00	2.95	4.25	2.92	3.56
CBR (0/00)	22.1	21.9	17.3	14.4	12.3	11.6	12.1	11.7
CDR (0/00)	6.7	6.6	6.5	6.5	6.8	7.1	7.6	8.2
TFR(/Women)	2.41	2.38	1.96	1.80	1.70	1.60	1.60	1.60
E(0)-M (years)	68.0	69.2	70.5	71.4	72.5	73.3	74.1	74.9
E(0)-F (years)	70.9	72.6	73.8	75.1	76.1	77.1	78.0	78.9
E(0)- Both (years)	69.4	70.9	72.1	73.2	74.2	75.1	76.0	76.8

Constant fertility projection	1985	1990	1995	2000	2005	2010	2015	2020	2025
Population (000)									
Total	1059522	1144328	1240800	1333024	1411069	1484028	1564362	1651785	1736720
Aged 0-14	315052	306401	340066	377377	380034	366852	366382	388478	415034
Aged 15–24	237117	252890	220228	188058	207396	245885	259529	248045	236106
Aged 25–59	420480	483871	563173	635474	677629	702033	729150	773095	796183
Aged 60+	86873	101167	117333	132116	146010	169258	209302	242167	289397
Median age (years)	24.0	25.6	27.4	29.1	30.9	32.0	32.3	32.6	33.4
Sex ratio (/100 F)	106.2	105.9	105.5	105.1	104.7	104.3	103.8	103.3	102.8
Dependency ratio (/100 aged 15–64)	539	483	507	541	519	477	468	506	540

	1985–90	1990–95	1995–2000	2000–05	2005–10	2010–15	2015–20	2020–25
Growth rate (0/0)								
Total	1.54	1.62	1.43	1.14	1.01	1.05	1.09	1.00
Aged 0–14	—0.56	2.08	2.08	0.14	—0.71	—0.03	1.17	1.32
Aged 15–24	1.29	—2.77	—3.16	1.96	3.40	1.08	—0.91	—0.99
Aged 25–59	2.81	3.04	2.42	1.28	0.71	0.76	1.17	0.59
Aged 60+	3.05	2.97	2.37	2.00	2.95	4.25	2.92	3.56
CBR (0/00)	22.1	22.8	20.8	17.8	16.6	17.3	17.8	17.2
CDR (0/00)	6.7	6.6	6.5	6.4	6.5	6.7	6.9	7.2
TFR (/women)	2.41	2.41	2.41	2.41	2.41	2.41	2.41	2.41

If the WXS programme is reintroduced (the WXS projection), the total population is expected to grow to 1.304 billion in 2000, to 1.427 billion by 2015 and slowly to 1.485 billion in 2025 while the rate of growth will drop continuously from 1.54 per cent in 1985–90 to 0.79 per cent in 2000–05, to 0.45 per cent in 2010–15 and then to 0.36 per cent in 2020–25. Crude birth rate is expected to drop to 14 per 1,000 by 2000–05 and then vary between 11 and 12 per 1,000 afterward and crude death rate to increase slowly from 6.5 in 2000–5 to 8.2 in 2020–25 (Table 3).

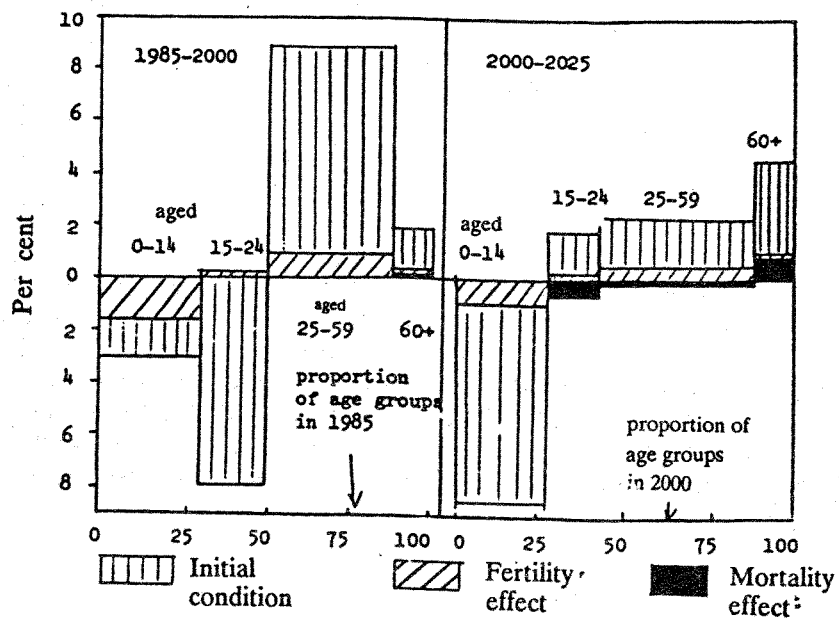
The two projections suggest certain differences as well as similarities in the future growth of the Chinese population. First, the projected total population is large under the constant fertility projection than the WXS projection for 2000 and beyond because the decline of fertility after 1995 is expected to be faster in the WXS projection.

The differences in the age distributions between the two projections are found only in the cohorts born after 1985 because mortality and migration assumptions adopted for both projections are the same. Under either projection, the median age of the population will increase rapidly, indicating very rapid ageing of the population, although the population under the WXS projection is expected to be two years older than that of the constant projection of 2010 and five years older by 2025.

Under both projections, the elderly population (aged 60 years and over) will grow the fastest followed by the middle adult ages (aged 25–59). Under the WXS projection, there will be far fewer children (ages under 15) and youths (aged 15–24) in the twenty-first century than under the constant fertility projection (Table 3). A future slow-down of fertility decline will not postpone the ageing of the population too much because the process of ageing is determined not only by future changes of fertility and mortality but also by fertility and mortality levels and the age structure of the population at present (initial conditions), which are determined by conditions in the past. Using the method of comparative population projection (Yu and Horiuchi, 1987), the contributions to the changing age composition of population between two points of time can be decomposed into fertility effect, mortality effect, and initial condition effects. It can be shown (Figure 2) that during the next 15 years from 1985 to 2000, the initial conditions are expected to contribute in a dominant manner to the

FIGURE 2

Decomposition of changes in age distribution



proportional increase of population for the middle-aged adults and the elderly and to the proportional declines of youths and children. During 1985–2000, fertility decline is also expected to have important impacts not only on the proportional decline of children but also on the proportional increase of youths and middle-aged adults. Mortality will however have only negligible effects on the changes of age composition. During 2000–15, the initial conditions are again expected to have a dominant impact on the decline of the proportion of children and on the increase of the proportions of other older age groups. The contribution of fertility and mortality to the changing of age composition will be very small.

CONCLUSION

The size of population and the process of ageing are the two major issues facing the growth of population in China. The size has always been a major concern for those who are interested in the population of China. However, a general consensus on the need to control population growth was not reached until the late 1960s. The present growth rate is actually very moderate, but it is the large population size that makes the moderate growth a critical issue for China and for the world. If the present family planning programme can be modified and the kind of programme such as the WXS can be reintroduced, there is the possibility that the total population can be controlled at just below 1.3 billion by 2000. An effective programme should be one under which couples can have more choice in their family building process, one that women understand and are willing to participate in. A comprehensive programme in China must have provisions to assist, in a direct way, the raising of the literacy and education level of the population, particularly the female population since no family planning programmes can be successfully implemented and their success can be continuously maintained when 70 per cent of the adult females are either illiterate or having only a few years of primary education.

Rapid ageing is a major characteristic of the population of China, a process that has been built into the present structure of the population during the demographic transition in the 1970s. Population ageing is now occurring mostly in industrialised nations and China is joining this process rapidly. Ageing will be the major characteristic of population change in the twenty-first century. There will be many more old people, many more middle-aged adults and relatively fewer young people. China will become the largest population of this nature in the early part of the next century. An ageing society is something people in the twentieth century know very little about but should begin to learn about and prepare for.

ANNEXE

The new WXS programme is expected to work in the following manner once it is introduced. For zero-parity women between the ages of 20 and 24, many are expected to postpone their childbirth by one, two, three or even four years to age 25 or after in order to gain the opportunity of having a second child four years later. Therefore, one year after the WXS programme is introduced, the peak fertility age, which is age 23 now, is expected to be shifted to age 25. By the fourth year, ages 25, 26, 27 and 28 are expected to assume the same fertility rates of present (1986) ages 23, 24, 25 and 26 respectively. For women under age 25, their fertility will decline and it is assumed that every fifth woman who would give birth will postpone her birth and therefore the decline will be 20 per cent in the first year. By the fourth year, their fertility is expected to decline to about half of the present level (1986). The birth rates of ages 29 and higher may be changing very little since they are not immediately affected by the new programme.

The second-order birth rate is expected to change in the following manner. One year after the new WXS programme is introduced, the birth rate of ages 29–44 years is expected to increase to the current level (1986) of ages 24–39 years respectively. The same level is expected to be maintained in the future. For women of ages 20–28, fertility is expected to decline slowly to half of the current level four to five years later and decline further by an additional 25 per cent in another four to five years. For women under age 20, the second-parity birth rate should be reduced to a negligible level four to five years later. The second-order fertility rate for women 45 years old and above is assumed to remain unchanged since they will be affected very little by the new programme.

If birth rates of the third and higher order remain unchanged, total fertility may increase to 2.63 one year after the WXS programme is introduced but begin to decline to 2.54 in the second year and further to 1.98 in the eighth or ninth year. If the third and higher-order birth can be reduced by about one-quarter in the first four to five years and by one-half in the next four to five years, total fertility rate is expected to increase only to 2.50 one year after the new programme is introduced but will decline to 2.42 in the second year and further to 1.70 eight to nine years later. The expected changes in age-specific fertility rates are shown in the annexe table.

ANNEXE TABLE

Age-specific fertility rates under the WXS alternative (per 1,000 women)

	Year								
	T	T+1	T+2	T+3	T+4	T+5	T+6	T+7	T+8
Age/TFR	2,411	2,501	2,416	2,326	2,253	2,002	1,921	1,845	1,774
15–19	20.4	16.4	13.7	11.5	9.3	8.3	7.5	6.7	6.1
20–24	210.3	171.7	150.4	129.0	115.0	96.7	88.1	80.2	73.0
25–29	162.8	165.8	172.8	178.3	180.1	162.4	156.0	149.8	143.8
30–34	62.4	100.4	100.4	100.4	100.4	92.4	92.1	91.8	91.5
35–39	19.0	37.6	37.6	37.6	37.6	33.9	33.8	33.7	33.7
40–44	6.2	7.5	7.5	7.5	7.5	6.2	6.1	6.1	6.1
45–49	1.2	0.9	0.9	0.9	0.9	0.6	0.6	0.6	0.6

REFERENCES

Bongaarts, John and Greenhalgh, Susan, 1985. An alternative to the one-child policy in China, *Population and Development,* Vol. 11, No. 4.

Chen Shengli, 1984. Fertility of women during the 42 year period from 1940 to 1981, in *1/1000 Survey.*

CPIC (China Population Information Centre), 1984. *Analysis on China's National One-per-Thousand-Population Fertility Sampling Survey* (1/1000 Survey), Beijing.

Grigsby, Jill and Olshansky, S. Jay, 1988. The demographic component of population ageing in China, paper presented to the IUSSP Seminar on Mortality Transition in South and East Asia, Beijing.

Jiang Zhenghua, Zhang Weimin and Zhu Liwei, 1985. A preliminary study of life expectancy at birth of China's population, in Li Chengrui (ed.), *A Census of One Billion People,* Beijing: Population Census Office in China.

Ogawa, Naohiro, 1988. Ageing in China: demographic alternatives, *United Nations Asia-Pacific Population Journal,* Vol. 3, No. 3.

PCO (Population Census Office Under the State Council), 1985. *1982 Population Census of China* (Results of Computer Tabulation), Beijing.

Qiao Bin and Xu Datong, 1984. The time length of birth interval, in *1/1000 Survey.*

Ran Yunang and Xie Qibin, 1984. A brief analysis of women's first marriage and first birth, in *1/1000 survey.*

SFPC (Leading Group of the National Fertility and Family Planning Sample Survey), 1988. *Communique of the National Fertility and Family Planning Sample Survey on Results of Manual Tabulations,* Beijing, 27 October.

Song Yuanjie, Shi Yulin and Zhang Cuihao, 1984. Birth parities of females, in *1/1000 Survey.*

SSB (State Statistical Bureau, Department of Population Statistics), 1988a. *Tabulations of China 1% Population Sample Survey,* Beijing.

SSB (State Statistical Bureau, Department of Population Statistics), 1988b. *China In-Depth Fertility Survey (Phase-II),* Preliminary Report, Beijing.

SSB (State Statistical Bureau, Department of Population Statistics), 1988c. *1982 Population Census of China. One Percent Household Sampling.* Books 1–4. Beijing.

SSB (State Statistical Bureau), 1983–88. *Statistical Yearbook of China,* Beijing.

SSB (State Statistical Bureau, Department of Population Statistics), 1986. *China In-Depth Fertility Survey (Phase-I),* Principal Report, Beijing.

United Nations, 1989. International Department of Economic and Social Affairs. *World Population Prospects: 1988*, New York.

Yu, Yeun-chung and Horiuchi, Shiro, 1987. Population ageing and juvenation in major regions of the world, paper presented to the 1987 Annual Meeting of the Population Association of America.

4

DATA COLLECTION SYSTEMS IN INDIA

K.S. NATARAJAN and V.S. SWAMY
Office of the Registrar General
New Delhi, India

In India, the main sources of demographic data are: (a) population census; (b) civil registration; (c) sample surveys; and (d) health and family welfare service statistics.

The most comprehensive source of data on basic demographic characteristics is the population census which provides data on size, structure and growth of population even for smaller administrative areas. Census begin a decadal operation, does not provide information on growth of population and related demographic variables on yearly basis. There is thus a need to obtain data through other sources for ascertaining short-term changes in population growth needed for purposes such as projecting future trends in population or evaluation of the impact of family welfare programmes. The conventional source of data on births and deaths is the civil registration system. But in India, the collection of reliable statistics on births and deaths through civil registration is handicapped by the low level of literacy, the overwhelming rural population scattered throughout the country and the inadequacy of the registration machinery. The statistics collected are deficient in content and coverage. As an alternative, demographic sample surveys conducted by various agencies along with the service statistics collected by the Health and Family Welfare Ministry provide a cross-sectional picture of the demographic situation.

POPULATION CENSUS

Introduction

Population census provides a variety of data on population characteristics. The first census in India was carried out in 1872. The last census was conducted in 1981. For listing out all the houses, a house-listing operation is undertaken, usually six to nine months prior to census taking. In recent censuses, this house-listing operation has been used to provide useful data on housing characteristics. The data collected in the various censuses and the tables generated are discussed in the succeeding paragraphs.

Coverage of Items

The various items collected in the different censuses have been categorised into groups as under: (a) demographic and social characteristics; (b) educational characteristics; (c) migration characteristics; (d) economic characteristics; and (e) other characteristics. The items covered under each of the categories have been listed in Table 1.

1. *Individual slip:* Information on castes was collected regularly in all the censuses till 1941 and was replaced by a question on Scheduled Caste/Scheduled Tribe, in 1951.

Data on ability to read and write were collected in all the censuses. From the 1931 census onwards, information on educational attainment of literate persons was collected. In the 1981 census a question regarding attendance at school or college was canvassed.

In view of the diversity of languages spoken in India, a question on language was included in the census. Till 1921, the data collected were on language ordinarily used in the household. From 1931 onwards, data were collected on mother tongue. In the 1981 census, while the question on mother tongue was included in the universal individual slip, a question on language mainly spoken in the household was also canvassed for each household.

A question on place of birth was canvassed regularly since the 1981 census. In the 1971 census, two other questions, namely, whether the place of birth was village or town and the duration of residence at place of enumeration were added. In the 1971 census data were collected on place of last residence also. In the 1981 census, reasons for migration were also collected.

Till 1951, income was the main criterion to classify individuals. Since the 1961 census, the concept of income has been given up. Only the actual work concept was used to classify a person as worker and non-worker. In the 1961 census a person was classified as a worker and non-worker only. In the 1971 and 1981 censuses, while the concept of work remained the same, the population was divided into three categories namely, main workers, marginal workers and non-workers. In the 1981 census, marginal workers and non-workers were asked whether they were seeking/available for work.

2. *Household schedule:* In the 1961 census, a household schedule was canvassed along with the census. The schedule collected information on the activity of the household. Data on the extent of the land cultivated by the household, the land rights particulars, nature of household industry, if any, conducted by the household and the number of workers engaged in cultivation and/or household industry were obtained. In the 1981 census also the household schedule was canvassed along with the census schedule. The data collected were predominant construction material of the house occupied by the household, facilities available to the household, namely drinking water supply, electricity, toilet (urban areas only), number of living rooms and

number of married couples usually living in the household. Apart from these, questions on whether the household cultivates land or not, whether the household lives in owned or rented house and whether the household owns a house site or not were also canvassed.

3. *Housing characteristics:* Since 1961, the census has collected data on housing. The data collected in the 1961 census included the purpose for which the census house was used, and if used as an establishment, workshop or factory particulars of products, repairs or service undertaken; average number of persons employed daily, kind of fuel or power used; material of wall and material of roof; number of rooms occupied by household; if household lives in owned or rented house; number of persons residing in the household. The house-list of the 1971 census followed the same pattern. A separate schedule called Establishment Schedule was also canvassed. In the 1981 census apart from ascertaining the purpose for which census house was used, a question on physically handicapped persons was canvassed. The details of the establishment were canvassed in a separate schedule called Enterprise List. In the 1991 census, it is tentatively proposed to include in the house-list amenities available to the household like electricity, water supply and toilet. The Enterprise List is also proposed to be canvassed.

Sampling

Sampling for tabulation was adopted in the Indian census as early as 1941. A 2 per cent systematic sample of individual slips was selected and tables on age and means of livelihood were based on this sample. In the 1951 census detailed cross classifications of age and civil conditions were made from a 10 per cent sample of individual slips selected systematically. In the 1961 census, household economic data collected in the household schedule were tabulated on a 20 per cent sample basis.

In the 1971 census, extensive use was made of sampling for tabulation. Tables relating to economic, social, cultural, migration and fertility particulars of the population were tabulated on a sample basis. The sample size was 10 per cent for rural areas and 20 per cent for urban areas. The sample was selected systematically, after rearranging the individual slips by age, sex and industrial categories at stratum level. Apart from this, an advance tabulation at the national level was undertaken on the basis of per cent of individual slips. For housing tabulations a 20 per cent systematic sample of census houses was drawn from the house-list separately for rural and urban areas.

In the 1981 census, for the first time in the history of Indian census, sampling was adopted at the enumeration stage. The sample enumeration was simultaneously carried out together with the complete enumeration. The sample slip was canvassed for all persons living in the 20 per cent sample of enumeration blocks in the major states i.e., all the states with an estimated population of 10 million and above in 1981. The items collected for the sample slip are also indicated in Table 1.

TABLE 1

Items included in the censuses of India, 1872–1981 and proposed for 1991

Items included in census schedule	1872	1881	1891	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991
I. Demographic and social characteristics													
Name	x	x	x	x	x	x	x	x	x	x	x	x	x
Relationship to head	—	—	—	—	—	—	—	x	x	x	x	x	x
Sex	x	x	x	x	x	x	x	x	x	x	x	x	x
Age	x	x	x	x	x	x	x	x	x	x	x	x	x
Marital status	—	x	x	x	x	x	x	x	x	x	x	x	x
Religion	x	x	x	x	x	x	x	x	x	x	x	x	x
Caste or class	x	x	x	x	x	x	x	x	a	a	a	a	a
Nationality	x	—	—	—	—	—	—	—	x	x	—	—	—
Mother tongue	—	x	—	—	—	—	x	x	x	x	x	x	x
Parent tongue	—	—	x	—	—	—	—	—	—	—	—	—	—
Language ordinarily used	—	—	—	x	—	x	—	—	—	—	—	—	—
Language ordinarily spoken in the household	—	—	—	—	x	—	—	—	—	—	—	—	—
Other languages	—	—	—	—	—	—	x	x	x	x	x	x	x
Infirmities	x	x	x	x	x	x	x	—	—	—	—	—	—
Number of children born to a married woman and children surviving	—	—	—	—	—	—	—	x	—	—	—	—	—
Age at birth for first child	—	—	—	—	—	—	—	x	—	—	—	—	—
For currently married women:													
Age at marriage	—	—	—	—	—	—	—	—	—	—	x	—	—
Any children in the last one year	—	—	—	—	—	—	—	—	—	x	—	x	
For all ever married women:													
Age at marriage	—	—	—	—	—	—	—	—	—	—	—	x[b]	x
Number of children surviving	—	—	—	—	—	—	—	—	—	—	—	x[b]	x
Number of children ever born	—	—	—	—	—	—	—	—	—	—	—	x[b]	x
II. Educational characteristics													
Able to read and write	x	—	—	—	—	—	—	x	—	—	—	—	—

TABLE 1 (Cont.)

Items included in census schedule	1872	1881	1891	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991
Youths upto age 20 attending school college under private tuition	x	—	—	—	—	—	—	—	—	—	—	—	—
Under instruction	—	x	—	—	—	—	—	—	—	—	—	—	—
Not under instruction but able to read and write	—	x	—	—	—	—	—	—	—	—	—	—	
Not under instruction and not able to read and write	—	x	—	—	—	—	—	—	—	—	—	—	
Learning, knowing illiterate	—	—	x	—	—	—	—	—	—	—	—	—	—
Literate or illiterate	—	—	—	x	x	x	x	—	x	x	x	x	x
Foreign language known	—	—	x	—	—	—	—	—	—	—	—	—	—
Know or does not know English	—	—	—	x	—	—	—	—	—	—	—	—	—
Whether literate in English	—	—	—	—	x	x	x	—	—	—	—	—	—
Educational level	—	—	—	—	—	—	—	x	x	x	x	x	x
Attending school/college	—	—	—	—	—	—	—	—	—	—	—	x	x
III. Migration characteristics													
Place of birth	—	—	x	x	x	x	x	x	x	x	x	x[b]	x
Born rural/urban	—	—	—	—	—	—	—	—	—	x	x	x[b]	x
Duration of residence	—	—	—	—	—	—	—	—	—	x	x	x[b]	x
Place of last residence	—	—	—	—	—	—	—	—	—	—	x	x[b]	x
Last residence rural/ urban	—	—	—	—	—	—	—	—	—	—	x	x[b]	x
Reasons for migration from place of last residence	—	—	—	—	—	—	—	—	—	—	—	x[b]	x
IV. Economic characteristics													
Principal occupation	x	x	x	x	x	x	x	x	x	x	x	x	x
Subsidiary occupation	—	—	—	x	x	x	x	x	x	x	x	x	x
Dependence (means of subsistence of earner/worker on whom dependent	—	x	x	x	x	x	x	x	—	—	—	—	—
Industry	—	—	—	—	—	—	x	x	x	x	x	x	x

(Cont.)

TABLE 1-(Cont.)

Items included in census schedule	1872	1881	1891	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991
Class of worker	—	—	—	—	—	—	—	—			x	x	x
Non-worker	—	—	—	—	—	—	—	—			x	x	x
Seeking or available for work	—	—	—	—	—	—	—	—			—	x	x
V. Other characteristics													
Are you in employment?													(1941 census)
Are you in search of employment?													
If yes, how long have you been in search of it													(1941 census)
Indigenous persons 'Assam, Manipur and Tripura'													(1951 census)
Are you an indigenous person of Assam?													
If so, state in the nearest bigha													
The land you own													
The land you have rented in cash or in kind from others													
Fertility (Bihar, Madhya Pradesh, Travancore–Cochin)													(1951 census)
Unemployment (Bombay, Saurashtra and Kutch, Vindhya Pradesh, Mysore, Punjab PEPSU, Bilaspur, Delhi, Himachal Pradesh, Hyderabad)													(1951 census)
Area of land owned and cultivated (Orissa, West Bengal, Sikkim)													(1951 census)
Infirmities (Rajasthan, Ajmer)													(1951 census)
Are you ex-service man, if so whether receiving pension or not													(1991 census)

Note: [a]Scheduled castes and scheduled tribes only.

[b]Canvassed in sample slip.

In the 1981 census sampling was also used at the tabulation stage. All the tables were processed on the basis of 20 per cent of enumeration blocks. To provide estimates quickly at the national and state level, a 5 per cent sample of enumeration blocks was selected. This sample was a 25 per cent subsample of the 20 per cent sample of enumeration blocks. Since full count values were available for selected characteristics like population, number of workers classified by cultivators, agricultural labourers, those engaged in household industry and other work, sex-wise, these were used as controls and estimates were derived by ratio estimation. The processing of the household schedule was also undertaken on the basis of 20 per cent sample of households selected systematically in each enumeration block.

Data Processing

Prior to the 1971 census, the entire census data were processed manually. For the first time in the 1971 census, data based on 20 per cent sample of individual slips

in urban areas were processed on computer using punch cards as input media. In the 1981 census, direct data entry systems were introduced to expedite processing. As a result of computerisation, the number of tables generated increased. While in the 1981 census 131 tables were prepared at state level, the respective numbers in the 1961 and 1971 census were 53 and 73. At district level, as against 53 and 40 tables prepared in the 1961 and 1971 censuses, in the 1981 census 93 tables were prepared. At tehsil level 9, 4 and 27 tables respectively were produced in the 1961, 1971 and 1981 censuses. At town level only one table was available in 1961. This number increased to 10 and 24 respectively in 1971 and 1981. The number of districts, tehsils and towns for which the tables were proposed also increased during the period 1961–81.

The tables generated are published under the title general population tables, general economic tables, social and cultural tables, migration tables, fertility tables, housing tables, household tables, special tables for scheduled castes and special tables for scheduled tribes. Apart from this, about 30 tables at the national level and 16 at the state level were released as part of advance tabulation.

Evaluation Studies

Since the 1951 census, evaluation surveys have been conducted as part of the census programme. The main purpose of such evaluation surveys was to have a measure of the coverage error. In the census of 1981, content errors were also studied.

The coverage error consists of two components, namely omission or duplication of persons due to omission or duplication of entire household and omission or duplication of individuals in households which have been enumerated. In the 1981 census it was estimated that the omission rate at the national level was 17.95 per 1,000 persons enumerated in census. In the case of males the omission rate was 17.10 per 1,000 and for females 18.85 per 1,000. The difference was not statistically significant. However, significant differentials in omission rate were observed between rural and urban areas. In the rural areas the omission rate was 15.04 per 1,000 and in the urban areas it was 27.63 per 1,000.

Apart from the above survey, another study was undertaken in a selected subsample of sample registration system (SRS) villages to study the errors in age reporting of children under 5 years of age in census. In these blocks the age reported in census by the household was compared with the actual age as derived from date of birth recorded in SRS schedule. The study indicated that at ages 0–4 the age is mostly over-reported.

Besides releasing tables giving out basic data, a number of analytical reports based on the analysis of the result of the 1981 census have been brought out by the office of the Registrar General, India. These reports point out significant trends emerging. Technical reports, examining the quality of the age data collected in census have been published. Based on the analysis of age data of the 1971 and 1981 censuses

and of data on children ever born and children surviving collected in the 1981 census, a report titled, 'Estimate of vital rates for the decade 1971–81' has been brought out. Based on the above two reports which establish the base levels of fertility and mortality and the trends indicated by comparing with other sources a report on population projections for the period 1981–2001 has also been brought out.

Another area wherein new development has been initiated in the 1981 census is the introduction of statistical quality control techniques in coding the economic questions of the individual slip. Being adopted for the first time, it was exploratory in nature.

CIVIL REGISTRATION

Historical Background

India has a long tradition of registration of vital events and the administrative machinery for the purpose has been in existence for over a century. In 1886, the Government of India enacted the Births, Deaths and Marriages Registration Act to provide for voluntary registration of births, deaths and marriages, throughout the country. The Act had very little application and remained a dead letter as far as the general population was concerned. In the urban areas registration was carried out under municipal by-laws and in the rural areas on the basis of executive orders and instructions to the village officials under the revenue codes and police manuals. On the basis of the recommendations of various committees, a decision was taken with the consent of the state governments for the enactment of a central law for regulation of registration of births and deaths throughout the country. Accordingly the Registration of Births and Deaths Act, 1969 was placed on the statute book. The Act replaced the diverse laws that existed on the subject, unified the system of registration throughout the country and made reporting and registration of births and deaths compulsory. It provided for a statutory authority at the Centre and in each state.

System of Registration

The whole hierarchy of officials in various states dealing with registration and compilation of vital statistics is drawn from various departments on a part-time basis. The states adopt different systems of registration depending upon their convenience. The registration machinery in the rural areas can be broadly classified into four categories—panchayats, police, health and revenue. In municipal towns and cities, the municipal authorities are responsible for registration of vital events and this function is usually a part of the duties of the Health Department.

Coverage of Items

After the enforcement of the Registration of Births and Deaths Act, 1969, the various forms were revised. The items of information currently collected in the registration records are given below:

1. *Births/still births:*

(a) *Characteristics of the event:* Date of registration, Date of birth, Sex, Place of birth, Order of live birth, Type of attention at delivery.

(b) *Characteristics of mother and father:* Literacy, Occupation, Nationality, Religion, Age of mother at confinement.

2. *Deaths:*

(a) *Characteristics of the event:* Date of registration, Date of death, Place of death, Cause of death, Type of medical attention received.

(b) *Characteristics of the deceased:* Age, Sex, Marital status, Religion, Nationality, Occupation.

Compilation and Tabulation

Prior to the enactment of Registration of Births and Deaths Act, 1969, there was no uniformity in recording, reporting and collection of civil registration data and compilation of vital statistics in the country. After the revision of forms, a tabulation plan has been prescribed for compiling the data. It is expected that the states will follow the pattern. In the case of towns with population 30,000 and above, compilation of basic data is done in the concerned registration offices. On the basis of the returns furnished by the states, the Office of the Registrar General, India brings out an annual report on vital statistics of India. This report provides basic data on births, deaths, infant deaths and their rates for the states and districts by rural and urban areas and for individual towns with population 30,000 and over.

Births, still births, deaths and infant deaths are presented at country, state, district, rural-urban and town level. Their classification by sex is, however, not given at district and town level. Births by order and births by age of mother are presented for country, state and for towns with population 100,000 and above. Data on births by age of mother and birth order are presented for country, state and for towns with population one million and above. Deaths by age and sex, cause and sex, infant deaths by age and sex and maternal deaths are presented at country, state and rural and urban level. Medically certified deaths based on ICD, reported from selected hospitals are also published by age, sex and cause.

Evaluation

Registration data are deficient due to incomplete coverage and under-registration. The extent of incomplete coverage and under-registration varies from state to state. The Office of the Registrar General, India undertook a study to measure the extent of under-reporting of vital events for the periods 1961–71 and

1971–81 using the Brass technique. The extent of under-reporting of births was 63 per cent and of deaths of young children 0–9 years 76 per cent at the national level during 1971–81.

SAMPLE SURVEYS

In India, civil registration and population censuses do not provide reliable estimates of vital rates on a current and continuous basis. Several alternate methods for gathering reliable information on population have been tried and tested through the application of sampling techniques. Such methods include single and multi-round retrospective surveys and dual record system.

National Sample Survey

Information on demographic characteristics of the population was first collected on a nation-wide scale in the National Sample Survey (NSS) in 1951 through a single round retrospective survey. During 1958–68 population surveys became an integral part of the NSS annual rounds; but they were discontinued thereafter. In the twenty-eighth round of NSS (October 1973-June 1974), a survey on population, family planning and morbidity was introduced. Thereafter, the NSS conducted a demographic survey on births, deaths and population in the thirty-ninth round (January 1984-June 1984). Surveys conducted by NSS have provided comprehensive data on all aspects of population covering size, structure and composition of population, births, deaths, migration and marriages. The data obtained from various rounds have been tabulated and presented in various reports of NSS. Table 2 summarises the types of demographic data collected in the different rounds of NSS.

In single-round retrospective surveys, information is collected on vital events which occurred to members of the sample households during a given reference period, generally 12 months preceding the enquiry. The inherent limitation of a retrospective sample survey is the inability of the respondent to recall all events which occurred in the household during the reference period. Though methods have been devised for adjustment of recall lapse, there does not appear to be a consistent pattern of errors over space and time; hence universally valid estimates of births and deaths cannot be developed.

Sample Registration System

Another source of information providing data on fertility and mortality is the sample registration system (SRS) organised by the Office of the Registrar General, India. SRS is a dual reporting system with the main objective of providing reliable estimates of birth and death rates at the state and national levels. The field investigation under SRS consists of a continuous enumeration of births and deaths by an enumerator (preferably a local teacher) and an independent six-monthly retrospective survey by a full-time supervisor. The data obtained through these

TABLE 2

Demographic data collected through NSS

Round	Survey/period	Births/ Deaths	Historical fertility	Marriage	Migration	Morbidity and health	Family planning
2	Apr-June 1951	—	x	—	—	—	—
4	Apr-Sept 1951	—	x	—	—	—	—
5	Dec 1951-Feb 1953	—	x	—	—	—	—
6	May-Aug 1953	—	x	—	—	—	—
7	Oct 1953-Mar 1954	x	—	x	—	x	—
8	July 1954-Mar 1955	x	—	x	—	x	—
9	May-Nov 1955	x	x	x	x	x	—
10	Dec 1955-May 1956	x	—	x	—	x	—
11	Aug 1956-Jan 1957	x	—	x	—	—	—
12	Feb-June 1957	x	—	x	x	x	—
13	Sept 1957-May 1958	x	—	x	x	x	—
14	July 1958-June 1959	x	—	—	x	—	—
15	July 1959-June 1960	x	—	—	x	—	—
16	July 1960-June 1961	x	—	—	—	—	x
17	Sept 1961-Aug 1962	x	x	—	—	x	—
18	Feb 1963-June 1964	x	x	—	x	—	—
19	July 1964-June 1965	x	x	—	x	—	—
20	July 1965-June 1966	x	—	—	x	—	—
21	July 1966-June 1967	x	—	—	x	—	—
22	July 1967-June 1968	x	—	—	x	—	—
23	July 1968-June 1969	x	—	—	x	—	—
28	Oct 1973-June 1974	x	x	—	x	x	x
35	July 1980-June 1981	—	—	—	—	x	x
38	Jan-Dec 1983	—	—	—	x	—	—
39	Jan-June 1984	x	x	—	—	—	x
42	July 1986-June 1987	—	—	—	—	—	x

two methods are matched. The partially matched and unmatched events are reverified in the field to get an unduplicated count of events. A baseline survey of the sample area is also carried out in order to provide baseline population for working out rates. The population figures are updated during every half-yearly survey.

Information collected under SRS includes the following:

Births:

(a) *Particulars of the child*: Place of birth, Date of birth, Live birth/still birth, Single/multiple birth, Sex.

(b) *Particulars of the mother*: Mother's relation to head, Residential status, Present age, Religion.

(c) *Other particulars*: Type of attention at delivery, First information source.

Deaths:

(a) *Particulars of the deceased*: Place of death, Date of death, Relationship to head, Residential status, Sex, Age at death, Marital status, Religion.

(b) *Other particulars*: Medical attention before death, First information source.

Tabulation: The annual vital rates produced by the system are published regularly in the Sample Registration Bulletin which is a biannual publication of the Office of the Registrar General, India. Detailed tables giving fertility and mortality indicators are published in the annual Sample Registration report. The data are presented at the state and national levels.

Special surveys: A number of special surveys have been carried out from time to time using SRS infrastructure. These are:

1. A fertility survey during 1972 in a sub-sample of SRS households in each unit with a view to studying the fertility differentials by socio-economic groups.
2. Survey on infant and child mortality in 1979, to study the pattern and differentials of fertility and child mortality, health and care of children.
3. Survey on fertility and mortality, 1984 to provide fertility and mortality differentials by socio-economic groups.

Evaluation: Attempts have been made in the past to assess the extent of completeness of events recorded under SRS using analytical and survey methods. A systematic and coordinated effort was made to measure the extent of under-enumeration of events through intensive field enquiry conducted by senior-level personnel during 1980–81. The study revealed that for both birth and death rates, the extent of underenumeration in SRS at the national level was of the order of 3 per cent. The intensive enquiry was repeated which showed that the extent of under-enumeration in the birth rate was 1.8 per cent for 1985. Underenumeration of death rate was 2.5 per cent.

Survey of Cause of death (Rural)

The survey of cause of death (rural) initiated by the Office of the Registrar General, India is aimed at ascertaining causes of death in the rural areas of the country. It makes use of lay investigation method and a non-medical list (symptoms associated) of probable cause of death by field visits to the household of the deceased. The investigation is conducted in headquarter villages of the selected primary health centres (PHC). A list comprising 10 major cause groups including conspicuous symptoms, with special subdivisions into numerous probable specific diseases is provided to the field agent. The field agent has to first ascertain the major cause group in which the death may fall and then determine the specific cause by investigation of the symptoms.

The tabulated data furnish information on deaths by causes or prominent symptoms cross-classified by age and sex. Within each broad cause, data are given by sub-causes. An annual report on survey of cause of death (rural) is brought out regularly.

There are certain constraints in any enquiry of cause of death. Errors could arise from bias of the respondent or from the predilection of the interviewer or incorrect appreciation of replies. Another limitation of the survey is that the collection of data is restricted to headquarter village of the primary health centre. It does not, therefore, provide a true picture of the mortality pattern either at the state or national level.

FAMILY WELFARE AND HEALTH STATISTICS

Family Welfare Statistics

The main sources of statistics on family planning and maternal and child health (MCH) services are (a) the administrative statistics released by the division of Evaluation and Intelligence (E&I), Department of Family Welfare, (b) ad hoc surveys on family planning conducted by various research institutions, like the population research centres, Operation Research Group, Baroda, National Sample Survey, Office of the Registrar General, India and (c) base-line surveys in the area projects.

Administrative statistics: The Evaluation and Intelligence Division in the Department of Family Welfare collates the data collected in respect of family planning programme. At the peripheral level, each primary health centre (PHC) has a 'computor', who collects the performance data in the prescribed proforma and submits it to district family welfare bureau. The district family welfare bureau has a statistical investigator and a 'computor' who compiles the data for the entire district and submits it to state bureaux. Periodic reports are submitted by the state family welfare bureaux to the E&I division at the national level.

Each family welfare centre is expected to maintain a register of eligible couples. The register provides information on name, age, number of living children, age of the youngest child, pregnancy status, use of family planning methods, and results of follow-up and is updated annually. This register is considered essential for the family planning staff to contact selectively the couples in the reproductive age group. Apart from the Eligible Couple Register, the following types of records have been prescribed to be maintained at different levels: (a) Daily Case Register, (b) Conventional Contraceptive Issue (Couples) Register, (c) Conventional Contraceptive Stock Register, (d) IUD Register, (e)Sterilisation Register, (f) Oral Pill Register, (g) MTP Register, (h) MCH Register. These registers in general include particulars like name, sex, address, and number of living children of the acceptor. Individual case cards for male sterilisation, female sterilisation and IUD insertions are also required to be maintained. In this, apart from demographic particulars, details such as educational level of husband/wife, interval since last live birth/still birth/abortion and results of various medical tests and follow-up visits are required to be entered. At the district level and state level a set of control and consolidated registers in respect of

various monthly reports have been prescribed. The Department of Family Welfare (E&I division) independently checks through its own evaluation team the performance statistics reported.

It has been found that in many cases, case cards and eligible couple registers are not maintained properly. In service registers addresses are often incomplete. At the evaluation level, while the couple protection rate is available its break-up by age is not available. Further in estimating the couple protection rate a number of assumptions have been made regarding the use-efficiency of various contraceptives, and retention rate of IUDs. In the absence of data based on field survey these parameters are questionable.

Ad hoc surveys: Population research centres, established to undertake research in family planning communications and population studies also undertake surveys in specific areas. Further KAP surveys were conducted by Operation Research Group, Baroda on contraceptive prevalence in 1974 and 1980. A diagnostic survey on family planning was conducted by market research agencies in 1985, in selected districts in the states of Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh and Maharashtra. The reports of these surveys provide an independent check on the contraceptive prevalence rate.

Base-line surveys: To give a fillip to the national family welfare programme particularly in the backward areas of the country, area projects were introduced in 15 states of India covering 67 districts. In these districts, international agencies like DANIDA, World Bank, UNFPA, USAID and ODA have been assisting the government for the development of intensive health and family welfare infrastructure and the upgradation of services. Evaluation forms an important and integral part of these projects. The base-line surveys were contemplated as bench-mark surveys to provide feedback on various components. These surveys provide a fund of data on family planning infrastructure facilities, various channels of information and communication, level of knowledge, attitude and practice, utilisation of health facilities in general and maternal and child health services in particular.

Health Statistics

At the national level, the Central Bureau of Health Intelligence (CBHI) in the Directorate General Health Services collects, compiles and disseminates health statistics. For some of the diseases like malaria, cancer etc., the data are collected directly from the programme officers concerned.

The CBHI brings out an annual publication, Health Statistics of India. It presents, mainly, demographic data, data on institutional facilities, morbidity and mortality statistics, data on preventive measures for communicable diseases, medical and para-medical education, health and manpower; and data related to national programmes.

The data on morbidity are generally collected through statutory reporting to local health authorities under notification of specific diseases from medical institutions and/or medical personnel, routing morbidity and mortality reports from medical/health workers, periodic special surveys by teams for specific diseases, field investigations about outbreaks of diseases and active case detection by health staff. From these the CBHI collects data on 20 common communicable diseases like chicken-pox, diptheria, measles, influenza etc. However, both the coverage and reporting are incomplete and vary from one period to another. Collection of morbidity and mortality data from government hospitals and dispensaries in respect of morbidity and mortality of both in-patient and out-patient according to international classifications has been attempted. Even in this, the response is limited and irregular. These suffer from many other limitations like selectivity and bias; apart from this the population base is also not known. Statistics of morbidity and mortality due to major non-communicable diseases are based on limited sample surveys for specific diseases conducted by agencies like the Indian Council of Medical Research.

Lack of trained staff is one of the major handicaps in the collection of morbidity statistics from hospitals and dispensaries. Excepting big hospitals there is no medical record section in others. Over the past few years the CBHI has attempted to establish an integrated management information and evaluation system (MIES) for the entire health and family welfare programme in the country. According to this system, records are to be maintained at the subcentre level for base-line information and different health and family welfare service activities in primary health care. Under this system a uniform set of records and registers have been prescribed to be maintained at each primary health centre.

This system of MIES, though introduced about six years ago, has yet to take roots. Most states/union territories have not so far adopted the standardised records prescribed. The position of receipt of monthly reports is also very unsatisfactory.

5

POPULATION DATA COLLECTION SYSTEMS IN NEPAL

Vidya Bir Singh KANSAKAR
Centre for Economic Development and Administration
Tribhuvan University
Kathmandu, Nepal

INTRODUCTION

The first modern population census covering the entire country of Nepal was conducted in 1911. The government notification regarding this census is not available, but the notification of 1920 indicated the government's intention to conduct census at an interval of 10 years (Department of Statistics, 1957: Appendix 4). The censuses were conducted in 1920, 1930, 1942 and 1952–54. The results of the censuses up to 1942 were not published for general use and the final results were presented in aggregate, i.e. head counts only (CBS, 1987: 1). To conduct the fifth census on modern scientific basis with the intent of meeting the objective of the UN to synchronise the population methodology for comparative study, the government sent five officials of the then Department of Industrial and Commercial Intelligence to participate in the International Training Centre on Censuses and Statistics for South-East Asia and Oceania held at New Delhi under UN and FAO sponsorship. These officials conducted a pilot population survey and ultimately prepared the schedules, definition and rules for the census and also trained 200 supervisors for three months on theoretical and practical aspects of population census. However, in 1950 when preparation for a nation-wide population census was in progress, the popular uprising against the oligarchic and autocratic Rana regime brought the work to a standstill. But population data were needed for formulating the national development plan and international organisations also were requesting for them. As the men and materials available were inadequate, the census had to be undertaken in two stages, one in 1952 for Eastern Nepal excluding Mahottari district and the other in 1954 for Western Nepal including Mahottari district (Kansakar, 1977: 3–5). The census of 1961, the sixth since 1911, laid the foundation for the decennial census with the fixing of the Census Day on 22 June which was followed in the census of 1971 and 1981. This census was marked by the establishment of the Central Bureau of Statistics (CBS) to conduct census on population, agriculture, industry and also preparation of national accounts. Besides the decennial population census, the CBS conducts mid-term population census and demographic sample surveys.

QUALITY OF DATA

Despite the experience of nearly four decades in modern scientific census, census operation in Nepal is very much hampered by dearth of technical manpower at the centre and low level of education of the field supervisors and enumerators. The CBS has not been able to provide adequate demographic training to its staff. Its experienced staff are constantly transferred to other institutions. There are less than half a dozen high-level staff who had witnessed the two preceding censuses (ibid.: 34). Frequent change in personnel is the main reason behind the frequent changes in schedule, definition and data processing, which affects the quality as well as the intercensal comparison of data. At the field level, the educational qualification of the enumerators is consistently low (CBS, 1987: 3). There is no rationale behind the recruitment level of the enumerators and the population size to be enumerated. The number of enumerators employed in 1961 (15,933) was less than that employed in 1952–54 (17,000). Their number further declined in 1971 to 12,000 and went up to 15,000 in 1981. The ratio of enumerators to population in 1981 was alarmingly low, with one enumerator on an average to cover 1,000 population as against 150 in China and 250 in India (Kansakar, 1984–85: 52). Moreover, as the enumerators and supervisors in the Nepalese census were temporarily hired persons rather than school teachers as employed in the censuses of India and China, they lacked responsibility and dedication, thus considerably affecting the quality and reliability of the 1981 census data.

Population census is intimately related to territory, because population figures carry no meaning unless they refer to well-defined territory. But in Nepal, population census from its very inception has been marked by the absence of appropriate maps with location of villages. The census of 1952–54 had to depend on topographical maps of 1926–27 to the scale of 1 inch to 4 miles. Apart from identifying newly emerging settlements and villages, census officials had difficulty in delineating the boundary of the census subdivisions: the *thums* and *pragannas*. Out of the 54 census districts, only 48 could be delineated for census subdivisions and though the country has 816 *thums/pragannas*, the census could subdivide the country into 484 *thums/pragannas* only. The census of 1961 had 55 census districts and an equal number of census subdivisions. The absence of maps with location of villages and delineated boundary of enumeration divisions hindered effective enumeration and posed greater possibilities of error of coverage (Kansakar, 1987: 11).

Frequent change in district boundaries is another serious problem. While not affecting the census operation for data collection it has considerably affected analysis and intercensal comparison by district (Sharma, 1987: 25). The constitutional amendment of 1962 divided the country into 75 administrative districts. The absence of appropriate maps and the absence of a strong cartographic unit in the CBS made it virtually impossible to project the 1961 census data according to the new administrative districts. The census of 1971 adopted the administrative districts as census districts and subdivided them into village (rural) and town (urban) panchayats which represented electoral constituencies. But the panchayats were given novel names which were not to be found in the maps, and the CBS had a tremendous

difficulty in locating panchayats, apart from delineating their boundary. The census supervisors and enumerators had to rely on the local panchas or political worker at the panchayat level regarding the extent of the boundary of individual panchayats. The possibility of over- and underenumeration in such situations is obvious. There were a total of 3,930 panchayats in the 1971 census, 3,914 of them village panchayats and 16 town panchayats. One panchayat in Parbat district was not enumerated by mistake. In 1975, the second constitutional amendment again changed the boundaries of the districts with substantial changes in the boundaries of the panchayats. Their number was reduced to 2,936. The census of 1981 adopted these districts and panchayats for its census operation, but immediately after the census, district and panchayat boundaries were changed by the third constitutional amendment in 1981. The number of panchayats was now raised to 4,051. District-level intercensal comparison between 1971 and 1981 was not possible in the absence of appropriate maps with delineated boundaries of the panchayats. UNFPA funds were made available for the census mapping project, but because of the failure of the project in availing services of the personnel and authorities involved in census operation, cartographic works and surveys, population studies, etc. the result was substandard maps. The maps contained ward boundaries for the town panchayats, not for the village panchayats. The enumerators were assigned to cover up to three wards of the village panchayats depending upon the size of the population and the area of the ward (CBS, 1987: 2). Chances of under- or overenumeration in such a situation of maps without ward boundaries are fairly high.

METHODS OF DATA COLLECTION

There has been considerable improvement in the methods of data collection since the census of 1952–54. But the inadequate number of enumerators coupled with their low level of education, lack of well-delineated maps of panchayats with ward boundaries and lack of post-enumeration quality check severely constrains the work. Additional information has been collected in the succeeding censuses without giving due consideration to improving the quality of data collection. Since the 1961 census there have been no post-enumeration reports describing methodologies, difficulties encountered in the field and treatment of omission and vague entries, etc., which constitute important guidelines for future censuses (CBS, 1977: 14). The work load of enumerators is very high as compared to that of those in China and India. Their low level of education makes the chances of error very high. The enumerators were assigned to fill up the census schedules on piecemeal basis. Because of the heavy work load coupled with difficulty of travel, it is alleged, the enumerators filled up the schedules without visiting each and every house. In the urban areas of Kathmandu, a large number of people complained that they had no knowledge of the enumerators visiting their houses during the census enumeration.

Post-enumeration Survey (PES)

Post-enumeration survey to assess the quality of data and coverage of error was absent until 1981. In 1971 only 10 per cent undercount of children in the age group of

0–4 years was estimated (CBS, 1977: 69). The single PES conducted during the period 1–14 August 1981, one and a half month after the census enumeration, ran into difficulties and its results were doubtful. The PES showed an undercount of 16.6 per cent for all rural strata and 19.5 per cent for all urban areas. The unadjusted population of Nepal was 11.56 and 15.02 million respectively in 1971 and 1981 with the intercensal growth rate of 2.6. If adjustment is made for the underenumeration as revealed by PES, the population of Nepal would be 18.05 million in 1981 with an intercensal growth rate of 4.5, an abnormally high growth rate which might not have occurred if the figures of underenumeration were available for the 1971 census. Besides the absence of the estimate of underenumeration in 1971, the doubt on the validity of under-counts revealed by the PES was ascribed to (a) onset of monsoon during PES and resulting communication difficulties and problem of effective coverage, (b) great difficulties in identifying properly the exact boundaries of the wards, because ward boundaries were available for urban areas and not for village panchayats, and (c) the deficiency in the methodology employed to estimate coverage error like vagaries of matching procedures and depending for the estimate of under-enumeration on one-way matching only (CBS, 1987: 5). On the basis of calculation of the events found in the census, Rele estimated that there had been 5.7 per cent over-count in comparison to the PES and raised considerable doubt as to the validity of the PES (1983: 5). Incidentally, the PES result was not published by the CBS.

Census data were analysed only for the 1952-54 census and not after. The five officials trained in New Delhi were responsible for this analysis including that of the procedures and methodologies adopted for the census and the experiences and difficulties encountered during the census. During the 1961 census these officials had been transferred to other ministries and departments of the government. The result of the 1952–54 census was published in one volume containing census data, analysis, census schedule and notification from 1911 to 1952–54. But in the 1961 census report, a brief note on census data was provided for each volume. The reports of the 1952-54 census were made available in 1957, whereas it took more than 10 years to publish all the results of the 1961 census. In the 1971 census the computer was first used in the country, but data could be made available in a limited number of computer prints only in 1974 and the printed publication appeared only in 1977. The UN consultant who tried analysis of the census results had great difficulty in making intercensal comparison between 1961 and 1971 because of changes in the number of districts and changes in district boundaries. For the analysis of the 1981 census data also the service of the UN consultant was utilised. The adviser supervised the analysis of the census data which was mostly done by the officials of the CBS.

Comparability of Census Data over Space and Time

Data that do not refer to a well-defined territory and time period have no meaning for development planning. Census data prior to 1961 had no well-defined periodicity but later censuses are taking place exactly at an interval of 10 years. However, the frequent changes in the district and panchayat boundaries have considerably reduced the importance not only of population census data but also

other data like agricultural census, industrial census, and different data at district and panchayat level. In the absence of a competent agency to project the past data according to the recurring changes in district and panchayat boundaries, the time series or intercensal analysis and comparison of district and panchayat level data have become virtually impossible. This has been made more difficult by the absence of village-level data which were being collected up to the 1961 census. Since 1971 data are available at the panchayat level whose boundaries are usually changing with population size and election. A village or a town on the other hand represents a socio-economic unit which has enduring boundaries and maintains its spatial identity for many decades. The maintenance of village-level data by Indian census has made the Office of the Registrar General competent enough to project the data of a new state or district in its present territorial dimension from 1901 onward. Intercensal district-wise comparison existed up to 1961 but has been virtually absent since 1971 (Kansakar, 1987: 16). The intercensal comparison between 1971 and 1981 is confined to geographic regions and development regions (The country has been divided into three geographic regions: the Terai, the Hill and the Mountain; and five development regions: the Eastern, the Central, the Western, the Mid-Western and the Far Western).

Nepal has already embarked on decentralisation and the need of data at the district and local or panchayat level for planning and administration has increased considerably. The changes in district and panchayat boundaries immediately after the 1981 census have made the census data unsuitable for meeting the data base for decentralisation. Since 1985 the country has pledged for the fulfilment of the basic minimum needs of the Nepalese people such as shelter, food, clothing, education, health and security by 2000 A.D. The need for local-level data on population has further increased. The panchayat-level data do not provide information on distribution of population by hamlet or village or town. The census of 1961 recorded a total of 28,662 villages and towns in Nepal with an average of 326 persons in each settlement (Kansakar, 1981: 20). The present panchayats numbering 4,048, in no way can portray the number of villages and their ranking by population size. Unless and until the population size of a village or a score of villages in close proximity is known the formulation of a plan and a strategy to provide basic minimum needs and services will be a myth.

SOME IMPORTANT VARIABLES OF POPULATION

Urban and Rural Classification

Up to 1961 an urban area in the census was defined as a settlement having a population of 5,000 or more and accordingly there were 16 urban centres in 1961. The first amendment of the constitution defined urban areas on political basis. The Town Panchayat Act of 1962 defined a town panchayat as 'an area having not less than 10,000 population', but it did not specify the other attributes of the town panchayat. However, some of the areas with less than 10,000 population were declared as town panchayats. In 1971, there were four such town panchayats and out of 23 town

panchayats in 1981, there were two such town panchayats. The overwhelming proportion of population engaged in non-agricultural activities as the main criterion for declaring an area as urban area in India and China is absent in Nepal.

Components of Population Change

Collection of data on migration started in 1952-54 and was confined to out-migration at the place of enumeration in the form of absentee population, not in-migration at the place of enumeration. Data on out-migration refer to migration within the country and emigration. In the 1961 census, data on migration were also available by place of birth and by nationality, while in the 1971 census the question on absentee population was deleted. Migration, particularly international migration, has played a dominant role in the growth of population apart from natural increase due to high birth rate and low death rate resulting from improvement in overall health conditions. The existence of an open border between Nepal and India has resulted in the high growth of population due to migration in Nepal. India's population is nearly 46 times that of Nepal and a small addition of population in Nepal due to immigration will have a tremendous impact on population growth rate of Nepal, while the addition of the same number in India's population will be unnoticeable in the growth rate of India. International migration has been a very sensitive issue in most countries of the world. India has deleted the question on nationality since 1971, while in Nepal data on international migration showed a decreasing trend indicating the tendency of foreign nationals and foreign-born population to falsely claim to be native born and Nepalese nationals. The census of Nepal indicated 337,620 foreign-born population in Nepal in 1961 while it went down to 337,448 persons in 1971 and further to 234,039 persons in 1981.

Data on Fertility and Mortality

Since the census of 1961, data on fertility, birth and death were collected. The quality of data is so poor that there are hardly any reliable data available on birth and death for the country as a whole (CBS, 1987: 249). In the absence of data on vital statistics, birth and death rates are estimated indirectly depending to a large extent on satisfying the assumptions each method of estimation poses (ibid.: 259). The estimate on fertility and mortality can be made at the national level, because intercensal comparison of these data is not possible due to change in district boundaries. The data only serve the purpose of international comparison rather than the formulation of plan, policies and strategies in different parts of the country.

Data on Employment

Though the data on economically active population and their occupational and industrial composition are available since 1952-54, their reliability has been very doubtful, apart from intercensal comparison. The change in definitions and concepts in different censuses made the employment data uncomparable (ibid.: 201). The proportion of economically active population in the non-agricultural sector indicated

an absolute decline in industrial categories like manufacturing, construction, transport and communication and this decline is perceptible in both the sexes. The national picture is not what the census data depict (Kansakar, 1977: 10) and the decline was also notable in the 1981 census. The decrease in the proportion of females in the labour force due to their categorisation into the housewife group is a misnomer of the actual situation prevailing in the country. As the overwhelming proportion of population is engaged in agricultural activities, the role of women is as important as that of men from the two major considerations: the seasonality of agriculture with part-time involvement on the one hand, and the active participation of women in agriculture particularly in the hill and mountain regions of Nepal due to the large-scale out-migration of men for employment opportunities, on the other.

POPULATION DATA FROM OTHER SOURCES

In order to fulfil the data need during the intercensal period on different aspects of population, there had been an attempt at collecting national-level data through different surveys. The most noteworthy are the national health survey (1966) by the Ministry of Health, Nepal and University of Hawaii; demographic sample surveys (1974–75, 1976, 1977–78 and 1986–87) by CBS; family planning knowledge, attitude and practice and fertility surveys (from 1974 to 1978) by the Nepal Family Planning and MCH Project; national fertility survey (1976) as part of the World Fertility Survey by Nepal Family Planning and MCH Project; the contraceptive prevalence survey in 1981 by NFP/MCH Project; the fertility and mortality survey in 1984 by New Era. These surveys are marked by the absence of defined periodicity and continuity. In the absence of village-level data, they had to adopt the village panchayat data either of census or of the electoral list of the Election Commission as sample units. But the utility of the data generated with a varying sample base becomes meaningless because of the changes in the village panchayat boundaries. Non-existence of village-level data and dependence on population or electoral data of village panchayats subjected to frequent changes in boundaries have made the survey data unusable for and non-comparable with other surveys.

The vital registration system was introduced in Nepal in 1978 after the establishment of the Office of the Registrar under the Ministry of Home and Panchayat in 1976-77. The Village Panchayat Law of 1962 made it compulsory for people to register vital events like birth, death, marriage and migration in the respective panchayats. Despite the imposition of fine for not reporting people showed little interest in registration; the fine has been since relaxed. The registration of vital events is so low that the collected data are not useful for arriving at any conclusion.

CONCLUSION

The importance of population census in a developing country like Nepal, characterised by lack of basic data in many fields, cannot be overlooked. Planning, policy formulation or researches based on unreliable census data are bound to fail and this is one of the main reasons behind the failure of development planning in

Nepal. In order to enhance the quality, reliability and usefulness of the population census data, the methods of data collection need to be improved through the following strategy:

1. Provision of sufficient number of manpower in the CBS with the background of demography and population studies;
2. A strong cartographic unit with adequate manpower, equipment along with large-scale maps with the smallest of the villages located;
3. Adoption of the village as the lowest territorial unit of enumeration, because a village or a town maintains its spatial identity and enduring boundaries for many decades unlike electoral constituencies which generally change with population size and ensuing elections. Moreover the village or the town constitutes an important unit in selecting samples for conducting other national, regional and district-level surveys.
4. Recruitment of well-educated people as field supervisors and enumerators. In this context, the recruitment of local school teachers holds a great promise for effective census coverage as well as correct and reliable entry of data in the census schedule.

The need for cooperation among the SAARC countries in improving the methods of data collection through censuses and surveys should be explored. In this context, India's experience of more than a century in population census can considerably help in the quality, consistency and comparability of census data in Nepal and among SAARC countries.

REFERENCES

CBS (Central Bureau of Statistics), 1987. *Population Monograph of Nepal,* Kathmandu: Central Bureau of Statistics.

CBS (Central Bureau of Statistics), 1977. *The Analysis of the Population Statistics of Nepal,* Kathmandu: Central Bureau of Statistics.

Department of Statistics, 1957. *Population Census of Nepal—1952-54* (in Nepali) Kathmandu: Department of Statistics.

Kansakar, Vidya Bir Singh, 1988. Indo-Nepal migration: problems and prospects, paper presented at the International Seminar on Indo-Nepalese Relations, Varanasi, February.

Kansakar, Vidya Bir Singh, 1987. A review of population census and enumeration division in Nepal and her neighbours, *Report of the National Seminar on Census Enumeration Division,* 7 July, Kathmandu: National Commission on Population.

Kansakar, Vidya Bir Singh, 1984–85. Nepal, China and India: Population profiles and policies, *Strategic Studies Series,* 2.

Kansakar, Vidya Bir Singh, 1981. *Scenario Analysis of the Basic Minimum Needs for Nepal:* 2000 A.D. Kathmandu: Centre for Economic Development and Administration.

Kansakar, Vidya Bir Singh, 1977. *Population Censuses of Nepal and Problems of Data Analysis,* Kathmandu: Centre for Economic Development and Administration.

Rele, J.R., 1983. *Report on a Mission in Nepal,* 7-18 June, Population Division, ESCAP.

Sharma, K.R., 1987. *Report of the National Seminar on Census Enumeration Division, July 7, 1987, Kathmandu*, Kathmandu: National Commission on Population.

6

DEVELOPMENT OF DATA COLLECTION SYSTEM AND VITAL STATISTICS IN SRI LANKA: AN OVERVIEW

K.H.W. GAMINIRATNE
Department of Census and Statistics
Colombo, Sri Lanka

INTRODUCTION

Since the late nineteenth century Sri Lanka has had a long series of regular population censuses and a well-established vital registration system. Both these systems are a legacy of the British rule, from 1796 to 1948, during which period there was also a sound system of maintaining administrative records. The wealth of demographic information available in the country has led some scholars to describe Sri Lanka as a true demographic laboratory (Taeuber, 1949). This paper provides an overview of the national statistical system of Sri Lanka and examines the current status of vital registration. The paper is divided into three main parts. Part 1 gives a brief history of the evolution of the statistical system in Sri Lanka and how the collection of statistics is integrated into a national system. Part 2 describes the basic features of the vital registration system and briefly evaluates the coverage and quality of the vital statistics. Part 3 deals with the more general problems of the national statistical system and indicates areas where attention should be paid.

STATISTICAL SYSTEM IN SRI LANKA

History

From the beginning, the British administration in Sri Lanka, then known as Ceylon, began to systematise the collection of demographic data and registration of vital events in the island. Several ordinances were enacted after 1815 to establish the system of marriage registration, making non-registration a punishable offence. The legal penalties imposed were however ignored by the people who continued to marry and separate as they had done before forcing the administration to change the policy

The author is currently at Department of Demography, Australian National University, Canberra, Australia.

with regard to marriage registration (Gooneratne, 1959). Several decades later, a Department of Registrar General was established in 1867 to register the marriages, births and deaths in the island. The registration of births and deaths was made compulsory only after 1895. Before long the responsibility of conducting population censuses also became the function of the office of the Registrar General. The first in the series of regular censuses was conducted in 1871 under the legal provisions of the ordinance of 1869. This ordinance was replaced in 1880 by one under which the next two decennial censuses were taken. The ordinance of 1880 was found to be inadequate for the censuses to be conducted effectively so that more comprehensive legislation along the lines of Indian census law was adopted. The census ordinance so drafted provided a basis for modern census taking. It included among others measures such as procedures of census taking, appointment of census officials, fixing responsibilities to individuals, making public and other agencies legally bound to cooperate with the census work. Necessary measures were also introduced in the ordinance to safeguard the secrecy of the personal information collected. This legislation of 1900 has been amended three times since then but its basic features still remain unchanged.

In 1935 further legislation was brought in to establish a regular Department of Statistics. This ordinance (Statistics Ordinance) empowered the Department of Statistics to collect, compile, process and publish demographic and socio-economic statistics pertaining to the inhabitants of the country. In 1947 the Department of Statistics was given the responsibility of conducting regular censuses as well, and accordingly it was renamed the Department of Census and Statistics (DCS).

Although census taking and collection of statistics became the function of the DCS, other government departments also continued to collect data for administrative and other purposes. By a decision of the cabinet in 1951 such statistical work also became the function of DCS, which subserviently became the central agency for maintenance, and supply of all statistics for official purposes. This agency has been enlarged over the last three decades and today it collects, compiles, and processes statistics of almost all aspects of socio-economic activities.

Statistical Organisation

The DCS currently functions under the Ministry of Plan Implementation. In order to perform its function as the central agency for collection of statistics, it has established statistical units in all key government ministries and departments. These units assist the department to collect, compile and process the statistics required for its administrative, planning and other purposes. The data so collected are led into the central statistical system for dissemination. The departments concerned also publish the data generated by them in their annual administration reports. By providing its statistical staff to other ministries and departments for statistical work the DCS exercises a certain degree of control and coordination over the collection of statistical work.

At the headquarters the DCS is organised into 14 divisions of which 10 are subject matter divisions. The statistical work of the other ministries and departments and the staff attached to them are supervised by the relevant subject matter division in

the DCS. The DCS has a well-established field organisation as well, with statistical units under a senior officer attached to each of the 25 district *kachcheries* (district administrative offices) and with a Statistical Investigator in each of the 250 Assistant Government Agent divisions (see Figure 1).

Although the DCS is the authority responsible for official statistics there are other agencies, mostly non-government, which also collect socio-economic statistics on a regular basis. For instance, the Central Bank of Sri Lanka compiles monetary, financial and national income statistics and conducts socio-economic surveys. Likewise, the Agriculture Research and Training Institute in Sri Lanka collects data on the cost of production of paddy and other agricultural commodities and conducts ad hoc socio-economic surveys.

Data Sources

The main data base of the central statistical system of Sri Lanka consists of three major elements: periodic censuses, intercensal surveys, and administrative records.

(a) *Periodic censuses:* Sri Lanka has a tradition of conducting censuses on a regular basis. These are, census of population, housing, agriculture, industry, and public sector employment. All censuses except the latter which is taken at four-year intervals, are taken every 10 years. The censuses of agriculture and industry, although they do not have along data series normally follow the population census. Population censuses in Sri Lanka are conducted on a *de jure* basis. A census of housing is also carried out along with the population census.

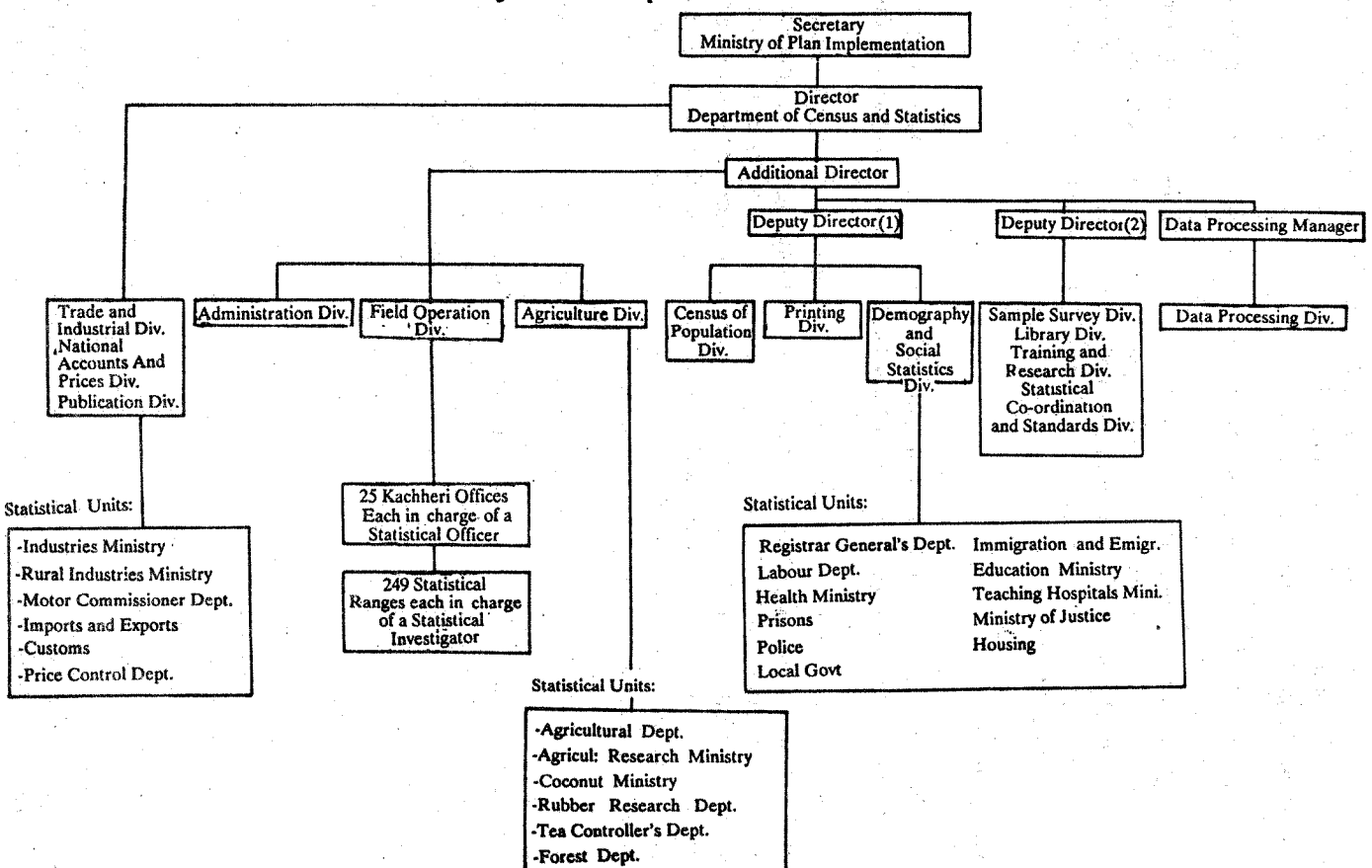
(b) *Intercensal household surveys:* These are carried out to obtain more detailed data on demographic and socio-economic characteristics of the population. In the past socio-economic and labour force surveys were conducted on ad hoc basis. Owing to the growing data needs of the country, specially at subnational level, the DCS has established a regular sample survey programme under the National Household Survey Capability Programme (NHSCP). Under the NHSCP the DCS has carried out surveys on labour force, income and expenditure and household economic activities. It is envisaged to repeat these surveys at regular intervals.

There are also some surveys conducted on an ad hoc basis often in collaboration with external agencies. For instance, the 1975 World Fertility Survey of Sri Lanka, the 1982 Sri Lanka Contraceptive Prevalence Survey, and the 1987 Sri Lanka Demographic and Health Survey. These surveys provided important and reliable data to assess the levels, trends and determinants of fertility, and contraceptive use of the population.

(c) *Administrative records:* Among the administrative records, data on arrivals and departure maintained by the Department of Immigration and Emigration and the registration records maintained by the Registrar General are important. In the case of immigration and emigration records, only a very limited information is collected. The records available for statistical purposes carry items such as age, sex, country of

FIGURE 1

Organisation chart. Department of census and statistics



citizenship, country of origin or destination, purpose of travel. In addition separate records are maintained on the persons of Indian origin repatriated under the Indo-Ceylon Pact. Statistics on arrivals and departures are tabulated manually at the statistics unit of the Immigration and Emigration Department and a limited number of statistical tables are produced.

Out-migration of Sri Lankans for employment pur poses, has for some time, assumed ever increasing importance in terms of volume, income generated by the process, and the overall development of the country. However, this constitutes a major statistical gap in the country as there has not been a systematic attempt to collect data on this important aspect of international movement.

VITAL REGISTRATION SYSTEM AND VITAL STATISTICS

Vital Registration

Vital registration in Sri Lanka is the responsibility of the Registrar General who functions under the Ministry of Home Affairs. The Registrar General is responsible for several other functions as well, which are authorised by ordinances such as the Stamp Ordinance, Mortgage Ordinance, Powers of Attorney Ordinance, and Registration of Documents Ordinance. His duties and functions with regard to the registration of vital events—marriages and divorces, births and deaths—are provided in four separate ordinances.

Registration of Marriages and Divorces

For the purpose of registration of marriages and divorces the population of the country is divided into three broad groups: Kandyan Sinhalese, Muslims and the rest. Kandyans are the descendants of the Sinhalese living in the traditional Kandyan provinces (Central, North Central, Uva, Sabaragamuwa and portions of Eastern and North Western provinces) as distinguished from the low-country Sinhalese. They have their own marriage customs and the current laws governing Kandyan marriages and divorces are contained in the Kandyan Marriage and Divorce Act of 1952. Muslims are those who profess Islam and mainly consist of Moors and Malays. Matters relating to their marriages are governed by the Ordinance of 1886 which provided legal sanction for the maintenance of registers of marriages. The law governing their marriage registration now in force is contained in the Muslim Marriage and Divorce Act of 1951.

The rest of the population is subject to the provisions of the General Law and the registration of these marriages is covered by the provisions of the Marriage Registration Ordinance of 1907. Registration of marriages is compulsory for all marriages contracted under the Kandyan and Muslim marriage laws but is optional for the others. However, it has been observed that while not all Kandyan and Muslim marriages are registered, most of the marriages contracted under the General Law are registered. The census data on marriages collected by

recent population censuses indicate that the proportion of customary marriages to all marriages has rapidly declined. In 1946 the customary marriages constituted nearly a third of all marriages, but, in 1981, they were only 10 per cent (Table 1).

TABLE 1

Customary marriages in Sri Lanka as proportion to total marriages by sex for census years 1946–81

	1946	1953	1963	1971	1981
Male	30.5	28.2	19.6	18.4	10.0
Female	31.6	28.7	20.2	20.2	10.5

Source: Department of Census and Statistics (1986).

Registration of Births and Deaths

Unlike the registration of marriages, the registration of births has a single law applicable to all persons, provisions of which are contained in the Birth and Death Registration Act of 1951.

Registration Areas

For effective performance of registration, the Birth and Death Registration Act requires the country to be divided into three areas: towns, estate and rural. For the purpose of registration, towns are defined as areas so proclaimed by the Registrar General. Estates are defined as plantations of 10 acres or more in extent and whose resident population is covered by the provisions of the Medical Wants Ordinance. The rest of the areas—non-proclaimed towns and non-estates—are considered rural.

In towns the Act specifies that registration of births and deaths should be attended by a 'medical practitioner or a practitioner of Ayurvedic medicine or a holder of a certificate of competency issued by the Director of Health Services'. The Act requires that all still births which occur in the proclaimed towns, where medical men function as the registrars, should be registered in addition to the births and deaths. Currently there are 62 proclaimed towns with medical registrars and they cover about 12 per cent of the population (Gaminiratne, 1984). In the rural areas, registration of births and deaths is attended by persons who are appointed for the purpose by the Ministry of Home Affairs. They are mostly laymen and the criterion used for the selection is that they should be 'persons with local influence and good standing and with a reasonable level of education'. They also should show the ability of obtaining cooperation of the people and institutions of the area. In estate areas there are no special registrars. The responsibility of reporting births and deaths in an estate is, however, vested with the superintendent of the estate who is required to report the events to the nearest registrars for registration. Of the total registration divisions of births and deaths (928) in the country in 1982 about 93 per cent were lay registration divisions (ibid.).

Time Limits for Registration

The Birth and Death Registration Act specifies the individuals and the agencies responsible for reporting a birth and death and also specifies the time allowed for each of them to report an event to the registrars. In general, for reporting births to the registrars the time limit allowed by the Act is 42 days from the date of the event. In the case of a death (or a still birth), the event should be reported to the registrar in five days from the date of death. The Act however permits late registration of births and deaths without any fine or penalty and accordingly the Act authorises registering an event within three months immediately after the date of the event.

Contents of Registration Forms and Statistical Returns

Two sets of forms are used by the registrars: one for the registration and the other for reporting statistics. The items of information included in the registration forms are prescribed in the law and any new items to be included necessitate amendments to the relevant sections of the law. The major items of information collected in the birth registration form are date and place of birth, sex of the new-born, date and place of birth, race, and rank (or profession) of the father, date and place of birth, race, and age of the mother at the time of birth, and the legitimacy of the birth. However, the statistical return on births does not provide space to record any information on the father. The statistical return carries additional information on type of birth (single or multiple), place of birth (confinement). Since recently information on live birth order has also been collected.

The registration of death schedule has provisions to collect information on items such as the date and place of death, sex, race, rank or profession of the deceased, age at death, cause of death and date of registration. The statistical return carries most of the information except for the rank or profession and the place of death (hospital or other). The statistical return used to report particulars of deaths has space to include the immediate cause, antecedent and underlying cause of death. The registration schedule of still births contains provision to record information on date and place of occurrence, sex, type of still birth (single or multiple), age and place of residence of mother, rank or profession of the mother and the father, and pregnancy duration at still birth. The last two items are, however, not reported in the statistical return.

The registration forms used to report marriages vary somewhat between the marriage types but there are certain items common to all three marriage types. They include age, civil condition, place of residence, and date of marriage. All these are reported in the statistical return as well.

Compilation of Vital Statistics

Vital statistics are compiled at the Vital Statistics Branch (VSB) of the Department of Registrar General. Since 1951 the responsibility for compilation of vital statistics had been transferred from the Registrar General to the DCS. However,

the collection of statistical returns from the districts continues to be the responsibility of the Registrar General.

Each of the local registrars is expected to report all events registered in the division to the district registrars before the 10th of the following month to be forwarded to the VSB. These returns are edited and coded by the staff of the VSB who send them to the DCS for data entry, computer editing and tabulations. The data are normally tabulated according to the date and area of registration and certain tabulations for urban areas are done according to the place of usual residence.

Coverage of Birth and Death Registration

The quality, coverage and the effectiveness of the registration system vary according to the registration division in which the events occur. In the case of deaths, the cause of death statements reported for town areas are considered as of high quality as in those areas registration is done by medical men. In towns most deaths are medically certified as the majority of deaths are preceded by an illness. Even otherwise the medical registrars are better able to inquire and report the best possible cause of death. The causes of death information provided for rural areas are often unsatisfactory. Except where the cause of death is medically determined, the lay registrars are often unable to describe the condition accurately to enable detailed coding. In Sri Lanka the proportion of deaths attributable to symptoms and ill-defined conditions constitute nearly 25 per cent.

In 1953, an attempt was made by the DCS to estimate the coverage of birth and death registration along with the post-enumeration of the 1953 population census. The survey covered a nationally representative sample of about one per cent of the households. The sample was stratified by urban and rural sectors and births and deaths which took place in the selected households between 1 January 1953 and 31 March 1953 were recorded: the information so collected was later matched with the registration records. The survey showed that for the country as a whole 11.9 per cent of the births and 11.4 per cent of the deaths were not registered (Kannangara, 1953).

In 1967, a similar sample survey was carried out by the DCS in about one per cent of the households selected from a stratified sample of urban, rural and estate sectors. Births and deaths which took place in the households were recorded in a schedule and later matched with the registration records. The survey showed that for the country as a whole the coverage of birth registration was as high as 98.7 per cent. The estimated coverage of both births and deaths was 100 per cent for the urban and estate sectors (Aponso, 1971). It may be noted that in the case of unmatched events this survey did not make revisits to households in order to verify the information as was done in the previous study.

A further attempt was made in 1981 by the DCS to estimate the extent of under-registration. The study was done along with the post-enumeration survey to estimate

the coverage of the population census of 1981 and covered a representative sample stratified by urban, rural and estate sectors. The survey covered a little less than one per cent of the census blocks of the 1981 population census. The data on births and deaths in the households between 1 January 1980 and 31 March 1981 were recorded and later matched with the registration. Unlike in the 1967 study unmatched events were checked with registration records of the preceding and succeeding months, and to eliminate reporting errors, verifications were also made by revisiting households. This survey revealed that the coverage of birth registration was 98.8 per cent complete while for death it was 94.5 per cent (Department of Census and Statistics, 1984).

TABLE 2

Completeness of coverage of birth and death registration in Sri Lanka, 1953, 1967 and 1980

	Births			Deaths		
Sector	1953	1967	1980	1953	1967	1980
All sectors	88.1	98.7	98.8	88.6	94.5	94.0
Urban	96.8	100.0	98.6	94.7	100.0	92.9
Rural	86.6	98.3	99.3	86.9	91.7	92.2
Estate	*	100.0	93.6	*	100.0	100.0

*estates not covered.

Source: Kannangara (1953).

The data suggest that there has been a slight deterioration in the coverage of vital events particularly in urban areas. Owing to the variations in the procedures adopted in the above surveys in matching events, one cannot judge whether the coverage of registration has actually been declining or improving. Immerwahr and Pollack (1983) have observed that following the discontinuation of the infant milk ration after 1977 which was an important incentive for early registration of births, there is a delay in registration of births and have drawn attention to the possibility of under-registration of births and deaths. They argue that if an infant dies before its birth is registered both events can escape registration. There is evidence to show that there are now substantial delays, even beyond the time limits allowed for registration, in registering a birth or a death as revealed in the 1981 survey (Table 3). Even though a slight deterioration of the coverage of vital events has been observed, there are, in fact several factors operating which will ensure a high coverage.

Factors Influencing High Coverage

Sri Lanka has a well-developed medical and health care network covering all parts of the country. For several years over 80 per cent of the registered births in the country have taken place in government medical institutions which ensures high coverage of registration. In the case of births taking place in hospitals the hospital

TABLE 3

Births and death registration classified according to duration between occurrence and registration, 1967 and 1980, Sri Lanka

Duration*	1967		1980	
	Births	Deaths	Births	Deaths
1 month	52.8	79.2	52.0	76.0
1—3 months	47.2	20.8	45.2	17.8
3 months or more	—	—	2.8	6.2
All durations	100.0	100.0	100.0	100.0

*Duration since occurrence
Source: Gaminiratne (1984) Table 1.1.

authorities normally insist on proof of registration of a birth before the baby and the mother are discharged. Similar procedures are adopted for hospital deaths. In major hospitals where a large number of deliveries are taking place, office space within the hospital is provided for the registrar, so that births and deaths can be registered without delay. In the case of births and deaths taking place in private hospitals, nursing homes etc., according to the provisions of the Birth and Death Registration Act, they should be duly reported to the registrar in their weekly returns. Thus the presence of a large proportion of institutional births ensures a high coverage. The number of deaths taking place in institutions are however small—about 40 per cent.

In proclaimed areas, there are other regulations in operation which make it imperative to register a death (or a still birth). The Cemetery and Burial Grounds Act specified that in town areas dead bodies should be cremated or buried in an authorised cemetery. The Birth and Death Registration Act specifies that 'no person can bury, cremate or otherwise dispose of the corpse of a person dying' in these areas without a proof of registration, and cemetery keepers insist on proof of registration before the burial or cremation permit is issued. Similarly funeral undertakers require a copy of the death certificate in order to transport a corpse. These burial formalities are however not present in the estate or rural areas.

Another important factor ensuring high coverage of registration is education. In Sri Lanka education is provided free of charge from kindergarten to university level and parents, irrespective of their social status, have a great concern about the education of their children. For school admissions production of a birth certificate is essential. The high level of literacy of the population also to a large extent ensures the high coverage of registration.

PROBLEMS AND LIMITATIONS

Although the statistical system in Sri Lanka is well established and has expanded rapidly in terms of quantity and quality, there are several drawbacks which require remedies:

(a) *Time-lag between collection and publication of detailed data.* The data collected in a large-scale operation like a population census normally involve a substantial time-lag. As such detailed data at smaller-area level will normally be available after about three years of the date of census. By then the data become outdated. There is an unfortunate delay of about three to four years in releasing detailed vital statistics relating to a specific year (and publication of data takes even longer). The main delay appears to be in the difficulty of collection of statistical returns from the registrars and there is also a delay in processing data.

(b) *Lack of coordination.* The DCS exercises a certain degree of coordination over the collection of statistics of the country but in several respects the coordination is not effective. As a result there exists a certain degree of duplication in the statistical work carried out by the agencies outside the statistical system and the DCS and occasionally between the agencies within the statistical system.

(c) *Lack of uniformity and comparability.* The lack of comparability can be seen in two main areas in geographic coverage and in the concepts and definitions used. Many agencies collect and maintain data according to their own administrative units which often differ from that of the civil and local government administration. The urban, rural and estate definitions used by the vital registration system differ from those of the census system. Therefore the data on urban, rural and estate sectors used for the generation and publication of statistics by the two systems are not exactly comparable. The other is the difference in the concepts and definitions used. Labour force data provide a good example: the labour force data collected at the 1963 and 1971 censuses are not comparable as the former used the concept of gainful employment and the other used the labour force concept. The 1981 census also used labour force concept but the procedures used to approach data were different.

(d) *Absence of a proper geo-coding system and accurate maps at village level.* Village lists are continuously updated by the DCS for the use of population and other censuses but there is no proper geo-coding system developed. The absence of village-level maps has been a serious problem facing DCS in planning censuses. In Sri Lanka as a prelude to a population census a listing and numbering of dwellings is carried out. The demarcation of census blocks (enumerator areas) is also attended to at this stage. The census blocks so demarcated and the household information collected at this stage will serve as the basis for future censuses and household surveys. In the absence of accurate maps at village level, the success of the work will almost entirely depend on the judgement of the listing officers.

(e) A more common problem which hinders further development of the statistical system is the *lack of interest and the low priority accorded to the function of statistics in the agencies*. This has led to budgetary and manpower constraints in the collection, supervision and compilation of statistics. The statistical work of most government departments has not yet been automated and this factor has prevented any further improvements in the data collection system.

REFERENCES

Aponso, W.M.L.S., 1971. *A Study of Extent of Under-registration of Births and Deaths*, Colombo: Department of Census and Statistics.

Department of Census and Statistics, 1986. *Census of Population and Housing 1981 General Report Vol. 3*, Colombo: Department of Census and Statistics Press.

Department of Census and Statistics, 1984. *Report on a Study to Estimate the Completeness of Birth and Death Registration in Sri Lanka, 1980*, Colombo: Department of Census and Statistics Press.

Gaminiratne, K.H.W., 1985. Civil registration system and vital statistics in Sri Lanka, paper presented at the Asian Seminar on Civil Registration and Vital Statistics, 10–16 December, ESCAP, Bangkok.

Gaminiratne, K.H.W., 1984. *Trends in Causes of Death: 1971–1979,* Population Information Centre Research Paper Series No. 1, Colombo: Ministry of Plan Implementation.

Goonaratne, T.E., 1959. An historical outline of the development of the marriage and divorce law in Ceylon: General and Kandyan Marriage Laws, *Report of the Commission on Marriage and Divorce*, Sessional Paper XVI, Colombo: Government Press.

Immerhwar, G.E. and Pollack, M., 1983. *Health and Population Problems In Sri Lanka,* Washington, D.C.: American Public Health Organization.

Kannangara, I., 1953. *Post Enumeration Survey 1953,* Monograph No. 1, Colombo: Department of Census and Statistics.

Taeuber, I., 1949. Ceylon as a demographic laboratory, *Population Index,* Vol. 15, No. 4, October.

7

RECENT CHANGES IN POPULATION POLICIES: MALAYSIA AND SINGAPORE

Paul P.L. CHEUNG
National University of Singapore
Singapore

Direct government actions to reduce fertility have become the hallmark of population policies of most governments in the developing world. Asia, in particular, has been quick in endorsing this theme. By 1966, when the United Nations legitimised the inclusion of fertility limitation programmes in technical assistance, 12 out of 22 Asian nations had adopted explicit antinatalist policies (Ness and Ando, 1984). Malaysia and Singapore were among this group of early believers. Singapore introduced the National Family Planning and Population Programme in 1965 and established the administrative body, the Singapore Family Planning and Population Board (SFPPB) in the following year. In Malaysia, the Family Planning Act was enacted in 1966, and the National Family Planning Board (NFPB) was established to oversee its implementation.

Acclaimed world-wide as model programmes, the family planning efforts of Malaysia and Singapore developed and expanded rapidly in the first 15 years. In the early 1980s, however, the desirability of continuing their antinatalist policies was questioned in both countries in response to changing economic and demographic circumstances. In 1982, the Malaysian Prime Minister surprised many in openly expressing the economic advantages of a larger population base for Malaysia. Subsequent policy review led to the revision of the Family Planning Act in 1984 with strong pronatalist implications. In Singapore, concerns for the adverse implications of sustained below-replacement fertility since 1975 gave rise to a comprehensive review of its population programme. The SFPPB was eventually closed in 1986, and the pronatalist New Population Policy was announced in 1987.

These policy reversals place Malaysia and Singapore distinctly apart from other countries in the region still vigorously pursuing antinatalist policies. Are these changes merely idiosyncratic responses to country-specific circumstances? Or are they signals of a new era in population policy in Asia, a region that has made significant strides

toward population control? This paper examines the background to the revisions and the new policy objectives. Their likelihood of success will then be assessed. Finally, implications for other Asian countries will be drawn.

BACKGROUND

When Malaysia enacted the Family Planning Act in 1966, its population was growing at the rate of about 3 per cent per annum, and the total fertility rate (TFR) was about 5.6 per woman. The impetus for population control came from the Economic Planning Unit which in 1963, upon review of the then five-year plan, expressed grave concerns over the adverse effects of rapid population growth. The Unit was instrumental in defining the Malaysian government's position in population matters, a role it has continued to date. The economic rationale in population control was clearly stated in the First Malaysia Plan (1966–70):

> A high rate of population increase poses challenging problems of finding productive employment for each year's new entrants into the labour force and imposes a social cost in that resources which might have been used to increase levels of welfare must instead be devoted to supporting the growing population at the existing standard of living.
>
> (quoted in United Nations, 1987: 25)

In the 20-year Perspective Plan introduced in the same year, which outlined the broad path of national development, the family planning programme was given the target of reducing the annual population growth to 20 per cent by 1985. For each of the four subsequent five-year plans, specific crude birth rate targets were set. As shown in Table 1, the targets were met in the first two five-year plans (1966–75). From the mid-1970s, the decline in the crude birth rate levelled off on the strength of the baby boom cohorts coming into the reproductive span. The TFR, however, continued to decline until the early 1980s. By 1985, the TFR for Malaysia was 3.8, and the rate of natural increase stood at 2.6.

The decline in TFR was largely attributed to the delay in marriage timing which has occurred in all ethnic groups (Hirschman, 1986; Leete and Tan, 1988). The significant declines in marital fertility and completed family size among the non-Malays were also an important contributing factor. The 1985 TFR for the Chinese and Indians stood at 2.4 and 2.9 respectively. For the Malays, the decline in marital fertility was visible up to the mid-1970s, but has levelled off subsequently. In the early 1980s, the fall in the Malay TFR has been reversed, largely because of the catching up of births among those who delayed marriage. The rise in Muslim fundamentalism also caused the switching over to less effective family planning methods. It is unclear whether the decline is likely to resume in the near future as conflicting forecasts have been made. In 1985, the Malay TFR was at 4.8 rising from a low of 4.3 in 1978.

Over the span of the four Malaysia Plans, population policy emphasis was regularly modified in line with changing socio-economic circumstances. In the

First Malaysia Plan (1966–70), emphasis was placed on the importance of family planning for successful economic and social development. The thrust of the plan was to establish an effective family planning programme. The Second Malaysia Plan (1971–75) continued the emphasis on family planning, but broadened the scope of population planning to include sectorial development impact on education, health and housing. In the Third Malaysia Plan (1976–80), the reliance on a clinic-based, health-oriented programme had widened to become community based and welfare oriented, setting the stage for the subsequent shift from 'family planning' to 'family development'.

TABLE 1

Selected fertility indicators, Peninsur Malaysia and Singapore, 1965–85

	Malaysia				Singapore			
	Birth rate		Growth* rate	TFR*	Birth rate		Growth* rate	TFR*
	Targeted	Actual*			Targeted	Actual*		
1965	—	36.7	2.88	5.6	—	29.9	2.41	4.7
First Five-Year Plan (1966–70)	37.2–35.0	32.5	2.55	4.9	20.0	22.1	1.70	3.1
Second Five-Year Plan (1971–75)	32.5–30.0	30.3	2.41	4.2	18.0	17.7	1.26	2.1
Third Five-Year Plan (1976–80)	30.0–28.2	30.3	2.48	4.0	—	17.1	1.19	1.7
Fourth Five-Year Plan (1981–85)	30.3–26.0	31.3	2.60	3.8	—	16.6	1.14	1.6

Note: * indicates end-of-period figure.

The five-year plans in Malaysia are also known as Malaysia Plans. In Singapore, there are only two five-year plans.

Sources: United Nations, 1987. Case Studies in Population Policy: Malaysia, Population Policy Paper No. 14; Singapore Family Planning and Population Board Annual Reports.

The Fourth Malaysia Plan (1981–85) marked a significant departure from the previous Plans. Although still endorsing the 2 per cent growth target, the Plan has to respond to the changing economic circumstances of the country after 15 years of rapid economic growth. In the preceding five-year period, Malaysia's GDP grew by an annual rate of 8.6 per cent. By 1980, a labour shortage had occurred, especially in the rural sector. Recognising the need for economic restructuring and higher productivity growth, the plan emphasised the urgent task to upgrade the quality and productivity of the labour force. Concern was also expressed regarding the adequacy of population growth to meet future manpower needs. The stage was therefore set for a review of the population policy as the economic basis of population control appeared to be outdated.

In Singapore, fertility control was viewed in 1965 as one of the major challenges confronting the newly independent country. At the inauguration of the SFPPB, the then Minister for Health made clear the government's emphasis:

> Singapore . . . is a very overcrowded little island of nearly 2 million people living in an area of just over 2 hundred square miles or a density of around 8000 people per square mile. Family planning is therefore a matter of national importance and indeed one of urgency for us. Our best chance for survival in an independent Singapore is to stress on quality and not quantity.
>
> (quoted in Saw, 1980: 52)

The concern for an overpopulated Singapore was well founded. When the city-state of Singapore gained independence in 1965, its growth rate, at 2.5 per cent, would double the population in about 28 years. Recognising the danger of excessive population pressure on inadequate socio-economic infrastructure and physical resources, the government pursued the family planning programme with vigour. The first five-year plan (1966–70) focused on the provision of contraceptives within the reach and financial means of everyone, the liberalisation of sterilisation and abortion practices, and intensive, broad-based information and education efforts. An ambitious crude birth rate target was set which was nearly achieved (Table 1). These efforts continued in the second five-year plan. Moreover, a comprehensive package of incentives and disincentives, introduced in 1969, were further intensified in 1972 to avert the levelling off of the fertility decline. These policy measures, especially the disincentives, were designed to exert pressure on couples to limit their family size. In addition, sterilisation was promoted as the best contraceptive method for those who had completed their families, and abortion became available on demand for a small fee in government facilities.

The intensity of the family planning programme, coupled with the rapid socio-economic transformation of the society, accelerated the fertility decline which had begun after the Second World War. The rapidity of the decline, which occurred in all ethnic groups, was impressive. Singapore's TFR dropped rapidly from 6.6 in 1947 to 4.5 in 1966, 3.1 in 1970, and 2.1 in 1975. Since 1976, the TFR drifted steadily lower. It fell to 1.44 in 1986, the lowest ever in Singapore and Asia. The Chinese TFR fell to 1.26, while the Malay and Indian TFRs were at 2.05 and 1.89 respectively.

The rapid drop in TFR was an outcome of two changes: a shift towards late marriage and a significant reduction in completed family size (Cheung, 1988a). The delay in marriage timing has been drastic. By 1985, 19 per cent of the women and 27 per cent of the men remained unmarried at ages of 30–34, as compared with 4 per cent and 17 per cent respectively in 1957. The completed family size, on the other hand, dropped from 5.5 in 1970 to 3.2 in 1985.

THE NEW POPULATION POLICIES

In September 1982, Dr Mahathir Mohamad, the Prime Minister of Malaysia, first hinted at a new policy initiative when he stated that Malaysia could support a population of up to 70 million, or about five times the size of the 1982 population. In subsequent statements, he reaffirmed the desirability of a 70 million population as optimal for Malaysia. The mid-term review of the Fourth Malaysia Plan spelled out the basis for the new target:

> Malaysia's population is relatively small and the nation has the capacity to generate the wealth that will support a much larger population. The domestic market is relatively small and this has also put constraints on the development of industries. Recognizing that a large population constitutes an important human resource to create a larger consumer base with increasing purchasing power to generate and support industrial growth . . . , Malaysia could, therefore, plan for a larger population which would ultimately reach 70 million.
>
> (quoted in United Nations, 1987: 34)

In January 1983, the Ad hoc Committee on Population Issues was set up by the then NFPB to review the population growth trends and to recommend the path to a 70 million population. Its report, fully adopted by the government and published in July 1984, recommended that the present fertility decline be slowed down such that the targeted population size could be achieved in 115 years, or around the year 2100. Specifically, it recommended that TFR be reduced by about 0.1 point every five years from 1985, such that a replacement-level TFR would be achieved by about 2070.

To slow down the fertility decline, several measures were introduced in 1984. A five-child family norm was promoted when the Prime Minister encouraged Malaysian parents to 'go for five'. The theme was echoed by other ministers and politicians. In support of this, maternity benefits, previously limited to the first three children, were allowed for five children. Tax deductions were similarly extended. As the Family Planning Act was amended to become Population and Family Development Act, the NFPB was also renamed the National Population and Family Development Board (NPFDB) to reflect an emphasis on family welfare and development, rather than family planning.

In Singapore, the government's announcement of the new policy in March 1987 did not create as much of a surprise as in the case of Malaysia, but probably generated equal intensity in public discussions. The issue was first raised by the Prime Minister in 1983 when he noted with concern the fertility differentials by education and the future impact of below-replacement fertility of the higher educated for Singapore. Subsequently, the population quality issue was downplayed because of adverse public reaction. As more data became available, the issues of population ageing and potential population decline became the focus of discussion. Thus, the

need for a balanced age structure and a sufficient supply of future labour force became the premise of the policy revision. With a TFR of 1.4 to 1.6, projections showed that population decline would set in as early as 2020, and the ageing of the population structure would be rapid. Moreover, labour shortage continued to be the major obstacle to faster economic expansion (Pang and Cheung, 1988). In 1986, the Population Planning Unit was established to review the demographic situation and to recommend appropriate actions. The new policy was eventually announced in March 1987 by Goh Chok Tong, the First Deputy Prime Minister, with the immediate objective of raising fertility to the replacement level.

The thrust of the new policy is to change the two-child family norm inculcated among the people in the past 20 years. The new policy slogan, 'Have Three, or More if you can afford it' reflects the government's intention of encouraging a three-child family norm for all, with the qualification that those who can afford it should have more than three children. To achieve this, a package of incentives was announced which surprised many for its generosity (Cheung, 1987). The incentives include:

* A special tax rebate of S$20,000 will be given to parents for the birth of their third child, to be deducted against the income tax payable by either or both parents. In addition, a tax rebate of 15 per cent of the mother's earned income is allowed for working women.

* The delivery and hospital costs arising from the delivery of the fourth child can be offset against the parents' earned income up to a maximum of S$3,000.

* A $100 subsidy is given to all children enrolled in child-care centres.

* Married female civil servants will be given special unrecorded leave to look after their sick children who are below six years old. A total of five days are allowed for each child. The private sector is encouraged to establish similar schemes.

* The high proportion of singles in the population is addressed. Since 1984, a unit has been established in the government to create opportunities of interaction among male and female graduates. In addition to organising various activities, the unit also offers a computerised match-making service. In 1985, the service was extended to those without university education. The importance of the marriage programme is recognised and the range of activities will be significantly expanded.

* A programme of public education on the three-child norm will be launched. Multimedia approaches are used and the programme is expected to reach all sectors of the population.

* Various advantages will be given to three-child families such as in school registration for the child and in housing allocation.

* Although no changes were made to the accessibility of abortion and sterilisation, counselling will be offered to women seeking abortion and sterilisation.

ASSESSMENT

The two new population policies are designed to counter demographic trends brought about by the socio-economic development of each country and population programmes previously introduced. In the case of Malaysia, the aim is to slow down fertility decline sufficiently such that an optimum population target can be achieved. As Singapore's fertility level is already at rock-bottom level, its objective is to generate a rebound to the replacement level. The experiences of these two countries raise two interesting questions: Can fertility decline be moderated once it has begun? Can fertility be increased once it has stabilised at the 'post-transition' level?

The Malaysian case is interesting as it has set a specific population size as target over a period of 115 years. Few countries in the world have adopted such a long-term perspective in population planning. However, the target of 70 million should not obscure the more salient objective of moderating fertility decline such that population growth can continue at a moderate level. Clearly, Malaysia has the capacity to carry a larger population. Its present population density of about 50 per sq. km. compares favourably with the Western European countries. Given the economic optimism in the late 1970s and early 1980s and the growing labour shortage, the economic rationale of having a larger population base is not unreasonable. The recession in 1985–87 has of course cast doubts over this line of reasoning and retarded the government's push for higher fertility. In the long run, however, the economic prospect of Malaysia is promising, and a higher rate of population increase in tandem with economic growth could well be accommodated.

The central question however is whether fertility decline can be moderated once it is in process. The new policy expects the TFR to reach replacement level by 2070. It has been shown that, if past trends can be used as a guide, replacement-level fertility could be reached by the Chinese and Indians as early as the year 2000, and by the Malays around the year 2025. The population will then reach about 35 million (Jones and Tan, 1985). Few would doubt that the fertility transition of the Chinese and the Indians will run its course, and the new policy is unlikely to have a significant impact on the fertility decisions of these groups. Concentrated in the urban areas, they are more integrated into the formal sector, manifest a preference for smaller family size, and have been the major consumer of family planning services. One can expect the Malay population to be more responsive to the new policy as they are concentrated more in the rural areas, with larger family-size preferences and more receptive to political messages. Leete and Tan (1988) showed that birth expectations have indeed gone up by as much as two children in response to the new policy and religious revivalism. To the extent that this is true, the policy would have the inadvertent effect of increasing ethnic differential in fertility.

Although the Malaysian government has de-emphasised family planning and promoted a family size norm of five, the continuing socio-economic development in the society is still in favour of continuing fertility decline. The Malaysian Population and Family Survey conducted in 1984–85 showed that 99 per cent of the sample had knowledge of family planning, 83 per cent had ever used contraception, and 51 per cent were currently using. Although the NPFDB had adopted a low-key approach to family planning, the high awareness rate could sustain the demand for modern contraceptives at a reasonable level. The economy, now recovering from the recession, is likely to draw more women, especially those aged 20–30, into the work force. Opportunities for primary and secondary education are expanding rapidly for women in the rural sector, and the rising educational attainment is likely to have an impact on their work aspirations and fertility ideals. Future social changes are likely to affect the rural Malay women disproportionately as they are increasingly drawn into the urban way of life. As Malaysia continues to modernise, it is not unreasonable to expect the fertility decline among the Malays to resume in due course, a point also argued by Hirschman (1986). Whether the Malaysian government's policy could indeed hold back the impact of socio-economic development can only be assessed in due course.

If societal factors are in favour of low fertility, can a government counter the negative effects through a battery of incentives? The incentives introduced by Malaysia are probably not substantial enough to generate a fertility reversal. In this regard, the experience of Singapore is an interesting case in point. Through a generous package of incentives, the Singapore government hopes to influence fertility decisions in three ways: to lower the financial cost of delivery and child rearing; to provide some tangible monetary and social incentives for new births; and to educate the public on the severity of the implications of below-replacement fertility and the desirability of a three-child family.

These factors, although pertinent, may not address the central concerns of the parents in arriving at the desired family size. Financial incentives may not matter much in an affluent society, as the examples of Western European countries have shown. The changing values of children in Singapore may also mitigate the effectiveness of the policy. In an urban society, children are valued for their psychological benefits rather than their economic contributions. Consequently, the quantity is not as important as the quality of children, and the parents' need for progeny could be easily satisfied by one or two children. The motivation for three or more children in a modern urbanised economy may have to come from a more profound appreciation of the psychological value of a large family size.

The situation in Singapore is however different from the western societies. The institutions of marriage and the family remain strong and the desire for a moderate size family is still common. In a 1987 survey on currently married women of reproductive ages, 59.4 per cent of the sample preferred a family size of three or more children. The easing of the child-care burden in an urban society may facilitate those who desire a larger family to do so. Some degree of success can therefore be expected.

However, the decision to have three or more children is likely to be based on personal calculus of gains and losses, rather than in response to external pressures and demands. While a woman can be compelled to prevent birth, she can only be enticed to have one.

To succeed in raising fertility, the Singapore government has to address the marriage issue. In a society where out-of-wedlock births are rare, the decreasing prevalence of marriage has a direct negative bearing on fertility. Research has shown that singlehood is largely an outcome of circumstances rather than choice (Cheung, 1988b). Many singles indicated a lack of opportunity to meet suitable marriage partners. The marriage programme, a novel social experiment introduced in 1984, has gained acceptance among the singles as an avenue of marital search. However, as at December 1987, only 497 marriages could be attributed to the programme. The challenge of increasing the marriage rate is likely to be far greater than the task of raising marital fertility.

IMPLICATIONS FOR THE REGION

How to motivate parents to have more children is a question that has received little attention in Asia. The received wisdom assumes children are wanted by the parents, and the responsibility of the state is simply to limit the number they can actually attain. However, as the region moves into the industrial era with the emergence of export-oriented high growth economies, a new way of life has evolved. For many women, work and career are now desired options along with marriage and procreation. The traditional desire for a large family is being rapidly replaced by a small-family-size norm. Countries such as South Korea and Taiwan, where fertility rates have already dropped below the replacement level, may soon be compelled by demographic forces to reverse their population policies. However, it can no longer be assumed that they will be as successful with a pronatalist policy as they have been with the antinatalist policy of the past. To the extent that a small family size is rationally compatible with the demands of a modern society, then, any effort to promote larger family size, however intense and expensive, is bound to bring only modest results.

The Malaysian case could serve as a useful lesson in population planning in the region. Rather than focusing narrowly on the magnitude and speed of fertility reduction, it may be useful to set some long-term targets on population size in line with expected socio-economic development of the country. For the newly industrialising countries in the region, the optimal population size may be higher than what is currently being projected, given the vast potential for economic growth and expansion. In this regard, it might be advantageous to slow down the intense family planning efforts to allow for a more gradual decline in fertility in tandem with the socio-economic changes in society. Moreover, rapid shrinkages of cohorts create undesired age structure distortions with serious ageing and labour supply implications. Indeed, if Singapore had eased its intense programme in the late 1970s, it might not have had to face the age structure fluctuations that are likely to come from the 15 years of below-replacement fertility and the present push to reverse it. A major revision of the population planning paradigm in Asia may indeed be warranted.

REFERENCES

Ad hoc Committee on Population Issues, 1984, *Towards a Population of Seventy Million*, Kuala Lumpur: National Population and Family Development Board.

Cheung, P., 1988a. The demographic validity of Singapore's population policy: the nuptiality-fertility relationship re-examined. Research report submitted to Population Council, New York, under The Determinants of Fertility in Developing Countries programme.

Cheung P., 1988b. Marriage market, timing, and policy in Singapore, paper presented at the 1988 Annual Meeting of Population Association of America, April 1988, New Orleans, USA.

Cheung, P., 1987. Beyond demographic transition: industrialization and population change in Singapore, paper presented at the Fifth Regional Conference of Sociology, December, Seoul, Korea.

Hirschman, C., 1986. The recent rise in Malay fertility: a new trend or a temporary lull in a fertility transition? *Demography*, Vol. 23, No. 2.

Jones, G. and Tan, P.C., 1985. Recent and prospective population trends in Malaysia, *Journal of Southeast Asian Studies*, Vol. 16, No. 3.

Leete, R., 1987. The post-demographic transition in East and Southeast Asia: similarities and contrasts with Europe, *Population Studies*, Vol. 41, No. 2.

Leete, R. and Tan, B.N., 1988. Retardation of fertility decline in Malaysia and its causes: diversity and change, paper presented to Seminar on Fertility Transition in Asia, March, Bangkok.

Ness, G. and Ando, H., 1984. *The Land is Shrinking: Population Planning in Asia*, Baltimore: The Johns Hopkins University Press.

Pang, E.F. and Cheung, P., 1988. Regional labour flows and Singapore, paper presented at the IUSSP Seminar on International Migration, September, Kuala Lumpur.

Saw, S.H., 1980. *Population Control for Zero Growth in Singapore*, Singapore: Oxford University Press.

Sidhu, M. and Jones, G., 1981. *Population Dynamics in a Plural Society: Peninsular Malaysia*, Kuala Lumpur: University of Malaya.

United Nations, 1987. *Malaysia, Population Policy Paper No. 14*, New York: United Nations.

THE EPIDEMIOLOGIC TRANSITION IN LATIN AMERICA

Julio FRENK[1]
Tomas FREJKA[2]
José L. BOBADILLA[1]
Claudio STERN[2]
Jaime SEPULVEDA[3]
Marco JOSÉ[1]

[1]National Institute of Public Health
Mexico

[2]The Population Council
Latin America and the Caribbean
Mexico

[3]General Directorate of Epidemiology
Ministry of Health
Mexico

INTRODUCTION

At least for the past half century, Latin America has been undergoing a complex transformation of its health conditions. The changes have profound implications for the well-being of the 450 million people living in this region, who represent close to 9 per cent of the world population. It is therefore necessary to understand those changes if countries are to meet present needs and to anticipate future conditions. In addition, such understanding may add significantly to the extent of our empirical knowledge and the strength of our theoretical elaboration regarding the interaction among demographic, socio-economic and health processes.

With these purposes in mind, the present paper analyses the health situation in Latin America using the notion of the epidemiologic transition as the guiding concept. The paper opens with an outline of the origins and meaning of this concept. In the next section, it presents an overview of the current health scene in the region. On the

basis of this cross-sectional comparison, the paper selects two cases, Costa Rica and Mexico to offer a more dynamic view of the changes in health through time; these cases are chosen because they appear to represent two different transition experiences. Finally, the last section draws out the implications of the empirical analysis for the further elaboration of the epidemiologic transition theory. Specifically, we suggest that a number of Latin American countries might fit a new model of the transition. This model needs to be more thoroughly studied if we are to comprehend and transform the process of health change in the world.

CONCEPTUAL ELEMENTS

There have been several interpretations of changes in health at the population level, particularly of declines in mortality (see, for example, Kitigawa, 1977; Preston, 1977; Caldwell, 1986). In this paper we shall adopt and adapt one of such frameworks: the theory of the epidemiologic transition. Indeed, we postulate that this is a key concept to understand the present and the future nature of health in Latin America. The concept was first used by Omran (1971), although Frederiksen (1969) had previously analysed the feedbacks between the economic and demographic transitions, relating them to their concomitant expression in health problems and services. In an apparently independent manner, Lerner (1973) presented some time later an unpublished paper on what he called the health transition.

Since the work of these original authors, the concepts introduced by them have been often used in a rather loose manner. It would be convenient, therefore, to develop some conceptual clarifications. We propose that the broadest construct is the 'health transition'. For analytical purposes, this construct can be subdivided into two more specific transitions, which correspond to the two basic health phenomena in human populations: on the one hand, the health *conditions*, i.e., the processes of health and disease that define the epidemiologic profile of a population; on the other hand, the organised social *response* to those conditions that is implemented through the health care system (Frenk et al., 1988). Correspondingly, the 'health transition' has two components. The first one, which is the 'epidemiologic transition' strictly speaking, refers to the changes in the frequency, magnitude and distribution of health conditions expressed in death, disease and disability. The second one, which we call the 'health *care* transition', deals with the transformation of the social response expressed in the way that the health care system is organised for the delivery of services.

Clearly, there are close relations between the two transitions. Although this is still a debated matter, it is generally agreed that the health care transition has had an important impact on the epidemiologic transition, as new technologies have been applied to the population through the health care system. Indeed, one of the mechanisms for the change in the main causes of death has been the reduction of case-fatality rates. In turn, the planner would like to see the epidemiologic transition inform the transformations in the structure and functioning of the health care system, although this link is far from perfect and in fact has been absent in many countries that have adopted health care models alien to their epidemiologic realities. Largely

determined by broader social, economic and technological developments, the health care transition has involved at least two major changes since the middle of the twentieth century. The first one led to the adoption of a technology-driven, hospital-based model of medical care. The second one has been the recent development of a community-based comprehensive approach to primary health care. Important as these changes have been, we will not deal with them in this paper. Instead, we will concentrate on the epidemiologic transition, although in the concluding section we will draw some of its implications for the future organisation of health care.

To recapitulate, the concept of the epidemiologic transition refers to the long-term changes in the patterns of death, disease and disability that characterise specific populations and that usually accompany broader transformations in their demographic, social and economic structures. It is a dynamic concept, as it centres on the evolution of the predominant mortality and morbidity profile in a society. More specifically, it is posited that the transition follows a dominant direction: from infectious diseases that are associated with areas of primary deprivation (e.g., nutrition, water supply, housing conditions), to chronic and degenerative illnesses, accidents and mental ailments, which are related to genetic factors and to areas of secondary deprivation (e.g., personal safety, environmental hazards, affection, opportunities for full realisation of potentialities).

There is a basic connection between the demographic and the epidemiologic transitions. The initial declines in mortality, by being selectively concentrated on infectious causes of death, tend to benefit the younger age groups, since infections are more frequent and severe among them. In addition, improved survival beyond childhood increases the exposure to risk factors linked with chronic diseases and accidents, so that their relative contribution to mortality grows. The decline in fertility, by affecting the age structure, also has a profound impact on the morbidity profile, as the growing proportion of older people magnifies the importance of chronic and degenerative ailments. Therefore, there is a second direction of change, as the burden of death and disease moves from the younger to the older age groups.

A third direction of change is the shift from a health picture dominated by mortality to one where morbidity is the predominant force. In this respect, the concept of the epidemiologic transition goes beyond that of the demographic transition since it not only attempts to account for changes in mortality but also in morbidity. Thus, in the process of the transition, the whole meaning of diseases is transformed: from being predominantly an acute process that very often ends in death, disease becomes a chronic status, which many people—mostly older people—endure for long periods in their life. In this way, it is possible to have the apparently paradoxical combination of declining mortality with increasing morbidity (Verbrugge, 1984).

In many developing countries, there is a common assumption that the changes implied in the epidemiologic transition are a sign of 'progress'. It can hardly be contested that it is positive to postpone death. Nevertheless, it is questionable that degenerative ailments, accidents or violence represent a more 'civilised' form of dying

than infectious diseases (Soberon et al., 1986). Indeed, many of the emerging conditions in the transition are not at all a sign of progress, but rather the expression of defective modes of industrialisation, urbanisation and mass consumption, which are expressed, among others, in the problems of atmospheric pollution, motor-vehicle and occuptional accidents, mental distress, consumption of harmful substances like tobacco, alcohol and other drugs, and unhealthy eating habits. The challenge for developing countries is to overcome the 'left-over ills' (Frenk et al., 1989) represented by infections and malnutrition without repeating the pathological patterns of currently developed nations.

This view of the epidemiologic transition as 'progress' derives, to a large extent, from the linear and unidirectional perspective that was posited by the original theory. Such perspective is clearly expressed in the three classical works mentioned above. Thus, Frederiksen (1969) presents four 'states of society'—traditional, early transitional, late transitional and modern—each of which corresponds to a predominant pattern of morbidity, mortality and fertility, as well as to a specific mode of organising health care. Omran (1971) proposes three sequential stages of the epidemiologic transition, which he designates as the 'age of pestilence and famine', the 'age of receding pandemics', and the age of degenerative and man-made diseases'. Recently, Olshansky and Ault (1986) have suggested a fourth 'age of delayed degenerative diseases'. In his seminal paper, Omran does recognise that there may be different models of the transition, which he calls the 'classical or western model', characteristic of Europe and North America; the 'accelerated model', epitomised by Japan, and the 'contemporary or delayed model', exemplified by some developing societies like Sri Lanka and Chile. Nevertheless, the differences among models are limited to the time at which transition begins and the pace at which a country traverses the stages. The basic assumption of a linear, unidirectional sequence of stages is unaltered. Similarly, Lerner (1973) presents three successive stages: 'low vitality', 'increasing control over mortality' and 'broadened conception of health'. As we shall see later on, one of the characteristics of the epidemiologic transition in many Latin American countries is that this linear conception does not seem to hold strictly.

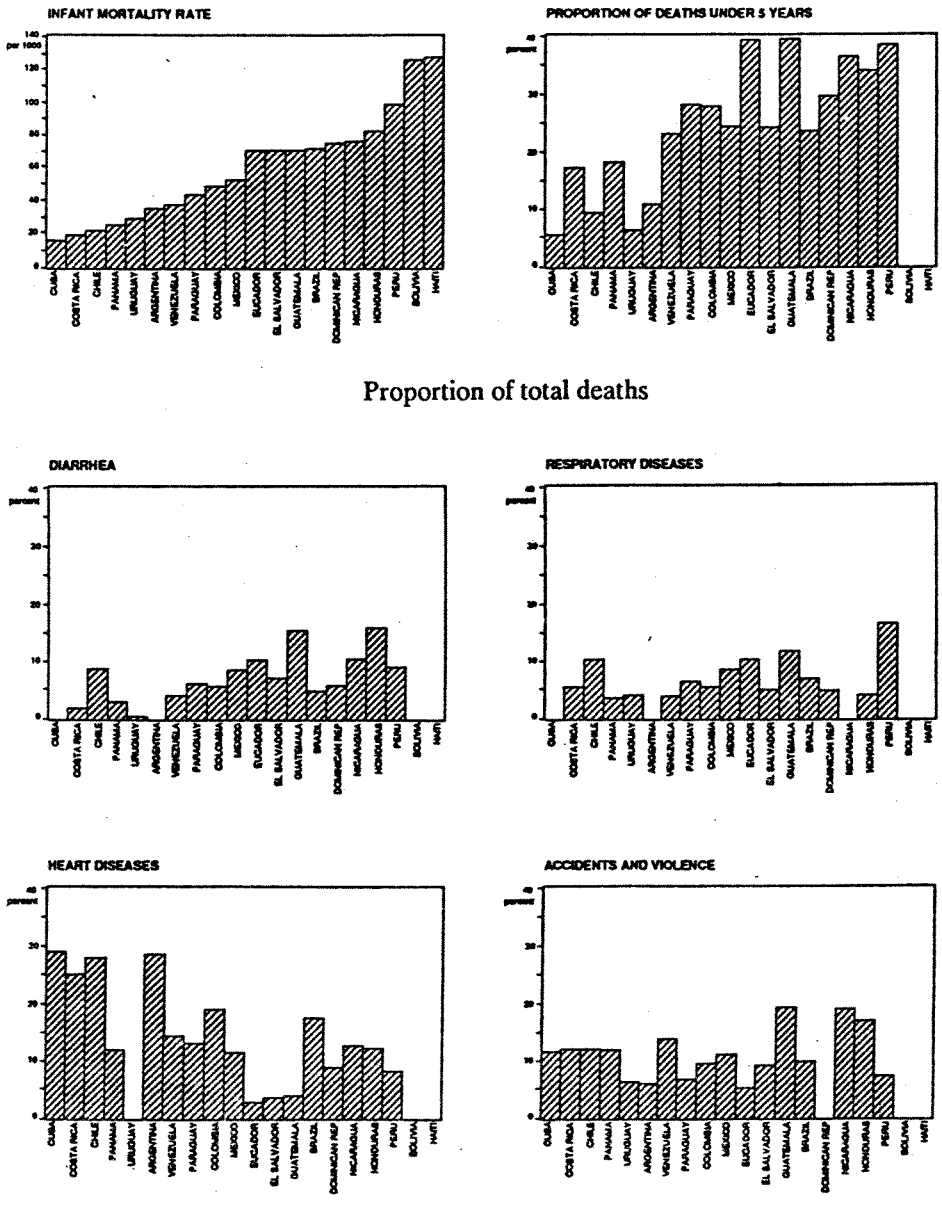
THE STATE OF HEALTH IN LATIN AMERICA

The epidemiologic transition in Latin America and the Caribbean got under way prior to the 1930s. The majority of Latin American countries around 1930 had life expectancies below 40 years and more than 60 per cent of their populations died of infectious diseases. By 1950 the life expectancy for the region as a whole was above 50 years and only Haiti and Peru had a 40-year life expectancy. In the early 1980s, the average life expectancy was 64 years, compared to 49 years in Africa, 55 years in South Asia and 68 years in East Asia.

Not all countries have participated equally in this mortality decline. As of the early 1980s, there is a significant heterogeneity among Latin American countries with respect to their health conditions. For example, Cuba, Costa Rica and Chile have infant mortality rates around 20 per 1,000, whereas the rates for Haiti and Bolivia are more than six times higher (Figure 1). Similarly, the proportion of deaths under 5 years of age out of all deaths is around 10 per cent in the former countries and close

FIGURE 1

Health indicators, Latin America and the Caribbean, early 1980s



to 40 per cent in a number of Central American countries and in Peru; probably even higher for Bolivia and Haiti but data are not available.

Figure 1 also contains data on the proportions of deaths for selected causes, namely two major representatives of the pre-transitional pathology (diarrhoea and respiratory infections) and two examples of the post-transitional conditions (heart diseases and accidents). The proportion of all deaths due to diarrhoea was less than 2 per cent in Costa Rica, yet more than 16 per cent in Guatemala and Honduras. Similar, but less accentuated differentials exist for respiratory diseases.

Heart diseases demonstrate differentials in the other direction. In a number of countries around 30 per cent of the population dies due to heart diseases—Cuba, Costa Rica, Chile and Argentina— whereas for El Salvador, Guatemala and Ecuador the proportions are below 5 per cent.

Essentially the differentials of the selected causes of deaths due to infections and chronic diseases demonstrate that different countries of the region are in different phases of the epidemiologic transition.

An interesting picture is provided by deaths caused by accidents and violence. In the 'traditional' epidemiologic transition countries the usual trend is a gradual increase over time due to this cause of death. In Latin American countries there does not seem to be a correlation between this cause of death and their respective stage in the health transition. While there are differentials, on average the proportion of deaths due to accidents and violence appears similar among countries. If anything, the countries with poorer health have a relatively high proportion of deaths due to accidents and violence.

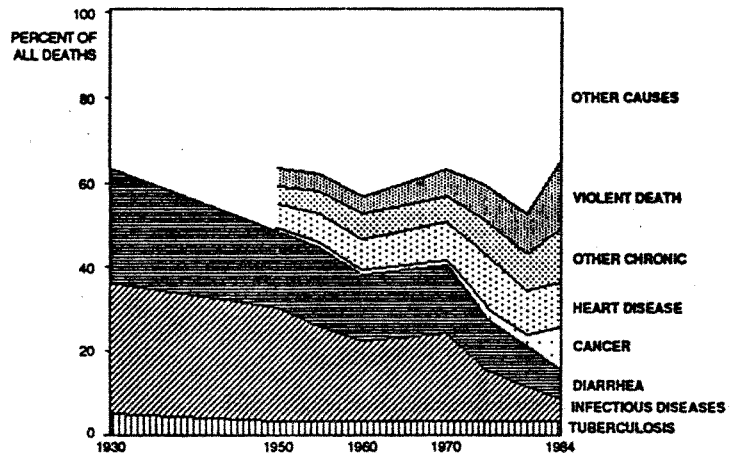
We have assembled comparable data for a period of 50 years or more to demonstrate changes in the composition of deaths by causes for two typical countries in Latin America: Costa Rica and Mexico (Figure 2). Costa Rica represents a country in an advanced stage of the epidemiologic transition, and Mexico could be considered a representative of countries which have a relatively even distribution of both infectious and chronic diseases. (Our goal was to gather long-term comparable data also for a country in the early stages of the epidemiological transition, but data simply are not available.) In both Costa Rica and Mexico around 1930 over 60 per cent of deaths were due to infectious disease. By the early 1980s significantly less than 20 per cent of deaths were due to these causes. The most dramatic decline in both countries was in the proportion of deaths due to diarrhoeal diseases: in Costa Rica from 18 to 2 per cent, in Mexico from 26 to 7. On the other hand, there was a significant increase in both countries in the proportion of deaths due to chronic diseases, from 15 to 59 per cent in Costa Rica between 1930 and 1980; in Mexico, the increase was from 18 per cent in 1950 to 47 per cent in 1984.

Although the epidemiologic transition of both countries, Mexico and Costa Rica, could be classified a priori as part of the delayed model (Omran, 1971), there are

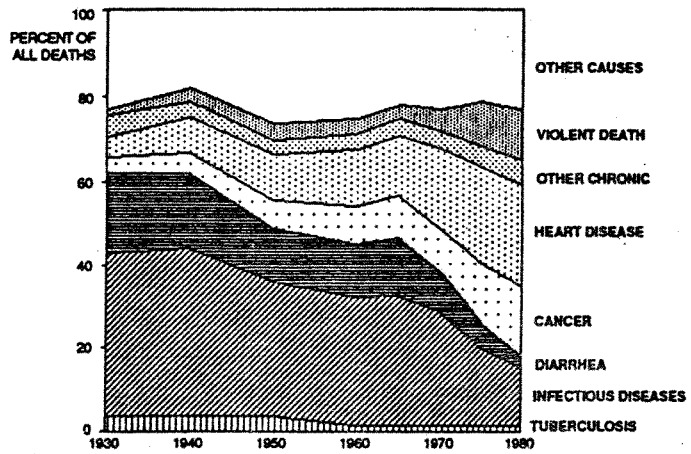
FIGURE 2

Distribution of death by causes

Mexico, 1930–1984



Costa Rica, 1930–1980



important differences between the two that suggest that this may not be the case. Table 1 compares cause-specific death rates for diarrhoeal diseases and acute respiratory infections in one group, and cardiovascular diseases and malignant neoplasms in another group. The death rate for the two infectious diseases was only slightly higher for Mexico in 1930, but because of a faster rate of decline in Costa Rica, the rates diverge, changing their difference from a ratio of 1.2 in 1930 to 3.5 in 1984. An opposite picture can be described for the two chronic causes of death, since the rates in the two countries tend to converge from a ratio of 0.36 in 1960 to 0.82 20 years later.

To illustrate the combined effect of the two processes, a ratio between the death rate for chronic diseases to the death rate for infectious diseases is shown in Table 1. For Costa Rica it increases rapidly, from 0.23 in 1930, to around 1 in 1960, to 8.0 by 1984. The trends in Mexico were rather different, starting with 0.26 in 1960 and increasing to only 1.4 in 1984. This means that while Costa Rica has been able to move definitively into an epidemiologic situation dominated by chronic diseases, Mexico has been hovering around a mixed situation where neither of the two groups of diseases predominates.

TABLE 1

Cause-specific death rates (per 100,000 population), selected infectious and chronic diseases, Mexico and Costa Rica, 1930–84

Causes of death	Country	1930	1960	1970	1975	1980*	1984**
Diarrhoea and acute respiratory infections	Mexico(a)	747	314	327	185	115	78
	C.Rica(b)	604	236	168	73	36	22
	Ratio a/b	1.2	1.3	1.9	2.5	3.2	3.5
Cardiovascular diseases and cancer	Mexico(a)		—82	94	102	142	108
	C.Rica(b)	139	227	219	194	174	177
	Ratio a/b	—	0.36	0.43	0.53	0.82	0.61
Ratio Chronic/ Infections	Mexico	—	0.26	0.29	0.55	1.23	1.38
	C.Rica	0.23	0.96	1.30	2.66	4.80	8.05

Sources: *Costa Rica*. Mata L., Rosero L., 1988. *National Health and Social Development in Costa Rica: A Case Study of Intersectorial Action*, Washington: Pan American Health Organization; Pan American Health Organization, 1986. *Health Conditions in the Americas 1981–1984*, Volume 1, Washington.

Mexico : Vital Statistics of the Civil Registrar, Mexico.

Notes: * For Mexico figures refer to 1981.
** For Costa Rica figures refer to 1983.

TOWARDS A NEW TRANSITION MODEL

The data that have been presented so far point to a more complex situation than has usually been recognised in discussions about the epidemiologic transition. Two major elements contribute to such complexity. The first one refers to the fact that, even in a relatively homogeneous region like Latin America, there are great differences among countries. The second one is due to the possible emergence of a new model of the epidemiologic transition.

With respect to the first element, there seem to be three major groups of Latin American countries according to their transition pattern. The first one is represented by those nations that are in an advanced stage of the transition, in a modality not very different from that of developed countries although with a considerable delay. Indeed, this group corresponds fairly well to what Omran (1971) called the 'delayed model' of the transition. The main representatives are Cuba, Costa Rica and Chile. To be sure, there are still great differences in the specific evolutionary patterns of each of these countries. Relative to the rest of the region, however, they constitute a homogeneous subset. That this health homogeneity sharply contrasts with the enormous political heterogeneity of the three countries, remains a challenge for further research into the macro-social determinants of health status.

The second group is formed by countries that are still in an early stage of the transition. This means that they exhibit very high infant mortality rates—often above 100 per 1,000—and that their morbidity pattern is dominated by common infections and malnutrition. Typical countries in this group include Haiti, Bolivia and Peru. While some of them have begun to exhibit an increase in chronic and degenerative ailments, the overwhelming burden of disease is still represented by conditions whose continued existence has no technical justification, since they could be prevented with technologies that have been in use for several years or even decades.

Between the countries that are in an advanced stage of the transition and those that are in an initial stage, lies a third group that is undergoing what could be a new transition experience, one that differs from that of developed nations. Among the nations that we have examined here, Mexico is one of the best examples of this process. For reasons that will become clear, we propose to call it the 'protracted polarised model'. In a previous article (Frenk et al., 1989), we have sketched the specific characteristics of the new model. What follows is a more detailed analysis of those characteristics in the light of some of the data that were presented earlier in this paper.

The 'protracted polarised model' of the epidemiologic transition presents the following distinctive features:

1. *Overlap of eras.* As stated before, the original theory of the epidemiologic transition suggested that there is a unidirectional sequence of eras. In a similar manner to Rostow's (1960) conception about a series of relatively fixed stages of

economic development, all countries would pass through uniform patterns of mortality and morbidity. However, in several Latin American countries the stages do not follow a sequential order but instead exhibit considerable overlap. The case of Mexico clearly illustrates this situation. As shown in Figure 1, by 1980 Mexico had reached a point where the proportions of deaths attributable to diarrhoea, respiratory diseases, heart conditions, and accidents and violence were all very similar, around 10 per cent. Thus, the country suffered simultaneously from high incidences of both the pre- and post-transitional diseases.

2. *Countertransition.* The linear and unidirectional nature of the original theory left little room for the possibility of backward movements along the transition process. Such movements, however, have become common during the last decade in many Latin American countries. The re-emergence of diseases that had been virtually controlled, such as malaria and dengue fever, constitutes powerful evidence in this regard. In Mexico, the incidence of malaria jumped from about 45 cases per 100,000 inhabitants in 1974 to 110 in 1985 (Sepulveda et al., 1987). While mortality from this cause has remained at zero, malaria now weighs very heavily in the burden of illness. This case illustrates that the shift from mortality to morbidity can occur not only for degenerative diseases, as has been typical of developed countries, but also for infectious conditions, as is now occurring in some developing nations.

3. *Protracted transition.* The two processes described above lead to a situation in which there is no clear resolution of the transition process. Thus, many Latin American countries appear to hover about a picture of mixed pathology, without being able to break free of the common infections and moving decidedly towards an absolute predominance of chronic conditions. In this sense, we may speak of a 'protracted transition' (Soberon et al., 1986). This is one of the distinctive characteristics of the new transition model. Indeed, it could be argued that most industrialised countries also experienced the first attribute—the overlap of eras—since they passed through a stage in which the two types of pathology coexisted. But the distinguishing feature of many Latin American nations is that this coexistence becomes prolonged as is illustrated by Table 1 for the case of Mexico.

4. *Epidemiologic polarisation.* The three characteristics described so far do not take place in a random manner across social groups or geographic regions. Instead, they tend to distribute pathology in a pattern that exacerbates previous inequalities in health. Indeed, there have traditionally been marked *quantitative* differences in the *amount* of death that each social group had to bear. But the 'protracted polarised transition' introduces new, *qualitative* differences in the *type* of pathology that various social groups suffer. Thus, the overlap of eras at the national level happens because the poor and rural populations continue to succumb to the pre-transitional pathology, while the urban dwellers who are better off experience mostly a post-transitional pattern of morbidity. Therefore, the heterogeneity of Latin America that contributes so much to the complexity of its health picture does not only occur between but also within countries. It is this persistence and even deepening of social inequalities that seem to account for the protracted nature of the transition.

There is a special and increasingly numerous group—the recent immigrants to large cities—where the two types of pathology appear to clash, so that the transition process becomes compressed. Regrettably, there is insufficient information about the dynamics of health status among rural-urban migrants to confirm this hypothesis, which requires further research.

Nevertheless, we do have data about subnational differentials in mortality that strongly support the concept of the epidemiologic polarisation. For example, Brazil offers striking contrasts among its regions. Thus, in 1984 the proportion of deaths due to intestinal infections ranged from 11 per cent in the poor northeast, where this was still the first cause of death, to 2.1 per cent in the affluent south, where it had dropped to number 13 in the list of main causes of death. In contrast, ischemic heart disease was the second cause of mortality in the south (slightly below malignant tumours), accounting for 15 per cent of all deaths, but represented only 4.9 per cent of deaths in the north and occupied the seventh place as a cause of death (Pan American Health Organisation, 1984, Table 3). Similarly, a recent study revealed that, while the mortality rate due to heart attack in 1983 was 19.4 per 100,000 inhabitants for the whole of Mexico, it varied considerably by region: 32.3 in the North (which comprises the wealthiest states), 20.9 in Mexico City, 15.9 in the central region and 13.4 in the south (which includes the poorest states) (Lozano and Villa, 1968).

CONCLUSIONS

Most countries in Latin America are passing through a profound epidemiologic transition. The decline of infectious and parasitic diseases is substantial but still inconclusive, and has been accompanied by a sharp increase of chronic conditions. The result is a growing complexity in the health profiles of most Latin American countries.

Some countries like Mexico seem to present a transition pattern which does not fully comply with the previously described models. Since these countries are still in the midst of their transitions, it is too early to tell what shape the epidemiological transition will take in most Latin American countries. Indeed, the 'protracted polarised model' will need to be confirmed through a close follow-up of the epidemiological evolution of many countries.

Whatever the outcome may be, it is clear that the greater epidemiologic complexity needs to be reflected in a more responsive health care system. In this respect, the epidemiologic transition must guide the health care transition, as defined in the first part of this paper. The epidemiologic transition in Latin America already shows sufficient specificities as to warrant the development of service delivery modalities that are better adapted to the particular realities of the region.

Understanding the epidemiologic transition will offer countries extremely relevant information to plan their health care transitions. For countries like Mexico, which are experiencing a 'protracted polarised model', three guiding principles can be drawn to reformulate the social response to health conditions.

First, efforts should be made to reduce to very low levels the incidence of infectious diseases and malnutrition. All currently available technology that has proven to be cost-effective should be fully applied as in the case of oral rehydration and immunisations. At the same time, it is necessary to promote policies aimed at improving the underlying structural factors that lead to infections and malnutrition (e.g., housing conditions, water supply, and sanitation).

Second, an anticipatory model of primary prevention should be devised in order to restrain the growing threat of the chronic and degenerative diseases. High rates of cardiovascular diseases and cancer exert a formidable pressure on health systems. Even the wealthier countries are in serious trouble due to this pressure. Many Latin American countries have a unique opportunity to prevent the rise of such diseases even as they break away from the 'left-over ills'.

Thirdly, the improvements in health should follow a principle of equity, whereby the utilisation of services is proportional to health needs. Thus, the first two strategies should concentrate on those vulnerable groups where the problems are most acute. Only in this way will countries like Mexico supersede the protracted character of their transitions and overcome the unacceptable polarisation in the health of their populations.

REFERENCES

Caldwell, J.C., 1986. Routes to low mortality in poor countries, *Population and Development Review*, 12.

Frederiksen, H., 1969. Feedbacks in economic and demographic transition, *Science*, 166.

Frenk, J., Bobadilla, J.L., Sepulveda, J. and Lopez-Cervantes, M., 1989. Health transition in middle-income countries: new challenges for the organisation of services, *Health Policy and Planning*, 4 (forthcoming).

Frenk, J., Bobadilla, J.L., Sepulveda, J., Rosenthal, J. and Ruelas, E., 1988. A conceptual model for public health research, *Bulletin of the Pan American Health Organization, 22.*

Kitigawa, E.M., 1977. On mortality, *Demography*, 14.

Lerner, M., 1973. Modernization and health: a model of the health transition, paper presented at the Annual Meeting of the American Public Health Association, November, San Francisco, California.

Lozano, R. and Villa, A., 1988. Regional analysis of mortality by myocardial infarction (unpublished data).

Olshansky, S.J. and Ault, B.A., 1986. The fourth stage of the epidemiologic transition: the age of delayed degenerative diseases, *The Milbank Quarterly*, 64.

Omran, A.R., 1971. The epidemiologic transition: a theory of the epidemiology of population change, *Milbank Memorial Fund Quarterly*, 49.

Pan American Health Organization, 1984. *Health Conditions in the Americas, 1981–1984*, Scientific Publication No. 500, PAHO, Washington, D.C.

Preston, S.H., 1977. Mortality trends, *Annual Review of Sociology*, 3.

Rostow, W.W., 1960. *The Stages of Economic Growth*, London: Cambridge University Press.

Sepulveda, J., Lopez-Cervantes, M., Frenk, J. and Bobadilla, J.L., 1987. The epidemiologic transition in Mexico: myths and realities, paper presented at the Annual Meeting of the American Public Health Association, November 1987, New Orleans.

Soberon, G., Frenk, J. and Sepulveda, J., 1986. The health care reform in Mexico: before and after 1985 earthquakes, *American Journal of Public Health*, 76.

Verbrugge, L.M., 1984. Longer life but worsening health? trends in health and mortality of middle-age and older persons, *Milbank Memorial Fund Quarterly*, 62.

World Bank, 1987. *Financing Health Services in Developing Countries: An Agenda for Reform*, Washington D.C: World Bank.

9

SOME NEW APPROACHES TO THE COLLECTION OF DEMOGRAPHIC DATA IN LATIN AMERICA

José Miguel GUZMAN
CELADE, Santiago, Chile

The purpose of this paper is to give an overview of recent developments in Latin America in the field of non-traditional approaches to data collection. Attention will be given to innovative procedures, to the development and exploitation of non-conventional sources of demographic data and to the efforts that have been made to improve the coverage and quality of data collected. It is not our intention to cover the whole range of studies on data collection techniques used in Latin America, but we shall try to show which are the main achievements in this field.

NEW TRENDS IN DATA COLLECTION

Progress in data collection in Latin America can be summarised under the following headings: (1) the development of new sources of data collection; (2) the utilisation of research tools from other disciplines for the collection of demographic data; (3) the development and the improvement of different procedures for data collection; (4) the use of new units of analysis; and (5) the utilisation—still in its beginning—of the tools made available by new technologies.

1. Development of New Sources of Data Collection

Most demographic studies in Latin America still base the measurement of demographic phenomena on census results and vital statistics and they employ specialised surveys, increasingly numerous, for both quantitative and interpretative studies. We shall here refer to the development of the so-called preceding-birth technique.

On the basis of information obtained from the clinical records of pregnant mothers attended at the hospitals on Solomon Islands in the period 1968–75, Brass and Macrae (1985) have developed an estimation technique called 'preceding-birth technique' to calculate childhood mortality on the basis of the proportion of deaths among children born prior to the current birth.

In its original version this technique uses only data already collected. However, as information from the clinical records is not easily available in general, CELADE supported in several countries of the region the use of this technique by using a simple questionnaire which the mothers answered in the post-delivery room. Information is collected on whether the child from birth immediately preceding the current birth is dead or alive . In CELADE's experiments questions were included on dates of birth and death (if applicable) of the previous child; this makes it possible to effect direct estimations of infant mortality.

This procedure was first applied in hospitals in Honduras and Bolivia in order to determine its applicability (CELADE and Unicef, 1985). Later, given the relative success obtained with its implementation, new field trials were made in hospitals in Argentina, the Dominican Republic and Bolivia. In a detailed report on these experiences (Guzman, 1988), it has been demonstrated that the results obtained on infant mortality rates show a general consistency with the figures expected. Further, quite coherent results have been observed with respect to the mortality differences by age of mother, parity and birth interval.

The advantage of this innovative and interesting collection technique is that it is *simple and of low cost* while yielding a relatively current information on infant mortality levels (and even of trends if it is maintained as a system of current registration). The women are interviewed in a single place which reduces the cost of research and, at the same time, most of them—except the ones who are having their first child (about 30 per cent)—report on their last child.

It has the disadvantage that the women who are interviewed do not necessarily represent the whole population in terms of its demographic and socio-economic characteristics. For this reason it does not seem to be a good procedure to apply where intra-hospital delivery is not the rule. However, it has been shown that the effects of the 'demographic' bias are not very important (Aguirre and Hill, 1988).

It seems important to stress the potential value of this technique for monitoring trends in childhood mortality and for the evaluation of the results of health interventions. In addition, it can be used to investigate the proximate determinants of infant mortality. For example, in Bolivia an experiment was conducted recently which had as one of its objectives to determine the infant mortality differentials associated to fertility factors (parity, birth intervals, etc.) (SIAP, 1988). A more ambitious experiment, following the same lines, is taking place in the Dominican Republic.

The development of this technique has stimulated research using data already collected. For example, Ferreira and Ortíz (1980) worked with data from hospitals in Sao Paulo which already included a question on the survival condition of the last child in the medical records. Following the same line it has been suggested (Guzmán, 1988) that a pair of questions be included in the perinatal clinical record which is filled in many hospitals in Latin America as part of a programme of the Consejo Latinoamericano de Perinatologia (CLAP) of the Panamerican Health Organisation

(PAHO). It has been shown that part of the information collected in this record can be employed for infant mortality estimates (Chackiel, 1988).

2. Use of Research Tools from Other Disiciplines for the Collection of Demographic Data

Since there is increasing interest in the causes of demographic behaviour, it has been necessary to consider such behaviour within a more ample perspective. This phenomenon perhaps explains the growing search for links between different disciplines which deal with the activities of men and women in society. This process also involves the adoption of different methods of data collection. There is a trend among demographers to rely increasingly in the analytical tools of disciplines such as epidemiology and anthropology.

Use of Epidemiological Techniques

One of the interesting cases in the use of epidemiological methods for the study of infant mortality in Latin America is the so-called case-control study.[1] Gray (1986) has put forward important arguments for integrating epidemiological case-control studies in the study of mortality. In this document, some of the experiments done in Latin America using this technique will be described, in terms of data collection.

A research project of this kind was carried out in Rio Grande do Sul in Brazil in order to test the hypothesis that breast-feeding protects against infant death due to diarrhoea, respiratory and other infections. The cases selected (300) were all of children who had died between the age of one week and one year and who were resident, at the time of the illness leading to death, in the metropolitan areas of Porto Alegre and Pelotas, Brazil. Two controls were selected for each case. The information was collected through the use of a standardised questionnaire which the mothers of the dead children or some near relative had to fill in. After interviewing the mother of a case, the interviewer proceeded in a pre-established system to interview the mothers of two surviving children. The results, first analysed for the case of diarrhoea, have made it possible to test the hypothesis and to determine the high risk of death by diarrhoea that is associated with the type of milk which was given to the child in its first year of life (Victoria, 1985).

With the same technique, another research project was also carried out in Brazil by Ferraz et al. (1985) to identify the risk factors associated with low weight at birth and perinatal mortality in a town in the north-east of Brazil.

This procedure was also applied in Guatemala (Delgado et al., 1986). This study was part of a longitudinal research project on the biological and socio-economic determinants of physical growth and mental development in preschool-aged children, which was carried out in four communities of the Department of El Progreso. Taking

1. 'In case-control studies individuals with an outcome of interest such as disease or death (cases) are selected for comparison with individuals without these conditions (controls), and information is obtained on antecedent risk factors' (Gray, 1986: 9).

advantage of the prenatal control programme, some 50 women who had reported a foetal death between January 1971 and January 1977 were studied. For each case three controls were chosen among the women who had successfully completed their pregnancies. This research has given some insight into the effect of the characteristics of the mother and of the family on foetal death risk. A study which combines the preceding-births technique with the case-control studies procedure is being carried out at present in a maternity hospital of the Dominican Republic with the technical assistance of CELADE.

Case-control studies are acquiring increasing importance due to the advantages they offer. As Gray (1986) has shown, the main advantage of this technique is that it does not require a very big sample, so that it is possible to collect more detailed and complete information on mortality determinants; moreover, powerful analytical tools are available for complex analysis of this type of data.

An additional advantage is that the starting point can be phenomena registered in hospitals (births, deaths, frequency of underweight, etc.) or in hospital records, which simplifies the whole operation of data collection. It is also true, however, that in order to validate the hypothesis, in the first two studies mentioned, the information collected in the health centres was combined with home visits, which has as its main disadvantage—and this is characteristic of all follow-up studies—the difficulty of locating the women in the field.

Use of Analytical Tools Taken from Anthropology

The main objective from the demographic point of view of this type of study is the possibility of obtaining a qualitative description of some social processes and of their implications for specific demographic components. The use of analytical tools taken from anthropology is becoming increasingly common in demographic studies.

The recent development of micro approaches to demographic research has been reported by Caldwell and Hill (1985). They relate the experience basically of Asia and Africa, where this line of research has been developed considerably. Latin America, though it is not mentioned in that article, has not been absent from this process. We will deal with some studies of this type.

An important research project which to a certain extent is a pioneering study is that on the forms of survival in conditions of marginality in a populous district of Mexico City between 1969 and 1971 (de Lomnitz, 1977). Although it is not, properly speaking , a demographic study, the way it deals with subjects like migration and the family, and the level of generalisation which is achieved on the basis of the study of a small area, have placed it among the most valuable studies of this type. During the research period a district of some 200 houses was studied, and several censuses were taken. This information was supplemented by the participant observation of three families in the community.

De la Cadena (1988) undertook recently a similar study on migration to cities from the Peruvian Sierra. Communities from the Peruvian Sierra were studied in an attempt to determine the significance of the relationships which rural migrants maintained with the places of origin (de la Cadena, 1988). The study also had the objective of determining how the difference among communities explained, to a great extent, the various patterns of urbanisation among migrants. A census of all migrants from the two communities studied to the city of Huancayo was combined with case studies of eight families.

One of the major challenges for the use of case studies seems to be the problem of linking the personal histories with social dynamics and the degree of representativeness of cases selected (Aramburu, 1986). One solution to these problems can be that which has been adopted in a study being carried out at present among Mapuche Indian communities of Temuco, Chile with the aim of determining maternal and child conditions in these communities.[2] In this study there is a combined use of demographic and anthropological methods. In a first stage there was a socio-demographic diagnosis of the several Indian reservations, applying the data of the Chilean census for 1982 (Romaggi, 1988); at a second stage an area was selected in which a questionnaire was applied in order to bring up to date the census for this community and obtain more accurate demographic estimates. The proposal for the third and fourth stage includes an in-depth survey of 200 to 300 families; later on, there would be a case study of 20 families. The last stage would start with the social stratification of the area to be investigated; the families for the in-depth survey would be selected in such a way as to guarantee that they will represent the several strata; cases would be selected that are relevant to the variables of interest.

Another line of work which would also fall among the contributions of anthropology to demographic studies is that applied in research carried out in 1982 in ten Yanomami[3] villages of Sierra Parima, Territorio Federal Amazonas, Venezuela (Schkolnik, 1982). Retrospective information was collected for the indirect measurement of infant mortality and fertility applying a structured questionnaire.

Data were not provided directly by the indigenous population, but they were obtained fundamentally from an informant (a missionary) who had resided in the area for some ten years and who kept a written register of vital events which had occurred since her arrival. These data were completed with information provided by a Yanomami informant. The information could not be obtained directly because of cultural barriers and social taboos in relation to the phenomena to be studied. In spite of the limitations of the data, which were due to the condition in which they were obtained, the results on fertility and child mortality levels were on the whole consistent with those expected.

2. This research is being carried out with the technical assistance of CELADE.
3. The Yanomami Indians are an indigenous semi-nomadic community numbering several thousands and distributed in different areas of the Venezuelan and Brazilian Amazon region.

3. New Instruments of Data Collection Used in Surveys and Censuses to Improve Quality of Information

One of the areas in which great strides have been made is that of the development of new instruments for the collection of demographic data from censuses and surveys, and the improvement of those already existing. These advances relate mainly, although not solely, to retrospective information on fertility and infant mortality. We shall outline here some of the experiences of the region.

Full vs. Five-year Birth History Experiment

The birth history is an instrument of great importance which has been used to collect data in order to estimate directly fertility levels and trends. From the time that it was applied in the World Fertility Surveys (WFS), many countries were made aware of the changes which fertility had registered. However, by all retrospective information, it is subject to omissions and to errors due to the lack of precision with which different events are placed in time (Brass, 1974). Some evaluations of such data have made it possible to confirm the concern over this matter (Guzmán, 1980).

For this reason in the Demographic and Health Surveys (DHS) programmes it was decided to try out a history of pregnancies which only included the last five years. A questionnaire was applied to an independent sample in Peru and in the Dominican Republic. The results for Peru, analysed by Goldman (1988), show that although there is a great deal of agreement between total fertility estimated for the last five years, the same is not true of the trend during that period, which is less pronounced in the case of the experimental survey. These preliminary results would tend to show that it is better to use the complete history and not the short history, since the time for the interview is almost the same but the information collected in the first is more complete and one cannot be sure that the quality of the information collected in the short history is better than that obtained in the complete history.

Use of a Calendar for the Collection of Retrospective Data

All events investigated retrospectively pose problems of location in time. At the same time, there is a need to collect retrospective data which include simultaneously different types of history (fertility, mobility and occupational history). In the study of migration, for example, Courgeau (1988) has showed the need for cohort analysis which takes into account mobility as an element of permanent interaction with all the other aspects of family life, professional life, etc., of the individuals.

In the Demographic and Health Survey of Costa Rica (Asociatión Demografica Costarricense, 1987) information was collected on a total of 3,527 women aged 15 to 49 years. On half of the sample the so-called calendar was utilised, in which the occurrence or non-occurrence of specific facts related to fertility, breast-feeding, use of contraceptives, unions and occupation for each month of the last five years were

registered. In the other half the same questions were asked but in the traditional way, that is to say, within a questionnaire.

The results of this experiment, analysed recently (Sosa, 1988), show that the information collected using the calendar was of better quality, in the sense that there was less overlapping between events and a greater number of events were identified (pregnancy, unions, etc.). This improvement could be the result of the fact that in the calendar, the interviewees can observe in one single document all the events and it is easier for them to relate them among each other.

This instrument, however, has some disadvantages. One of them is that the events are not investigated in the same detail as when there is an independent history. For example, in the case of variable nuptiality it is known when the union begins or ends but nothing about the course of the dissolution; likewise, in the case of employment one knows whether the woman was occupied or not but no question is asked about the type of work done, occupational category, etc.

On the other hand, in the case of birth history analysed before, information is only obtained about fertility in the last five years. A solution in this case could be to lengthen the calendar but this would demand an excessive effort of memorisation on the part of the interviewee.

Last Child Information

Questions asked of women aged 15 years or more in the census and surveys on the number of children born alive, born dead or surviving, have made it possible to obtain reliable estimates of the levels and trends of infant mortality. The same is not true of questions relating to survival of the last child, particularly of those born the year before the census or survey, which in most cases have given poor results (Somoza, 1988).

With the object of studying the causes of such deficiencies, CELADE, together with the Fundación Cruzada Patagónica, carried out an experimental census in October 1986 in the city of Junin de los Andes, Neuquén province, Argentina. The basic hypothesis of the study was that some women do not declare the last child when that child has died, which would explain the underestimation of mortality which in general was obtained with this type of information. The questionnaire was very simple (census type) and contained the basic questions of a census plus those related to the children born alive and surviving children. Immediately following, a question was asked on the survival or no survival of the last child, then the date of birth and of death, if relevant, of the last child was asked. At the end, some questions were included asking whether after the last child born live (declared) the women had other deliveries and how they had concluded. The presence of these questions was not logical, but they were made with the intention of detecting inconsistencies.

Several cases of inconsistency were found which were checked with a new field visit. Although the hypothesis was not totally proven (because although there were

four cases in which the last live-born child was not declared, only one of these had died) it was possible to determine that the information on the last child born alive can be affected by a variety of errors which can lead both to an overestimation and to an underestimation of infant mortality. For example, there were errors in the date of birth of the last child because of negligence on the part of the interviewers when registering this date, through erroneous declaration; moreover, there were several cases of children declared dead which were really stillborn and finally some children given in adoption were also not declared by the women.

The corrected estimate of infant mortality on the basis of the final results leads to infant mortality rates slightly lower than that obtained with the results of a first visit. This was due to a slight increase in the number of births and to a decrease in the number of deaths.

Age Declaration of the Elderly

In Latin America, it has been found that the mortality among the elderly is lower than that observed in other countries or models with a similar or lower general mortality level. Serious evidence exists that there is a strong tendency among the elderly to exaggerate their own age, which could explain the low levels of mortality observed in this population.

In order to determine the existence of such errors, CELADE, based on an idea developed by Somoza (1981), undertook a research study in two cantons in Costa Rica (García and Ortega, 1988). The collection technique consisted of identifying, on the basis of the Population Census of 11 to 16 June 1984, those persons who declared themselves to be older than 60 years and who resided at the time of the census in the selected localities (a total of 2,000 people).

About a year later (3-20 June 1985), these persons were visited in their homes, their survival was established, and a simple questionnaire was applied to them in which information on age and other socio-economic characteristics was collected. In 80 per cent of the cases the age was determined with the aid of personal identity documents or other official documents and it is presumed that this is the real age.

The data collected did not confirm the hypothesis that people more than 60 years old exaggerate their age. It was found that more than 80 per cent of the interviewees declared their correct age in the census, or with an error of no more than one year. At the same time, the remaining 20 per cent showed no special trend toward systematic exaggeration of age. In terms of mortality, the results compared very well with vital statistics; furthermore, both results give lower mortality rates than those based on model life tables, which fact the authors interpret as a suggestion that in Latin America elderly people have a lower mortality than in other regions of the world.

New studies along these lines are required in other countries, since Costa Rica is characterised by a low mortality and since it is not a country where the declaration of age is particularly deficient.

4. Study with New Units of Analysis: The Study of Institutional Factors

An interesting line of work in the collection of data is that followed by some researchers in which the unit of analysis are the so-called 'institutional mediators', that is to say, those institutions and persons which, because of the roles that they play, have the responsibility of implementing social policy. An example of this category is the study carried out by Potter et al. (1986) in rural areas of Mexico, which investigated the different effects which health services proivde had in the changes in patterns of breast-feeding and use of contraceptives. After the Rural Family Planning Survey of 1981 had been carried out (in localities of less than 2,500 inhabitants) a subsample of 40 villages included in the survey was selected. On the basis of the information provided by the local authorities, a list was prepared of the medical facilities available to women of the community and of the medical personnel in general who were present at the time of the survey in the communities. Interviews were held in clinics and hospitals in which a questionnaire was given to the medical personnel (doctors, interns, registered and practical nurses). The questionnaire included aspects related to the attitudes and habits with respect to the use of contraceptives, length of birth interval, breast-feeding, etc. This study showed the causal link between the use of the maternal health services and the behaviour of women in rural areas of Mexico with respect to contraception and breast-feeding.

5. Utilisation of New Technologies for the Collection of Demographic Data

Use Of Satellites (Remote Sensing) to Produce Demographic Data

The ORSTOM (Institute Francais de Recherche Scientifique pour le Développement en Coopération) mission team has been engaged since 1985 in a novel and interesting experiment in Quito, Ecuador (Dureau et al., 1987, 1988). On the basis of Spot and Thematic Mapper satellite images it is possible to keep the land use under continuous and relatively precise observation; in consequence, exhaustive information can be collected on urban morphology, so that it is possible to obtain demographic data on urban populations quite rapidly through sample surveys.

This technique was applied successfully in 1987 in Quito, where a demographic survey was carried out based on a sampling by block selected with the help of high resolution images from a SPOT satellite. The possibilities for the study of cities and their growth that are opened by the application of this technique are numerous.

New Technique for Collection of Information: Use of Portable Microcomputers

In response to the growing complexity of surveys and to delays in their processing, a special programme has been developed for the entry, validation and

processing of the data to be used in the demographic and health survey project called ISSA (Integrated System for Survey Analysis). The implementation of this programme took place once the data were collected by conventional questionnaires.

A new experiment took place in Guatemala in 1987, in which the collection of data was done directly by portable laptop microcomputers which the interviewers carried to the field (Ochoa et al., 1988). For an interactive implementation through the ISSA a series of procedures were developed which generate a questionnaire on the screen almost identical to a printed questionnaire, in which the on-screen pages are selected automatically according to a pre-established flow of questions and in which the question which must be asked in each case is highlighted. To determine the feasibility of using this procedure and the quality of the data collected in comparison with printed questionnaires, this survey was carried out in a quasi-experimental design in which two groups of women were interviewed twice (150 in each group) using both techniques. In one group, the interview with the questionnaire was carried out first and in the other a portable microcomputer was used first.

The results of this experiment, although limited to a smaller number of women than that foreseen, made it possible for the authors to conclude that there were several benefits from the combined use of ISSA and laptop microcomputers, which could be summarised as follows: (a) elimination of one of the most laborious stages of field work which is digitation; (b) considerable reduction of the work load of validation of data since the greater part of inconsistencies are checked directly in the field;[4] consequently, the time between field work and processing of the survey is reduced; and (c) an important reduction (25 per cent) of the duration of interviews.

This procedure has been found very promising for the collection of data and its advantages are not only those explained above but also include the possibility of improving training and imparting greater versatility to the design of the surveys. The interviewees have not had any adverse response to this type of equipment.

In spite of the above-mentioned reasons it seems necessary to carry out other tests to validate these results in different situations and geographical contexts. Moreover, the technological dependence implied in the use of imported hardware, just at a time when Latin America is going through an acute external debt crisis, makes it necessary to give serious thought to this disadvantage of such procedures.

DISCUSSION

This document tries to answer the following question: Has there really been an important development in the collection of data in Latin America? From the foregoing analysis the conclusion arises that there has really been substantial progress in this matter. This advance, however, cannot be considered as affecting Latin

4. According to the authors this experiment has shown the feasibility of including numerous checks for consistency of information without this having an adverse effect on the collection of data.

America alone; in fact, a great part of the information-gathering instruments applied in the region have had their origin in some ideas developed in other regions of the world and have been adapted to the Latin American environment.

Simple and low-cost procedures have been developed which make it possible to obtain demographic indicators and to use them to validate hypotheses bearing on specific causal relationships between demographic variables and some specific factors. In this line of thought efforts are being made that involve the utilisation of existing information in registers like hospital records and the use of tools deriving from other disciplines like anthropology and epidemiology.

Technological advances in the last two decades have not always been rapidly applied to the collection of information. The main contributions are in the processing of information, in terms of rapidity of processing, validation mechanisms and utilisation of information at the local level. There are, however, some new trends such as the use of satellites for the study of cities and the use of laptop microcomputers for the collection of information.

At the same time, some attempt has been made to improve the collection of certain types of information, such as retrospective data asked in censuses and/or surveys.

In spite of the progress made in the collection of data, the traditional sources of data have not improved. The censuses of the 1980s were (according to studies made by CELADE) more deficient in general than those of the previous decade. Vital statistics have not improved in the countries where these were traditionally poor and in some countries, where they were of relatively good quality, they have deteriorated.

REFERENCES

Aguirre, A. and Hill, A., 1988. *Childhood Mortality Estimates Using the Preceding Birth Technique: Some Applications and Extensions*, Centre for Populations Studies, London: London School of Hygiene and Tropical Medicine.

Aramburu, C.E., 1986. Notas y reflexiones sobre la investigación micro-social en los trabajos socio-demogr ficos, *Problemas metodológicos en la investigación socio-demogr fica*, Mexico: PISPAL, El Colegio de México.

Asociación Demográfica Costarricense, 1987. *Encuesta de Fecundidad y Salud*, San José, Costa Rica.

Barros, F.C. and Gomes, Victoria C., 1982. Estudo longitudinal das criancas nacidas en 1982 en Pelotas, Brasil, paper presented to Taller Latinoamericano sobre Salud y Mortalidad Infantil y Perinatal, Buenos Aires: CENEP-IDRC, November.

Brass, W., 1974. Análisis de la historia de embarazos para detectar cambios en la fecundidad, *Metodos para estimar la fecundidad y la mortalidad en poblaciones con datos limitados*. Selección de trabajos de william Brass, Ser. E, No. 14, Santiago: CELADE.

Brass, W. and Macrae, S., 1985. Childhood mortality estimated from reports given by mothers at the time of a maternity: I Preceding-birth technique, *Asian and Pacific Forum*, Vol. 11, No. 2.

Caldwell, J. and Hill, A., 1985. Recent developments using micro-approaches to demographic research, *International Population Conference*, Florence. Liège: IUSSP.

CELADE and Unicef, 1985. *Nuevo procedimiento para recolectar información sobre la mortalidad en la ninez, Investigacion experimental en Bolivia y Honduras,* Ser. OI, No. 37, Santiago: CELADE.

Chackiel, J., 1988. *Uso de la Historia Clinica Perinatal Simplificada para la estimación de la mortalidad en la ninez*, Santiago: CELADE (draft).

Courgeau, D., 1988. Nouvelles approaches pour mesurer la mobilité interne, paper presented to IUSSP Seminar on Data Collection and Processing of Demographic Data in Latin America, May, Santiago.

de la Candena, M., 1988. *Comuneros en Huancayo, Migración campesina a las ciudades serranas*, IEP Instituto de Estudios Peruanos, Documento de trabajo No. 26, Lima.

de Lomnitz, L.A., 1977. *Cómo sobreviven los marginados*, Siglo XXI, Mexico, second edition.

Delgado, H.L. et al., 1986. A cohort approach to explain differentials in mortality and to evaluate the impact of interventions in developing countries, paper presented to IUSSP Seminar on Comparative Studies of Mortality and Morbidity: Old and New Approaches to Measurement and Analysis, July 1986, Siena, Italy.

Dureau, F. et al., 1987. L'utilisation de la télédétection pour 1' observation des populations urbaines, *Equateur*, Bulletin de liaison No. 12, Paris: ORSTOM.

Dureau, F. et al., 1988. Using remote sensing to produce rapidly demographic data in the cities: the example of Quito (Ecuador), paper presented to Seminar on Gestion Urbaine et Développement, September, Lyon, France.

Ferraz, E. et al., 1985. Identifiçao de fatores de risco para baixo peso ao nascer e mortalidade perinatal numa cidade do nordeste brasileiro. Abordagem Caso-controle. Consideraçoes prelimirares, paper presented to Taller Latinoamericano sobre Salud y Mortalidad Infantil y Perinatal, November, Buenos Aires: CENEP-IDRC.

Ferreira, C.E. and Ortiz, L., 1984. *Pesquisa da mortalidade infantil en um segmento populaçional da periferia de Sâo Paulo*. Sâo Paulo: Fundaçao SEADE (draft).

Goldman, N., 1988. Full vs. five-year maternity history data for fertility and child mortality measures, paper presented to IUSSP Seminar on Data Collection and [redacted]ing of Demographic Data in Latin America, May, Santiago.

Gracía, V. and y Ortega, A., 1988. Age declaration, mortality and selected socio-economic characteristics of the elderly, paper presented to IUSSP Seminar on Data Collection and Processing of Demographic Data in Latin America, May, Santiago.

Gray, R.H., 1986. Epidemiologic methods and case-control studies of mortality and morbidity, paper presented to IUSSP Seminar on Comparative Studies of Mortality and Morbidity: Old and New Approaches to Measurement and Analysis, July, Siena, Italy.

Guzmán, J.M., 1988. El procedimiento del hijo previo: La experiencia latinoamericana, paper presented to IUSSP Seminar on Data Collection and Processing of Demographic Data in Latin America, May, Santiago.

Guzmán, J.M., 1980. *Evaluación de la historia de embarazos en la Encuesta Nacional de Fecundidad, Costa Rica, 1976*. Ser. C, No. 1011, San José, Costa Rica: CELADE.

Ochoa, J.H. et al., 1988. Procesamiento iterativo de encuestas complejas con micro-computadores port tiles: un experimento en Guatemala, paper presented to IUSSP Seminar on Data Collection and Processing of Demographic Data in Latin America, May, Santiago.

Romaggi, M., 1988. Pre-diagnóstico demográfico de reducciones indígenas de la IX Regiòn. Anàlisis del Censo de Pobalción de 1982, Paper presented to IUSSP Seminar on Data Collection and Processing of Demographic Data in Latin America, May, Santiago.

SIAP (Servicios de Investigación y Acción en Población), 1988. *Estudio sobre releciones entre fecundidad y mortalidade infantil en meternidades de las ciudades de La Paz, Cochabamba y Santa Cruz, Bolivia, 1987-1988*, La Paz.

Somoza, J., 1988. El censo experimental de Junín de los Andes. Informe Técnico sobre la experimentación para estimar la mortalidad infantil reciente, paper presented to IUSSP Seminar on Data Collection and Processing of Demographic Data in Latin america, May, Santiago.

Somoza, J., 1986. Una idea para medir la mortalidad de la población de edad avanzada, *Notas de Población*, Year IX, No. 26, Santiago.

Sosa, D., 1988. La expreiencia del calendario para la recolección de datos demográficos, Costa Rica, 1986. Draft presented to IUSSP Seminar on Data Collection and Processing of Demographic Data in Latin America, May, Santiago.

Victoria, C., 1985. Case-control study to investigate the influence of feeding practices on infant mortality in Rio Grande do Sul, Brazil. Preliminary Report, paper presented to Taller Latinoamericano sobre Salud y Mortalidad Infantil y Perinatal, November, Buenos Aires: CENEP-IDRC.

10

IN-DEPTH INTERVIEW APPROACHES TO DEMOGRAPHIC DATA COLLECTION

C. Lwechungura KAMUZORA
University of Dar es Salaam
Department of Statistics/Demographic Unit
Dar es Salaam, Tanzania

In-depth interviews, from the connotation of the term itself, are quasi-anthropological/ethnological intensive studies aimed at understanding *in toto* phenomena, particularly of a social, cultural and attitudinal nature. They are thus characterised by participant observation, use relatively informal approaches unlike for example in a conventional sample survey, and their typical method of measurement is usually through conversation rather than adhering to a formal questionnaire. Let it be noted from the start that the term in-depth is preferred to anthropological or ethnological as it does not imply that one needs to be a trained anthropologist to use this informal approach.

The in-depth survey is a relatively new type of data collection procedure in population studies; the dominant one, beyond the census being formal sample surveys (Caldwell, 1985) e.g. the WFS, DHS etc. To become of much significance in population studies in-depth surveys have shown much potential as a solution to the usual problems of social science research of contrasting and not infrequently conflicting evidence on relationships between socio-economic and demographic variables. This is the major reason for the subsequent general lack, in actual fact failure, of development of social science theory of demographic behaviour.

Two important examples showing the need of in-depth surveys can be noted. First the disclaimer of the famous theory of demographic transition by research findings that the theory sparked on Europe: for example, Knodel and van de Walle (1979) show that fertility decline in Europe occurred through a variety of socio-economic circumstances: before, e.g. France, after, e.g. England and Wales or with no particular relation to social and economic development.

Second are unprecedented rapid fertility declines, at that, at low levels of development in Asia e.g. in Thailand (Knodel et al., 1984), and more interestingly impending even faster declines in sub-Saharan Africa where high fertility has persisted, as seen in a recent Kigarama village survey by Kamuzora (forthcoming), negating Caldwell and Caldwell's (1987, 1988a) suggestion of a lag due to peculiarities of a pronatalist African culture. The latter examples are dealing the last blow to the theory of demographic transition. Thus it is such contentious issues that have drawn more and more scholars to go for in-depth interviews to see what the actural actors in the demographic dynamics say.

The thrust of this paper therefore is the role of these surveys in data collection for research into demographic phenomena. A gradual approach to this is adopted: first, an appreciation of in-depth surveys is shown by case study examples in Section 1.0; here the unique role of in-depth survey information is demonstrated. Further, by its nature in-depth survey methodology is amenable to ascertaining the accuracy of numeric information, for example age. A 1986–87 survey by the author will illustrate this point as another unique advantage of in-depth survey taking.

With the increasing importance, hence need of in-depth studies, a question that derives from these examples is (a) the methodology of in-depth studies, particularly when one need not be a professional anthropologist to do such a study, and (b) the role of modern audio recording and computer technology in the efficiency of recording information in the field, and processing and analysis. This is dealt with in Section 2.0 where the author's experience is given for detailed first-hand information. In Section 3.0 a summary discussion and recommendations are made including the role of in-depth interviews as a vital complement to censuses, and particularly conventional sample surveys.

1.0 APPRECIATION OF IN-DEPTH INTERVIEWS: CASE STUDY ILLUSTRATIONS

A number of surveys employing in-depth interview methodology have been conducted. They offer good illustrations on the unique importance of the information derived, hence powerful methodology to an intimate understanding of social phenomena. Samples of these studies will be given for the social, cultural and economic determinants of major components of population growth, namely migration, mortality and fertility. The role of in-depth study in data quality e.g. on age accuracy will also be covered.

1.1 Migration

An example of in-depth survey approach on migration is given by Das Gupta (1985) for the real explanation of relatively low rate of urbanisation in India. The conventional explanation has been low labour demand due to relatively little expansion of industry. Das Gupta's study, however, shows eixstence, in the rural areas, of reliable economic security systems from various informal, but institutionalised

sources of income. These range from patron-client relationships of share-cropping 'concessions' in e.g. housing, to free collection of various items e.g. fuel, that make one go by in life.

While Das Gupta's description fits in with Todaro's model of differential income between rural and urban areas as a determinant of migration, real rural income measured from Das Gupta would probably be higher—thus explaining the low rural-urban migration—than what would come from a conventional survey.

1.2 Mortality

The importance of in-depth study of processes of morbidity and mortality comes from the general realisation that modern medical measures and approaches are not enough in both preventive and curative aspects. The need has therefore been for knowledge of the socio-cultural interaction. It is because ultimately it depends on what people believe in and do. Little in-depth study of the processes of morbidity and mortality has been made, particularly the behavioural aspects of child care (Caldwell and Caldwell, 1988b). (However, the Mosley (1985) and Mosley-Chen (1986) *a la* Bongaarts (1978) proximate determinants framework has made headway for intensive study of these phenomena.) Two illustrations of the importance of in-depth surveys in morbidity and mortality studies are given here.

Feyisetan (1988) gives examples of inconsistencies in survey data on the effect of child, and prenatal maternal nutrition on infant and child morbidity and mortality in Ife (Nigeria), where in-depth ethnographic studies could help to clear them.

The inconsistencies are as follows:

(a) Breast-feeding only is associated with higher risks of death; at the same time it is shown that less bottle feeding and later introduction of supplemental feeding are associated with higher infant/child survival chances.

(b) The more the mothers eat protein foods (beans, fish, beef) during pregnancy the higher the risks of death to their infants/children.

The inconsistency in (b) is explained by exaggerated responses, the claiming to be eating good food while actually doing something different. The importance of in-depth studies here is given by Randall (1988: 1.2.2):

> The anthropologist synthesises:
>
> | | |
> |---|---|
> | What people say they ought to do | The rules |
> | What people say they do | The norms |
> | What people actually do | The reality |
>
> Understanding of the relationships between these layers cannot be obtained rapidly or through using questionnaires; hence the frequent response of anthropologists to demographers: 'No, you can't ask that, you will never get any data that mean anything that way.'

The second illustration of the importance of in-depth surveys in mortality studies is the Garenne and van de Walle (1985) study of the mother's knowledge, attitudes and practices related to child health and mortality in the Kaolak (formerly Sine-Saloum) area of Senegal. This area had been studied through twenty years of survey work that confirmed high stable mortality 'but had not explained its cause' (Caldwell and Caldwell, 1988b). Garenne and van de Walle have done that.

The Garenne-van de Walle approach was founded on the basis, and in actual fact found that, the level and pattern of infant and child mortality is

> . . . affected by local knowledge of disease transmission, as well as influenced by local customs, religious beliefs, childbearing practices and parental behaviour. Maternal knowledge, attitudes and practices have been posited as critical variables. The data necessary to assess these variables are difficult to gather and to quantify, and they are susceptible to rapid changes. Furthermore the interpretation of the data is often subjective. Still, these variables may be as important as conventional socio-economic data such as income, education or access to health facilities in explaining mortality levels and patterns (Garenne and van de Walle, 1955: 267).

1.3 Fertility

The most significant and pertinent contribution of in-depth studies on fertility perhaps, by the nature of their methodology, has been laying bare the socio-economic-cultural process of fertility determination: among these factors, their correct interlinkages are revealed, in contrast to, as they are sometimes thought, as having independent influences on the proximate determinants of fertility. As will become clear from illustrative case studies below, it is the economic base, i.e. material endowment for procurement of means of livelihood, that determines people's attitudes and behaviour legitimised as the culture (Kamuzora, 1987, forthcoming).

The examples are on the reason for fertility decline in Thailand and Manupur(in the Ludhiana district of India), and for the impending fertility decline in rural Kigarama village in Bukoba district, north-west Tanzania.

In Thailand, based on focus group interviews, fertility decline has been explained by Knodel et al. (1984: 324) as being a result of the interaction between socio-economic changes and organised family planning, but '. . . both operating within a cultural setting conducive to reproductive change. . .' Here culture is put as a *sine qua non* for the practice of fertility limitation. However, a different interpretation from that of Knodel et al. is arrived at by the author.

From the statements of Knodel et al. themselves that '. . . socio-economic changes played an essential role in creating the initial and continued receptivity to limitation of births. . .' (ibid.: 324), and from excerpts of Thai respondents themselves (some reproduced below), it is clear that the 'traditional' base (consisting of

elements of high benefits from and low costs of children) making for the associated pro-natalist culture has changed to that of reduced benefits and increased costs, thus laying a new base for attitudes and behaviour (culture) for low fertility. The excerpts are as follows:

> (Having fewer children nowadays) is good because making a living is different than before (older Buddhist man, South) (p. 301).
>
> Before when things were not expensive, there were plenty of children. Now when things are expensive, there are fewer children. If you have many children, you need to spend a lot. If you have fewer children you spend less. (older Buddhist woman, South) (p. 303).
>
> Having higher education is the same as owning rice fields. Without education there is no job. (older woman, North-East) (p. 306).
>
> (Children earlier) worked in the field, in the garden, did everything. Whatever the parents did, the children would do the same. But today they only study, they don't help their parents. Only study and the parents have to earn money to support them. (older woman, North) (p. 308).
>
> (parents will still be supported well) because education has progressed. Now children get a higher education. Repayment of parents will go according to the level of education. . . Two children with education can repay parents better than ten (without education) (older man, North-East) (p. 311).

The respondents clearly show that it is econmic factors of costs and reduced benefits from children—and the economics of giving high education to a few children to get the same or more returns as from many low educated children—that has formed the attitudes and behaviour towards the desire for a few children and subsequent limitation of fertility.

The reproduction of excerpts here to argue for the correct interpretation demonstrates the advantage of the methodology of in-depth interviews of (tape) recording the respondents verbatim. It is because, after all the correct interpretation of such attitudinal matters can only be given by the respondents themselves. The role of the researcher, really, is to make such information known to other scholars.

The Manupur study by Nag and Kak (1984) presents an interesting case study of change from desire for and actual high fertility to moderation to a few. Mamdani (1972) interviewed farmers in this area in 1970 and reported them desiring a large number of children because the latter met *inter alia* their labour and old age security needs. Twelve years later (1982) Nag and Kak (1984) interviewed the same farmers and also their children who had become adults. In between the two study visits significant economic changes had taken place, notably agricultural mechanisation that did away virtually with all the activities that had needed the labour of children. The

non-agricultural occupations that children could undertake needed higher education and both necessitated living far away from home. Thus new costs were introduced. With reduced benefits from children the desire for many children changed to that for a few. These views were expressed by both parents who had been interviewed by Mamdani, and now also their children in the new study.

The Kigarama village study by Kamuzora(forthcoming) in 1986–87 was prompted by dissatisfaction with the analysis of quantitative fertility and fertility determinant survey data. Here ultimately, one has to provide some interpretation to the data; unlike when a complementary in-depth study provides the explanation of phenomena shown by the main survey.

The element for which this study is brought up here is to demonstrate the advantageous ability of in-depth surveys in bringing out subtle and intimate information that cannot come out in formal interviews. The Kigarama village survey was an in-depth study of the relationship between the status of women and fertility; indeed it was a pilot study for what questions to ask and how, in a conventional survey, by letting the respondents determine the hypotheses, define and provide a lexicon of terms for appropriate measurement.

The element of interest here is the interpretation of the desired number of children that the majority of women stated. Over 63 per cent stated five or more, or as many as one can or that it was up to God. This number, by usual interpretation, shows nothing but high fertility desire. However, when one adds the reasons given for that number a dramatically different interpretation comes out. It is that the majority of these women, over 64 per cent on average, but much more, that is over 80 per cent of the younger women under 35 years of age, said it was because life was difficult and/or that was the number one would be able to take care of. Isn't the interpretation of this that women want few children! Some excerpts from the conversations are given below for further illustration.

Woman of age 23:

As the situation is today; in my own view now; I see she should bear six children [Reasons.] I see how the situation is (i.e. it is difficult) (ID38.2.23).

Woman of age 34:

I cannot know about that. How can I, that depends on one's liking. (You mean in today's situation, you are saying one should bear as one likes?) We are able to take care of them: one should bear about five. Or one can exceed. Now if it hasn't stopped yet, what can you do! (No, leave alone stopping, your recommendation.) She should bear five. (Why this number?) The situation is not changing: it has become difficult (ID32.2.34).

Woman of age 42:

I see that she should bear six children. [Reasons.] This number? Because the situation has become bad. In the old days you wanted to bear six, ten, nine

children; because you would feed and clothe them; but in today's situation, there is no food: you depend on those who are working; when you try to grow food you get nothing. Then it is better to bear only six children, they are the ones I will be able to feed; those are the ones I and my husband will be able to clothe (ID 14.1.42).

Woman of age 50:

I am not God. I can't control them. But perhaps four. That is the fashion. God is the controller. But life is difficult. You need a few in order to support them.

Woman of age 80:

Four or five children, then she should stop. There won't be peace and security; and seven children will be a burden. But four children, that is quite peaceful. In the past we used to ask for a lot of childbearing. Now, we can't afford to have more children (ID41.1.80).

The explanations in these conversations that in-depth interviews afford us reveal impending fertility limitation by these rural women. Similar other studies have been conducted: notable *inter alia* is Oppong (1980) and subsequent studies e.g. Oppong (1988) that reveal the 'seven roles of women' in Ghana; they provide another illustration of the unique importance of in-depth studies. Such information can hardly be got in formal surveys.

1.4 Data Accuracy

In-depth surveys, by the nature of their methodology, have the capability of gauging to what extent the respondent gives correct and accurate information. Hence they can act as pilot studies for formal surveys. An illustration is given on age determination from the surveys conducted by the author. In these conversations one gets an insight into the process of usual determination of age, interestingly the difficulties faced with old people, and the role of the interviewer.

The questions put to the respondent on age were as follows:

What year were you born?

That means you are how old?

Of a number of patterns of arriving at the recorded age that can be identified in the responses three are given here as an example; they can be easily identified in the excerpts below. In some instances these are noted. The three patterns are:

(a) The respondent states the year of birth and age correctly. (Here it was virtually only the young who could do that.) A significant number say they do not know the year but say they know their age. (This could be right or wrong: it will

be seen in some cases that the interviewer (shown by words in normal () brackets) tries to make probing corrections when she sees the given age is unrealistic.)

(b) The interviewer corrects the given age correctly or wrongly. (On the latter it will be seen that the investigator (the author making a correction shown as figures in 'arrow' < > brackets. The investigator reckons the correct age when the respondent has stated some calendar event.)

(c) The respondent states, in all cases of this type, the name of the reigning chief when she was told she was born. (This type of response was given mostly by old respondents.)

The excerpts, arranged by age, are as follows:

(Note: the number at the end of each excerpt is identification for the woman. This is explained below under data processing methodology.)

> <I was born in> 1963. <I am> 22 <years old>; this year is my twenty third (ID16.22).

> Can I know the year! (How old are you then?) I am 29 years of age (ID27.2.29).

> I don't remember. May be 30 or what, I don't know (ID53. 1.30).

(Note: here the age was taken as given, even though the woman gave all indications that it could be wrong).

> I don't remember it anymore. I am about 43 years of age (ID31. 2. 43).

> <I was born in>1942. Maybe forty-five, do I know? (Have you already reached forty-five years!) That is the age (ID12.1.45).

> I don't know the year. (During whose reign?) Chief Mutakubwa. My age? I remember, I am in the 46th year (ID50.1.46).

This is about her correct age as Mutakubwa reigned in the 1930/40s. Note how the respondent herself used the event calendar unsolicited to determine her age.

> Do I know it! At this time? I think I am 40. (Only 40?) Let's say it is 45, or 50.<Person in background: no you haven't reached that.> <I am> 45. <no> I am 40. <But interviewer wrote 50 on label of tape. That is probably right.> (ID14.3.50).

The decision by the investigator is wrong! On other questions, she states she has six children, but the age of her eldest son is 30, and she married at age 15. Thus she was about 45/46 years old as she had stated.

> <silence> <I am> 52 <years old> (ID02.2.52).

Oh, I don't know what years! My father refused to send me to school. Now? I am 97 years old. (Come on, stop joking! Your mother is not 97 and you are!) I am fifty-something. (Fifty three, how many?) 52 (ID12.1.52).

Ooh! Did our fathers write these things! The age I have told you. (The 57 you have told me?) Four hundred. (You cannot reach four hundred! You have told me you are fifty-seven years old.) That's it (ID11.2.57).

(Do you remember the year you were born?) No. (Who was the regning Chief when you were born?) Mboneko.(How old are you then?) About forty-six. (No, you have passed that age.) But I have not reached fifty. I am around forty-seven. Terrible of me! They usually tell me my age and then I forget; I have become absentminded! (ID50.1.57).

No, I don't remember the year. (Who was the reigning Chief?) Was it Mutatembwa? <Backg; Mutahangarwa> Mutahangarwa. Wasn't it the one who was succeeded by Mboneko? I could even be a hundred <years old>.(Hundred?) <66> (ID57.1.60).

I don't know the year I was born.<I am> 63 (ID05.3.63).

The woman does not know the year, yet she can tell her age!

I am 64 years of age (ID15.2.64).

Here the woman just states the age, and the interviewer does not bother to check the correctness of the statement.

I don't know the year. I don't know my age.<Tp 65> (ID23.3.65).

Here the interviewer just guessed the age.

I can't know the year. (Who was the reigning Chief?) Mutahangarwa. (Can you therefore tell your age? It is 18 years, I am now in the 19th year. (Your age? No, you exceed that, and by far; now, let's see how old you are: I think you must be 60 years and above (ID61. 2.66).

This is an example of non-numeracy.

During the reign of a certain chief, that is what our 'mothers' used to tell us. (During which chief were you born?) I was born during the reign of Mboneko. That is the period I grew up, that is the time I was when he died. (That means you are how old?) Now, I am in the seventies; that is where I have reached. My husband died after fifty years of marriage, not including that since birth (ID10.1.70).

But Mboneko ruled in the 1920/30s: thus the woman in 1986–87 was certainly not older than 65!

> Can I know it! To come to reach this age, would I know this? (What age can we say you are?) Even sixty, I could be that. (Only sixty, or even eighty!) You have said it! (ID14.1.80).
>
> I cannot remember. I think I am 80 (90?) (maybe) (ID07.2.90).

In the last two cases it seems the women look so old that the interviewer probably overestimates their ages. In any case this does not affect this study at all, because these are in the old age group (over 50) as categorised by the study design.

2.0 THE METHODOLOGY OF IN-DEPTH SURVEYS

With the need for in-depth surveys gaining ground, consideration of the methodologies for adequate collection, processing and analysis becomes pertinent. This is especially so when the term in-depth largely means anthropological methodology. The latter have traditionally involved participant observation over a relatively long period, at that accumulating a bulk of notes. While the period of stay should be long if the investigator really wants adequate acquaintance with the target population, the methodology of recording information and its implications for processing, in view of innovative approaches being used, needs review. The author's recent survey experience in this matter is given here. It is suggestive of a viable methodology: efficient in time but not compromising the in-depth nature of the data.

The pertinent stages of in-depth study methodology are data collection, processing, and analysis.

2.1 Data Collection

The general aspects of data collection in intensive studies are largely known: by their aim—deep understanding of socio-cultural and attitudinal behaviour, and therefore by their nature—informal approaches and participant observation. it is the method of recording interview information that has developed beyond note-taking that will be dealt with. This is tape-recording the conversations.

The study in which the author used the tape-recording method was on the role of children in a woman's life in patriarchal peasant-economy societies. While participant observation was done for the period data collection went on, the main source of data was interviews guided by an open-ended questionnaire set, used to keep the conversation on track and to ensure that all points intended were covered. Thus the points of conversation and their order were uniform for the entire sample to facilitate processing, summary and analysis. The interviewer added probing questions either when the response was not clear or when the respondent talked about new interesting information pertaining to the general subject matter of the study.

The advantages of tape-recording interviews are: (a) whole information is recorded; unlike when taking notes, where because of fatigue some of the interesting

subtle points can go unrecorded; (b) attitudes can easily and accurately be discerned by listening (and relistening) to the conversation. Here intonation matters: different intonation but using the same words alone can be expressing different attitudes. It is realised that these aspects can be accommodated in note-taking: it would not be to the same extent though; hence the advantage of tape-recording.

What looks as a disadvantage, that is, of information being on audio tapes—but not real as will become clear below—is that one has to spend a relatively long time to listen to the tapes (and rewinding for relistening); this can be almost impossible for making a summary of the entire sample. The method of processing these conversations takes away this problem, as is explained next.

2.2 Processing

The processing of conversational, tape-recorded data, specifically summarising them for analysis, takes time in absolute terms, as one would have to listen to them versus reading the notes. However in the long run, the methodology used and suggested by the author, as will immediately become clear, has far superior benefits than having notes or another method that was exposed to the author. We start therefore by describing the author's methodology, while other methods are compared along the way.

2.2.1 *Processing of the Kigarama Village Survey Data*

The processing of Kigarama conversational tape-recorded information went through the stages of transcription, translation into English, keying in the latter to computer storage medium, and coding.

Transcription to 'hard copy' was necessary as reading is quicker than listening to tapes—these usually need rewinding the tape back and forth at some portions to ascertain the meaning. Translation into English was done before keying the data into the computer medium: though not necessary, it was seen as advantageous for future users who did not speak Kihaya, the language of the interview. The interviews could be for wider use: e.g. socio-psychological analysis on various aspects. After all, the reports and papers coming out of this research were envisaged to be in English, and excerpts from the interviews of some respondents would form integral parts of these papers. This was especially so because one of the intentions for the study was to let the respondents provide interpretation on the subjects they were being studied on.

Keying in the conversations to the computer medium was first and foremost for facilitating text analysis and secondarily, but important, for reproduction and copying excerpts into the research reports mentioned above. For analysis the originally intended procedure was to use computer software (e.g. EDIX) to collect into one, all places in the text where a term (subject of interest), for example, child, was stated, in order to analyse the context into which the term was being used. But, as not in all places a major point of discussion used the same term(s) this was anticipated as not

inclusive of the entire sample. Therefore this intention was abandoned. It should be noted—rather than one becoming cynical—that these processes are new, thus innovation, hence experimentation was also simultaneously in process.

Another method for processing to summarise the data for analysis was to collect the responses of all women for each topic, then read and summarise, as used by Francine van de Walle for the early 1980s similarly tape-recorded study in Burkina Faso. The disadvantage of this method was anticipated to require too much reading time and note-taking. Coding was therefore resorted to. This raises questions, particularly on oversummarisation, hence possible distortion of meaning and therefore defeating the whole purpose of in-depth study. Let the reader be assured beforehand that this problem was totally avoided, as will be explained next.

Numeric codes for responses on major points of the interview were established to facilitate a summary or an overview of the entire sample by (a) frequency distributions of responses on each major point of interview; and (b) cross-tabulation of responses of different variables; for example, if a group of women has similar responses on one question one would want to see whether they varied on another. The actual responses subsequently 'flesh-out the bones', that is, provide the interpretation to the cross-tabulated information.

It can be noted that as a normal process of coding, each interview is identified by tape number, person number, and age (see e.g. the ID numbers for the excerpts in Sections 1.3 and 1.4). These IDs have an advantage of cross-tabulation with responses so that one can easily go back to a tape for a particular individual woman with a particular response. Suffice to say that the basis for the codes were the ('hard copy') texts (conversations) themselves, as should be. The point of note here is that by the nature of the data (i.e. conversations) themselves a lot of reading of the text, by samples of age of respondents was done to ensure a broad-based (whole) code system. It ensured that almost all possible responses were covered, thus avoiding having to adjust the coding significantly during the actual coding to accommodate new response (value) items.

Two main advantages that overcompensate for the amount of time spent on data processing for computer use can be given here. One, the coding establishes (permanently) data which could be cross-tabulated in almost an infinite number of ways, for the vast different (including oblique) outlooks one could have on the responses. This contrasts with going through the bulky files of survey notes. Two, a fairly adequate analysis, i.e. based on all sample units, is ensured; with the data processing part of it done very fast by computer. To make the 'story' of in-depth interview data complete an example is given in the next subsection.

2.3 Analysis

An example is drawn from the author's Kigarama village survey. One aspect suffices: that of distribution of women on children desired and the reasons thereof. This is adapted from Kamuzora (forthcoming). (Excerpts on these points were given in Section 1.3 to illustrate the role of in-depth surveys in understanding fertility behaviour.) The questions asked on desired number of children went as follows:

In today's times, the way things are, what number of children should a woman bear? Why this number?

One significant finding from the responses is the development towards low fertility desires. A frequency distribution of women on number of children desired (table not shown, but can be seen in Kamuzora, forthcoming) is that on average, about 56 per cent of the women desire to have two to six children, with the majority of them, accounting for 53 per cent points, desiring four to six. Interestingly, significant proportions in all age groups desire to have four children or less: these are about or over 30 per cent of women of ages of up to 59 years. Even for old women of 60 years and above, a significant proportion, that is over 19 per cent, desire four children or less. The proportions in the categories of up to God, or as many as one can have, are not many, and not a new phenomenon to dwell upon. This development can be seen explicitly in the reasons women gave for the stated desired number.

Even on average only, the majority of women, that is over 64 per cent, see either that it is the number of children one can afford, or that life itself is actually difficult. Younger women, almost all, that is over 80 per cent come out stating these reasons. The other age groups are not far off either: it is 61 per cent of the middle aged, between 35 and 44 years, and 50 per cent of the older ones of ages 45 to 59. Even among the oldest, over ages of 60, more than 40 per cent mentioned these reasons.

Cross-tabulation of desired number by reasons shows, as would be expected, the women desiring less children being mainly the ones mentioning the difficult circumstances. Even some women who desire many children, that is 7–9 children, or as many as one can, and also those leaving it up to God, mention the difficulty of circumstances.

The excerpts, e.g. those given in Section 1.3, from the majority of women, would fit here to 'flesh-out' the 'skeleton' given in the frequency distributions just stated.

A summary interpretation of the above information is that, women, regardless of age, though one would expect it more of younger ones as the foregoing evidence shows, are moderating their fertility desires in response to changing material circumstances. As the women themselves have stated, their economic circumstances are increasingly worsening, hence the in-depth information conclusively foretells of an impending fertility decline at low levels of development. Importantly, this reality has made irrelevant—and hence laid the basis for change of—the patriarchal culture that had made cheap the labour of women and children and consequently high fertility of much advantage. All this tells against the Caldwells' (1987, 1988) preoccupation with the old normative cultural beliefs as likely to cause a lag in fertility limitation in Africa.

3.0 SUMMARY, DISCUSSION, AND RECOMMENDATIONS

While in-depth study approaches are not new—social anthropological work has a long tradition—their emergence to wider use particularly in population studies is new.

This arose largely out of both (a) continuing variations/exceptions and in many cases conflicting evidence of relationships between socio-economic and demographic variables, e.g. the 'demise' of the theory of demographic transition; and (b) consequently, failure of development of a social (science) theory of demographic behaviour. The in-depth or 'micro' approach in demography is proving to be of vast potential as it lays bare the real situation, particularly interrelationships of phenomena. Examples were given on determinant components of population growth and age data accuracy, on points that the formal survey is hardly able to capture.

Although the amount and nature of data from in-depth interviews appears dauntingly insurmountable to process, the experience by the author shows that tape-recording and transcription to computer media produces an organised data set. Further, coding of responses on major points of the interview facilitates frequency distribution and cross-tabulation of responses, with the details from the complete transcribed interview 'fleshing out' these distributions. Thus computer processing has vast long-term benefits.

From the case illustrations above and their general implications in-depth studies are seen to have wide applications, importantly by playing complementary and supplementary roles in virtually all stages of formal data collection methods i.e. censuses and sample surveys, and analysis and interpretation of data. First, they act as pilot studies on what questions can be asked and how, and monitor accuracy. Second, and this is their unique role, they offer superior methods of collection of attitudinal and social science data, and thereof, interpretative capability.

With the importance of in-depth surveys ascertained, a review on the relative role of censuses and sample surveys is in order. This is put forward in the light of the complementary and supplementary roles of the three types of data collection procedures, what each can and cannot do. The census, in view of its gigantic nature, particularly for developing countries, should concentrate on age and spatial distribution of the population; it can add only a few quantifiable and easy to collect demographic and socio-economic characteristics. The sample surveys should be for more detailed quantifiable demographic and socio-economic characteristics that the census can hardly collect; at best it is for quantifying associations between the variables. Finally in-depth surveys, apart from acting as pilots for censuses and surveys should be for qualitative information: these would provide the interpretation of the quantitative data from the other two sources of data.

In other words, the census is for showing where people are, the sample survey for associations between quantifiable characteristics of the population, and the in-depth study for why those associations exist. Then we would have the story complete, instead of the current uncharted, sometimes conflicting, roles of these data collection methods.

REFERENCES

Bongaarts, J.,1978. A framework for analysing the proximate determinants of fertility, *Population and Development Review*, Vol. 4, No. 1.

Caldwell, J.C., 1985. Strength and limitations of the survey approach for measuring and understanding fertility change: alternative possibilities, in J. Cleland and J. Hobcraft (eds.), *Reproductive Change in Developing Countries*, London: Oxford University Press.

Caldwell, J.C. and Caldwell, P., 1988a. Is the Asian family planning program suited to Africa? *Studies in Family Planning*, Vol. 19, No. 1.

Caldwell, J.C. and Caldwell, P., 1988b. An overview of the potential and actual contribution of the anthropological approach to the understanding of factors affecting demographic variables—fertility, mortality and migration, *African Population Conference,* Dakar, Vol. 3, Liege: IUSSP.

Caldwell, J.C. and Caldwell, P., 1987. The cultural context of high fertility in sub-Saharan Africa, *Population and Development Review*, Vol. 13, No. 3.

Das Gupta, M., 1985. Micro-perspectives on the slow rate of urbanisation in India: informal security systems and population retention in rural India, *International Population Conference*, Florence, Vol. 4, Liege: IUSSP.

Feyisetan, B., 1988. Understanding the relationships between child care practices and child mortality: the need for ethnographic approaches in child mortality studies, *African Population Conference*, Dakar, Vol. 3, Liege: IUSSP.

Garenne, M. and van de Walle, E., 1985. Knowledge, attitudes and practices related to child health and mortality in Sine-Saloum, Senegal, *International Population Conference,* Florence, Liege: IUSSP.

Kamuzora, C.L., forthcoming. Impending fertility decline at low levels of development in Kigarama village, Tanzania: Cultural materialism versus idealism (Demographic Unit, University of Dar es Salaam and Population Studies Center, University of Pennsylvania) (Working Paper, 1988).

Kamuzora, C.L. 1987. Survival strategy: the historical and economic roots of an African high fertility culture, in E. van de Walle, (ed.), *The Cultural Roots of African Fertility Regimes. Proceedings of the Ife Conference: February 25–March 1, 1987,* University of California Press.

Knodel, J., Havanon, N. and Pramualratana, A., 1984. Fertility transition in Thailand: a qualitative analysis, *Population and Development Review*, Vol. 10, No. 2.

Knodel, J. and van de Walle, E., 1979. Europe's fertilitty transition: new evidence and lessons for today's developing world, *Population Bulletin*, Vol. 34, No. 6. A shorter version is, Lessons from the past: policy implications of historical fertility studies, *Population and Development Review*, Vol. 5, No. 2.

Mamdani, M., 1972. *The Myth of Population Control,* Monthly Review Press.

Mosley, H., 1985. Biological and socio-economic determinations of child survival. A proximate determinants framework integrating fertility and mortality variables, *International Population Conference*, Florence, Liege: IUSSP.

Mosley, W.H. and Chen, L.C., 1986. An analytical framework for the study of child survival in developing countries. Special isssue of *Population and Development Review*, New York: The Population Council.

Nag, M. and Kak, N., 1984. Demographic transition in a Punjab-village, *Population and Development Review*, Vol. 10, No. 4.

Oppong, C., 1988. Modernising mothers: analysis of Ghanaian focused biographies, *African Population Conference*, Dakar.

Oppong, C., 1980. A synopsis of seven roles and status of women: an outline of a conceptual and methodological approach, ILO, World Employment Programme Working Paper.

Randall, S.C., 1988. Use of ethnological knowledge in the collection of demographic data, *African Population Conference*, Dakar, Vol. 1, Liege: IUSSP.

11

RAPID POPULATION GROWTH, EMPLOYMENT AND HOUSING IN MEGA-CITIES IN DEVELOPING COUNTRIES

A. S. OBERAI
Employment Planning and Population Branch
ILO, Geneva, Switzerland

I. INTRODUCTION

The trend in urban concentration and the growth of large cities pose a formidable challenge to developing countries. By the year 2000, nearly 40 per cent of the 5 billion population of the developing countries will be living in urban areas and more than 40 Third World cities are expected to have a population of over 4 million. Most population distribution policies designed to moderate the rate of rural-urban migration appear to have had limited success so far. But even if such policies do succeed in future, large cities are likely to grow larger because of the high rate of natural population increase in urban areas. In 1985, of the 20 largest cities in the world, 13 were in the less developed regions. By the year 2000, 17 of the 20 largest cities will be in the less developed countries, and of the six super cities with a population of 15 million or more, four will be in developing countries; two cities in Latin America (Mexico City and São Paulo) will have a population of around 25 million.

In most large cities in developing countries nearly half of the population is living in slum and squatter settlements and at least 25 per cent of the population is estimated to be living in absolute poverty (Table 1). The manifestations of this poverty are low and insecure incomes from low productivity and unprotected employment; poor health and limited access to housing and basic social services. Some sections of the city populations such as recent migrants are particularly underprivileged in terms of housing, job access and incomes. Public investment often misses the urban poor, with expenditures biased towards the higher-income groups. Relatively little attention is paid to the water, sanitation, hygiene, nutrition, maternal and childcare, family planning and health needs of the poor with new roads, hospitals and other infrastructure tending to bypass the slums. The lack of these services leads to higher fertility accompanied by high infant mortality amongst the urban poor, particularly amongst the slum dwellers. Any serious effort to alleviate global poverty and improve employment and living conditions would thus have to face these growing problems of urban population growth and poverty, particularly in large cities in developing countries.

TABLE 1

Percentage of population living in slums and informal settlements in selected cities

Addis Ababa (1980)	85	Lima (1980)	33
Bombay (1981)	45	Manila (1980)	40
Cairo* (1977)	50	Mexico (1980)	40
Calcutta (1981)	40	Nairobi (1986)	34
Dar es Salaam (1980)	60	São Paolo (1980)	32
Delhi (1981)	50		

*Informal housing (without licence).

Source: HABITAT, 1987: Table 5.18; and several country reports.

The purpose of this paper is twofold. First, to examine the implications of rapid urban population growth for employment, poverty and access of the poor to housing and basic social services. Second, to assess institutional and other constraints on increasing employment opportunities and meeting the needs of the urban poor for shelter. The paper is divided into five sections. After a brief introduction in this section, Section II examines the major sources of urban population growth and spatial concentration and analyses the effects of migration on urban labour supply and demand for social services. Section III assesses the implications of labour force growth for labour market structure and examines the extent to which distortions in the functioning of the labour markets contribute to unemployment and low productivity. Section IV discusses the relationship between urban poverty and access to housing. More specifically, it examines the way in which labour market dualism leads to the formation of slums in urban areas. Finally, Section V summarises the main conclusions and highlights their policy implications.

II. DETERMINANTS OF URBAN GROWTH AND SPATIAL CONCENTRATION

Because of their different relationship to the development process, the increased growth of cities and increases in urbanisation must be carefully distinguished. While city growth rates represent the percentage change in the absolute number of people living in a given city or group of cities, increases in urbanisation refer to a growing proportion of the national population living in urban areas.

Contrary to popular impression, large cities in many developing countries are growing more through natural population increase than through migration. A recent study (United Nations, 1985) shows that between 1960 and 1970, in 26 large cities in developing countries, 37 per cent of the population growth was due to migration and 63 per cent to natural increase.

Although migration is not the major source of growth in many developing countries, the relatively young age of rural migrants to cities means a greater contribution to natural population increase through more births and fewer deaths. The age selectivity of the migration process and the relatively higher fertility among migrants than among urban natives also leads to young age distributions in urban areas. In most cities in developed countries, the 0–19 age group comprises less than

30 per cent of the total city population. For many cities in developing countries the figure is over 40 per cent (Table 2). This has enormous implications, particularly for the provision of employment opportunities and social services in large cities.

TABLE 2

Proportion of population in 0–19 age group in selected cities (per cent)

Developed countries		Developing countries	
Frankfurt 1981	24.8	Bangkok 1981	44.1
London 1981	27.6	Cairo 1976	47.7
Los Angeles 1980	28.8	Delhi 1980	48.9
Madrid 1980	33.5	Jakarta 1981	52.9
New York 1980	28.1	Mexico City 1980	48.5
Paris 1982	18.7	São Paulo 1980	40.0
Rome 1981	29.6	Santiago 1982	41.7
Tokyo 1981	28.2	Seoul 1980	42.5

Source : Adapted from J.T. Martin, I. Ness and S.T. Collins, 1986. *Book of World City Rankings*, New York: Free Press (Macmillan).

Migrants move to urban areas mainly in response to better employment and income opportunities. The true determinants of urbanisation and spatial concentration in developing countries are therefore to be found in the forces that determine the location of employment opportunities: the nature and pattern of industrialisation; the pace of agricultural development; and the growth of transportation and communications networks.

In the rural areas of many developing countries, low agricultural incomes and agricultural unemployment and underemployment are major factors pushing migrants towards urban areas particularly the large cities which offer greater job and income opportunities. The indirect causes of this migration are those factors which reduce the ratio of jobs to labour force in rural areas. These factors are rapid rates of population growth, inequalities in the distribution of land and income, factor price distortions, rising labour productivity associated with capital-intesive production technologies, and declining rural incomes relative to those of urban areas.

The pace and pattern of industrial development is, however, the major determinant of urbanisation and spatial concentration. Industries tend to locate themselves in urban areas, especially in the larger cities, because there they can benefit from ready access to capital and labour, and to specialised needs such as financial, legal and technical support services. Large cities also offer markets for industrial products, and provide convenient access to other domestic and international markets through the established transportation systems. The spatial concentration of economic activity and the emergence of large cities is therefore a necessary adjunct of a development process which relies predominantly on the growth of modern industry rather than on agriculture. However, public policies commonly bias this basic spatial development pattern towards more rapid urbanisation and more extreme spatial

concentration. Foreign exchange policies, tariffs and industrial incentives often encourage activities of the type located in the major urban centres rather than those located in economically less progressive regions, as has happened, for example, in Brazil and Nigeria. Governmental regulation of transport tariffs and energy prices often favours large cities, as do public investment and subsidies for other urban services that influence the location of industries.

III. URBAN GROWTH, EMPLOYMENT AND POVERTY

(a) Labour Force Growth, Labour Market Structure and Labour Absorption

The size and distribution of a city's labour supply are determined by the natural population growth in the city, the net migration to (or from) the city, the participation rate of the labour force, and the human capital embodied in the labour force (that is, the availability of skills and the health of the labour force, both of which affect the composition and quality of the urban labour force).

The unprecedented growth of cities and the urban labour force in developing countries, and the prospect that this will continue, has aroused great concern about the ensuing economic and social consequences, particularly since many urban areas, especially the large cities, have serious employment and poverty problems. A widely noted characteristic of urban labour markets in most developing countries is the degree of segmentation where the labour market is divided into two sectors. One segment of the labour market (the formal sector) is characterised by protected wage work, advanced technology and high labour productivity, while the other segment (the informal sector) retains the features of a low capital-labour ratio, lack of protection, dominance of self-employment, easy entry and low productivity. According to Squire (1981), a key distinction between the two sectors is that the rate of return to labour in informal activities is determined primarily by supply and demand conditions, whereas market imperfections tend to limit modern sector wage flexibility, generating unemployment and supply spillovers to the informal sector. Perhaps because of these rigidities, rapid population growth is associated in cross-national results with a slower absorption of the labour force into industrial and modern sector activities (Oberai, 1978; Squire, 1981).

There are several possible sources of labour market imperfections in the modern sector, including wage inflexibility in government employment and union pressure. Mazumdar (1984) notes that large-scale production firms may be motivated to pay a wage premium to encourage worker productivity and ensure stability, given the relative scarcity of skilled workers and the costs of training. Another imperfection may arise from discrimination based on race, ethnicity and sex, which may restrict access to high-wage employment (Knight and Sabot, 1982). It is also important to highlight the role of rural to urban migration among the factors which lie behind the progressive growth of the informal sector and which contribute towards widening the gap in intersectoral productivity, thereby generating the dualistic economic structure.

In the Lewis model with unlimited labour supply, migrant workers from low-productivity rural jobs are absorbed into high-productivity urban industrial jobs, which

implies a one-stage process of labour transfer. However, Todaro (1969) emphasises a two-state migration process: at the first stage, the migrants enter the 'urban traditional sector' (informal sector), due to their limited access to the 'modern sector' (formal sector). With the duration of stay increasing, workers in the urban traditional sector are likely to acquire skills and graduate to the formal sector, or what Todaro calls 'eventual attainment of a more permanent modern sector job', implying the second stage of the migration process. But his model is essentially based on the assumption of free entry of labour from the urban traditional sector into the urban modern sector, which seems to be unrealistic. Alternatively, what one may find in actual labour market conditions is that many of the unskilled rural labourers are not in a position to meet the skill requirements of the urban modern sector, nor can they afford to remain unemployed for long. Second, even if they possess the requisite skills, their absorption into the industrial sector may not take place on a large scale either because of the limited spread of this sector, or because of the sluggish growth of employment resulting from the sluggish growth of output and/or the adoption of capital-intensive technology. Consequently, they may continue to work in the unorganised segment of the urban labour market permanently or for a long time. Thus, when the employment-generating capacity of the formal sector lags behind the growth of the urban labour force, the informal sector is overburdened with the excess labour supply. The concentration of employment in low-productivity activities or marginal jobs leads to increased dualism as has happened in several Latin American countries during the recent economic crisis (see Table 3).

TABLE 3

Informal sector employment as a percentage of non-agricultural *labour force in selected Latin American countries*

	All	Argentina	Brazil	Colombia	Mexico	Venezuela
1980	26.1	26.3	24.1	32.0	24.2	25.6
1985	30.7	28.9	30.1	35.4	29.5	26.2

Source: Adapted from ILO/PREALC, 1986: *Creation of Productive Employment: A task that cannot be postponed*, Santiago.

While there is evidence of labour market imperfections, it would be a mistake to conclude that supply factors have no impact on modern sector wage levels. Indeed, there is evidence that, as theory would predict, rapid increases in labour supply result in slower wage growth both in manufacturing and in non-manufacturing modern sector activities (Squire, 1981).

How does the labour market adjust to the substantial and growing imbalances in labour demand and supply? The adjustment can take five principal forms. These are: (a) a reduction in rural-urban migration; (b) a rise in open unemployment; (c) a decline or stagnation in formal sector employment; (d) a fall in formal sector wages; and (e) an expansion of informal sector employment accompanied by a decline in wages and earnings.

A recent study of several African countries based on data on growth in the non-agricultural labour force during the periods 1970–80 and 1980–85 (Ghai, 1987) concludes:

> There has been a steady deterioration in the employment situation in most sub-Saharan African countries in the seventies with a marked accentuation in the eighties because of a continuing deceleration in economic growth accompanied by a rise in the growth of labour supply.
>
> The brunt of the crisis had to be borne by the urban sector. Reduction in rural-urban migration and rise in open unemployment have been of limited importance in most countries as means of adjustment. The predominant way in which the labour markets have adjusted to the economic crisis has been through sharp reductions in real wages which have helped sustain employment in the formal sector and a rapid expansion of the informal sector with falling real wages and earnings, resulting in work-sharing and increasing underemployment.

In the informal sector, the free play of supply and demand means that labour force growth does influence wage levels. Because informal sector output is generally not traded internationally, prices of output tend to decline with increases in supply, so that rapid labour force growth in this sector tends to depress wages and earnings of people employed in it.

(b) Labour Market Segmentation, Employment and Poverty

The main cause of urban poverty is thus the severely limited incomes earned by the poor through gainful employment. An important issue here is the extent to which vulnerability to poverty is related to vulnerability to employment problems.

There is a great deal of controversy about the role of open unemployment in generating poverty in developing countries. Some observers regard growing open unemployment as the main cause of urban poverty. Others argue that most open unemployment is voluntary and can be attributed to the relatively well-educated younger members of the urban middle- and higher-income groups who can rely on family support while searching for jobs that they find commensurate with their training and wage expectations. The main problem is not therefore open unemployment as such but low productivity and low earnings.

Tokman (1987) notes that between 1980 and 1985 the number of unemployed in urban areas in Latin American countries increased by 48 per cent as a consequence of the economic recession (see Table 5). He also notes that the expansion in the rate of open unemployment during the 1980s has been accompanied by changes in the structure of unemployment. It is no longer concentrated among secondary household workers. Many other empirical studies conducted in Latin America and Asia (Rodgers, forthcoming) also show that unemployment is indeed associated with poverty and is not confined to the relatively better-off sections of the community.

TABLE 4

Growth of enumerated non-agricultural employment and real wages in selected African countries (percentage per annum)

	Enumerated employment		Real wages	
	Period	Growth	Period	Growth
Burundi	1972–79	4.7	1977–82	—4.9
	1981–85	0.7	1980–85	3.8
Ghana	1969–79	1.7	1975–80	—24.2
Kenya	1972–85	5.1	1976–85	—3.3
Malawi	1969–84	4.4	1969–83	—2.1
	1977–84	2.7	1980–84	—6.4
Nigeria			1975–80	—7.5
Sierra Leone	1974–81	2.2	1969–81	—4.2
Tanzania	1970–81	5.4	1971–81	—6.5

Source: Adapted from Ghai, 1987: Table x.

While open unemployment has been rising, real wages have also generally been falling in most Latin American countries in the 1980s (Table 5). Thus poverty can be expected to increase not only as a consequence of rising unemployment and underemployment but also as a result of falling real wages. The available evidence suggests that the number of families below the poverty line increased from 12 to 16 per cent between 1981 and 1982 in Chile and from 17 to 29 per cent in Costa Rica. In Brazil, the percentage of individuals below the poverty line in urban areas increased from 31 per cent in 1980 to 36.6 per cent in 1982 (see studies quoted in Singh, 1988).

TABLE 5

Open urban unemployment rates and real minimum wages in selected Latin American countries in 1980 and 1984

Country	Open unemployment rate		Real minimum wages (1970 = 100)	
	1980	1984	1980	1984
Argentina	2.3	3.8	55.0	91.8
Brazil	6.2	7.1	101.7	82.7
Chile	11.7	18.5	76.0	50.8
Colombia	9.7	13.4	127.3	143.7
Mexico	4.5	6.7	110.0	80.8
Peru	7.1	10.0	83.2	50.8
Venezuela	6.6	14.0	106.9	77.1
Uruguay	7.4	14.0	80.7	74.0

Source: Adapted from ILO, 1987.

Several recent research studies also suggest that urban poverty is not simply a preserve of the informal sector but occurs in many parts of the formal sector as well. Nevertheless, the evidence from a multi-country study (Rodgers, forthcoming) does suggest on the whole a positive relationship between poverty and employment in the informal sector. In large Brazilian cities in 1983, 16 per cent of 'protected' workers were poor (i.e. had earnings below the minimum wage) compared with 52 per cent of 'unprotected' workers.

The existence of poor and vulnerable groups in urban areas thus calls into question the functioning of the urban labour markets. Some studies argue that labour market segmentation keeps the urban poor locked within a 'poverty trap'. But the empirical basis for this view is still very flimsy. Poverty and precarious and poorly paid work certainly exist, but it is by no means clear that it is the structure of labour markets as opposed to overall development and employment policies that are mainly at fault. A recent Unicef (1987) study shows that in countries where GDP per capita fell, unemployment rose, real wages fell and poverty increased. The Unicef study also found that, on average, countries which had cut expenditure on health and education were experiencing worse economic conditions (as measured by decline in GDP per capita) than those which increased social sector expenditure. Singh (1988) therefore argues that it is the pace and pattern of economic growth rather than labour market interventions which will have the largest potential impact on poverty alleviation.

While labour market imperfections may not be a major cause of urban employment and poverty problems, distortions that affect the demand for labour and investment in human capital do constrain the growth of urban employment and productivity. According to Linn (1983) such constraints can be roughly grouped into three types:

1. Those that inhibit human capital accumulation, for example, insufficient or unequal access to education, training, health and managerial and entrepreneurial know-how;

2. Those that distort access to or prices of complementary inputs, such as imperfections in the market for investment and working capital, land, and other material inputs, or inadequate availability of public utilities and services such as telecommunications, water, electricity and transport;

3. Those that impose unnecessary cash and time costs on business transactions, such as those caused by inappropriate land use, business permits, fee structure and licensing requirements.

It is therefore expected that removing these distortions will in many cases produce positive pay-offs even if labour markets are more severely segmented into high- and low-wage sectors than appears to be the case.

IV. URBAN POVERTY AND ACCESS OF POOR TO HOUSING

As discussed above, the urban labour market in most developing countries is marked by structural dualism. The above analysis also suggests that the existence of

the informal sector has to be seen not simply as a short-run transitory phenomenon, but as a persistent one.

The persistence of trade and service-dominated informal sector activities and the slums must not be seen merely as two unrelated phenomena which happen to exist simultaneously; rather the former is to be causally linked to the latter. The low levels of income accruing to workers in the informal sector do not enable them to face the challenges of urban life in general and the high cost of living in particular. In large cities where there is not enough scope for geographical expansion in the face of high population density, land scarcity leads to high land prices and speculation. In such situations, the dualistic economic structure of the cities in terms of employment further accentuates the level of inequality by limiting the access of informal sector workers, particularly the migrant workers, to housing and availability of land. This therefore leads to the formation and growth of slums and squatter settlements in the large cities (Mitra, 1987).

The National Commission on Urbanisation in India in its report of 1987 regards the proliferation of slums and squatter settlements in the urban areas as the most visible symbol of urban poverty and decay. It notes that between 1961 and 1981, while the Indian population increased by 50 per cent, and the urban population doubled, in Bombay, the squatter population recorded a tenfold increase from 400,000 to 4 million.

Although not all squatters earn their livelihood in the informal sector—nor do all informal sector workers live in squatter settlements—there is nevertheless a considerable overlap between the two. Some studies suggest that 70–80 per cent of squatter residents, depending on the location, would be unable to afford 'formal sector' accommodation.

The policy problems of housing are therefore not related simply to meeting the basic need for shelter; they also have an important bearing on a host of other issues such as the informal sector, employment generation and resource mobilisation. The construction of housing is clearly a source of both employment creation and income generation. But there is a widespread misconception in this regard which has to do with the way many governments view investment in housing as investment in a durable consumer good as opposed to investment in industry which they see as generative of economic development. Janice Perlman (1986) notes that as we come to understand the workings of the informal sector, the standard view of housing as a durable consumer good is wide of the mark in relation to Third World cities where houses are often used for the making, storing and selling of goods. Yet because this is part of the conventional wisdom in official circles, it has led to misguided investments in 'finished product' homes and self-defeating codes, standards, and zoning regulations.

Investments in public housing projects do not satisfy even a small part of the needs that are identified. In fact, such investments often aggravate the housing problem for the majority of the poorer urban households, since they tie up scarce

resources in a small number of housing units, usually for the benefit of the better-off. Moreover, public housing projects have frequently involved the bulldozing of slums, and thus the destruction of valuable housing stock.

The public housing programmes have now given way to squatter-settlement upgrading and sites-and-services schemes in most developing countries. The success rate of these schemes has been 'none too high' either (Wadhwa, 1988). In the case of squatter-settlement upgrading, the finance made available has been quite inadequate to improve the conditions in slums and squatter settlements significantly. The sites-and-services schemes have suffered from many of the weaknesses of the earlier programmes such as wrong location and high costs. The preferred locations of the poor are generally in the vicinity of city centre—near the employment opportunities. In these areas either vacant land is simply not available or, if available, not in large enough plots to make any sites-and-services project feasible. Further, land at the centre is very expensive. But even when the governments have minimised the cost of land by locating projects in peripheral areas, the actual cost to the beneficiary has often turned out to be much higher either due to high transportation cost or high cost of development of the sites (HABITAT, 1987).

Despite their many limitations, 'self-help' and 'user participation' schemes are an important source of substantial resources mobilisation. In their present form, however, they do not provide a long-term answer to the problems of accommodating growing numbers of urban poor at decent standards. Virtually all the upgrading and sites-and-services projects so far undertaken in most developing countries have been supported by multilateral and bilateral aid agencies. Despite efforts to make projects 'replicable', the project approach ties too many resources and institutional efforts in a few locations and has not been able to reach the desired scale of shelter output. The project approach is therefore unlikely to have a significant impact on solving shelter problems in most developing countries (United Nations, 1988).

There are several other unresolved issues which need urgent attention. One of the most contentious of them is security of tenure for squatters. The dominant view is that squatters cannot be expected to improve their housing conditions without first being certain that they will be allowed to remain where they are. Another issue is the crucial one of affordability; self-help schemes have little to offer the very poor and nothing to offer the destitute. If such people are to be reached, something more than squatter-settlements upgrading and sites-and-services projects in their present form is required.

Some governments realise this and have looked for low-cost alternatives. The Sudan and the United Republic of Tanzania, for example, have provided unserviced sites for the very poor and virtually abandoned the application of standards (HABITAT, 1987). The Tanzanian case is particularly interesting, since the application of sites-and-services principles has undergone a marked transformation. The earliest schemes were built to too high a standard and were beyond the reach of the poor, but the latest schemes are based on the concept of progressive standards.

This is a flexible interpretation in which standards are not viewed as a once-and-for-all affair but assumed to improve over time as consolidation takes place.

One of the major problems in increasing the supply of housing for the poor is the availability of urban land. Frequently, more unused urban land could be made available for residential use if it were not for institutional constraints (Kundu, 1988). The subdivision of urban land and the conversion of land for different uses are often impeded by restrictive zoning regulations, cumbersome land registration requirements, high land transfer taxes and disputed land titles. The poor are least able to overcome these institutional barriers. If they are not willing to accept overcrowded living conditions, they must engage in various forms of illegal land deals. If they do so, they suffer from insecure tenure, which in turn limits their ability and willingness to improve their accommodation.

Where land and services are available lack of finance is probably the primary reason for the difficulties poor households encounter in their efforts to build or improve shelter. Financial markets are underdeveloped, particularly for housing finance, and hampered by government regulations concerning interest rates and the conditions under which funds may be lent. The poor are the first to be excluded from such a capital market, especially where disputed land titles make it impossible to use land as collateral in borrowing.

An appropriate housing finance system for a developing country would not be a mere emulation of the finance institutions of the developed world geared towards purchase of a home. Instead, a financing system is needed that addresses the various facets of housing production and upgrading. In metropolitan areas, large accretions to housing stock take place through the upgrading of existing dwelling units by petty landlords. The financing of such investments requires small loan amounts with short to medium repayment periods and flexible interest and repayment schedules.

Since many poor people rent accommodation, increasing the availability of housing sites, materials and credit does little for those who must rent. The rental sector in most developing countries is large and is growing steadily; it often comprises at least 50 per cent of all urban housing stock. In view of the importance of rental housing in the total housing stock, particularly in low-income settlements, there is a need to promote investment in rental housing as an effective way of expanding production options for shelter. One possibility is financial support to non-governmental, non-profit-making organisations to purchase and develop property specifically for rental units. A second is support for tenants to convert tenancy into cooperative ownership.

V. CONCLUDING REMARKS

This paper has outlined several problems facing large cities in developing countries. The analytical issues discussed as well as the analysis of trends in urbanisation, employment and poverty provide an essential part of the policy framework within which specific policy issues need to be examined.

Rapid urbanisation and concentration of economic activity in a few locations particularly in large cities are an inevitable outcome of economic and industrial development. The range of policy instruments available for controlling migration is, however, quite limited. Instead of directly intervening in population distribution policies, governments should try to correct the biases of national development policies which have implications not only for industrial location patterns but also for regional income inequalities. Greater emphasis also needs to be placed on bringing down birth rates in order to slow down population growth in general, and urban natural growth in particular. In sub-Saharan Africa and low-income Asia, family planning efforts in rural areas are important to reduce migration to urban areas. In Latin America, slowing down the natural growth rate of the urban population holds the most direct hope for reducing the explosive growth of cities. An important reason for the high fertility amongst the urban poor, particularly amongst the slum dwellers, is their limited access to housing, education, health and family planning services. Most slum dwellers have limited access to housing and social services because of their low productivity and incomes. Improving the access of the urban poor to employment opportunities, shelter and social services and raising their productivity and incomes are therefore likely to bring down population pressure in large cities.

In finding the ultimate solution to the problems of housing in large cities, attention has to be focused on causes rather than on symptoms. The root cause of the housing problem in most developing countries is low levels of productivity and income of the urban poor. In fact, at existing prices, even an extremely modest housing of acceptable standards is beyond the affordability limits of the majority of the poor. Clearly efforts have to be directed both at improving the productivity and incomes of the poor and at the same time working for solutions towards reducing the cost of housing.

Coping with employment and poverty problems in large cities is thus the major challenge facing the developing countries. There is an urgent need to examine the scope and adequacy of current policies relating to employment promotion, particularly in the informal sector; promotion of small-scale industry; employment generation through investments in housing and community infrastructure for the poor; and improvements in productivity and working conditions of vulnerable groups in the urban labour market. Particular attention will need to be paid to the question of the adequacy of the existing institutional structure for dealing with employment and poverty problems at the city level. In most developing countries, city authorities are primarily oriented towards the provision and maintenance of urban infrastructure and services. They have little interest in, and no capacity to deal with, social and economic issues such as the promotion of employment and the alleviation of poverty. Unless this situation is changed it will be virtually impossible to find any viable way of initiating and implementing comprehensive anti-poverty programmes in Third World cities. The solution to the problems of employment and urban poverty cannot be found in an institutional vacuum.

REFERENCES

Ghai, D., 1987. Economic growth, structural change and labour absorption in Africa: 1960–85, paper prepared for the meeting organised by OECD on Evaluation of Urban Employment Research and Policies in Developing Countries, Paris, 2–4 November.

HABITAT (United Nations Centre for Human Settlements), 1987. *Global Report on Human Settlements 1986*, Oxford: Oxford University Press.

ILO, 1987. *World Recession and Global Interdependence*, Geneva: ILO.

Knight, J.B. and Sabot, R., 1982. Labour market discrimination in a poor urban economy, in *Journal of Development Studies,* Vol. 19, No.1.

Kundu, A., 1988. Does national housing policy answer the housing question? in *Economic and Political Weekly* (Bombay), 24 September.

Linn, J., 1983. The rural-urban wage gap, migration and working of urban labour market, in *Indian Economic Review,* Vol. 18, No. 2.

Mitra, A., 1987. Duality, employment problem and poverty incidence: slum perspective, Delhi: Delhi School of Economics.

Oberai, A.S., 1978. *Changes in the Structure of Employment with Economic Development,* Geneva: ILO.

Perlman, J., 1986. Six misconceptions about squatter settlements, in *Development,* Vol. 14.

Singh, A., 1988. *Urbanisation, Poverty and Employment: The Large Metropolis in the Third World*, Geneva: ILO.

Squire, L., 1981. *Employment Policy in Developing Countries,* New York: Oxford University Press.

Todaro, M.P., 1969. A model of labour migration and urban unemployment in less developed countries, in *American Economic Review,* Vol. 59.

Tokman, V., 1987. Evaluation of research and policies on employment problems in Latin America, paper prepared for OECD Meeting on Evaluation of Urban Employment Research and Policies in Developing Countries, Paris, 2–4 November.

United Nations, 1985. Migration, population growth and employment in metropolitan areas of selected developing countries, New York, Sales No. E79 XIII.9.

United Nations, 1988. *Global Strategy for Shelter up to the Year 2000,* Report of the Commission on Human Settlements, Forty-third Session, General Assembly, New York, 6 June.

Wadhwa, K., 1988. Housing programmes for the urban poor, in *Economic and Political Weekly,* 20 August.

EVOLUTION OF MEXICO CITY IN THE TWENTIETH CENTURY

Gustavo GARZA
El Colegio de Mexico
Mexico

The important economic development experienced in Mexico during 1940–80, transformed its system of cities and, especially, Mexico City. During this time, the city became one of the largest metropolises in the planet and constituted a highly interesting urban phenomenon for the advancement of metropolitan planning and theory. The objective of this paper is to analyse the urban and demographic growth stages of Mexico City during the twentieth century and the main metropolitan problems it faces.

I. ECOLOGICAL–DEMOGRAPHIC GROWTH STAGES OF MEXICO CITY (1900–2010)

The crystallisation of a metropolis is the outcome of centuries of evolution. Apparently for religious reasons, the Spanish conqueror, Hernan Cortés, decided to build the centre of the Spanish empire on the ruins of Tenochtitlan, the city he had destroyed during the conquest. Early in 1522 he began the construction of the city, later named (1548) the 'Renowned Imperial City of Mexico'. At its inauguration as a Spanish city it lodged just 30,000 people, including both natives and Spaniards.

By the end of the colonial period, in 1803, Mexico City had 137,000 inhabitants, which increased to 180,000 in 1810, at the beginning of the independence war. Since then, and up to the consummation of independence in 1821, many Spaniards left Mexico City and its population decreased to 165,000 in 1823.

During the first four decades of the independent nation, Mexico City grew slowly, reaching up to 200,000 inhabitants in 1855 and 230,000 in 1877, when its population growth rate started to be higher than that of the country as a whole. At the dawn of the twentieth century, in 1900, the capital city reached 345,000 inhabitants and initiated an accelerated urban growth which led, in the late 1980s, to its transformation into the world's largest city.

First Stage: Growth of the Central Nucleus (1900–30)

During the first stage of metropolitanism, the population residing in the central area increases in absolute and relative terms, and the number of people that travel to

the 'centre' grows as well. In Mexico City, this stage covers the period 1900–30, during which the relatively small population of 345,000 inhabitants in 1900 expanded to 1 million in 1930. The urban area as such recorded an annual growth rate of 3.3 per cent, while that of the Federal District was 2.6 per cent. It is important to make clear that the Urban Area of Mexico City (UAMC) is located within the Federal District, which is divided into 16 'delegations' (boroughs). This District is partially surrounded by the State of Mexico, one of the 31 states of the Mexican Republic, the entity from which the city absorbed new territory after 1950.

In 1930 the UAMC began to expand out of the four central 'delegations' which conformed to the boundaries of the politically defined Mexico City area. From that year on, growth went toward the surrounding 'delegations' of Coyoacán and Azcapotzalco, which shared 2 per cent of the population, while 98 per cent remained in the central city. Thus began the city's expansion in the direction of the 'delegations' which outlined the central area (see Table 1).

Second Stage: Peripheral Expansion (1930–50)

The second stage of Mexico City's territorial expansion dates from the 1930s. This stage was characterised by the higher growth rates of the 'delegations' that surrounded the city. Thus while the central city grew at a rate of 3.4 per cent a year between 1930 and 1940, the seven surrounding 'delegations' registered a rate of 5.4 per cent. During the 1940s, this difference became more marked, with growth rates of 4.3 per cent and 10.3 per cent respectively. As a corollary, the central city's share of the total population declined rapidly in relation to the UAMC, from 98 per cent in 1930 to 78.3 per cent in 1950 (see Table 1).

During this second stage began the commercial, services and population decentralisation toward the peripheral 'delegations'. Although this enlargement occurred exclusively within the Federal District territory, it reached its northern boundaries with the State of Mexico in 1950. In this year, then, the second growth stage of Mexico City reached its end.

Third Stage: Metropolitan Dynamics (1950–80)

In the third stage, the UAMC spilled out beyond the northern limits of the Federal District, toward the municipality of Tlalnepantla in the State of Mexico, giving rise to the Metropolitan Zone of Mexico City (MZMC). Since then the analysis of Mexico City's growth differentiates the concept of UAMC and its Metropolitan Zone (see Table 1). In 1950 only this municipality formed part of the emerging MZMC, but in 1960 three new municipalities were incorporated: Naucalpan, Chimalhuacan and Ecatepec. These municipalities of the State of Mexico registered an important population growth due to the increased movement of manufacturing firms from the centre to the northern periphery. Therefore, between 1950 and 1960 their annual population growth rate was 10.3 per cent, while at the central district it reached only 2.4 per cent. The accelerated decline of the central city continued and its share of the total population decreased to 57.6 per cent in 1960 (see Table 1).

TABLE 1

Mexico City: Total population distribution in basic territorial units (1900–80)

Territorial units	1900	1910	1921	1930	1940	1950	1960	1970	1980
a. Central city	344,721	471,066	615,367	1,029,068	1,448,422	2,249,221	2,829,756	3,002,984	2,686,499
b. Federal District	541,516	729,753	903,063	1,220,576	1,757,530	2,329,840	5,178,123	7,327,424	9,165,136
c. Urban area of Mexico City	344,721	421,066	615,367	1,049,000	1,560,000	2,872,000	4,910,000	8,355,000	14,274,746
d. Metropolitan Zone of Mexico City	—	—	—	—	1,644,921	3,135,673	5,381,153	9,210,853	14,419,454
e. (a)/(d) x 100 (%)	—	—	—	—	80.35	71.73	52.59	32.60	18.63
f. (b)/(d) x 100 (%)	—	—	—	—	106.84	103.32	96.23	79.55	63.56
g. (e)/(d) x 100 (%)	—	—	—	—	86.54	91.59	91.24	90.71	99.00
h. (a)/(b) x 100 (%)	63.66	65.36	73.03	83.69	82.39	69.42	54.65	40.98	29.31
i. (a)/(c) x 100 (%)	100.00	100.00	100.00	98.00	92.82	78.32	57.63	35.94	18.82

Source: Negrete and Salazar, 1987: 126.

From 1960 to 1970 seven new municipalities (Netzahualcoyotl, La Paz, Zaragoza, Tultitlan, Coacalco, Cuautitlan and Huixquilucan) were added to the MZMC. These administrative areas recorded a high annual growth rate of 14.3 per cent thus strengthening the metropolitan process in the State of Mexico, which in 1970 represented 20.5 per cent of the total MZMC population.

The metropolitan growth towards the State of Mexico proceeded, and in 1980 another eight municipalities were added to the MZMC: Chalco, Chiautla, Chicoloapan, Chiconcuac, Ixtapaluca, Nicolas Romero, Tecamac and Texcoco. Thus, in 1980 the MZMC was integrated by all the 16 'delegations' of the Federal District and by 21 of the State of Mexico's municipalities.

Thus, throughout the twentieth century, the sustained high population growth of Mexico City transformed the Mexican capital from a small locality into perhaps the largest metropolis in the world.

Fourth Stage: Emerging Megalopolis

In the last decades of the twentieth century, the systems of territorial organisation have undergone a significant transformation, especially notable for the suburbanisation of extensive areas and the rapid integration of previously isolated urban nuclei. This process gives rise to polycentric metropolitan urban networks that concentrate more complex social structures and relations, thus constituting whole subsystems within highly integrated cities. The most advanced kind of urban interrelation is known as megalopolis, created by the fusion or overlapping of two or more metropolitan areas.

A recent research on the demarcation of the metropolitan zones at the region of Mexico identified the following ones: (a) Metropolitan Zone of Mexico City; (b) Metropolitan Zone of Toluca; (c) Metropolitan Zone of Puebla, and (d) Metropolitan Zone of Cuernavaca (Negrete and Salazar, 1986). Thus, the MZMCs surrounding cities have undergone a significant metropolitan growth which made possible the emergence of a megalopolis. Actually, by 1980 the Metropolitan Zones of Mexico City and Toluca had overlapped, technically constituting a megalopolitan conglomeration which could be referred to as the megalopolis of Mexico City.

Considering the fact that Mexico City was founded nearly 500 years ago, it might at first seem that its metamorphosis into a huge megalopolis is the outcome of a protracted process spanning over centuries. From the fifteenth to the nineteenth century, however, the city grew slowly, its population increasing from 30,000 in 1522 to 300,000 in 1884. It is only during the present century that Mexico City has been transformed from a modest city of 344,000 inhabitants in 1900, into a megalopolitan conglomeration of approximately 21 million people in 1988.

It has been forecast that towards the year 2010, the metropolitan zones of Puebla and Cuernavaca will be added to the megalopolis which will have at least 31 million inhabitants (Garza, 1987: 419).

CHARACTERISTICS AND PROBLEMS OF MEXICO CITY

Mexico City is by far the most important economic-demographic concentration in Mexico. Around 45 per cent of the gross national product and 37 per cent of the country's urban population are located within its 1,300 sq. km. of urban area. It is, additionally, the main cultural centre of the country and the seat of political power. Parallel to the importance of Mexico City, this superconcentration implies complex problems delineated below.

Housing

In Mexico, housing scarcity derives from a dramatic situation: about 65 per cent of families have no access to the private or public housing market. This problem has to do with insufficient income of the medium and low strata of population, and Mexico City maintains a relatively privileged position as its inhabitants enjoy higher income and 'only' 47 per cent of the families remain excluded from the housing market.

In 1980 there were in the UAMC 2.58 million dwelling units of which 57.5 per cent were within the Federal District and 32.5 per cent in the conurbated municipalities of the State of Mexico. In the Federal District, 82.8 per cent of the dwelling units had drainage systems and 69.7 per cent had piped water supply systems. For the 17 municipalities of the State of Mexico these figures are lower: 78.2 per cent had drainage and 61.9 per cent had piped water. Finally, 97 per cent of the total dwelling units in the UAMC had electric energy, and this basic service had an almost total and very equitatively distributed coverage in the portion corresponding to the State of Mexico and in the Federal District (see García Peralta, 1987).

Squatters, Working Class Suburbs and Urban Marginality

There are in the MAMC approximately 500 squatters in 700,000 land properties wherein live, under seriously precarious conditions, nearly 500,000 persons. Of these plots, 60 per cent are in communal regime lands, 30 per cent 'ejidos' (Mexican form of communal land tenure) and 10 per cent are private properties.

Working-class suburbs cover 40 per cent of the total urban area and lodge at least 4 million persons. A large number of their inhabitants, jointly with those of squatters, integrate the so-called stratum of the 'marginalised'—those families which, generally, do not earn the official minimum wage. Within this group the problems of unemployment and underemployment are more acutely felt. It is roughly estimated that open unemployment before the economic crisis of 1982 was under 4 per cent and at present it is more than 10 per cent: underemployment represents around 40 per cent of the labour force. This is Mexico City's main problem since, apart from its socio-economic dimension, it is at the root of insufficient infrastructure and urban services which have to be partially provided by the purchasing power of its inhabitants.

Urban Growth and Land Tenure

The urban area of Mexico City has extended as fast as its population. At its foundation, it was estimated to have 2.7 sq. km.; it slowly grew during the colonial period, to reach in 1845 14.1 sq. km. In 1900, its area was 27.5 sq. km. At present it is estimated to have an urban area of about 1,300 sq. km. and a metropolitan zone of 3,323 sq. km., including the 16 'delegations' of the Federal District and the 17 conurbated municipalities of the State of Mexico.

This vertiginous growth occurred in a partially controlled form, since about 50 per cent took place on 'ejido' and communal property lands which have been incorporated to the private market under terms of speculation.

Urban Infrastructure for Manufacturing

Inasmuch as it generates around 45 per cent of GNP, Mexico City is by far the main production area of the country. It requires a complex aggregate of infrastructure works which are indispensable for industrial firms.

Electricity system: At present, Mexico City is served by almost 30 hydro-electric and thermo-electric plants which in 1984 contributed 20,267 GWH; this represents 25.2 per cent of the national electricity consumption. In 1960 the annual consumption amounted to 4,299 GWH. During the quarter of a century since then, the need for electricity has thus almost quintuplicated. Economic activities constitute the main consumer, with manufacturing absorbing 61.6 per cent of the total consumption, while trade and services account for 22.4 per cent. Domestic consumption represents only 10 per cent of the total.

Hydraulic system: In 1900 the city was supplied with 1.1 cu. m. of water per second for a population of 344,000. For 1930 water flow increased to 3.1 cu. m. per second and to 4.3 cu. m. in 1940. However, this increase was lower than the demographic increase.

In 1960 water supply was substantially increased to 21.0 cu. m. per second with the extension of the Xochimilco network, the Chiconautla system and the Lerma flow. Between 1960 and 1970 the utilisation of the Xochimilco system continued and a second stage was developed for the High Lerma. This enabled a 36.0 cu. m. per second supply for 1970, although given the large increase of the population, the supply per inhabitant registered an imperceptible increase. At present, the UAMC receives about 50.3 cu. m. per second, of which 38.3 cu. m. supplies the Federal District and the rest is for the conurbated municipalities of the State of Mexico.

Public transportation: The explosive growth of Mexico City generates a growing demand of transportation services given the commutation requirements of the economic sectors and of almost 19 million inhabitants of the megacity.

In the 1950s, the significant growth of the urban area increased the transportation needs of the population and the number of private vehicles began to rise from 72,000 units in 1950 to 329,000 in 1964.

In April 1967 the underground public transportation system was created. In 1969 the first line was inaugurated, and subsequently in 1970, lines 2 and 3, which jointly have 40.8 km. of tracks and 59 nine-wagon trains. In 1976 extension works of the system were reinitiated and 1978 saw the conclusion of a new track of line 3 (1.6 km. in length), which was extended to 3.7 km. in 1979 and 5.0 km. in 1980. In 1981–82 lines 4 and 5, with 9.4 and 14.6 km., respectively, were completed. In 1983 6.2 km. were added to line 3, and line 6 was built with an extension of 6.8 km. Between 1984 and 1985, lines 1 and 2 were extended to 1.5 and 3.4 km. each, and line 7 with 11.2 km. was concluded. Finally, between 1986 and 1988, there were laid out 15.3 km. of line 9—line 8 is still pending—to make up a total extension of 140.4 km. of the eight underground train lines in 1988.

To have an overall conception of the general situation of transportation it can be pointed out that within the MAMC, at present 19.5 million person-trips are generated daily (28.5 million, considering exchanges and walking trips). These are distributed among different transportation media, among which stand out urban buses (27.2 per cent of the total trips), cars (23.8 per cent) and the underground with 18.5 per cent of the total trips.

Hydrocarbons supply: At present, the capital is supplied by means of three oil pipelines, five gas pipelines, four multiple pipelines and one petrochemical pipeline, which connect it to the oil-producing areas of the country and which, in case of need, would allow it to have 83.6 per cent of the total hydrocarbons distributed in the domestic market. However, hydrocarbons consumption in Mexico City represents around 50 per cent of the country's total. The transportation sector is the main consumer, with 45.9 per cent of the total; the energy sector comes second with 26.0 per cent, and industry, with 22.7 per cent is third. Domestic consumption absorbs only 3.6 per cent of the total (see Conrado et al., 1987).

Infrastructure for the Population

The above infrastructural works, though they satisfy the needs of the population, are nonetheless associated to manufacturing, which is their main user. But there are other items of infrastructure and services which especially favour the population and are therefore indirectly necessary for carrying out the manufacturing process. This section summarises the situation regarding those most important for Mexico City.

Food supply system: It is estimated that the population of the Federal District alone demands around 13,000 tons daily of food which comes from different parts of the Republic. The infrastructure for storage and distribution is constituted by Mexico City's 'Central de Abastos' (Supplies Centre), by 298 public markets, 53 itinerant markets, 476 'tianguis' (one day a week street markets), 126 public supply spaces, 37 CONASUPO commercial centres (government-sponsored stores) and 88 private supermarkets (see Departamento del Distrito Federal, 1987: 50).

Educational and cultural services: Primary school is the educational level with the widest coverage and during the recent school years it was possible to meet 100 per cent of the demand. The coverage level of secondary education is about 84 per cent, and it is estimated that university level is covered in around 88 per cent of the requirements.

Additionally, the Federal District counts on 255 libraries, 50 galleries, 40 theaters, 26 museums and 18 art halls. Although these could be considered insufficient to serve Mexico City's total population, undoubtedly it is the best provided with respect to all of these educational items within the Mexican Republic (see Cervantes, 1987).

The health system: In 1980 the Federal District had a total of 1,068 medical units, 960 of which were out-patient services and 108 hospital units. These units accounted for a total of 17,116 beds and had 19,115 medical personnel. But after the earthquake of September 1985, which destroyed the Medical Centre of the Mexican Institute of Social Security (IMSS), the number of available beds decreased to only 3,677 (see Direccion General de Servicios Medicos del Distrito Federal, 1987).

Environment

Mexico City is located within the Valley of Mexico, which covers 9,600 sq. km. in area and has an average altitude of 2,240 metres above the sea level. Due to the superconcentration of inhabitants and of economic activities, the city is experiencing a strong ecological deterioration.

In the first place, dust storms which occur during the first three months of the year, blow 308,000 tons of dust particles yearly. Secondly, the 2.5 million vehicles which circulated in the city in 1985 generated 5.2 million tons a year of contaminants among which stand out 4.6 million tons of carbon monoxide, 450,000 tons of hydrocarbons, 60,000 tons of nitrogen oxide and 10,000 tons of sulphur dioxide. It is estimated that these mobile sources produce 40 per cent of the city's atmospheric pollution.

In the third place, the almost 40,000 industrial establishments produce an additional 30 per cent of air pollution, considering they emit 385,000 tons a year of particles, 393,000 of sulphur dioxide, 91,000 of nitrogen oxide, 114,000 of carbon monoxide and 130,000 of hydrocarbons. The remaining 30 per cent of atmospheric contaminants can be attributed to sundry sources.

Finally, the city generates about 14,000 tons daily of debris which the collection system cannot totally take care of and which, when disposed of by the population, pollutes the ecosystem.

At the setting of the twentieth century, Mexico City still represents an enigma with respect to many of its characteristics, some of which have been outlined in this paper. Given the extraordinary importance the city has for the country's present and future, it is urgent to make progress in the knowledge of this complex megalopolitan mosaic which summarises Mexico's socio-economic evolution.

REFERENCES

Cervantes, Edilberto, 1987. Los servicios educativos en el Distrito Federal, in G. Garza et al. (eds.), *Atlas de la ciudad de Mexico*, El Colegio de Mexico y el Departamento del Distrito Federal, Mexico.

Conrado, C., C. López y M. Vidrio, 1987. Abastecimiento de hidrocarburos en la ciudad de Mexico, in G. Garza et al., ibid.

Departamento del Distrito Federal, 1987. *Programa General de Desarrollo Urbano del Distrito Federal, 1987–1988*, Direccion General de Reordenacion Urbana y Proteccion Ecológica México, D.F.

Direcciòn General de Servicios Médicos del Distrito Federal, 1987. Systema de atenciòn a la salud en el Distrito Federal, G. Garza et al. (eds.), op. cit.

García Peralta, Beatríz, 1987. La situación de la vivienda en la Zona Metropolitana de la ciudad de México, G. Garza et al. (eds.), ibid.

Garza, Gustavo, 1987. El futuro de la ciudad de México: megalópolis emergente, G. Garza et al. (eds.), ibid.

Negrete, Ma. Eugenia y Salazar, Héctor, 1987. Dinámica de crecimiento de la población de la ciudad de México: 1900–1980, in G. Garza et al. (eds.), ibid.

Negrete, Ma. Eugenia y Salazar, Héçtor, 1986. Zonas metropolitanas en México, 1980, *Estudios Demográficos y Urbanos*, Vol. 1, Núm. 1, enero-abril, El Colegio de México.

Unikel, L., Ruíz Ch., C. y Garza, G., 1976. *El desarrollo urbano de México*, El Colegio de México.

13

MEGACITIES IN CHINA

Aprodicio LAQUIAN
UN Population Fund
Beijing, China

Of the world's 99 urban agglomerations with population of more than 2 million in 1985, 12 are in mainland China (United Nations, 1987: 25–27). The largest of these Chinese mega-cities, Shanghai (population 11.9 million), ranked fifth among the world's largest cities while Beijing (9.2 million) ranked fourteenth and Tianjin (7.8 million) ranked eighteenth. Harbin, the smallest of the mega-cities, had a 1985 population of 2.61 million, but is expected to reach 3.46 million by the year 2000 (see Table 1).

Unlike most of the world's mega-cities in developing countries, those in China have not been growing rapidly. In fact, Shanghai, Beijing and Tianjin, the three mega-cities under the authority of the central government, have had annual rates of population growth lower than the national average. In 1970–85, Shanghai had an annual growth rate of 0.31, Beijing 0.73 and Tianjin 0.93, at a time when the Chinese population was growing at 2.2 per cent per year (IBRD, 1988).

There are two main reasons for the slow population growth of mega-cities in China: strict control of internal migration and a successful family planning programme. A household registration system does not permit people to live where they are not registered; by law, a person who stays in a place other than the original place of residence has to register with the police if he or she stays more than three days. Since 1979, also, China has pursued a one-child-per-couple policy, which has helped to reduce the annual rate of population growth from 2.2 in 1970–75 to 1.1 per cent in 1985–90 (United Nations, 1988: 252).

China has an explicit urban policy—to strictly control the size of big cities, rationally develop medium-sized cities and encourage the growth of small cities and

TABLE 1

Urban agglomerations in China

Agglomeration	Population (million)		Annual rate of growth (%)	
	1985	2000	1970–85	1985–2000
Shanghai	11.96	14.30	.31	1.19
Beijing	9.25	11.17	.73	1.25
Tianjin	7.89	9.70	.93	1.37
Shenyang	4.08	5.35	1.74	1.81
Wuhan	3.38	4.35	1.41	1.70
Guangzhou	3.30	4.37	1.84	1.88
Chongqing	2.70	4.49	3.70	3.42
Chengdu	2.67	3.87	3.49	2.48
Harbin	2.61	3.46	1.77	1.89
Zibo	2.39	3.66	4.04	2.85
Xi'an	2.26	3.00	1.77	1.88
Nanjing	2.14	2.75	1.23	168

Source: United Nations, 1987: 25–27.

towns (Li, 1982).[1] To implement this policy, China had adopted specific measures, which include, in addition to internal migration control and family planning: (a) comprehensive metropolitan planning; (b) regional development planning; (c) land use planning and control; (d) opening up of coastal cities and special economic development zones; and (e) job creation and service provision in small towns. These measures have been complemented by such interventions as the control of foodgrain prices, housing construction and subsidies, and spatial allocation of urban infrastructure investments. As the current urban patterns in China show, the policy measures and interventions seem to have been successful not only in limiting the growth of mega-cities but in making them livable and well-functioning urban centres. At the same time, a balance between rural and urban development seems to be in the process of being achieved.

ORIGINS OF URBAN POLICIES

Ideologically, the early Chinese Communist idea of the big city was amazingly close to the Confucian world view—big cities were evil while goodness was to be found in rural life, the family and the peasantry. The peasantry, after all, and not the urban proletariat, helped win the 1949 Communist Revolution. Big cities like Shanghai and Tianjin were 'parasitic creatures of foreigners and the strongholds of China's national capitalists' (Delfs, 1986). The capital city, Beijing, was 'a relic of the

1. In China, cities of more than two million are classified as 'huge or very large cities', those with a population of one to two million are 'big cities'; those with a population of 500,000 to one million are 'large cities'; those with population of 300,000 to 500,000 are 'medium-sized cities' and those with 100,000 to 300,000 are 'small cities' and those below 100,000 are 'very small cities or towns'.

feudal emperor' (Liang, 1950) and 'a parasitic and consumptive city' (Sit, 1985: 75–77). Early policies in China, therefore, were markedly anti-urban.

Soviet-style central planning tried to shift industrial concentration from coastal cities. The Korean War and perceived external military threat also led to the adoption of the 'defence in depth' strategy, which favoured investments in interior cities. During the Great Leap Forward campaign (1958–62), China sought to double iron and steel output by rural industrialisation. There was massive resettlement of urban youths and intellectuals to rural areas. Peasants were organised into people's communes aand discouraged from tilling their own plots. These policies, however, resulted in crop failures and famine. Hungry peasants flocked to the cities and the strict migration measures virtually collapsed.

During the three years of economic recovery (1963–65) and the Third Five-Year Plan period (1966–70), the government pursued a policy of 'agriculture as the base and industry as the key'. The communes were reorganised into smaller brigades and production work teams. The Great Proletarian Cultural Revolution (1966–76), however, campaigned for ideological purity by reviving the communes and idealising rural life. More than 30 million people were sent down from cities to rural areas to receive 're-education through labour' and learn from the peasants. The effects of these policies were even more disastrous than those of the Great Leap Forward. The death of Chairman Mao Zedong in 1976 and the overthrow of the 'Gang of Four' in the same year, ushered in China's new development policies.

China's new policies of economic reform, modernisation and opening up to the outside world were adopted at the Third Plenum of the Chinese Communist Party's Eleventh Central Committee Meeting in 1978. The main elements of the reforms relevant to urban development were: (a) the production responsibility system designed to increase rural production; (b) development of township enterprises to absorb people shifting from agriculture to non-agricultural pursuits; (c) setting up of urban townships; (d) strengthening of coastal cities and the creation of special economic zones; and (e) decentralisation of authority to cities and other local governments to accelerate development.

It is apparent from the brief historical account mentioned above that while China, since 1949, has tried to control rapid urbanisation, there have been periods of disruption when cities had grown rapidly and urbanisation had spontaneously occurred. The current policies are attempting to achieve the twin goals of rapidly increasing production (focused on cities) while at the same time improving the rural-urban balance (by rural and township enterprise development). It is significant that the development strategy is hitting at all levels simultaneously by improving farmers' incomes through the production responsibility system and attempting to expand industrial production through delegation of authority to local managers and by urban enterprise reforms.

China's urban strategists think of a national human settlements hierarchy with three tiers. By the year 2000, it is hoped that the first tier of mega-cities with population of 2 million and above would not exceed 25 cent of the total urban population.

The second tier, composed of large and medium-sized cities (population 200,000 to 2 million) would make up a third of the urban population. The third tier, made up of small cities and towns, would constitute about 42 per cent of the urban population.

By pursuing this balanced urban hierarchy, China's planners are also seeking to balance the geographical distribution of the urban population. Since most of the mega-cities are on the eastern and south-eastern coasts of China, limiting their growth would shift people more into the interior. More important, China is thinking of regional urban systems and city-centred regions that would be economically and culturally linked up with each other. The gradation of settlements (village, town seat, county seat, prefecture, municipality, city, region, province) is designed to achieve linking and interacting activities. What China's planners are trying to evolve are regional settlement systems performing specific functions that are logically and functionally linked with each other.

In the planners' goal of limiting the size of mega-cities, there is good evidence that the policy is succeeding. When the United Nations assessed the population of the world's largest urban agglomerations in 1980, it projected that Shanghai would reach a population of 25.9 million by the year 2000 (it would rank second only to Mexico City). However, after the release of the 1982 Chinese census results, the United Nations had to change its estimate and placed Shanghai's population by the end of the century at 14.3 million, ranking fifth among the globe's largest agglomerations. Similarly, Beijing, which was thought to reach 22.8 million by the year 2000, is now expected to have 'only' 11.1 million. Beijing does not even rank among the world's top ten urban agglomerations any more (United Nations, 1987).

POLICIES AFFECTING MEGA-CITIES

As mentioned above, China has been pursuing explicit policies and programmes not only to control the growth of mega-cities but also to make them more livable and productive. It is, therefore, useful to analyse these policies and programmes in terms of their viability in the Chinese context and relevance to conditions in other developing countries.

Internal Migration Control

China's desire to limit the growth of mega-cities arises from the fact that the bulk of the country's urban population is concentrated in huge or very large cities. While cities of 2 million or more make up only 3.9 per cent of the total number of urban centres (1987) they contain 20.2 per cent of the urban population. In fact, the 73 cities with a million or more people hold close to half of China's urban population (see Tables 2 and 3).

In China, each person has to be registered at birth in an official place of residence. This registration (*hukou*) is maintained by the Public Security Bureau at the neighbourhood level in urban areas and at the brigade level in rural areas. If a

person moves, he or she must obtain permission from the authorities at place of origin and destination point. Generally, there are only a few authorised reasons for moving: permanent employment in destination area (granted to a person but not necessarily to other family members); middle school or university enrolment; joining the army and displacement by urban expansion of metropolitan peripheral areas.

TABLE 2

Number of cities by population size (1986)

	No. of cities	Percentage	Population (millions)	Percentage
2 million or more	13	3.7	47.1	20.4
1 million to 2 million	49	14.1	61.4	26.6
500,000 to 1 million	99	28.5	69.9	30.3
300,000 to 500,000	84	24.2	32.6	14.2
100,000 to 300,000	91	26.2	19.1	8.3
Less than 100,000	11	3.2	0.5	0.2
Total	347	100.0	230.6	100.0

Source: State Statistical Bureau, *Sitatistical Yearbook of China*, Hong Kong: Longman Group (Far East Ltd.,) 70.

TABLE 3

Number of cities by population size (1987)

	No. of cities	Percentage	Population (millions)	Percentage
2 million or more	15	3.9	57.8	20.2
1 million to 2 million	58	15.2	71.2	27.3
500,000 to 1 million	115	30.3	81.5	31.2
300,000 to 500,000	90	23.6	35.5	13.6
100,000 to 300,000	90	23.6	19.1	7.4
Less than 100,000	13	3.4	.7	.3
Total	381	100.0	260.8	100.0

Source : State Statistical Bureau, 1988: 79.

If a person moves from a rural to an urban area without permission, he or she will not be entitled to subsidised foodgrain, housing, formal employment, education for the children and various benefits. The most important reality to a Chinese person is the *danwei* or work unit, which supports and pays for most of these benefits. A migrant who does not join a *danwei* in the city would find difficulties in living there.

Since the early 1980s, however, rural-urban migration in China has rapidly

accelerated. Rural prosperity arising from the production responsibility system[2] has created urban-ward pressures. Millions of peasant families have become specialised households (*zhuanyehu*) with a non-agricultural household registration (these households devote at least 60 per cent of work time to one specialised line of production or service and derive at least 60 per cent of income from such calling).

In January 1984, the Central Committee of the Chinese Communist Party issued Document No. 1, which allowed peasants to move from villages to towns provided they made their own arrangements for obtaining their foodgrain supply. In October 1984, the State Council also issued the 'Circular on the Peasants' Moving to and Settling in Towns', which urged all governments at all levels to assist peasants who desire to move. Towns in China were also reclassified in 1984 so that all county seats were designated towns and the definition of townships was changed to the extent that the number of places designed as towns nearly doubled. In the latest statistics given by the government, China was declared 46.6 per cent urban at the end of 1987 (State Statistical Bureau, 1988) because of these definitional changes. The medium variant projection for China by the United Nations indicates that China would be 33.6 per cent urban by the year 2010.

Although migration was supposed to be allowed only to towns, the general loosening of the household registration system has incrased movement to mega-cities as well. It is estimated that 20 per cent of people living in big cities at present are not registered there. Informal surveys of the so-called 'floating population' set the temporary, seasonal and cyclical migrants to big cities at 10 million with Shanghai having 1.7 million, Beijing 1.2 million, Guangzhou 1.0 million and Tianjin 700,000.

Many reasons account for the increased migration to mega-cities. As previously mentioned, rural prosperity enables peasants to pay for housing, food and other necessities in cities. The lifting of economic controls has created a boom in free markets and other informal sector enterprises that provide employment, food and services to migrants. Even housing is now being sold in the open market. Of course, the influx of millions of migrants to mega-cities has created many problems. One of these, which has received intense governmental attention in recent months, is the higher fertility of the migrants.

Limiting Population Growth

Since 1979, China has pursued a policy of encouraging people to get married later, to postpone the birth of a child and to limit each family to only one child. Couples who sign the one-child pledge are entitled to higher salaries, larger housing units, guaranteed education for their only child up to the age of 14, higher retirement

2. Under the production responsibility system, a rural household signs a contract with a production unit to meet a certain output quota for a specified period. All other income above the quota belongs to the household. The system has created an economic boom in the countryside, with farmers intensively cultivating private plots, raising cash crops, selling their products in free markets instead of state stores, and engaging in rural industries.

pensions and other incentives. If they violate the pledge or exceed the birth quota of their work unit, penalties are imposed.

A combination of spontaneous and interventionist factors has made family planning more effective in urban areas, especially in mega-cities. Urban residents tend to have higher literacy rates, urban wives tend to be fully employed, urbanites are more exposed to family planning information and they have better access to family planning methods. Incentive and disincentive schemes are more effective in mega-cities where housing, food and other amenities are more difficult to get. Young urbanites who want to have all the benefits before they get married tend to delay their marriage. City life is also better organised. In all mega-cities, neighbourhood committees have been mobilised in family planning campaigns to encourage compliance with the family planning policy. It is no wonder, then, that more than 90 per cent of married women of reproductive age in cities like Beijing, Shanghai and Tianjin are using a contraceptive compared to 76 per cent in the whole country.

Metropolitan and Regional Planning

All cities in China are required to have comprehensive urban development plans. For cities of 500,000 and above, such plans are approved by the State Council, the highest executive body in the land. Plans for smaller cities are approved by Provincial, Municipal or Autonomous Region governments. Technical assistance in developing the plans is given by the Ministry of Urban and Rural Construction and Environmental Protection. Each urban unit is expected to have its own planning department, which supervises plan implementation.

Mega-cities in China are planned in such a way that they encompass large tracts of rural and suburban areas. As Table 4 shows, the mega-cities of Shanghai, Beijing and Tianjin have inner city cores that contain 56.6, 60.4 and 66.2 per cent of total metropolitan populations respectively. Furthermore, the proportion of residents classified urban ranged from 61.4 per cent in Shanghai to 69.1 per cent in Tianjin (State Statistical Bureau, 1986).

Growing environmental problems and the need for urban services have required expansion of metropolitan jurisdictions in China. For example, because Beijing is in a semi-arid region annually plagued with sandstorms, the government has pursued afforestation programmes energetically. The current targets call for planting trees in 10 million *mu*[3] of hilly and mountainous areas north of the city, creation of a windbreak of poplars, pines, willows and other fast-growing species and the expansion of the forest cover from 7.5 to 28 per cent of the metropolitan area by the year 2000 (Beijing Municipal Government, 1987).

3. One mu is equal to one-seventeenth of a hectare.

TABLE 4

Characteristics of China's three largest cities (1985)

	Shanghai	Beijing	Tianjin
Area in sq. km.	6,139	16,808	11,305
Population in millions (municipal area)	12.2	9.6	8.0
Density (persons/sq. km.)	1,967	591	715
Population of inner city (in millions)	6.9	5.8	5.3
Percentage of inner city population to municipal population	56.6	60.4	66.2
Population defined urban in municipal area (millions)	7.5	6.4	5.6
Percentage of urban municipal population	61.4	66.6	69.1

Beijing's metropolitan transport system has also been planned to integrate various modes such as walking, bicycling and the use of buses, subways, trains and cars. The area-wide transport system relies on four ring roads encircling the city and nine radiating and 14 sub-radial roads thrusting from the city core. An expressway system of interprovincial trunk roads as well as rail lines connect Beijing with other cities. Within the city, buses and the subway provide interdistrict mobility. At the street and neighbourhood level, however, Beijing's 6.7 million bicycles provide the main means of mobility. One of the main reasons why Beijing's traffic is not so congested as Bangkok, Cairo or Manila is the planning of residences close to work places and reliance on the bicycle and walking for journeys to and from work.

In the case of Shanghai, one important reason for expanding the metropolitan boundaries was the establishment of industrial satellite zones. In 1953–57, four industrial satellite zones were set up on Shanghai's fringes. In 1958, 12 more satellite zones were established. The zones were specially devoted to such purposes as a petro-chemical base, a site for electrical engineering and an iron and steel complex. Complementing the satellite zones were more than 200 workers' housing estates to accommodate people working in the zones. The workers' estates are self-contained communities with their own schools, hospitals and service centres, closely linked up by transport services to and from the work zones.

To sum up, several reasons have been advanced for area-wide metropolitan planning in China's mega-cities. First, the city cores were becoming too densely populated and people had to be moved to outer areas. Second, the expanding city required more water and metropolitan boundaries had to be expanded to water sources. Third, expansion of industries needed more land, especially as some of the industries contributed to air, water, and noise pollution. Fourth, Chinese urban planning puts a premium on being self-reliant in food supplies; so vast agricultural tracts of land were placed under municipal control. Finally, some primary industries were dependent on resources (coal, natural gas); so city boundaries were expanded to these raw material sources.

To develop the planning of intermediate and medium-sized cities rationally, urban planning in China encompasses larger regions between mega-cities. For example, although Beijing and Tianjin have metropolitan development plans, both are considered within the scope of a regional development plan that covers the whole Beijing-Tianjin-Tangshan megalopolitan area stretching from Beijing to the Bohai Gulf on the coast of Shandong province. This regional plan covers about 80 cities and towns that carry out specific functions but are linked together into a regional unit.

The Beijing-Tianjin-Tangshan regional plan seeks the dispersal of industries and manufacturing to 24 cities and towns. Four cities and four towns are designated 'satellite areas' designed to perform specific roles. For example, Langfang City, which is equidistant between Beijing and Tianjin, is planned as a railroad hub; Nankou is selected for heavy industry; Dangang is for pertroleum processing; Dananhe would be a textile centre and Mixian county would be developed for tourism. The two medium-sized cities in the region (Tanggu aand Qinghuangdao) are being developed to have their own 'spheres of influence' so that they could act as counter-magnets to Beijing and Tianjin. Light industries and transport facilities (both cities are coastal ports) would be developed in these medium-sized cities.

At the bottom of the regional urban settlement hierarchy are some 39 small cities and towns which are county seats or of lower rank. Some of these settlements are raw-material producing areas (e.g., coal, iron ore, limestone). Others are mainly administrative centres and market towns. The range of population of these settlements is from 5,000 to 30,000. According to the regional plans, these urban centres are designed mainly to provide services to outlying villages and serve as market towns. Where such settlements are close to small or medium-sized cities, they are to serve as satellite and service centres (Sun and Ye, 1984).

Special Economic Zones

In 1979, soon after the ascendancy of the group of reformers under the leadership of Deng Xiaoping, an aggressive policy to develop 14 coastal cities and four special economic zones was launched. Of the 18 areas selected for implementation of the policy, 13 are medium-sized or small cities and five are big ones including Shanghai and Tianjin.

According to the strategy of coastal cities and special economic zones, it is all right, ideologically, for some areas of China to grow much faster than others. Thus, the government seeks to build upon local resources and locational advantatges in certain zones and concentrate investments there. Productive investments are concentrated in coastal cities and SEZs, physical infrastructures are upgraded, economic decision-making authority is decentralised to local officials and greater taxation nd income-generating powers are delegated to local managers. The opening up of China to the outside world through the encouragement of foreign investments and joint venture enterprises is concentrated in the SEZs. As a result of these incentives, it has been found that productivity of enterprises in SEZs was 66 per cent higher than those in comparative enterprises in other areas.

Some of the powers delegated to local officials are most unusual in a centrally planned economy. For example, city governments in the coastal cities and SEZs may reduce income taxes for enterprises as much as 80 per cent of national rates. City officials in Shanghai and Tianjin can approve projects not exceeding US$30 million. City institutions can even engage in foreign borrowing—in 1987, the Industrial and Commercial Bank of Shanghai was allowed to sell bonds worth $27 million over a two-year period. About $150 million was also borrowed by Shanghai in the Tokyo financial market. The Shanghai Jiushi Company, a local venture, was set up in 1987 to raise money from abroad. The company was authorised capital worth $130 million and allocated $100 million in hard currency.

In Tianjin, the State Council allowed the Tianjin Commission on Foreign Economic Relations and Trade to borrow $1 billion over and above the capital allocations in the current five-year plan. The loan was to be used for upgrading and reconstructing industries and commerce in the city. Under the State Council authorisation, 50 per cent of the loan would be under the responsibility of the Tianjin Investment Company, 25 per cent would be backed by foreign partners and 25 per cent would be for Chinese partners.

In China's efforts to open up business with the outside world, even the socialist view of land has been changing. In March 1988, 12,000 sq.m. of prime land in the Hongqiao area of Shanghai was put up for bids to foreign investors. Foreign buyers were encouraged to own the piece of land and use it for hotels, apartments, business offices or other enterprises. It was clarified that the sale was for 'the right to use the land' rather than the land itself. The terms of the sale, however, permitted the buyer to use the land as collateral for mortgage. Houses and other improvements on the land could be freely bought and sold. The change in land tenure was so fundamental it even required a change in the Chinese Constitution.

The measures mentioned above have rapidly accelerated the growth of mega-cities like Shanghai and Tianjin. From 1980 to 1987, Tianjin approved about 222 joint venture enterprises with total investments amounting to $530 million. In 1987, Shanghai broke the Yuan 1 billion mark in combined industrial and agricultural output. In the same year, exports from Shanghai hit $4.14 billion, an increase of 16.1 per cent over 1986.

The rapid economic growth of Shanghai is rationalised by regional development efforts in the whole region dominated by the city. In 1983, the Shanghai economic zone was created 'to coordinate the economic growth of all its sub-areas and achieve common prosperity'. The economic zone of Shanghai covers 640,000 sq. km., and includes in addition to Shanghai municipality, parts of the provinces of Jiangsu, Zhejiang, Anhui, Jiangxi and Fujian. The zone covers 6.64 per cent of China's land area and 21.8 per cent of the country's population (about 220 million people). In 1986, this economic zone was estimated to have manufactured about Yuan 338 billion worth of goods, fully one-third of China's industrial output value (Jiang, 1988).

The Shanghai economic zone has been compared to the Tokyo-Yokohama

conurbation or the Great Lakes megalopolis in the Eastern United States. Within the zone are the cities of Suzhou, Wuxi, Changzou and Nantong; the ports of Nanjing, Dagang and Ningbo; and other economic development zones. An extensive railroad and road-based transport network serves the whole zone. Because of these advantages, the Shanghai economic zone has been called 'a port, a pivot and a springboard' for China's economic and social development.

Housing in Mega-cities

In socialist China, housing is one of the 'five guarantees' to every citizen, along with food, clothing, employment and burial. Traditionally, housing is a citizen's welfare right and investment in housing is considered a 'fixed asset' expenditure. In mega-cities, public housing is constructed by housing agencies and production units or collectives buy them and rent them to their members at minimal costs. Housing standards are low (the per capita living space in Shanghai is about 4.2 sq. m. while Beijing is slightly higher at 6.2 sq. m.) but one does not find in Chinese mega-cities the festering slums and uncontrolled settlements found in other developing countries.

China has set as a target that by year 2000, 'each urban household will have an economical and habitable flat of eight square metres per person and each rural household would have a practical, hygienic and compactly laid out house that will meet the household's living and productive needs' (MURCEP, 1987). To achieve this goal, China would have to build about 9,041 apartment units per year in urban areas alone until the end of the century. A survey of housing conditions in China in July 1986 revealed that about 1 million households were without homes and 10.5 million households were living in overly crowded and substandard housing. About one-third of urban households did not have their own kitchen, another third did not have piped water and two-thirds had no flush toilets (Ye, 1986).

To date, housing in China has been heavily subsidised—on the average, each urban household pays about Yuan 1.20 per sq.m. of housing, roughly 2 to 3 per cent of household income. However, the government spends Yuan 2.6 per sq. m. for maintenance, repair and management. On top of this, the estimated construction cost for an apartment was Yuan 300 per sq. m. Under these conditions, housing is a heavy drain on state finances.

A Beijing survey in 1985 revealed that the average family paid 2.3 per cent of total household income for housing in 1978. In 1985, because of rapid increases in income, the proportion spent for housing actually went down to 1.25 per cent. Because housing costs were so low, families used their extra money to buy television sets, refrigerators, washing machines and imported luxuries. Citing these surveys, housing authorities have argued for raising rents and even selling housing units to individuals. They have argued that maintenance cost to the government would be minimised if people owned their homes.

Recent housing reforms in China have rapidly increased rents. At the same time,

in big cities, work units have been increasing salaries and other benefits to compensate for higher housing costs. In some cities, pay increases are given in terms of coupons, which are saved by employees and then used as down payments for housing. The goal in mega-cities is to sell about 20 per cent of the new housing stock to individuals. Other cities are even renovating old housing units and offering them for sale.

The sale of houses to individuals was approved by the State Council in early 1980. Experiments were conducted in the cities of Changzhou, Zhenzhen, Siping and Sashi in 1982 and by the end of 1983, about 1,746 residential units were sold in the four cities. Housing reforms were extended to 80 cities in October 1984 and in 1985, 20 per cent of new housing in Shanghai and 5 per cent in Beijing were earmarked for sale. In September 1988, the Leading Group for Housing System Reform in the State Council announced that China had 2.1 billion sq. m. of housing ready for sale. The government said that buyers of such houses could use them and that in future, they could be inherited by their heirs. Five years after purchase, the houses could be freely sold and bought in the open market.

Despite the innovative approaches in housing reform, the sale of housing in China is lagging way below expectation. In 1986, Shanghai built and sold only 2,904 apartment units, about 3 per cent of the total units built that year. In general, the authorities have found that people would rather pay low rents than buy homes. In 1988, the government proposed that house rents should be raised to about 20 per cent of a household's income. This sharply increased rent might encourage people to buy their own homes. The government's decision to allow resale in the open market five years after purchase might also help to encourage house sales.

CONCLUSION

Despite a strict family planning policy, China is expected to reach a population of 1.3 billion by the year 2000, a full 100 million higher than its original target. China is also expected to be almost 50 per cent urban by the turn of the century, although this is mainly due to definitional changes and a conscious policy to encourage the development of small cities and towns while trying to contain the growth of mega-cities.

China's rapid rate of economic growth and opening up to the outside world are creating pressures for the growth of mega-cities. In the past, strict control of internal migration and an effective family planning programme had served to limit mega-city growth. However, decentralisation of authority to local units, which is necessary for encouraging rapid economic development has also resulted in relaxation of both the migration and birth control programmes. There is increasing evidence that urban-ward migration is not being contained at lower levels of the urban hierarchy and it might eventually result in mega-cities growth.

So far, Chinese mega-cities have managed to avoid most of the problems that

plague their counterparts in developing countries. The political will to provide basic housing, water, transport, health, education, sanitation and other services at great public expense has been translated into policies and programmes that have adequately met people's needs, albeit at modestly set standards. The population growth of mega-cities has been kept in check by strict migration control and family planning programmes. As indicated in this paper, however, the current Chinese drive to modernise, to achieve rapid economic development and open up to the outside world, may bring daunting problems. Already, the recent additions to mega-city populations through migration and increased fertility are exerting pressures on urban resources. Although jobs in the informal sector have been absorbing most of the rural-urban migrants, problems of housing and other amenities are now cropping up. In the medium and long-term perspective, Chinese mega-cities will also be confronted with demographic realities, one of the most important of which is the rapid ageing of the urban population. By the year 2000, about 10 per cent of China's population would be 60 years old and above. At present, however, mega-cities like Shanghai and Beijing already have more than 12 per cent of their population in the aged category.

Chinese authorities are taking a gamble that the attainment of higher levels of economic and urban growth would spontaneously encourage people to limit the size of their families; a sort of urbanisation-fuelled demographic transition. By the year 2000, when China is expected to be half urban, the authorities hope to attain a per capita income of $1,000, at a time when the annual growth rate would be lower than one per cent. In this strategy, the growth of cities plays a very important role because it has been shown that family planning programmes can be more effectively implemented in cities. Whether these expectations would be realised or not, the results of China's venture are critical to humankind because, with 23 per cent of the world's population, population and urban trends in China have a most significant effect on world patterns.

REFERENCES

Beijing Municipal Government, 1987. *Beijing—A General Survey,* Beijing: Beijing Publishing House.

Delfs, Robert, 1986. Rising from the Ashes, *Far Eastern Economic Review* (Hong Kong), July.

IBRD (International Bank for Reconstruction and Development), 1988. *World Development Report 1988,* Washington, D.C.: Oxford University Press.

Jiang Zhenghua, 1988. Population growth and regional development planning in China, UN Expert Group Meeting on Consequences of Rapid Population Growth in Developing Countries, 23-26 August, New York.

Li Ximing, 1982. Minister of Urban and Rural Construction and Environmental Protection, China, quoted in *China Daily* (Beijing), 13 July.

Liang Scheng, 1950. On whether to preserve or to tear down Beijing's city wall, *New Architecture* (Beijing), Vol. 2, No. 6, May (unofficial trranslation).

MURCEP (Ministry of Urban and Rural Construction and Environmental Protection), 1987, Statement on Housing Policy, quoted in *China Daily,* 24 February.

Sit, Victor, 1985. *Chinese Cities, the Growth of the Metropolis since 1949,* Hong Kong: Oxford University Press.

State statistical Bureau, 1988. *China Statistical Yearbook,* Hong Kong: International Centre for the Advancement of Science and Technology.

State Statistical Bureau, 1986. *Statistical Yearbook of China,* Hong Kong: Economic Information and Agency.

Sun Panshou and Ye Shunzan, 1984. City and town development in the Beijing-Tianjin-Tangshan region, *Economic Geography* (Beijing), Vol. 3, No. 1 (unofficial translation).

United Nations, 1988. *World Demographic Estimates and Projections, 1950–2025,* Deopartment of International Economic and Social Affairs (ST/ESA/SER.R/79), New York.

United Nations, 1987. *The Prospects of World Urbanization* Revised as of 1984–85, Department of International Economic and Social Affairs (ST/ESA/SER.A/101), New York.

Ye Rutang, 1986. Providing shelter for a billion people, *China Reconstructs* (Beijing), Vol. XXXVI, No. 7, July.

MEGACITY TRANSFORMATIONS: THE CASE OF TOKYO

Koichi MERA
Tokyo International University
Tokyo, Japan

THE REJUVENATION OF TOKYO

According to the theory of Klassen and Pealinck (1979: 1095-1104), the cities in industrialised countries were destined to go through a cycle of growth, maturity and decline, and many of the large cities in high-income industrialised countries in North America, Western Europe and Japan were on the verge of or in the process of decline already in the late 1970s. Serveral authors including myself (Mera, 1986a) documented the relative decline of Tokyo during that time. Tokyo started losing population, and the income advantage of Tokyo was diminishing for nearly 20 years. Many urbanologists hastened to conclude that at last diseconomies of scale in large cities started to overwhelm economies of scale.

The above impression was prevalent in the first half of the 1980s. But, now in the middle of 1989, it is totally contradictory to the fact. The tide has been reversed in Europe and the US. This reversal appears to be most dramatic with Tokyo. There are three indices which describe the rejuvenation of Tokyo in the 1980s.

First, the population of Tokyo declined from 1975 to 1980 by 0.5 per cent for Tokyo Prefecture and by 3.4 per cent for the city of Tokyo as shown in Table 1.[1] This declining trend was reversed for the period of 1980 to 1985 with a positive 1.8 per cent for the prefecture and 0.03 per cent for the city. Since 1985, further acceleration of population growth appears to be taking place (Table 1). This acceleration of growth is going on in the context of the national population which is growing at a lesser rate than before.

1. The city of Tokyo refers to the 23 special Ward area within the Prefecture of Tokyo.

TABLE 1

Five-year change in regional population (per cent)

Region	1975–80	1980–85	1985–90[d]
Prefecture of Tokyo	—0.5	1.8	2.8
in which			
Special Ward Area	—3.4	0.03	0.8
Other South Kanto Prefectures[a]	11.1	8.0	7.3
North Kanto Prefectures[b]	6.9	5.1	3.8
Kinki Region[c]	3.7	2.9	2.6
in which			
Osaka Prefecture	2.3	2.3	2.4
Nation	4.6	3.4	3.0

Notes: [a]Prefectures of Chiba, Saitama and Kanagawa
[b]Prefectures fo Ibaraki, Tochigi and Gumma
[c]Prefectures of Shiga, Kyoto, Osaka, Hyogo, Nara and Wakayama
[d]Linearly extrapolated on the basis of the rate of change available in the source.

Source: For 1975–80 and 1980–85, the census of population published by the Agency for General Affairs of the Government.

For 1985-90, the population registration reported in Economic Planning Agency, *Chiiki Keizai Yoran*, 1987 and the Prefectural Government of Tokyo, *The Population of Tokyo*, 1987. For Tokyo, the registration up to 1 January 1987 was used. For other areas, that of 1 October 1986 was used.

Second, regional income disparity is now expanding since 1979. The long-term trend of diminishing disparity is over as shown in Table 2. According to the data provided by the Economic Planning Agency, per capita income of Tokyo increased most from 1979 to 1984 among the 47 prefectures (see Figure 1). In addition, most of the prefectures which recorded an above-average growth rate are located in the capital region. The situation is quite similar to the development stage of developing countries.

TABLE 2

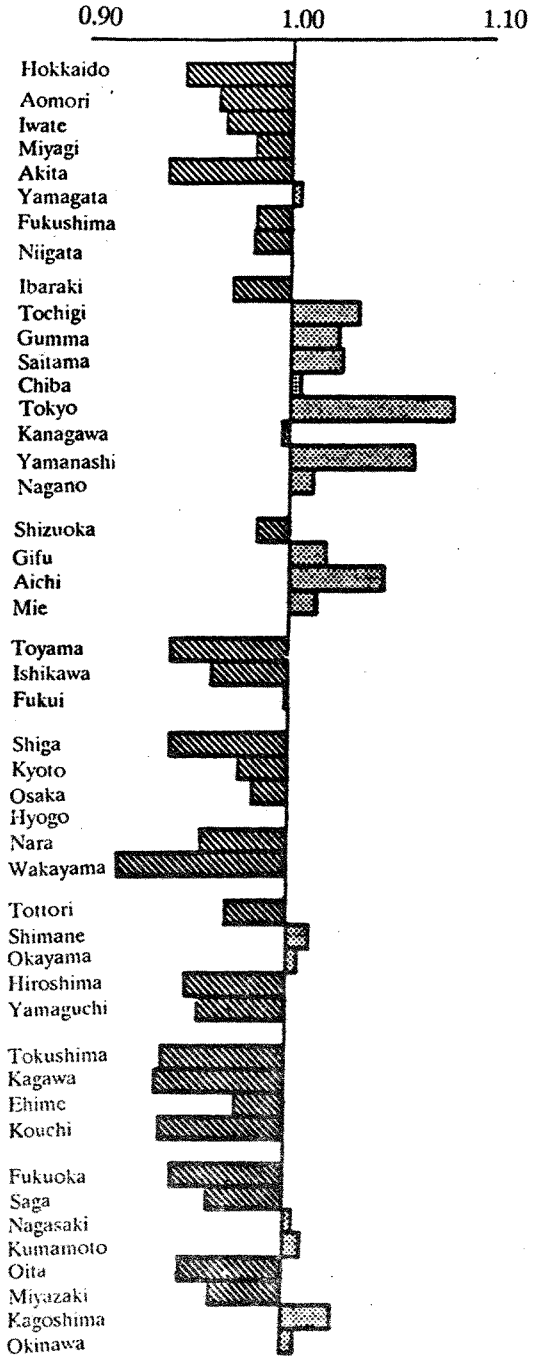
Variation of per capita prefectural incomes, 1975–84

Year	Coefficient of variation (%)
1975	13.5
1976	13.4
1977	13.4
1978	12.9
1979	12.6
1980	13.3
1981	13.7
1982	13.9
1983	14.1
1984	14.2

Source: Economic Planning Agency, April 1987.

FIGURE 1

Relative growth rate of per capita prefectural incomes from 1979 to 1984 (National Rate = 1.00)



Source: Economic Planning Agency, April 1987

Finally, the recent dramatic rise in land price presents an unmistakable testimony to the rejuvenation of Tokyo. Land price in Japan has been stabilised since 1981. It rose at less than 5 per cent in 1982 and the growth rate subsided to 2.6 per cent by 1985. Although this stabilisation is still continuing in the rest of the country, land price in Tokyo has shown a dramatic rise. As early as in 1983, land price in central Tokyo started showing a rising trend. It rose at 9.2 per cent in 1983. It has been accelerated gradually and reached 51.6 per cent by the middle of 1986. This upward move has spread to surrounding areas through a filtering-down process. The residential land of the city of Tokyo as a whole increased at 30.5 per cent for the same period. This rate was further accelerated by the beginning of 1987, and recorded the rate of 53.9 per cent for the Prefecture of Tokyo as a whole. It was the highest rate since the publicly announced land price system was initiated in the 1970s.*

All these indices demonstrate that Tokyo has beem rejuvenated and is ready to grow again. The rejuvenation of Tokyo may have to be seen in the context of large cities in other countries which have also been rejuvenated. Certainly, there is synchronisation of urban growth. This may be due to the worldwide trend of economic conservatism as expressed by deregulation and privatisation, being promoted by such political leaders as Reagan, Thatcher and Nakasone. To further test and examine this hypothesis, let us try to identify the factors which have led to this rejuvenation.

CAUSES OF REJUVENATION

A number of factors are said to be the causes of the rejuvenation. They include the structural change of the economy toward service orientation, the distribution of public investment, increased reliance of the economy on information processing and transmission, increased money flows, and the internationalisation of the financial sector. Each of these will be examined below as a possible cause.

The industrial structure of the Japanese economy has been changing toward the tertiary sector. As Tokyo is specialised in the tertiary sector, the growth of this sector would encourage the growth of Tokyo. The 1986 Survey of Industrial Establishments has shown that the secondary sector has diminished and the tertiary sector has gained its share relative to five years earlier. Within the tertiary sector, no noticeable growth in employment was observed in public administration and services or transportation, but personal services grew at 15.2 per cent and real estate service at 13.3 per cent. Moderate growth of about 5 per cent was observed in finance and insurance, and wholesale, retail and restaurant services. However, these changes are quite similar to those which took place before the previous survey five years ago. If anything, the growth of personal services or real estate services declined from the previous level. Therefore, although the regional distribution of the tertiary sector growth may have changed and further subdivision of the subsectors of the tertiary sector may reveal

*Sources: Prefectural Government of Tokyo, the Assembled Data on Land, 1986 and newspaper reports on the publicly announced land price as of 1 January 1987.

something relevant, the macro-sectoral growth itself does not explain the rejuvenation of Tokyo well.

The geographic distribution of public investment played a significant role during the 1960s and 1970s for narrowing interregional income disparity as demonstrated elsewhere (Meira, 1986a). This situation was altered around 1980 by the pressure to cut down the total government spending to reduce its dependency on borrowing. The tighter the budget ceiling became, the more reductions were made for not so urgent projects. Impacts were greater in relatively less developed areas. Tokyo's share of public investment went down and bottomed at 7.8 per cent in 1979. Since then, it started rising despite a stagnant or declining budget ceiling at the central government because a conservative politician replaced a socialist governor at that time. It rose to 9.3 per cent in 1983 and then 10.2 per cent in 1984.

The growth in the amount of investment from 1983 to 1984 was 8.1 per cent despite one per cent reduction in the national total, and was ¥ 200 billion in amount. This amount may be considered substantial. But, even if its incremental capital-output ratio (ICOK) is assumed to be 1.5, a generous assumption, its contribution to the regional product would have been ¥ 133 billion, which was a mere 0.3 per cent of the regional product of Tokyo in 1984, amounting to ¥ 51 trillion. The actual growth was 6 per cent. Therefore, the actual contribution of public investment would have been small.

The third possible factor is the growth and diffusion of information processing and transmission technologies. Indeed, evidence indicates that office space per employee has increased recently due to more widespread use of computer terminals, facsimiles, word processors and alike. It was 15.1 sq. m. in 1975, rose to 17.8 sq. m. by 1979 and went beyond 18 sq. m. after 1983. In addition, the number of people engaged in the information processing industry has been growing at the rate of 10 per cent per year, and there is a high concentration of those people at the centre of Tokyo.*

Moreover, technological improvement in information processing and transmission appears to have had a certain impact on the locational behaviour of central management function. At least during the recent past it appears to have strengthened the role of the headquarters, by taking over some of the functions which had been hithertofore delegated to branch offices. Also, it appears to have attracted headquarters to areas close to locations that generate the kind of information which cannot readily be transmitted long distances. The close contact with the National Government must have become more important than before as a result.

A recent questionnaire survey has revealed that among the corporations whose stock is traded in the Tokyo Stock Exchange and which have headquarters in Tokyo, 13.4 per cent are new migrant offices to Tokyo during the past five years, and another

*Source: The Institute of Building Economics, the Report of the Committee for Examination of Land Price Problems in Central Tokyo, March 1986.

24.6 per cent have expanded headquarters facilities in Tokyo. The available information indicates that the trend of concentration in Tokyo is more pronounced since 1983 than before.

Indeed, the technological improvement in information processing and transmission has affected the growth of Tokyo. But it has been a gradual shift and cannot be considered as the major cause of such dramatic rise in land price.

Another oft-mentioned factor is the 'excess supply of money'. It is reflected in the lowering of lending rate of interest. The prime rate went down from 7.5 per cent in 1980 to 5.5 per cent in 1985 and further down to 3.75 per cent in 1986 and again to 3.38 per cent in March 1987.

Although the lowering of interest rates has an effect of increasing the price of land, it does so within a certain limit and only if the low interest rates are expected to persist for a long time. The fact that there is a considerable spread between the fixed-rate mortgage interest rate and the variable rate indicates that many people do not believe this low interest rate would last very long. Moreover, the excess supply of money is a national phenomenon, and should not affect only one particular locality.

The last factor which is considered here is the internationalisation of the financial sector of Japan. The real internationalisation of the Japanese financial market started as late as 1984, much later than many other sectors of the economy. Indeed, there were some signs of liberalisation during the period 1975–80, in response to the deregulatory policy which became prevalent in this sector in some other industrialised countries.

In Japan, the Foreign Exchange Act was amended in December 1980 to the effect that international capital movement was freed in principle and funds could be freely mobilised and managed abroad. In 1982, the articles of the Tokyo Stock Exchange were amended to allow membership to foreign securities firms, and the Banking Act was liberalised. However, real liberalisation started only after the agreement reached by the Japan-US Yen-Dollar Committee in May 1984. The US government was able to obtain substantial concessions from the government of Japan on this occasion as the latter was interested in increasing the share of stock ownership in the World Bank by obtaining concurrence of the government of the US (for further details, see Meira, 1986). The government of Japan made several commitments for deregulation including free trading of Euro-yen, interest liberalisation of large-scale bank deposits, the removal of the barriers for entry of foreign trust banks, and the development of short-term money markets. Since then, the Japanese Ministry of Finance has been holding consultative meetings with corresponding authorities of other industrialised countries quite frequently, further accelerating deregulation and consequential internationalisation of this sector.

In 1985, the commission fees for stock trading were lowered, the future trading market for government bonds started, and the interest rate was liberalised for large-

scale depostis. In 1986, six foreign-owned securities firms were admitted to the Tokyo Stock Exchange. During this year, several additional measures were implemented for further liberalisation and internationalisation of this sector, including the birth of an offshore financial market at Tokyo and the provision of a legal basis for security investment consultants. Further steps are being taken in 1987 for deregulation and internationalisation, although there is still strong pressure from abroad for further liberalisation.

Under these deregulatory measures, the financial sector of Japan has been transferring abroad ever-increasing amounts of surplus long-term capital, which was generated by stagnant domestic demand and huge trade surplus. As shown in Table 3, in 1981 the transfer of long-term capital abroad was a mere $22.8 billion. Its growth to 1983 was a moderate 20 per cent per year. The growth suddenly took off in 1984 and has been recording a growth rate of some 60 per cent per year and the amount of transfer reached $132 billion in 1986. It is indeed six times the amount of 1981. Much of the transfer is directed to US government bonds and stocks.

TABLE 3

Flow of Japanese capital abroad ($ billion)

Year	Amount
1981	22.8
1982	27.4
1983	32.5
1984	56.8
1985	81.8
1986	132.4

Source: Management and Coordination Agency, Statistical Bureau, *Monthly Statistics of Japan*, April 1987.

This phenomenal growth in securities trading could not be undertaken without corresponding increase in the number of people engaged in this activity. According to the Ministry of Finance, only 10 foreign-owned securities firms were in business in Japan at the end of 1984. The number doubled to 20 by the end of 1985, and increased to 34 by the end of 1986. In addition, more than 90 per cent of their offices are located in Tokyo. Within Tokyo, they are notably located downtown such as Marunouchi, Hibiya and Akasaka.

The number of these firms does not tell the whole story. Their size is also important. The largest and most established of them, Salomon Brothers, Inc., started its branch office in Tokyo in 1982, and its staff size grew to 80 until it moved to Ark Hills in 1986 where its size expanded to more than 200 within a span of less than a year. It is reported that it is planning to expand to 400 to 500 within a few years. Although this is for just one office, most other branch offices are expanding their size at similar rates.

In terms of the intensity of its growth rate, its location and its timing and also its ability to pay for business inputs such as office space and employees, the growth of the international section of the financial sector can be said to be a principal cause of the land price increase in Tokyo in 1985 and 1986.

By now, Tokyo has become a world financial centre. In terms of the value of stocks and bonds traded and money exchanged, Tokyo has joined New York and London as a world centre. As long as trade surplus and stagnant domestic demand continue, Japan needs to transfer surplus abroad, mainly through Tokyo. Now, the shortage of workers engaged in the financial sector is said to be 100,000 to 200,000. Although some of the needed workers would be provided through shifting from other sectors, there would be a significant net gain. Tokyo would continue to grow on this basis for some time.

To recapitulate this section, the recent growth of Tokyo started with the improved information technology around 1980, but the recent phenomenal rise in land price has been provoked by the sudden growth of the financial sector which was given stimulus by deregulation. Consequently, Tokyo has become from a capital of a single nation to an important centre of the world. The deregulatory policy, coupled with improved communication technology, has made this possible.

URBAN POLICY FOR THE REJUVENATED TOKYO AND THE COUNTRY

This sudden change of Tokyo has given rise to heated debate on land and regional policy in Japan. In and around Tokyo, people are complaining about the high land price itself because those who do not own a house or a condominium but would like to in the future have now a much bleaker chance of realising the plan. Some are blaming real estate agents for raising the price. The government announced last year its intention to liberalise building and land use control and develop infrastructure in Tokyo in order to accommodate increased demand for space. Immediately representatives from other parts of the country criticised the policy as it would lead to a more unbalanced development.

So far, the government has reacted to this issue with intensified control. The Prefectural Government of Tokyo extended the reporting obligation of planned land transaction to plots of 500 sq. m. and above from the previous level of 2,000 sq. m. and above, in order to cool off the rising trend of land price. The National Government is planning to increase tax rates on income earned from short-term transaction of land. In addition, the Ministry of Finance is maintaining a close watch on loans which might lead to speculative land purchase.

These measures have succeeded in arresting the runaway rise of land price. Now, the price is said to have been stabilised and in some areas declining. On the other hand, a large number of new office buildings have been constructed. Obviously, the rise in office space rental has induced new construction. The combination of government controls and market response appears to have moderated the ascent

substantially. But, the public measures have only remvoed some of the symptoms; they have not solved the essence of the problem.

There are three major tasks for urban development in the country. First, the urban functions of the country must be restructured from the traditional manufacturing orientation to service orientation, particularly for performing financial services on a global scale. This would require massive redevelopment in central Tokyo. The future growth of the Japanese economy depends in part on the efficiency of urban functions which Tokyo can provide. Second, the standard of living in cities is poor in Japan relative to other industrialised countries. The size of housing units is small and the commuting is done in overcrowded trains for a long distance. Living standards need to be considerably improved. Third, the new phase of prosperity which is now centred around Tokyo mainly from the rise in financial activities should be shared more widely by other parts of the country.

Intensified control on the land market would retard market response to the problem. During the past year or two real estate agents were assembling small parcels of land in downtown Tokyo in order to provide sufficiently large plots for efficient large-scale redevelopment. They were led by profit incentives. But in effect they were an agent for changing the structure of the downtown from the traditional two-to-three storey small buildings to large-scale high-rise structures. Government control has virtually killed this activity. The process of restructuring downtown Tokyo has been considerably slowed down.

What is needed is deregulation and appropriate pricing for urban and regional development which would match the deregulation in the financial sector. One factor which restricts the supply of urban land is the government's protection of agriculture through price support and the virtual exemption from the real estate tax. Bringing the agriculture sector into the regular market economy would improve the urban living standards by increasing the supply of urban land and consequently lowering land price. Urban development is constrained by other factors as well. Development is regulated by strict building codes and land use control, which are aimed at *status quo* rather than development. Substantial liberalisation is needed for the central parts of the metropolitan area. Many visitors to Tokyo are amazed by the lack of high-rise buildings in Tokyo. Another factor is the low level of real estate tax, which allows the continuance of low-intensity use in central areas. Although the nominal rate is the respectable 1.4 per cent of property value, the tax has been diminished multifold by exemptions and conservative assessment. An increase in the effective rate would accelerate the process of restructuring. The third factor is the shift from nationally uniform pricing to locationally segregated pricing for publicly provided services. If the principle is established that each user, often locationally identified, should pay the marginal cost of providing public service, the oft-cited problem of resource shortage for providing public services would be solved. Those areas for which demand warrants development would be developed. These are minimum measures needed for improving urban standards of living.

The third issue of spreading the new phase of growth with other parts of the country should be dealt with also through deregulation and appropriate pricing. Although Tokyo may remain the major generator and sender of information, other parts of the country can develop more if transportation and communication are cheaper and easier. The major obstacle is the high cost of travel and communication. Due to the protective policy of the government, the domestic airfare and railroad fare are very high by international standards. Expressway tolls are also high. Although privatised, the telephone charges for domestic long distance calls are still very expensive. These are preventing other cities and regions from fully taking part in the new development. Competition should be introduced more widely to these sectors to reduce the barriers between regions.

CONCLUSIONS

The economy of Japan has gone into a new phase in which the international financial sector plays an important role. This is a result of recent deregulation of the financial sector. The recent growth of Tokyo, which may have been initiated by the development of information technology, is certainly a reflection of the phenomenal growth of the international financial sector which is concentrated in Tokyo.

As the new phase of the growth was brought about through deregulation and greater reliance on the market, the current urban and regional problems can also be approached with the same policy orientation. The greater reliance on the market, coupled with the principle of marginal cost pricing for publicly provided services, would ameliorate much of the current problems.

REFERENCES

Klassen, L.H. and Paelinck, J.H.P., 1979. The future of large towns, *Environment and Planning*, 10.

Mera, Koichi, 1986a. Population stabilization and national spatial policy of public investment: the Japanese experience, *International Regional Science Review*, 10.

Mera, Koichi, 1986b. Japan as seen from the world: observations through international exchanges, *Planning Administration*, 17 (in Japanese).

15

CHANGING FORMS OF MIGRATION TO BIG CITIES: BANGKOK AND SHANGHAI COMPARED

Sidney GOLDSTEIN
Population Studies and Training Center
Brown University
Providence, Rhode Island, USA

Developing countries continue to experience sharp increases in the size of their urban populations, in the level of urbanisation, and in the number of cities, especially big cities, and continuing rural growth (United Nations, 1987b). In 1985, the urban population of LDCs had already risen to 1.1 billion and the level of urbanisation had increased from only 17 per cent in 1950 to 31 per cent. Population is projected to reach 3.8 billion by the year 2025 and to encompass over half of all LDC people. Moreover, projections anticipate that the number of million-plus cities will increase from 146 in 1985 to almost 500 by 2025, over 100 of which will be in the 4 million-plus category. This situation presents a complex set of developments to challenge research and policy formulation efforts, and points to the pressing need for attention to population movement.

THE IMPORTANCE OF MIGRATION IN URBAN GROWTH

Migration's importance as a component of rural and urban population change is attested to by the magnitude of the number of persons involved. According to an estimate by the World Bank (1984: 97), between 1950 and 1975, 330 million persons, equal to almost one-fourth of the rural population in developing countries at the beginning of the period and greater than the total urban population at that time, shifted residence from rural to urban places. Yet these estimates encompass only a portion of the total volume of population movement, since they are net statistics and also exclude temporary migrants as well as moves within rural areas and between urban places. Migration, excluding the births attributable to migrant parents, has come to account for about 40 per cent of all LDC urban growth (United Nations, 1980), although this percentage varies among countries. Its importance in accounting for differential rates of growth and composition of urban and rural places seems likely to increase as LDC fertility is brought increasingly under control.

Compounding the complexities of the role of permanent migration in urban growth and development is the simultaneous inflow into urban places of temporary migrants. A growing body of evidence (Chapman and Prothero, 1983) suggests that such movement, largely of circular migrants who return to rural areas on a regular basis, plays a key role in the adjustment strategies of individuals and households to changing conditions at origin and destination. The importance of such movement was recognised by the Mexico Declaration on Population and Development which recommended that governments should take into account the policy implications of various forms of population mobility (e.g., circular, seasonal, rural-rural, and urban-urban, as well as rural-urban), to consider the direction, duration, and characteristics of these movements (United Nations, 1986: 157).

Urbanisation, migration, and population distribution generally are topics of intense concern in much of the world (United Nations, 1986). Yet progress in understanding the dynamics of mobility has been hampered by poor conceptualisation and by misleading perspectives on the issues, as well as by data deficiencies (Goldstein and Goldstein, 1981; Findley, 1982). Some of these obstacles are now being considerably reduced, as more attention is given to refinement of concepts, coverage of the varied forms of movement, and collection and analysis of better data sets. Comparative research on the experience of different countries provides one of the best means for gaining new insights into the relation between migration and development.

China and Thailand are among the numerous developing countries in which population redistribution has assumed increased importance in both demographic change and national development. More particularly, both countries have been much concerned about the pace of growth of their big cities, Bangkok in Thailand and the three municipalities of Shanghai, Beijing, and Tianjin, and a host of other large cities in China.

Both countries have experimented with various policies—direct and indirect—to control migration to the big cities or to divert movement elsewhere. In both, temporary population movement has become an important mechanism for coping with rural pressures and urban constraints as well as urban labour force and service needs. Yet the situations in the two countries also differ widely, as the following discussion will document. This paper focuses on the migration experience of Bangkok and Shanghai, each country's largest city. In particular, what role has migration played in the growth of these two cities? How have the importance and character of migration changed over time? How have policies influenced these patterns? To what degree do the types of movement to Bangkok and Shanghai differ from or resemble each other? What relevance do the comparative experiences of these cities have for big cities in other developing countries?

DEVELOPMENT AND URBANISATION IN THAILAND AND CHINA

Great differences exist between Thailand and China in size, levels of development, political system, and efforts and ability to control migration and urban

growth. Yet both nations in the early 1980s had a comparatively low level of urbanisation (about 20 per cent) and both have experienced rapid changes in development since 1960.

Compared to other developing countries, Thailand has experienced particularly rapid socio-economic change since 1960. Its per capita GNP grew faster than that of all but 11 other developing countries (ESCAP, Population Division, 1984: 1). A growing percentage of youth have been enrolled in school; cultivated lands have been expanded concurrent with the emergence of a small-industry sector. Concurrently, the annual rate of population growth has declined from a high of 3.2 in 1960 to 2.0 by 1985. Even with this reduction, the country's population grew from 26.2 to 51.4 million in the 25 years, resulting in a sharp increase in population density and considerable pressure on resources.

Although the majority of Thailand's population has participated in and benefited from the development process, differentials among the country's regions and between rural and urban populations have persisted. The country remains largely agricultural (in 1985, 80 per cent of the population was estimated to be living in non-municipal areas), but a substantial shift from self-employment in agriculture to employment outside the primary sector provides continuing stimuli for both permanent migration and temporary movement. Since the Thai government, unlike its Chinese counterpart, does not directly control migration, its policy has been to decelerate the trend in rural-to-urban movement. Nonetheless, economic pressures continue to foster movement from less to more developed areas and from rural to urban places, especially to Bangkok.

Chinese policy-makers have viewed population distribution as needing to be planned and controlled as part of the broader efforts at central planning and development. Because China's political system allows such control to a high degree, China's experience provides an interesting contrast to that of Thailand. The Chinese model may also provide insights on how to avoid some of the negative consequences of rapid urban growth while realising the benefits of urbanisation, absorbing surplus rural labour, and achieving economic development.

Of China's one billion persons enumerated in the 1982 census, 206 million were living in its 236 cities and 2,664 other urban places. Its level of urbanisation in mid-1982 was thus not very different from that in Thailand, but the number of people living in China's urban places is more than five times the total population of Thailand. The Chinese situation is particularly challenging from a policy perspective because almost 800 million persons still live in rural areas and have been largely engaged in agricultural activities.

As in Thailand and other countries, considerable motivation exists among China's rural population to move into cities. Substantial differences characterise the quality of life between urban and rural places, despite ostensible efforts to reduce them (Johnson, 1988). In fact, Chinese policies have often served to accentuate the

differences. Urban places are characterised by higher urban incomes, better housing, sanitation facilities, educational opportunities, subsidised food, more varied entertainment, and greater availability of consumer goods. Urban job security has been more stable and a wide range of benefits have been associated with employment in State-owned enterprises. All these have served as powerful magnets for peasants whose annual incomes depended on the vagaries of weather and, until the 1980s, on income distribution decisions by the collective leadership of the communes. Some of these conditions are changing as a result of economic liberalisation in China. Nonetheless, the attraction of urban places for peasants is likely to remain quite strong (cf. Zhu and Wang, 1985).

The Chinese recognise that their efforts to modernise the country must sooner or later involve the absorption of several hundred million peasants into non-agricultural activities and possibly into urban places. The Chinese have therefore been experimenting with various efforts to control urban growth—especially the growth of big cities—and to absorb rural surplus labour in rural areas, in smaller cities, and in towns. They also increasingly recognise the role that temporary migration may play in these efforts.

Bangkok and Shanghai: Bangkok has long had the distinction of being the world's most primate city (Sternstein, 1984). In 1980, Bangkok, with its 4.6 million people, was 46 times as large as the nation's second largest city and accounted for 62.2 per cent of Thailand's urban population. Bangkok stands as the political, cultural, commercial, and social centre of Thailand and serves as the nation's link to the rest of South-East Asia and the world at large. Of the country's gross domestic product, 37 per cent is accounted for by Bangkok metropolis, as are 61 per cent of all exports and 99 per cent of all imports passed through its port. Helping to explain Bangkok's attractiveness to migrants from all regions of Thailand is the capital's much higher per capita income, 3.4 times the country's average. The metropolis's key position is reinforced as the nation's population is increasingly concentrated in the southern part of the Central Plain, where Bangkok is located. Nonetheless, the twentieth century has also witnessed the development of a network of regional towns and a substantial national urban hierarchy (ESCAP, 1982: 11).

In China, by contrast, cities show no indication of primacy at the national level. Indeed, in 1982 the 10 largest cities in China, in the aggregate, accounted for a lower proportion of China's urban population than did Bangkok of Thailand's. Shanghai, one of China's three municipalities, is its largest city with population of 11.9 million, about 5 million of whom live in the 10 largely rural counties under the city's jurisdiction; the central city itself had a 1982 population of 6.32 million.

By the 1980s, Shanghai has become China's largest comprehensive industrial city (Sit, 1985: 105), and serves as the centre for a large hinterland, which is one of the most developed areas of China. Its gross industrial output value in 1981 of 6.5 billion yuan accounted for 12.5 per cent of China's total and was equal to one-third of the

total output value of the 15 largest cities. The city contributed 16 per cent of China's revenue and accounted for almost half (47 per cent) of the revenue of the 15 largest cities.

SOURCES OF DATA

This assessment of migration to Bangkok and Shanghai draws upon a variety of data sources. Unfortunately, the amount of data available and the definitions and measures of migration used are not exactly comparable for the two cities. Among developing countries, Thailand has an exceptional set of statistics on migration. Questions on migration have been included in the 1960, 1970, and 1980 censuses, as well as in a number of national surveys (Goldstein and Goldstein, 1986). In addition, since 1974, the Bangkok Metropolis Migration Survey has yielded a rich array of information on the volume of in-migration, the characteristics of the migrants, their previous place of residence, their reasons for moving, and the expected duration of residence. Another survey has followed up respondents in the Bangkok Survey to ascertain actual length of residence.

In contrast to Thailand, few definitive national data sets on migration have yet been available to researchers assessing population movement in China. In part this has reflected the decentralised nature of the statistical record keeping system, in part the widely held belief that, since migration was largely controlled through the registration system, the local registration statistics were adequate to provide whatever information was needed. Reflecting this latter argument, the 1982 census did not include any direct migration questions. Researchers interested in migration must therefore rely heavily on relatively localised data, either from registration statistics or from ad hoc surveys intended to fill gaps in the existing data system.

In China, an individual is officially considered a permanent migrant only if the move involved a change in household registration. Persons living in cities who are not *de jure* residents of those cities are not counted as part of the city population in any enumeration based on household registers. Since *de facto* residents of cities may be numerous and different in their socio-economic and demographic characteristics from *de jure* residents, their omission from urban registers and statistics distorts the data on the size and composition of urban places, as well as the data on the rural populations at places of origin. Temporary population movement is taking on increased importance in China's cities. Its magnitude for Shanghai is documented in a series of Surveys of Temporary Migrants undertaken by scholars at Fudan University (Zheng et al., 1985a and 1985b).

MIGRATION PATTERNS: BANGKOK[1]

Lifetime Migrants: In 1960, when the Thai census first asked a migration question, 22.8 per cent of Bangkok's population was reported as having been born in a province other than Bangkok (encompassing the two provinces of Phranakhon and Thonburi).

1. For a fuller discussion of migration in Thailand as documented by the censuses of 1960, 1970, and 1980, see Goldstein and Goldstein, 1986.

This compared to only 7.7 to 10.9 per cent who were lifetime migrants in the four other regions of Thailand. Between 1960 and 1970, Bangkok's population grew from 2.1 to 3.1 million. Migration played a key role in this capital's growth; by 1970, 27 per cent of the capital's population were born elsewhere in Thailand compared to only 13 per cent in Thailand as a whole.

By the latest census in 1980, the percentage of lifetime migrants in the total kingdom had risen again but only slightly, from 13 to 14 per cent; it had remained virtually stable in Bangkok. This stability between 1970 and 1980 reflects the combined effects of the mortality of earlier in-migrants and the increase in the number of Bangkok-born persons (a combination of births to earlier in-migrants and to native-born residents). Of the capital's 1.6 million increase between 1970 and 1980, 70 per cent was accounted for by the growth in the number of Bangkok-born persons still resident in the capital. The declining role of migration in the capital's growth undoubtedly is also partly a function of the greater attraction of suburban developments in the surrounding provinces to migrants who might otherwise have moved to Bangkok. Nonetheless, in 1980, as in 1960, Bangkok continued to include the largest percentage of lifetime migrants in its population of any region in the country.

Five-year Migrants: The 1960, 1970, and 1980 censuses also collected five-year migration data based on comparison of province of residence at the time of the census and province of residence five years earlier. These data allow more precise determination of the changes that occurred in these decades.

Consistent with its prominent place in the Thai urban hierarchy, in 1960 Bangkok contained relatively more five-year migrants than any other region of Thailand. According to the census, over 130,000 persons in the capital (7.3 per cent) had moved there since 1955. This compares to 3.6 per cent of Thailand's total population who were classified as five-year migrants. Reflecting the dynamism of the 1960s, by 1970 the level of five-year migration had risen to 6 per cent nationally. In Bangkok, almost 300,000 residents (11 per cent of its population) had moved there since 1965.

The pattern changed by 1980. For Thailand, both the absolute and relative number of interprovincial migrants declined, from 5.9 to 4.1 per cent of the population, in part because the most dramatic economic and social changes had occurred during the 1960s, even though development continued into the 1970s. The lower level of recent interprovincial migration extended to Bangkok. Despite an increase in the absolute number of recent migration to the capital from 299,000 in 1965–70 to 341,000 in 1975–80, the per cent of recent migrants in the population declined to 8.0. Moreover, 1975–80 saw a continued narrowing between Bangkok and the Central Region in the percentage of migrants in their populations, suggesting a continuing population overflow from Bangkok to the adjoining provinces and movement directly to these provinces by individuals who would otherwise have gone to the capital.

Cross-tabulations of the lifetime and five-year migration status suggest that the

great majority of migrants to the capital came directly from their birth province and most arrived before 1975. However, of those who had moved since 1975, one in four had moved more than once, with 8.8 per cent being return migrants to Bangkok and 13.4 per cent migrants from provinces other than their province of birth. Moreover, many recent migrants to Bangkok are not certain about the duration of their stay. The 1985 Survey of Migration in Bangkok Metropolis (Thailand, National Statistical Office, 1986) found that among persons who had arrived in the capital between June 1983 and May 1985, only 6 per cent stated that they expected to stay less than one year, but almost two-thirds (62 per cent) did not know how long they would remain. Some 56 per cent indicated they were looking for work during the agricultural slack season. An earlier survey found that only 23.5 per cent of the migrants registered their move (Thailand, National Statistical Office, 1983: Table 26). Other research (Goldstein and Goldstein, 1979) had also shown that as many as one-quarter of Bangkok's migrants had lived in three or more different urban places, and that repeated residence in Bangkok was quite common among those living in other urban places in Thailand; one-third had lived in Bangkok at least once. The importance of temporary mobility is also indicated by a longitudinal study (Chamratrithirong et al., 1979), showing that just over one-fifth of the men and one-third of the women migrants to the capital returned to their communities of origin within two years.

Together, these studies strongly suggest that the more permanent movement identified by census data represents only a small portion of total movement to and from Bangkok. Without attention to circulation and other forms of return and repeat migration, the relation between population movement, on the one hand, and big city growth and development, on the other, cannot be fairly assessed. It is clear that many different forms of movement are used to allow individuals to take advantage of the economic and social opportunities available in Bangkok. At the same time, the growing network of other urban locations, including very small places, provides an increasing number of destination alternatives for different types of movement, including the possibility of considerable out-migration on the part of recent in-migrants.

MIGRATION PATTERNS: SHANGHAI

The paucity of migration data for Shanghai is compounded by the absence of a direct question on migration in China's 1982 census. For the current evaluation, heavy reliance must therefore be placed on the material collected in a 1986 omnibus survey of Shanghai which included questions comparable to those asked in the Thai census—province of birth and province of residence five years earlier in 1981.[2] However, the Bangkok and Shanghai data use different definitions of resident, so that the two data sets have limited comparability. In the Thai census, anyone reported as usually living in Bangkok was counted as a resident of the city regardless of registration status. The Shanghai sample, consisting of 1,000 households, is based only

2. Other surveys of migrants in Shanghai have been undertaken, but because their definition of migration includes movement within the municipality, their data are not comparable to those from the Thai census; they are therefore inappropriate for use here (e.g.Gui, Sheng, and Zhu, n.d.).

on registered households; it therefore omits persons living in Shanghai who are not registered there. Such persons are considered temporary migrants; only permanent residents, including migrants whose registration has been officially transferred to the city, were sampled. For assessment of non-permanent migration, other data sources are used.

Largely reflecting the development of industry in Shanghai during the 1950s and 1960s, the Shanghai survey reveals that one-third (31.6 per cent) of the municipality's 1986 population reported having been born elsewhere in China. By contrast very little permanent migration had taken place to the metropolis between 1981 and 1986. Only 2.8 per cent of Shanghai's population reported moving into the city as registered in the five years preceding the survey. These five-year migration data for Shanghai therefore confirm China's success in recent years in controlling migration, on a *de jure* basis, to its million-plus cities.

Place of Origin: Not only has the volume and rate of migration to Shanghai changed, as judged by the comparison of lifetime and recent migrants, so too has the origin of the migration streams. Among the lifetime migrants of Shanghai, almost half (48.0 per cent) were born in adjoining Jiangsu province, and an additional 38.8 per cent were born in the other provinces of the Eastern Region. These data thus suggest that Shanghai's population originated from within a quite restricted area, in part reflecting distance factors, and in part the population density and possibly also the heavy concentration of China's urban places in these provinces.

Recent migration is affected by a somewhat different combination of factors. Among persons who migrated to Shanghai as permanent residents since 1981, only 11 per cent originated in nearby Jiangsu province. Proximity in itself was clearly less important, although almost the same percentage (40 per cent) came from other parts of the Eastern Region as was true of lifetime migrants. That 50 per cent of all recent migration to Shanghai was from other than the Eastern Region, which accounted for 87 per cent of the lifetime migrants, points to a dramatic alteration in origin patterns. Policy concerns related to needed labour force and to return migration seem to offer the best explanations for the change toward migrants originating in more distant regions.

Among the five-year migrants, the great majority, 79 per cent, had moved to Shanghai from other cities. Of the remaining number, 13 per cent moved to Shanghai from towns and 9 per cent from communes. Such flows are very consistent with policy; not only is the total number of recent in-migrants small, most are coming from other large urban places, rather than from towns or from the countryside.

Types of Migration: The availability for Shanghai residents of information on both province of birth and province of residence five years earlier allows some assessment of the extent to which recent migrants to the city came directly from their place of birth or made at least one intermediary move. Of the 1986 residents, 67 per cent were born in Shanghai and were living there in both 1981 and 1986. Judged by these measures, the considerable majority of the city's population were therefore

residentially stable, a pattern quite similar to the 64 per cent of Bangkok's 1980 adult population who were born in the capital and living there in 1975. A small percentage (1 per cent) were born in Shanghai but had moved out and were still living in another province in 1981; these constituted the return migrants to the city. In all, 32 per cent were born outside the municipality, and 95 per cent of these moved to Shanghai before 1981, a level well below that characterising Bangkok. Only 5 per cent of the lifetime migrants to Shanghai were living in a different province in 1981.

These data suggest that Shanghai is like other cities in developing countries in that a considerable proportion of its population was born elsewhere. Shanghai differs, however, in its small percentage of recent permanent migrants. Reflecting the effectiveness of efforts to control migration to big cities, only 3 per cent of all of Shanghai's registered population age 15 and over had moved into the city since 1981 and half of these were return migrants. This gives a somewhat misleading picture of migration to Shanghai.

Temporary Migration: The economic reforms introduced in rural China in the 1980s have exacerbated the problem of rural surplus labour, but have also increased the need and opportunities for rural persons to interact economically with urban places, including big cities such as Shanghai. Thousands go to cities to market their agricultural and handicraft products, engage in construction work, and provide a wide range of services. Because of the restrictions on permanent migration few rural persons are able to change their registration to Shanghai; they can, however, move into the city on a temporary basis. Some register as temporary residents; others do not register at all. Official records do not, therefore, provide a good indication of the number of such migrants. Surveys provide the most reliable basis for assessing the extent and character of such movement.

The Shanghai Surveys of Temporary Migrants were designed for such purposes. The surveys sampled people who were staying temporarily in the households of Shanghai residents. They were supplemented by censuses of hotels and guest houses, boat populations, and estimates of construction workers, free market traders, and transients. The data below refer to the 1985 Survey.

In 1985, 1.1 million persons were estimated to be temporary migrants in Shanghai. By far the largest number (511,000 or 46.3 per cent) stayed in local households. An additional 268,400 were living in hotels and hostels. Many of these were peasants who came from other provinces to sell their agricultural and sideline products. In part, their numbers reflect the proliferation of free markets. Another large group of temporary migrants were the 240,000 construction workers, most of whom lived in temporary work sheds on the construction sites. Still another group are the 71,000 who lived in ships or boats as crew or boat people. The balance of temporary migrants consisted of small numbers of pedlars who slept in the free markets and transients who used facilities at bus and train stations for shelter.

These temporary migrants were seen as benefiting both themselves, through the

income they earned and their exposure to modern urban ideas and values, and Shanghai's population by providing services and helping to increase the size of the city's consumer market. At the same time, the heavy influx of temporary migrants into Shanghai (and other cities) is regarded by many as having negative consequences by adding to urban congestion, straining urban services, and increasing crime and accidents.

The data on temporary migrants suggest that distance is very differently related to such movement than it has been to recent permanent migration. Among temporary migrants, 12 per cent of those living in households came from suburban parts of Shanghai and one-third were from nearby Jiangsu Province. In all, eight out of every ten temporary migrants living in households and seven out of every ten living in hotels were *de jure* residents in the eastern region of China in which Shanghai is located. By contrast, only about half of five-year permanent migrants originated in this region. Clearly, temporary migration strategies are used by those living in the region around Shanghai. This may be particularly the case because of the legal restrictions on permanent changes in registration to residence in Shanghai for most people living outside the city.

Although all surveyed respondents qualified as temporary migrants because they had not changed place of registration, there was considerable variation in length of residence in Shanghai. Of those residing in households in 1985, 13 per cent were reported as being in the city five years and more, and 27 per cent as residing there a year or longer. About one-quarter had been resident in Shanghai a week or less. Were it not for the fact that their temporary status depended on lack of Shanghai registration, a substantial percentage of these migrants would qualify as 'permanent' residents under criteria employed by other countries. These data point to the problems inherent in reliance upon registration status as the basis for sampling population in China and as a criterion for determining migration status.

SHANGHAI AND BANGKOK, CHINA AND THAILAND COMPARED

This assessment of the role of migration in the growth and development of Bangkok and Shanghai points to both similarities and differences. The two cities are of similar size and migration has been a major source of their past growth; the respective nearby provinces were a major source of the lifetime migration flows. While each city is its nation's largest, Bangkok is a major primate city, economically, politically, and demographically. Shanghai by contrast, plays a major role in many aspects of China's national and international economy, but is not as dominant economically or demographically.

For both cities, considerable government attention has focused on how to control further growth, especially migration from other areas. In China, this reflected a more general concern with large cities throughout the country. In Thailand, it stemmed from the extreme primacy of Bangkok and the desirability of developing intermediate cities as regional growth poles and stimuli for rural development and for alternatives

for rural-to-urban migration. China has considerable ability to control big-city growth largely through the registration system, as evidenced in Shanghai's slower rate of migration and total growth in recent years. Thai government efforts also seem to be having some success, as suggested by the considerably lower in-migration to Bangkok since 1970.

Both Shanghai and Bangkok are characterised by substantial levels of temporary migration. Such migrants help these cities to meet their needs for labour and services and to avoid the burdens that permanent residence in the city would entail. Circulation has also helped to relieve the increasing demographic pressures in rural areas and to create links between city and countryside. For Shanghai, temporary migration clearly serves as an important mechanism especially for residents of nearby areas, for taking advantage of the city in the face of strict controls on permanent change in residence. Thus, despite differences in size, in levels of development, political systems, and efforts to control migration and urban growth, China and Thailand share many aspects of the dynamics of urbanisation as judged by the experiences of Bangkok and Shanghai.

Thailand and China both provide good examples of nations struggling with concerns about unacceptable patterns of population distribution, sometimes in similar ways and sometimes quite differently. In Thailand, a wide range of policies have directly or indirectly favoured urban places and especially Bangkok—including food subsidies, minimum wage levels, investment incentives, land use, and infrastructure development. These have led to heavy rural-urban migration and the unparalleled primacy of the capital. By the mid-1970s, however, the situation had changed considerably. Government investments in regional urban centres encouraged their growth; while Bangkok and its surrounding provinces remained attractive destinations for migrants, other cities also drew movers.

Thus, even without any direct policies to control population movement, Thailand, through a variety of development policies, has indirectly affected streams of migration (Lim et al., 1980). That the primacy of Bangkok continues unabated and that rural/urban inequalities remain great testify to the still limited success of these policies in meeting the nation's development goals. Moreover, rural/urban disparities have motivated many rural residents to turn to circular migration as their way of coping with the situation and minimising risk by taking up only temporary residence in Bangkok and other cities while maintaining more permanent ties in the villages.

China's attempts at simultaneous development and strict control of permanent migration, especially to big cities such as Shanghai, provide a striking contrast to Thailand. China's concerted effort to limit urban growth by controlling and directing population movement in the face of growing rural labour surpluses has led to heavy temporary movement and commuting and to the development of small towns as alternative urban destinations.

In China, temporary movement has come to be seen as serving a two-fold

purpose: (1) It minimises the risk involved in a shift away from the production of basic crops into more diversified agriculture (cf. Roberts, 1982). (2) Given the efficiencies in labour utilisation introduced by improved technology and more effective organisation, together with the higher levels of motivation for profits resulting from introduction of the responsibility system, such movement allows and stimulates growing numbers of peasants to seek the benefits of urban employment through migration. With permanent change in residence, especially to big and medium cities, still largely impossible, temporary movement provides a viable alternative for many.

The Chinese government may also be allowing such increased mobility as a kind of experiment to assess its value for coping with the surplus rural labour, with the labour force and service needs of cities, and with rural needs for greater resources for development. Circulation may be favoured because it helps to aviod the social dislocation and the added strain on cities that large-scale permanent migration may create (Standing, 1985). From a government point of view, the attractiveness of temporary mobility is enhanced by the ability to relax or tighten control over such movement as conditions in urban and rural places change. Permanent migration would be more difficult to reverse.

While the specific approaches to channel migration and foster development being used in China are not unique, the scope and speed at which they are being implemented and the role of the government in fostering the processes, if not actually controlling them in detail, certainly raises questions about the generalisability of the experience to other developing countries. Time and fuller evaluation of all the factors are essential before reaching conclusions about the value of China's experience for other LDCs. Nonetheless, as other developing countries such as Thailand—with no restrictions on movement—also turn more to rural development and a 'bottom up approach' as the major mechanism for reducing urban/rural inequality and for stemming migration to cities, the Chinese experience takes on special relevance.

Conversely, as the greater flexibility that China has allowed in its rural and urban economic systems creates pressures for more flexibility in its migration policies. China must learn from the experience of other developing countries, such as Thailand, that have already faced the distribution consequences of a much greater degree of freedom of movement than China is likely to allow in the foreseeable future. Most important is the evidence that strongly suggests that for China, Thailand, and other developing countries, temporary migration, whether part of official policy or not, has come to play a key role as a coping mechanism in the process of rural development.

The experiences of Thailand and China, and of Bangkok and Shanghai in particular, teach us that many people in these countries are, in fact, neither exclusively rural nor exclusively urban: that the dichotomies on which we have relied so heavily are artefacts of our classification scheme rather than a reflection of reality. Many persons may have bilocal or even multilocal residence patterns. The interests of these individual movers as well as of the rural and urban communities of which they are a part and to which they make important contributions can best be served by policies

that take account of the needs of the resident populations in both locations as well as of those who move between them. To be successful, such policies require that we recognise and give attention to all forms of population movement, including temporary movement, in our theoretical formulations, in our research, and in our efforts to develop effective policies. Temporary movement may well provide an important mechanism for coping with problems of big cities and overurbanisation and concurrently with efforts to achieve rural development and to reduce inequalities between rural and urban places.

Selected urban statistics, Thailand and China, Bangkok and Shanghai

	Thailand, 1980	China			
		1982		1985	
	(a)	(b)	(c)	(b)	(c)
Total population (million)	44.4	1,003.9	1,003.9	1,041.1	1,041.1
Urban population (million	7.4	144.8	206.6	212.9	382.4
Per cent urban	16.6	14.4	20.6	20.4	36.7
Number of urban places	124	236	2900	324	7835

	Bangkok		Shanghai
	1970	1980	1986
Population (million)	3.1	4.6	6.98[d]
Per cent of national urban pop.	54.8	62.2	3.3[e]
Per cent lifetime migrants	27.2	27.3	31.6
Per cent recent migrants	11.1	8.0	2.8

a. In Thailand urban places include all designated municipal areas.
b. Includes only places classified as cities.
c. Includes cities and towns designated as urban places.
d. Excludes counties controlled by Shanghai.
e. Based only on city population.

Sources: 1980 Census of Thailand.
1982 Census of the People's Republic of China.
Data for China 1985 are from Li Jingneng, China's urbanisation through small town development, paper presented at Brown University, Population Studies Training Center, December 1988.

REFERENCES

Chamratrithirong, Apichat et al., 1979. *Recent Migrants in Bangkok Metropolis: A Follow-up Study of Migrants' Adjustment, Assimilation, and Integration*. Bangkok: Institute for Population and Social Research, Mahidol University.

Chapman, Murray and Mansell Prothero, R., 1983. Themes in circulation in the Third World, *International Migration Review* 17 (Winter).

ESCAP (Economic and Social Commission for Asia and the Pacific), 1982. *Country Reports*, Vol. V, *Migration, Urbanization, and Development in Thailand.* New York: United Nations.

ESCAP, Population Division, 1984. *Urbanization in Thailand and its Implications for the Family Planning Programme*, Population Research Leads No. 17, Bangkok: Population Division, ESCAP.

Findly, Sally E., 1982. *Migration Survey Methodologies: A Review of Design Issues*, IUSSP Papers, No. 20. Liege: IUSSP.

Goldstein, Sidney and Goldstein, Alice, 1986. *Migration in Thailand: A Twenty-five year Review*, Paper No. 100, Honolulu: East-West Population Institute, East-West Center.

Goldstein, Sidney and Goldstein, Alice, 1981. *Surveys of Migration in Developing Countries: A Methodological Review*, Paper No. 71, Honolulu: East-West Population Institute, East-West Center.

Goldstein, Sidney and Goldstein, Alice, 1979. Types of migration in Thailand in relation to urban-rural residence, *Proceedings of the Conference on Economic and Demographic Change: Issues for the 1980s*, Vol. I, Liegé: IUSSP.

Gui, Shixun, Zhening Sheng, and Ci Zhu, n.d. Characteristics and policy implications of migration in Shanghai, *Population Science Series* (in Chinese).

Johnson, D. Gale, 1988. Economic reform in the People's Republic of China, *Economic Development and Cultural Change*, 36 (April).

Lim, E. R. et al.,1980. *Thailand: Toward a Development Strategy of Full Participation*, World Bank Country Study, Washington, D.C.: World Bank.

Roberts, Kenneth D., 1982. Agrarian structure and labour mobility in rural Mexico, *Population and Development Review*, 8 (June).

Sit, Victor F.S., 1985. *China's Cities: The Growth of the Metropolis since 1949*, New York: Oxford University Press.

Standing, Guy (ed.), 1985. *Labour Circulation and the Labour Process*, London: Croom Helm.

Sternstein, Larry, 1984. The growth of the population of the world's pre-eminent 'primate cities': Bangkok at its bicentenary, *Journal of Southeast Asian Studies*, 15 (March).

Thailand, National Statistical Office, 1986. *Survey of Migration into Bangkok Metropolis. The Vicinity of Bangkok Metropolis, and Khon Kaen Province, 1985*, Bangkok: National Statistical Office.

Thailand, National Statistical Office, 1983. The *Survey of Migration in Bangkok Metropolis, Nanthaburi, Pathumthani, and Samut Prakan: 1983*. Bangkok: National Statistical Office.

United Nations, 1987a. *Global Population Policy Database, 1987*, Population Policy Paper No. 9, New York: United Nations.

United Nations, 1987b. *The Prospects of World Urbanization, Revised as of 1984–85*, ST/ESA/SER. A/101, New York: United Nations.

United Nations, 1986. *Review and Appraisal of the World Population Plan of Action , 1984 Report*, ST/ESA/SER. A/99. New York: United Nations.

United Nations, 1980. *Patterns of Urban and Rural Population Growth,* Population Studies No. 68. New York: United Nations.

World Bank, 1984. *World Development Report 1984*, New York: Oxford University Press.

Zhang, Kaimin, 1985. Population growth in Shanghai and its characteristics, *Population Research (Renkou Yanjui)*, 2 (in Chinese).

Zheng, Guizhen, Guo Shenyang, Zhang Yunfan, and Wang Jufen, 1985a. A preliminary inquiry into the problem of floating population in Shanghai City Proper, *Population Research (Renkou Yanjui)*, 3 (in Chinese).

Zheng Guizhen, Liu Xian, Zhang Yunfan, and Wang Jufen, 1985b. A study of temporary population movement in Shanghai, Fudan University, Shanghai, (unpublished).

Zhu, Baoshu, and Giuxing Wang, 1985. The transformation of rural population and the control of city population, *Shandong Population*, 1 (in Chinese).

INTEGRATION OF DEMOGRAPHIC VARIABLES IN PLANNING FOR EMPLOYMENT

Andras W. UTHOFF
International Labour Office
Santiago, Chile

INTRODUCTION

The traditional approach for integration of demographic variables in planning for employment has been of little appeal to policy-makers, and thus of little assistance for policy formulation. This is due to its misleading emphasis on the population momentum and therefore in suggesting that population policies have only long-term effects. This issue is of great importance when attempting to improve information flows on population policies linked to labour market problems. My objectives are fourfold: to describe briefly my understanding of the traditional approach for integrating demographic variables in planning for employment; to discuss urban poverty and employment problems profiles as they are present in Latin American countries; to indicate the demographic factors operating in the production of such critical problems; and to assess, in light of the above, the potential for work on integration of demographic variables in planning for employment.

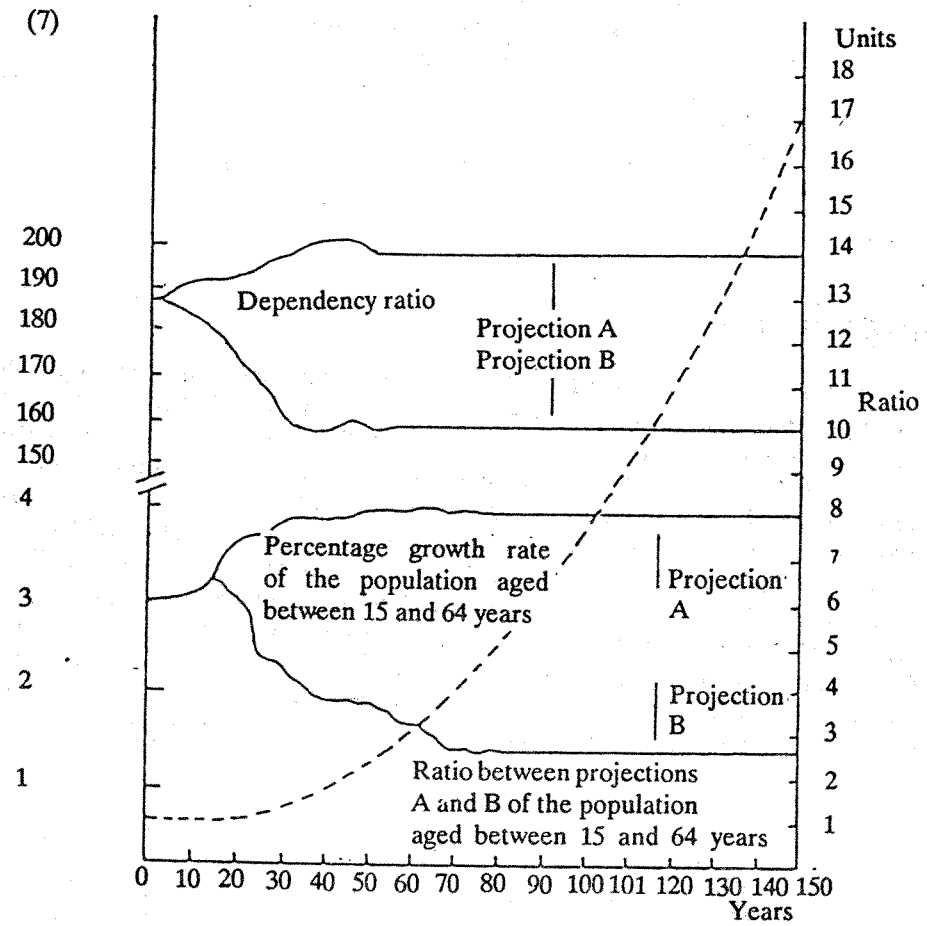
THE TRADITIONAL APPROACH

Figure 1 is obtained from Coale (1963) and illustrates ratios and rates for alternative population projections for 150 years for an initial population of a million people with an age structure and mortality and fertility patterns similar to some of the Latin American or the Caribbean countries with higher population growth rates. Birth and death rates are set initially at levels which give a natural rate of population growth equal to three, with total fertility rate set slightly over six.

*The responsibility for opinions expressed this article rests solely with the author, and publication does not constitute an endorsement by the International Labour Office of the opinions expressed in it.

FIGURE 1

Projection of some demographic rates and ratios in a hypothetical country



Source: Computed from table in Coale (1963).

Mortality and fertility assumptions for the population projections are implicit in the values simulated for life expectancy and age-specific fertility rates, respectively. The former is set originally at 53 years and assumed to approach in the lapse of 30 years that of industrialised countries, i.e. 70 years, remaining stable thereafter.

Alternative assumptions are made in respect of fertility regarding its future trend. In projection (A) it is assumed that the initial age-specific fertility rate remains constant; in projection (B) these rates are assumed to decline by 2 per cent annually from their initial value during a span of 25 years, which will account for a 50 per cent drop in fertility at the end of this period. Subsequently, the reduced rate is expected to remain constant.

This simple demographic projection is often used for academic purposes when teaching students about the importance of demographic assumptions over population age structure, working age population growth rates and population size. In fact, as can be seen in Figure 1, under these assumptions, in a close population three *demographic* periods can be distinguished. The first, during the first 15 years when only age structures effects are important (the demographic dependency ratio changes between both projections). The second, between 15 and 70 years, after the initial decline in fertility, when the working age population (15–64 years) growth rates effects are important (the rate of growth of the population age 15 to 64 is changed significantly across both projections). And finally, 70 years after the initial change in fertility when the ratio between both total populations increases asymptotically (the total population in projection A becomes significantly larger than that of population B). Subsequently exogenous estimates of labour force participation rates are combined to obtain labour force figures (Uthoff and Pernia, 1986: 26–28).

This extremely valuable simulation exercise can be also misleading unless a very careful analysis of its policy implications is done when introduced to newcomers, and especially when used for training of policy-makers. When used in employment planning several weaknesses are observed. First, it gives the impression that employment problems have only supply side roots, and especially that of the working age population growth rate. Even more, any action dealing with population appears as having effects only in the *economic* long run (15 years). Second, the exercise ignores the interactions between development and demographic variables and their role in producing the desirable changes in mortality and fertility. Most of these changes in demographic behaviour respond to socio-economic processes, several of which involve the distribution of the benefits of economic growth through the labour market and thus have to do with planning for employment. Third, the exercise ignores several issues on planning for employment which have to deal with demographic variables, such as differentials in labour force participation by age, sex and social strata, migration and employment opportunities for different family members, human resources planning and the age structure of both the school age and the working age population, etc. . . (For an extension of this model for planning for employment see Uthoff and Pernia, 1986).

More precise evaluations would require value judgements concerning the concept of population policy and their implications for planning for employment. That would be in the interest of a whole congress.

POPULATION, EMPLOYMENT AND POVERTY PROFILES

I rather wish to state that, in the interest of involving policy-makers in population policy, it is important to focus on the difference between placing before the static view

of a dynamic process (as in Figure 1) a dynamic view of a relatively static process (as in Figure 2). The latter reports the age structure of the population stratified by total family income per capita in urban Honduras after grouping into family units. The groups are defined according to the value of family income per capita separating by thirds from lower to higher income per capita.[1]

Figure 2 shows that whereas fertility has significantly declined for certain groups, it still remains high for others. Thus, demographic indicators influencing savings and resources allocations such as age dependency ratios, family size and their implication for different age groups, population growth rates differ across families grouped by income per capita. As already stated by Fishlow (1972: 392), 'families, while an important mechanism for redistribution of income at a moment of time, also are an important source for transmitting inequality into the future. To the extent that the probability of children earning increased income in the future is influenced by parents' income, equality of opportunity will not prevail, and inequality will tend to persist.'

The household characteristics of the population grouped by this stratification, as presented in Table 1, suggests that this mechanism is operative. The percentage of children is inversely related to total household income per capita. This is not only due to the larger family size within these households, but also due to the low productivity of their occupied members as well as to their higher unemployment rates despite lower labour force participation rates. The shape of urban poverty in Latin America stresses the importance of low levels of productivity and employment opportunities as determinants of the problems, and thus require emphasis in planning for employment.

TABLE 1

Honduras: household characteristics by poverty strata

	Destitute	Non-destitute poor	Non-poor	Total
Household size	6.3	5.2	3.9	5.2
Percentage child	33.9	30.6	21.0	30.1
Employed/adults	36.8	51.1	58.4	46.7
Active/adults	45.8	56.1	59.7	52.7
Employed/active	80.3	91.1	97.8	88.6
Income per capita	42.1	102.3	332.5	145.8
Income per employed	103.5	334.4	809.5	414.1
Total income	262.9	532.3	1,225.8	638.8

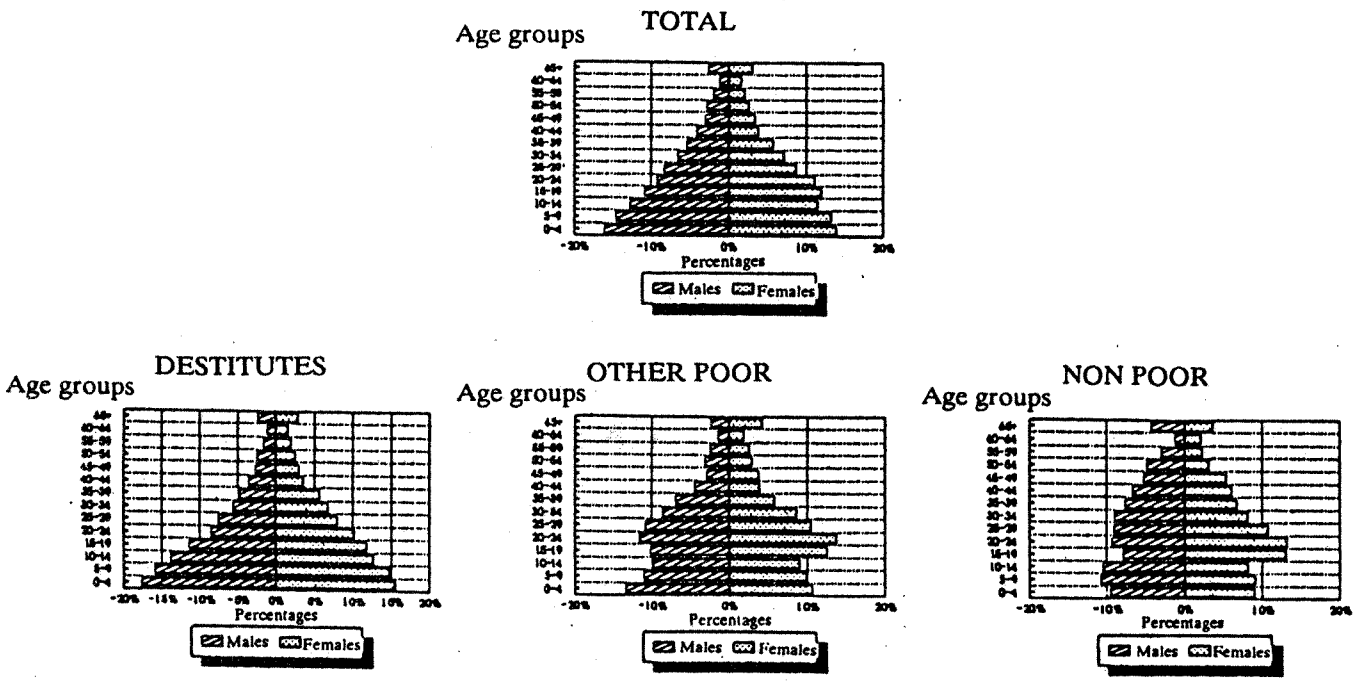
Note: Elaborated by the author from *Encuesta continua sobre fuerza de trabajo de Honduras*, September 1986.

Source: Children are those under 10 years old. Poverty is defined in relative terms, each category corresponds to approximately one-third of total households.

1. This criterion, based on relative inequality, was used after noticing that, according to absolute income standards, 67 per cent of households qualified below the poverty line, and another 20 per cent between 1 and twice the value of it.

FIGURE 2

Honduras population distribution by age
(percentages)



This approach, of (a) using a measure of the standard of living concept to stratify the population, (b) rescuing the family as a unit of analysis, and (c) looking at the implications of demographic variables in transmitting inequality through the labour market into the future, is of much more appeal for integrating demographic variables into planning for employment.

The whole concept and exercise of defining a poverty line to estimate and characterise the poor, has a lot to do with the integration of demographic variables into one component of planning for employment which is wage determination. Comparison of income per capita should be done with respect to some accepted regional/national standard. Although the minimum wage is originally set by law according to required minimum standards, it finally reflects relative income due to macro-economic constraints. The poverty line, instead, should reflect the cost of purchasing these consumption standards unequivocally for different family sizes with the aid of the elasticity of expenditure on food with respect to family size; because of the economies of scale it is assumed that larger families need relatively less income, and conversely for smaller.

The relationship between total and/or per capita family income and the family member's basic needs satisfaction, has often been neglected from population studies. The triple role of income from labour to be used in their determination [(a) reflecting the purchasing power of wages or other labour income; (b) being an important component of production costs; and (c) affecting the dynamics of price determination] offers a unique opportunity for integration of demographic criteria into wage or minimum income determination. Table 2 reports for three other countries (Chile, Costa Rica and Venezuela), the household characteristics for urban poverty defined according to the Economic Commission for Latin America and the Caribbean (ECLAC) minimum consumption baskets per person. These minimums were compared to per capita family income, obtained from urban household surveys, and then the families grouped into three categories: those destitute families whose per capita income is below the poverty line, those non-destitute poor families whose per capita income is between one and twice the value of the minimum consumption basket, and the non-poor families whose per capita income is above twice the value of the poverty line.

Straightforward comparison of per capita family income and the poverty lines gives the following figures of families not approaching an acceptable standard of income (destitute families) in 1982: 20.5 per cent in Costa Rica, 7.1 per cent in Venezuela and 10.8 per cent in Chile; whereas they represent 36.7 per cent in Costa Rica, 14.2 per cent in Venezuela and 20.4 per cent in Chile for the non-destitute poor families. This criterion is highly sensitive to short-term economic fluctuations in both: (a) prices (the cost of the minimum consumption basket) and (b) income from labour or other sources (the purchasing power of the family). It is also very sensitive to the concept and measurement of income, whether or not it includes income in kind,

TABLE 2

Household characteristics by poverty strata in Chile, Costa Rica and Venezuela

	Destitute		Non-destitute poor		Non-poor		Total	
Chile 1982								
Value of poverty line $1,151.47 US$ 16.68								
Household size	5.5		4.8		3.8		4.2	
Percentage child	35.0		32.0		23.0		27.0	
Employed/adults	21.0		33.0		46.0		40.0	
Active/adults	46.0		46.0		52.0		50.0	
Employed/active	46.0		72.0		88.0		81.0	
Income per capita	744.3	(10.1)	1,698.7	(23.1)	9,485.0	(129.2)	6,995.9	(95.3)
Income per employed	5,366.2	(73.1)	7,544.5	(102.7)	24,441.6	(332.9)	20,196.0	(275.0)
Total income	4,054.0	(55.2)	8,170.9	(111.3)	32,872.5	(447.7)	24,864.7	(338.6)
Costa Rica 1982								
Value of poverty line $ 714 US$ 17.74								
Household size	5.6		4.8		3.8		4.9	
Percentage child	57.0		33.0		29.0		32.0	
Employed/adults	59.0		57.0		70.0		67.0	
Active/adults	67.0		61.0		71.0		67.0	
Employed/active	89.0		94.0		98.0		93.0	
Income per capita	466.0	(11.6)	1,042.0	(25.9)	3,299.0	(82.0)	1,921.0	(47.7)
Income per employed	1,181.6	(29.4)	2,528.8	(62.8)	5,709.0	(141.8)	3,579.1	(88.9)
Total income	2,578.0	(64.0)	4,958.0	(123.2)	11,524.0	(286.3)	7,373.0	(183.2)
Venezuela 1982								
Value of poverty line $ 260.5 US$ 60.71								
Household size	6.8		6.2		4.9		5.2	
Percentage child	59.0		48.0		39.0		42.0	
Employed/adults	41.0		45.0		69.0		63.0	
Active/adults	47.0		50.0		74.0		68.0	
Employed/active	82.0		87.0		93.0		92.0	
Income per capita	157.8	(36.8)	383.4	(89.4)	975.6	(27.4)	821.0	(191.4)
Income per employed	240.3	(56.0)	828.6	(193.1)	1,551.0	(361.5)	1,337.3	(311.7)
Total income	1,054.5	(245.8)	2,351.3	(548.1)	4,190.3	(976.8)	3,662.3	(853.7)

Note: Values in parenthesis are US dollars, estimated at the market exchange rates obtained from IMF, International Financial Statistics.

Source: Pollack, 1987.

subsidies and/or other transfers (Pollack, 1987: 16). It also involves value judgements with respect to food and nutritional requirements across population groups, regions and along time. Nevertheless this criterion is commonly recommended for poverty studies (Sen, 1976; Altimir, 1978 and 1981; Rodgers, 1984).

According to this criterion the differentiating household characteristics of poverty emerge clearly from Tables 1 and 2: larger than average family size and number of children; higher unemployment rates among those active members; lower than average income per occupied family member. The shape of poverty in these countries shows that demographic and employment factors interact in the determination of poverty. The incidence of poverty is heavily weighed by groups who face important employment problems: discouraged workers or persons employed in non-economic activities (low labour force participation rates); the unemployed (those searching for work but unable to find it); and the underemployed (those working under low levels of productivity within certain sectors of the economy). The Latin American problem of poverty, which affects a high percentage of the population, is thus one strongly related to planning for employment.

Demographic Factors Operating in the Intergenerational Transference of Poverty

Solving contemporaneous employment problems will not necessarily overcome the problem of poverty. Demographic factors have an important role to play in the transfer of poverty between generations. The number of children per destitute families varies significantly from that per non-destitute poor and non-poor families. In urban Honduras (where children are defined as those below 10 years old) children are 1.9 per destitute family, 1.6 per other poor family and 0.8 per non-poor family. In Metropolitan Santiago (where children are defined as those under 15 years old) children are 1.9 per destitute family, 1.5 per other poor family and 0.9 per non-poor family. With the same definition as in Metropolitan Santiago children in San Jose, Costa Rica, are 3.2 per destitute family, 1.6 per other poor family and 1.1 per non-poor family. The same definition for children in Caracas, Venezuela, gives 4.0 children per destitute family, 3.0 per other poor family and 1.9 per non-poor family.

Despite some intercountry differences in family size per household income strata, due to socio-economic and cultural factors, what becomes clear is that family size and family income are not strongly associated. Thus, child work, and/or secondary family members work does not contribute significantly to family income enabling such family to escape poverty. Quite to the contrary, if such work exists it primarily responds to poverty conditions. Table 2 shows that children reared in the circumstances of poverty account for a much larger percentage than that corresponding to non-poor families.

As shown in several studies on poverty profiles (e.g. Fishlow, 1972: 394–5, Uthoff and Pollack, 1987: 22–44), these children inherit several characteristics which increase their probability of staying poor along their generation. They are not only raised under income conditions which avoid reaching appropriate levels of nutrition, but they will receive no transference of past assets and status and limited aspirations, besides deprivation of education and stable occupational conditions. Under these circumstances,

without any policy intervention, the mechanisms to achieve the attributes to escape from poverty are not operative: they attend school in a lower proportion than children in other statuses; they stay fewer years in school and advance less rapidly; they acquire unstable attitudes towards work; they have little access to assets and credit; they are forced to enter unproductive occupational opportunities. Table 3 gives the distribution of families and children per family income per capita strata.

TABLE 3
Household characteristics and economically active population

	Destitute	Non-destitute poor	Non-poor
Honduras			
Families	37.6	33.7	28.7
Persons	45.2	33.4	21.4
Children	50.9	34.4	14.7
Active	37.2	35.4	27.4
Employed	33.6	36.3	30.1
Costa Rica			
Families	20.5	36.7	42.8
Persons	25.3	38.8	35.9
Children	54.3	25.4	20.3
Active	17.6	38.3	44.2
Employed	16.4	38.0	45.6
Venezuela			
Families	7.1	14.2	78.8
Persons	9.2	16.9	73.9
Children	12.9	19.1	68.0
Active	4.5	11.1	84.4
Employed	4.2	10.8	85.0
Chile			
Families	10.8	20.4	68.8
Persons	14.2	23.4	62.4
Children	18.3	27.0	54.7
Active	11.6	20.0	68.4
Employed	6.6	17.9	75.5

Source: Data from Pollack, 1987.

INTEGRATION OF DEMOGRAPHIC VARIABLES IN PLANNING FOR EMPLOYMENT

For the implementation of an integrated approach to population policy 'implying, on the one hand, that the socio-economic planning agencies shall gear the objectives, goals and actions of their plans to the needs arising from the demographic process and, on the other hand, that the National Population Council shall incorporate into Population Policy the requirements and guidelines arising from socio-economic planning' (UNFPA, 1984: 5) the analysis from sections C and D is most promising. Past deficiencies in human resources development and their effect

through employment conditions are strongly associated to present poverty. But so are present poverty, the distribution of current human resources development opportunities and future poverty. For this reason the use of demographic variables on the analysis of actions and goals at improving the standard of living of given population target groups offers a unique opportunity to work within the trade-off between redistribution and growth, of so much interest for development policy design, and thus of great appeal for policy-makers.

Employment Planning and Demographic Variables at the Macro-economic Level

Several policy recommendations for employment planning arise from this approach. Besides its relevance for minimum income or wage fixing, there are two other issues at the macro-economic level:

(a) *Destitute Population Needs, Employment and Income Gaps*

The first issue is the determination of income gaps needed to eliminate destitute poverty. In Table 2 it is observed that for a destitute family of an average size of 5.5, 5.6 and 6.8 members in Chile, Costa Rica, and Venezuela, respectively, and given the corresponding values for the poverty line, total family monthly income should have reached in 1982 US$86 in Chile, US$99 in Costa Rica and US$413 in Venezuela (non-comparable dollars, see footnote, Table 2). On an average there are 1.6 workers but only 0.75 employed per destitute family in Chile, 1.6 workers but only 1.42 employed per destitute family in Costa Rica and 1.31 workers but only 1.14 employed per destitute family in Venezuela. Taking into consideration such employment conditions within the destitute families, minimum income per worker to eliminate destitute poverty should range between US$54 and US$115 in Chile, between US$62 and US$70 in Costa Rica and between US$315 and US$362 in Venezuela. Current income per occupied per destitute family (US$73 in Chile, US$29 in Costa Rica and US$56 in Venezuela) falls within the desired range in Chile but quite below the range in the cases of Costa Rica and Venezuela. Thus, poverty profiles according to household demographic and labour status characteristics are of large assistance for policy formulation. It shows employment opportunity problems in Chile as the main cause of poverty, and an income/productivity problem in Costa Rica and Venezuela. These gaps should be considered in the discussion of policy mixes addressed to the poor through income generation and/or welfare policies. The latter should focus on improving the children's human capital formation.

(b) *Non-destitute Poor Labour Underutilisation and Investment Requirements*

The second issue is the estimation of investment requirements to eliminate poverty through employment generation. The same profile is used to estimate labour underutilisation and investment requirements. If we look only to the non-destitute poor families, their actual income per active person is US$74 in Chile, US$59 in Costa Rica and US$168 in Venezuela. Whereas the income norm to escape poverty per active person in these families is US$100 in Chile, US$85 in Costa Rica, and US$467 in Venezuela. The income gap per active person expressed as percentage of the

income norm equals 26 per cent in Chile, 31 per cent in Costa Rica, and 64 per cent in Venezuela. Weighing these gaps by the percentage active pertaining to non-destitute poor families (20 per cent in Chile, 38.3 per cent in Costa Rica and 11 per cent in Venezuela) we obtain an estimate for labour underutilisation which should be added to unemployment rates and to labour force growth rates before estimating investment requirements needed to fulfil employment goals. Underutilisation within the non-destitute poor families is equal to 5.2 per cent of the urban Chilean labour force, 11.9 per cent of the Costa Rican labour force and 7 per cent of the Venezuelan urban labour force. Employment-output elasticities and incremental capital output ratios should be used to see the implications of these figures with respect to investment requirements.

Employment Planning and Demographic Variables at the Micro-economic Level

At the micro-familial level there are also several important implications for planning for employment. By using the household/family as the unit of analysis, a better understanding of the joint decisions of their members with respect to production, consumption, labour force participation and family size and composition can be achieved.

(a) *Employment versus Demographic Factors Contributing to Reduce Income Per Capita*

First, when comparing family income per capita interstrata (Uthoff and Pollack, 1987; Pollack, 1987) it can be shown that differences in occupational opportunities and status for their adult members have a much larger weight than differences in family size and composition in the determination of family income per capita differences. Thus, policies addressed to improve equality of job opportunities and status inter-income strata should be stressed. This implies the creation of jobs compatible with other roles of poor family members in the household, migration to better job opportunities, and the recognition that employment in the service sector, largely characterised by informal activities, can be both dynamic and a source of more stable employment.

(b) *Population Needs and Labour Force Participation*

Second, despite the above, in Table 2 almost unequivocally—Costa Rica being the sole exception—gross labour force participation rates (the ratio between actives and adults) increases proportionally with income. It looks as if those who most need income participate relatively less in economic activity, which becomes counterproductive.

What the above evidence supports is the need to extend the static framework for analysing labour supply and participation. This is stimulated by three facts which are relevant under this new approach. First, the recognition of the importance of life cycle considerations on family decisions. Second, the need to develop models of behaviour focused on labour force participation of different household members. And third, the shift from the conventional dichotomy of work and leisure to a threefold allocation of time to (a) labour force work, (b) consumption, and (c) domestic or non-labour force

work. As a result, the theoretical analysis must shift to weighing the relative opportunity costs of time allocated to labour force and non-labour force activities by different members of the family as a single unit at different stages in the household life cycle. Following this shift in theoretical attention the role of current wage rates is becoming less central to the analysis of patterns of labour supply, whereas the likely effects of allocating time to one or other types of activity for expected lifetime earnings has received more attention (For further development on these issues see Standing, 1978.)

(c) *Understanding Household Members' Activities and the Opportunity Cost of their Time*

At the same time, the question of earnings obtained from domestic and informal activities even under precarious labour productivity conditions and the range of issues associated with the formation and preservation of human capital, need to be integrated in the analysis of labour supply. This emphasis on the opportunity cost is preferable in low-income subsistence economies, as prevailing in several Latin American economies and especially among the poor for the analysis of labour force participation where child non-wage labour is significant. Actions should be addressed to have parents invest more time in the future care and education of their children by creating labour conditions which increase the value placed by parents on their own time and reduce the parents' desire and need for many children for their production, consumption and old age security utilities.

CONCLUSIONS

When integrating demographic variables in planning for employment, this paper suggests complementing the use of population projections—which places the issue in fertility limitations—with that of linking employment problems to standard of living conditions. The latter places population issues within the broader context of human resources planning. Demographic variables appear as an important vehicle transmitting inequality from generation to generation.

With this approach population and employment variables appear interacting in the determination of family/household income per capita. They both permit a more realistic assessment of current development problems such as poverty and thus must call the attention of policy-makers. Attention is placed in the household as a unit of analysis for all consumption, production and investment (human capital and other) decisions.

Whereas the approach still allows for macro-economic analysis for the determination of minimum income standards and income gaps to reduce poverty—which can be translated into investment and social welfare programme requirements—it also places interest in the micro-determinants of household members' behaviour. At this latter level the trade-off between quantity and quality of children becomes apparent. The poverty conditions under which the large majority of children are raised respond to labour market structures, which unless changed will not produce the necessary force to increase the value placed in the quality of children.

REFERENCES

Altimir, O., 1981. La pobreza en América Latina. Un examen de conceptos y datos, in *Revista de la CEPAL*, 3, Santiago: CEPAL.

Altimir, O., 1978. La dimensión de la pobreza en America Latina, in *Cuadernos de la CEPAL*, 27, Santiago: CEPAL.

Altimir, O. and Piñera, S., 1977. *An lisis de descomposición de las desiqualdades de los ingresos primarios en países de América Latina*, Santiago: CEPAL.

Coale, A., 1963. Population and economic development, in P.M. Houser (ed.), *The Population Dilemma*, New York: Prentice-Hall.

Fishlow, A. 1972. Brazilian size distribution of income, in *The American Economic Review*, Menasha, American Economic Association.

Pollack, M., 1987. *Pobreza y mercado de trabajo en cuatro países: Costa Rica, Venezuela, Chile y Perú*, serie Documentos de trabajo/309, Santiago: PREALC.

PREALC, 1984. *Employment Planning*, Santiago: PREALC.

Rodgers, G., 1984. Poverty and population approaches and evidence, Geneva: ILO (mimeo).

Standing, G., 1978. Labour force participation and development, Geneva: ILO.

Uthoff, A. and Pollack, M., 1987. Pobreza y mercado de trabajo en el Gran Santiago: 1969–1985, in *Estudios de Economía*, Santiago, Universidad de Chile, Facultad de Cientias Economicas y Administratives, Departamento de Economía, Vol. 15, No. 1.

METHODS TO PROJECT ENROLMENT BY SCHOOL LEVEL AND POPULATION BY LEVEL OF EDUCATION

Miroslav MACURA
Population Division/DIESA
United Nations
New York, USA

INTRODUCTION

It is virtually impossible to prepare school enrolment projections without relying on demographic inputs, which are often those generated in the course of making population projections. Even though educational planners are largely aware of the need to employ them, the potential for use of demographic inputs in preparing enrolment projections has not been so far fully exploited. This is in part due to the fact that a variety of enrolment projection techniques, such as the grade transition model or the age-grade transition model use assumptions which rule out mortality (or treat it in an implicit way) or assume away migration (Unesco, 1980). Although for many purposes the use of the no-mortality assumption cannot cause significant errors in enrolment projections, this assumption can be readily relaxed, which may render the methods conceptually and numerically more accurate. The use of the no-migration assumption can, however, cause serious inaccuracies where there is substantial migration affecting the school-age population. Unfortunately, the lack of requisite migration data would in many situations make it difficult to relax this assumption.

Planning for education was and continues to be almost exclusively focused on the educational sector, which typically involves preparing school enrolment projections along with related resource requirement projections. Educational planners rarely look beyond this sector with the view to assessing the implications of their plans for other sectors or the society at large. In particular, assessments of the implications of different educational policies for the educational attainment of the population have

The opinions, figures and estimates set forth in this paper are the responsibility of the author, and should not necessarily be considered as reflecting the views or carrying the endorsement of the United Nations.

not been part of routine educational planning. This is unusual since the ultimate objective of education is to reduce illiteracy and augment skills and knowledge of the members of the society. Besides, the methodology that can enable such exercises has been outlined (Unesco, 1977) and the benefits of carrying them out as part of broader planning exercises have been articulated (United Nations, 1965).

This paper seeks to remove some of the limitations of the educational planning methodology alluded to above. The first objective of the paper is to present a revised grade transition method and a revised age-grade transition method, which unlike the original methods explicitly allow for mortality, but retain the assumption of the closed population. The second objective is to indicate how the standard cohort component method of population projections can be modified in order to enable one to project population not only by age and sex but also by the level of educational attainment, using among other things the results of the revised age-grade transition method. The third objective is to present results of illustrative projections prepared by the joint application of the modified age-grade transition method and the revised cohort component method. To simplify the discussion of the various methods, references to sex as one of the key dimensions will be omitted through much of the paper. The illustrative projections will however allow for the subdivision by sex.

REVISED TRANSITION METHODS

The revised transition methods will be described as modifications of the original grade transition model and the age-grade transition model, which have been recently described by the United Nations Educational, Scientific and Cultural Organisation (Unesco, 1980).

The Revised Grade Transition Method

This method makes use of four equations to project the numbers of students, dropouts and graduates of the various grades at a given school level, such as the primary or secondary level. The projection is carried out over consecutive annual projection intervals, each of which represents an interval between the beginning of one academic year and that of another. The inputs consist of the numbers of students by grade for the initial year of the projection and the numbers of new entrants into the first grade of the school level in question in each subsequent year. They also include grade-specific transition rates for each projection interval beyond the initial year, which consist of promotion, repetition, dropout and completion (or graduation) rates along with grade-specific survival rates of students.

(a) *Projection Equations*

The first equation is for the number of students in the first grade of a given school level at the beginning of a particular academic year. It indicates that the number of students in this grade equals the number of new entrants into the school level, plus the number of repeaters in the first grade. The later number represent a

proportion of the surviving students of the first grade a year earlier who repeat the grade. Thus, the number of students in the first grade in year t+1 is calculated as:

$$E_g(t+1) = N(t+1) + r_g(t)\, s_g(t)\, E_g(t), \quad g = 1 \qquad \ldots(1)$$

where g is the grade and t is the year (the beginning of academic year). $E_g(t+1)$ is the number of students in grade g in year t+1, $E_g(t)$ is the number of students in grade g in year t and $N(t+1)$ is the number of new entrants in the first grade of the given school level in year t+1. $r_g(t)$ is the repetition rate indicating a probability that a student of grade g in year t who survives till year t+1 will repeat the grade in that year. $s_g(t)$ is the survival rate which is defined as the probability that a student in grade g in year t will survive until year t+1.

The second equation is for the number of students in any grade beyond the first at the beginning of an academic year. It shows that the number of students in each such grade consists of a portion of surviving students who were in the preceding grade a year earlier and who are promoted into that grade. It also includes repeaters, who represent a part of survivors of the students of the grade in question a year earlier who are repeating the grade. Thus, the numbers of students in the various grades above the first in year t + 1 are:

$$E_{g+1}(t+1) = p_g(t)\, s_g(t)\, E_g(t) + r_{g+1}(t)\, s_{g+1}(t)\, E_{g+1}(t), \quad g = 1, \ldots, g^{*}-1 \qquad \ldots(2)$$

where g^{*} is the last grade of the school level and $p_g(t)$ is the promotion rate, which is defined as the probability that a student of grade g in year t who survives till year t+1 will be promoted to grade g+1 in that year.

The remaining two equations are for the numbers of dropouts and graduates, respectively. The former equation indicates that the number of dropouts from any given grade at the beginning of an academic year consists of the survivors of students of that grade a year earlier who withdrew from school. Thus, the numbers of dropouts from the various grades at the beginning of academic year t+1 are:

$$D_g(t+1) = d_g(t)\, s_g(t)\, E_g(t), \quad g = 1, \ldots, g^{*}, \qquad \ldots(3)$$

where $D_g(t+1)$ is the number of persons in year t+1 who dropped out from grade g during the year prior to t+1. $d_g(t)$ is the dropout rate indicating the probability that a student of grade g in year t who survives till year t+1 will withdraw from school by that date.

The last equation indicates that the number of graduates of the given school level at the beginning of an academic year are the survivors of the students of the final grade of that level a year earlier who went on to graduate from that level. Thus, at the beginning of the academic year t+1 the number of graduates is:

$$C(t+1) = c(t)\, s_g(t)\, E_g(t), \quad g = g^{*}, \qquad \ldots(4)$$

where C (t+1) is the number of persons in year t+1 who graduated from the school level in question in the year before that date. c (t) is the completion (graduation) rate defined as the probability that a student of the final grade, g", in year t who survives until year t+1 will graduate from the school level by that date.[1]

(b) *Inputs*

The inputs required by the revised grade transition method include: (a) the numbers of students in the initial year of projection classified by grade; (b) the number of new entrants at the beginning of each year following the initial year; (c) grade-specific transition rates for annual interval between the beginning of adjacent academic years, starting with the one following the initial year of projection and (d) grade-specific survival rates for the same intervals. The initial-year numbers of students can be normally obtained directly from the relevant educational statistics, while the remaining inputs need to be prepared by the user of the method.

A. *Numbers of new entrants:* The way the number of new entrants for any given year is determined depends on whether the method is used to project enrolment at the primary level or at the secondary or tertiary level.

(a) *Primary level:* There is a variety of approaches to deriving the number of new entrants into the primary school level, one of which is however more technically sound than the others. Also, this approach takes into account conditions prevailing in developing countries, where the entry into primary schools is often delayed and is typically not universal. This approach calculates the number of new entrants in any given year as the sum of the numbers of new entrants at the various years of age at that date. Each of these latter numbers is obtained as a product of the number of children eligible to enter primary schools (potential entrants) at each relevant age and the rate of entry among those children. Thus, the number of new entrants in year t+1 is:

$$N(t+1) = \Sigma_{a} = {}_{a'a} N_{a}(t+1)$$
$$= \Sigma_{a} = {}_{a'a} e_{a}(t+1)\, U_{a}(t+1). \qquad \ldots (5)$$

where a is the age and å and a" are respectively the earliest and the latest age of entry into primary school. N(t+1) is the number of all new entrants in the first grade of primary schools in year t+1 and $N_{a}(t+1)$ is the number of new entrants at age a in that year. $U_{a}(t+1)$ is the number of children of age a who are eligible to enter primary school in year t+1, while $e_{a}(t+1)$ is the rate of entry into the first grade of primary school for age a, defined as the proportion of eligible children of age a in year t+1 who enter primary school.

1. The way the numbers of dropouts and graduates are calculated here differs somewhat from that used by the original grade transition method (see Unesco, 1980).

The use of this approach requires that the numbers of eligible children of various ages be determined. The number of youngest such children at any given date can be set equal to the number of youngest children who could be admitted to school at that date, which can come from a population projection. Thus, the number of those children in year t+1 is:

$$U_a(t+1) = P_a(t+1), \quad a = a', \qquad \ldots (6)$$

where $P_a(t+1)$ is the number of persons of age a in year t+1.

The number of eligible children at years of age beyond the earliest age of entry can be obtained in a different way. At each such age this number can be reached as the number of survivors of children who were one year younger a year earlier and who were eligible at that time to enter primary school but did not do so:

$$U_{a+1}(t+1) = s_a(t)\,[U_a(t) - N_a(t)], \quad a = a', \ldots, a'-1 \qquad \ldots (7)$$

where $s_a(t)$ is the survival rate defined as the probability that a person of age a in year t will survive till age a+1 in year t+1.

In order to derive the numbers of new entrants along with the numbers of eligible children for each year after the initial year of projection, the following additional inputs are needed: (a) the numbers of eligible children by age in the initial year and (b) the numbers of new entrants into the first grade of the primary school level by age in that same year. These inputs should also include: (c) age-specific rates of entry for each year following the initial year and (d) age-specific survival rates, which can come from an accompanying population projection.

In order to specify age-specific entry rates for the projection period, one would need observations on those rates for a recent date or time period. Such observations can be derived from information on: (a) the numbers of new entrants by age and (b) the numbers of children eligible to enter primary schools by age. Given such data, the observations on these rates can be obtained as ratios of the former numbers to the latter numbers.[2]

(b) *Secondary or tertiary level:* New entrants into the secondary or tertiary school level are recruited among graduates of the primary or secondary level, respectively. A simple way of determining the number of new entrants into either level requires an assumption that there are no delays in entry among those graduates

2. Where data on new entrants by age do not exist, there are alternative ways of deriving the number of new entrants. Thus, where information on the numbers of students and repeaters by age and grade is available, one can obtain the number of new entrants at any relevant age as a difference between the numbers of students in the first grade at that age and the number of students of the same age who are repeating that grade. Where the information on the numbers of students and repeaters by age is unavailable, one can use existing procedures to estimate those numbers from limited data (Unesco, 1980).

of the preceding level who continue education. Using this assumption, the number of new entrants into either level in year t+1 is:

$$N(t+1) = e(t+1)\, C(t+1), \qquad \ldots (8)$$

where e(t+1) is the rate of entry into the secondary or tertiary school level, defined as the proportion of graduates of the primary or secondary level in year t+1 who enter the first grade of the secondary or tertiary level. C(t+1) is the number of graduates of the primary or secondary level in that year.

In order to obtain the numbers of new entrants as indicated by equation (8), one would need: (a) entry rates for the level in question for each year following the initial year of projection and (b) projected numbers of graduates of the primary or secondary level for each such year, which can be obtained by making a projection of school enrolment for the primary or secondary level. In order to specify future entry rates, one would however need observations on such rates for a recent date or period. Each such observation can be derived as a ratio of: (a) the number of new entrants into the first grade of the school level in question at the beginning of an academic year and (b) the number of graduates of the previous school level at the same date.

B. *Transition rates:* In order to specify transition rates for consecutive annual intervals from the initial year of projection onward, observations of those rates for a recent year or time period must be available. Those observations can in some situations be used to obtain estimates of time trends of those rates, which can be, in turn, employed to derive future rates to be used in projections. We shall only indicate how one can derive observations on transition rates for an annual interval between two adjacent academic years.

To derive promotion and repetition rates for various grades of a given school level, it is necessary to have: (a) data on the numbers of students by grade at the beginning of a given academic year, (b) information on the numbers of students and repeaters by grade at the beginning of the subsequent academic year and (c) grade-specific survival rates for the time period between those two dates. Given these data, promotion and repetition rates can be derived as follows:

$$P_g(t) = [E_{g+1}(t+1) - R_{g+1}(t+1)] / [S_g(t)\, E_g(t)],$$

$$g = 1, \ldots, g''-1, \qquad \ldots (9)$$

and

$$r_g(t) = R_g(t+1) / [s_g(t)\, E_g(t)], \quad g = 1, \ldots, g'', \qquad \ldots (10)$$

where $R_{g+1}(t+1)$ is the number of students of grade g+1 in year t+1 who repeat the grade in that year.

In order to derive completion rates, it is necessary to use: (a) data on the number of students graduating from the final grade of the school level in question, (b) information on the number of students in that grade and (c) the relevant grade-specific survival rate. Given the data, the completion rate for the given school level can be derived as follows:

$$c(t) = C(t+1)/[s_g(t)\, E_g(t)], \quad g = g''. \qquad \ldots(11)$$

Unlike observations on promotion, repetition and completion rates, observations on dropout rates need not be calculated in order to specify transition rates to be used in the projection. This is so because once future promotion, repetition and completion rates are given, dropout rates can be derived from those rates. Thus, the dropout rate for each grade except the final one can be obtained as the complement of the sum of the promotion and the repetition rates for that grade: $d_g(t) = 1—[p_g(t) + r_g(t)]$; $g = 1, \ldots, g''—1$. The dropout rate for the final grade can be derived as the complement of the sum of the completion and the repetition rates for that grade: $d_g(t) = 1—[c(t) + r_g(t)]$, $g = g''$.

C. *Survival rates:* It can be shown that the survival rate for any particular grade is a weighted average of age-specific survival rates, with the weights being given by proportions of students at the various years of age who attend that grade. In view of this, grade-specific survival rates which are needed in order to derive observations on transition rates using equations (9) through (11), or which are required to make projections with the revised grade transition method can be obtained as weighted means of age-specific survival rates:

$$s_g(t) = \Sigma_{a = a', a''} s_a(t)\, E^*_{a,g}(t), \quad g = 1, \ldots, g'', \qquad \ldots(12)$$

where a' and a'' are the earliest and the latest year of age of students in the given grade and $\Sigma^*_{a,g}(t)$ is the proportion of students of age a in grade g in year t, where $\Sigma_{a = a', a''} {}^*_{a,g}(t) = 1$, for each grade g.

In order to derive with equation (12) grade-specific survival rates, which are required to calculate transition rates, one needs: (a) a life table and (b) single-year age distributions of students by grade. These data should refer to the same year or years as other information employed in deriving observations on transition rates. The life table would provide age-specific survival rates while age distributions of students would enable one to calculate the requisite proportions of students by age for each grade.

Where age distributions of students are lacking and grade-specific survival rates cannot be derived, one may use without great loss of precision age-specific survival rates in place of grade-specific survival rates. In particular, instead of survival rates for individual grades one can use survival rates for single years of age, which are believed to approximate mean years of age of students in those grades. Inaccuracies that can be incurred in the process are not likely to be great due to the fact that mortality is

relatively low within the school-age period and that its variations by age are limited over that age range.

Grade-specific survival rates, which are required to make enrolment projection could be also calculated as indicated by equation (12), using the following: (a) age-specific survival rates over the projection period, which would normally come from a population projection and (b) assumptions on proportionate age distributions of students by grade. Typically, as one would have no solid basis to specify assumptions about changing age distributions of students, it would be often necessary to assume, contrary to what is likely to happen, that those distributions remain fixed over the projection period. Moreover, where information on those distributions is lacking, one will be forced to approximate future survival rates for individual grades using survival rates for appropriate years of age.

(c) *Projection*

To make a projection of enrolment with the modified grade transition method, one can use equations (1) through (4) along with the requisite inputs. Those inputs include the numbers of students in the initial year of projection classified by individual grades as well as grade-specific transition and survival rates and the number of new entrants, which are needed for the entire projection period. If the projection sought is for the primary level, the number of new entrants in each year can be obtained by means of equation (5), using age-specific entry rates and the age-specific numbers of eligible children that can be obtained as indicated in equations (6) and (7). Where the projection is for the secondary or tertiary level, the numbers of new entrants can be obtained by means of equation (8), using the entry rates for the level in question and the numbers of graduates of the preceding level.

Apart from using the modified grade transition method to make a projection of enrolment for any particular school level, one can also use it to prepare a projection for two or three school levels simultaneously. Such a projection may be required in instances where educational planners are preparing a comprehensive plan for the entire educational system.

The Revised Age-Grade Transition Method

The revised age-grade transition method is a variant of the modified grade transition method, which can be obtained by disaggregating the latter method by single years of age of students. The modified age-grade transition method requires the types of data used by the revised grade transition method, which must however be disaggregated by single year of age of students. The treatment of mortality in this method is superior to that in the modified grade transition method. This is the result of the fact that all variables are disaggregated by single year of age, thus requiring only age-specific survival rates.

(a) *Projection equations*

This method consists of projection equations, which are age-specific counterparts of equations (1) to (4) and which can be written using the assumption that mortality conditions of students are unrelated to the grade they attend. The first two equations, which correspond to equation (1), indicate that the numbers of students in the first grade of the given school level, at the earliest age of entry into the level and at later years of age, in year t+1 are, respectively:

$$E_{a,g}(t+1) = N_a(t+1), \quad a = a', \quad g = 1 \qquad \ldots(13)$$

and

$$E_{a+1,g}(t+1) = N_{a+1}(t+1) + r_{a,g}(t)\, s_a(t)\, E_{a,g}(t),$$

$$a = a', \ldots, a''-1, \quad g = 1, \qquad \ldots(14)$$

where $E_{a,g}(t)$ is the number of students of age a in grade g in year t and $r_{a,g}(t)$ is the repetition rate defined as the probability that a student of age a in grade g in year t who survives till age a+1 in year t+1 will repeat that grade.

The equation which corresponds to equation (2) shows that the numbers of students at various years of age in any grade beyond the first in year t+1 are obtained as:

$$E_{a+1,g+1}(t+1) = P_{a,g}(t)\, s_a(t)\, E_{a,g}(t) + r_{a,g+1}(t)\, s_a(t)\, E_{a,g+1}(t)$$

$$a = a'-1, \ldots, a''-1; \quad g = 1, \ldots, g''-1 \qquad \ldots(15)$$

where a' and a'' are the earliest and the latest age of students for each given grade, g+1. $P_{a,g}(t)$ is the promotion rate defined as the probability that a student of age a in grade g in year t who survives till age a+1 in year t+1 will be promoted to grade g+1.

The equations used to project the numbers of dropouts and graduates, which are counterparts of equations (3) and (4) are:

$$D_{a+1,g}(t+1) = d_{a,g}(t)\, s_a(t)\, E_{a,g}(t);$$

$$a = a', \ldots, a''; \quad g = 1, \ldots, g'', \qquad \ldots(16)$$

and

$$C_{a+1}(t+1) = c_a(t)\, s_a(t)\, E_{a,g}(t); \; a = a', \ldots, a''; \quad g = g'', \qquad \ldots(17)$$

where $D_{a+1,g}(t+1)$ is the number of persons of age a+1 in year t+1 who dropped out from grade g in the year before t+1. $d_{a,g}(t)$ is the dropout rate defined as the probability that a student of age a in grade g in year t who survives till age a+1 in year t+1 will withdraw from school by that date. $C_{a+1}(t+1)$ is the number of persons of age a+1 in year t+1 who graduate from the school level in question in the year before that date. $c_a(t)$ is the completion (graduation) rate defined as the probability that a student of age a in the final grade in year t who survives to age a+1 in year t+1 will graduate from that school level by that date.

(b) *Inputs*

The inputs required by the revised age-grade transition method consist of: (a) the numbers of students in the initial year of projection classified by single year of age and grade, (b) the numbers of new entrants at the beginning of each academic year classified by single year of age, (c) age and grade-specific transition rates for consecutive annual intervals over the projection period and (d) age-specific survival rates for the same intervals. Where it is safe to assume that there are no major variations in transition rates by age at each grade, one can use grade-specific transition rates.

A. *Numbers of new entrants*

(a) *Primary level:* If the revised age-grade transition method is used to project enrolment at the primary school level, the numbers of new entrants by age can be obtained using the following modification of equation (5):

$$N_a(t+1) = e_a(t+1)\, U_a(t+1),\ a = a', \ldots, a'', \qquad \ldots (18)$$

where the numbers of eligible children by age can be derived as indicated by equations (6) and (7) using inputs required by those equations.

(b) *Secondary or tertiary level:* Where this method is employed to project enrolment at the secondary or tertiary school level, the numbers of new entrants distributed by single year of age can be obtained from the numbers of graduates of the primary or secondary school level at the various years of age and age-specific entry rates:

$$N_a(t+1) = e_a(t+1)\, C_a(t+1), \quad a = a', \ldots, a'', \qquad \ldots (19)$$

where $e_a(t+1)$ is the rate of entry into the secondary or tertiary school level, defined as the proportion of graduates of age a of the primary or secondary level in year t+1 who enter the first grade of that school level.

B. *Transition rates:* In order to specify transition rates to be used in the projection, it would be initially necessary to derive observations on those rates for a recent year or time period. To obtain those observations for a given year, one would

need: (a) information on the numbers of students classified by age and grade at the beginning of a given academic year, (b) data on the numbers of students and repeaters by age and grade at the beginning of the subsequent academic year and (c) a life table referring to a time period between the beginning of the two academic years.

Observations on promotion, repetition and completion rates by age and grade can be obtained using formulae analogous to those indicated in equations (9) through (11), which should be however disaggregated by age. For example, observations on promotion rates would be obtained using the following formula:

$$P_{a,g}(t) = [E_{a+1,g+1}(t+1) - R_{a+1,g+1}(t+1)] / [s_a(t)\, E_{a,g}(t)],\ a = a' - 1, \ldots, a'' - 1,\ g = g', \ldots, g'', \qquad \ldots (20)$$

where $R_{a+1,g+1}(t+1)$ is the number of students of age $a+1$ in grade $g+1$ in year $t+1$ who repeat the grade in that year.

(c) *Projection*

To make an enrolment projection with the revised age-grade transition method, one can use equations (13) through (17) together with inputs which include, among other things, the initial-year numbers of students classified by single year of age and grade. The inputs should also include the numbers of new entrants by age, transition rates by single year of age and grade and age-specific survival rates, all for consecutive dates or annual intervals over the projection period. Depending on the school level for which the projection is prepared, the numbers of new entrants can be obtained in a way similar to that used by the revised grade transition method, allowing, however, for disaggregation by age of students.

The method can be used to make a projection for any specific school level. Alternatively, it can be employed to prepare a simultaneous projection of enrolment at two or three school levels.

THE REVISED COHORT COMPONENT METHOD

The revised age-grade transition method requires selected results of a population projection, which can be prepared by the cohort component method. The cohort component method, in turn, can use chosen results of the modified age-grade transition method obtained for the various school levels and in the process project population not only by age and sex but also by the level of educational attainment. In order to enable the cohort component method to make such a projection, it must be however modified.

The modifications that need to be made in the cohort component method depend on the type of educational classification that one may wish to employ in the

projection. In the present discussion we assume three levels of educational attainment—low, medium and high, which are defined as follows. The low level includes educational attainments ranging from no education to incomplete secondary education. The medium level includes complete secondary education as well as incomplete tertiary education. The high level includes complete tertiary education.

Projection Equations

Using these definitions, the revised cohort component method must in the course of a projection be capable, among other things, of updating the educational structure of the population below the upper end of the school-age period using, in part, selected projection results of the revised age-grade transition method. It must also be capable of tracking the numbers of persons above the upper end of the school-age period classified by level of education. Steps that the revised cohort component method employs within these two broad age intervals are described next.

(*a*) *Below the Upper End of the School-age Period*

The number of persons at the various levels of education below the upper end of the school-age period are derived using different steps.

A. *Medium level*: The number of persons of a given age at a given date who belong to the medium level of education include, among others, out-of-school population of that age and level. The out-of-school population having those characteristics, in turn, includes survivors of out-of-school persons with the medium level of education who were one year younger a year earlier. It also includes those persons at the age in question who have completed secondary education over the past year and do not continue to the tertiary level, plus those of the same age who dropped out from the tertiary level before completing it during this time interval. Thus, the number of out-of-school persons of age a+1 in year t+1 with medium level of education (h=2) is:

$$O_{a+1,2}(t+1) = s_a(t)O_{a,2}(t) + [\,1-e_{a+1}(t+1)\,]\,C^2_{a+1}(t+1) + \Sigma_g = {}_{g'g''}D^3_{a+1,g}(t+1),\ a<a_u, \qquad \ldots(21)$$

where a_u is the upper end (the oldest age) of the school-age period, $O_{a,h}(t)$ is the number of out-of-school persons of age a in year t who belong to level of education h, and $O_{a+1,h}(t+1)$ is the number of out-of-school persons of age a+1 in year t+1 who belong to level of education h. The numbers 2 and 3, which are shown as superscripts indicate that the symbols to which they are attached are for variables that refer to the secondary and tertiary school level.

The population of a given age at a given date who belong to the medium level also include students having these characteristics. Therefore, the total number of persons of age a+1 in year t+1 at the medium level of education (h=2) is:

$$P_{a+1,2}(t+1) + O_{a+1,2}(t+1) + \Sigma_g = {}_{g',g''}E^3_{a+1,g}(t+1),\ a<a_u, \qquad \ldots(22)$$

where $P_{a+1,h}(t+1)$ is the number of persons of age a+1 in year t+1 who belong to the level of education h.

B. *High level:* The number of persons of a given age at a given date who belong to the high level of education include survivors of out-of-school population at that same level who were a year younger one year earlier. They also include persons at the age in question who have completed tertiary education over the past year and who after graduating joined the out-of-school population. Thus, the number of persons of age a+1 with the high level of education (h=3) in year t+1, which equals the number of out-of-school population of the same age and level of education at that date is as follows:

$$P_{a+1,3}(t+1) = O_{a+1,3}(t+1) = s_a(t)O_{a,3}(t) + C^3_{a+1}(t+1), \quad a<a_u. \qquad \ldots(23)$$

C. *Low level:* In order to obtain the number of persons at any specific year of age below the upper end of the school-age period who belong to the low level of education, one initially needs to obtain the number of all persons at that age and date by surviving the number of all persons who were a year younger one year earlier. Then, the number of persons at the low level of education can be calculated as the difference between the number of all persons at that age and the sum of the numbers of persons at the same age having medium and high levels of education. Thus, the number of persons of age a+1 in year t+1 with the low level of education (h=1) is:

$$P_{a+1,1}(t+1) = s_a(t)\,[\Sigma_{h=1,3} P_{a,h}(t)] - \Sigma_{h=2,3} P_{a+1,h}(t+1), \quad a<a_u. \qquad \ldots(24)$$

(b) *Above the Upper End of the School-age Period*

Over the age span beyond the school-age period, one can project population in a way analogous to that used in the cohort component method, but allow for the level of education as an additional dimension. A simple way of doing this would use the assumption that there are no educational differentials in mortality. Thus, the number of persons of age a+1 (except for the open age interval) in year t+1 who belong to the level of education h can be calculated as:

$$P_{a+1,h}(t+1) = s_a(t)P_{a,h}(t), \quad a \geq a_u. \qquad \ldots(25)$$

The number of persons of the open age interval can be obtained in a way which is analogous to that used by the cohort component method, but allows for the educational breakdown of the population.

Inputs

The inputs that the modified cohort component method requires include: (a) the numbers of persons in the initial year of projection classified by single year of age, sex and the level of educational attainment (such as, low, medium and high); (b) the numbers of out-of-school persons below the upper end of the school-age period

having medium and high levels of education in the initial year, classified by single year of age and sex, (c) assumptions on mortality and fertility for the projection period and (d) the projected numbers of students, graduates and dropouts over the same period, prepared by the revised age-grade transition method. The inputs listed under (a) and (b) would most often need to be expressly prepared for this type of projection by processing information collected in a population census or a demographic sample survey.

Projection

Projecting population with the revised cohort component method would require the use of the steps shown in equations (21) through (25) along with the specified inputs. It would also require that the numbers of births be generated on a yearly basis, which can be done using the standard procedure employed by the cohort component method.

ILLUSTRATIVE ENROLMENT AND POPULATION PROJECTIONS

This section presents results of illustrative projections prepared by a joint application of the revised age-grade transition method and the modified cohort component method, using information for the Yugoslav province of Kosovo. The data came from three major sources, one of which is the 1971 census of population, which was specially processed to enable projections of the sort described here. The census data provided the following initial-year information for the modified cohort component method: (a) the numbers of persons classified by age, sex and level of education and (b) the numbers of out-of-school persons with medium and high levels of education classified by age and sex. Also, they provided information for the modified age-grade transition method on the initial-year numbers of students classified by age, sex and grade.

The two other sources of data included the vital statistics and the education statistics. The former source was used to formulate assumptions on future trends in mortality and fertility, which are used by the revised cohort component method. The latter source was employed as a basis for formulating assumptions on future transition and entry rates, which are employed by the modified age-grade transition method. The transition rates used in this projection were specified by grade and sex, while the entry rates were age- and sex-specific at the primary level and sex-specific at the secondary and tertiary levels.

Selected results of the illustrative projections, which were made over a 30-year time period, 1971–2001, are shown in Tables 1 and 2. Table 1 indicates the numbers of students by sex enrolled at the different school levels in the initial and the terminal years of projection. The table also shows proportions of males and females in the age groups corresponding to those levels who attend school in the two years. Table 2 indicates distributions by level of education of males and females at the various five-year age groups at the beginning and the end of the projection. It further shows total numbers of males and females at the different levels of education in the two years.

TABLE 1

Selected results of the illustrative enrolment projection: 1971—2001

Level/Age	1971		2001	
	Male	Female	Male	Female
	Numbers of students (in thousands)			
Primary	131	99	221	207
Secondary	31	12	74	67
Tertiary	12	4	40	34
	Proportions of persons of relevant age groups in school (in percentage)			
7—14	90.0	77.6	92.1	90.3
15—18	63.2	28.9	68.9	65.9
19—22	34.5	12.1	36.6	33.0

TABLE 2

Selected results of the illustrative population projection: 1971—2001

Age	1971						2001					
	Male			Female			Male			Female		
	Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High
	Distributions of population in different age and sex groups by level of education (in percentage)											
0—4	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0
5—9	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0
10—14	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0
15—19	95.8	4.2	0.0	98.0	2.0	0.0	93.7	6.3	0.0	94.0	6.0	0.0
20—24	66.5	32.6	0.9	86.3	13.2	0.4	55.3	42.4	2.3	58.2	39.8	2.0
25—29	70.9	22.8	6.3	91.8	6.8	1.3	54.6	32.0	13.4	58.4	30.2	11.4
30—34	76.6	17.2	6.2	94.0	4.9	1.1	57.5	28.6	13.9	61.6	26.8	11.6
35—39	79.8	14.5	5.7	95.5	3.7	0.8	59.7	27.4	12.9	64.3	25.3	10.4
40—44	85.1	10.3	4.6	96.9	2.5	0.6	59.4	28.2	12.4	69.2	22.2	8.7
45—49	88.5	8.0	3.5	97.7	2.1	0.2	61.8	27.9	10.3	82.5	13.1	4.4
50—54	92.4	5.7	1.9	98.3	1.6	0.1	62.0	26.5	11.6	85.1	11.3	3.6
55—59	95.1	4.0	0.9	98.6	1.3	0.1	70.7	22.4	6.9	91.8	6.8	1.5
60—64	96.5	2.9	0.6	98.9	1.0	0.1	76.6	17.3	6.2	94.0	4.9	1.1
65+	97.9	1.8	0.3	99.6	0.4	0.0	82.0	12.8	5.1	96.1	3.2	0.7
	Numbers of persons at different levels of education (in thousands)											
Total	558	43	9	583	15	2	960	218	70	987	168	46

CONCLUDING COMMENTS

The revised transition methods described in this paper enable enrolment projections which are in many respects identical to those that can be prepared by the original transition models. However, they are also capable of explicitly taking mortality conditions into account in projections, which renders the methods conceptually and numerically more accurate. Moreover, the revised age-grade transition method can be applied together with the modified cohort component method, making it thus possible to project population not only by age and sex, but also by the level of educational attainment.

Projections that can be prepared by these methods may have great potential value to both development and population planning. In development planning, enrolment projections prepared by either of the modified transition methods can be used as the basis to assess future developments in enrolment as well as to project requirements for teachers, school facilities, etc., associated with projected enrolment. Also, in this type of planning, projections of population by age, sex and level of education can be used in order to make projections of labour force by the level of education (or skill). Such labour force projections can be used jointly with projections of employment by level of education in order to ascertain possible future imbalances in labour markets for different educational categories of labour.

In population planning, projections of the educational composition of the population obtained in the course of projecting population by age, sex and level of education can provide the basis for improving the formulation of assumptions about the components of population change, which are used with the revised cohort component method. In particular, with a view to improving procedures for formulating those assumptions, one may use preliminary projections of the future educational composition of women within the childbearing span along with information on the differentials in fertility and child mortality by level of education of mother. Combining this different information may enable the population planner to arrive at more realistic assumptions on future trends in fertility and mortality, which can be used as inputs into preparing revised population projections.

REFERENCES

United Nations, 1965. *General Principles for National Programmes of Population Projections as Aids to Development Planning*, New York: United Nations (ST/SOA/Series A/38, Sales No. 65. XIII.2).

United Nations Educational, Scientific and Cultural Organization, 1980. *Analysing and Projecting School Enrolment in Developing Countries: A Manual of Methodology*, Statistical Reports and Studies, No. 24, Paris: Unesco.

United Nations Educational, Scientific and Cultural Organization, 1977. *The UNESCO Educational Simulation Model*, Reports and Papers in the Social Sciences, No. 34, Paris: Unesco.

CHANGING PATTERNS OF MARITAL FORMATION AND DISSOLUTION IN THE UNITED STATES: DEMOGRAPHIC IMPLICATIONS

Arland THORNTON and William AXINN

Institute for Social Research
Department of Sociology and
Population Studies Center
The University of Michigan
Michigan, USA

INTRODUCTION

This paper proceeds from the observation that the family is a key institution for understanding the behaviour and well-being of human beings. For most people of the world the basic activities of their lives have been organised by family and kinship relationships. From time to time scholars have constructed lists of the basic activities of societies, including such things as production, distribution, consumption, reproduction, socialisation, education, recreation, coresidence, protection, and transmission of property. Scholars describing societies of the past—Europe and North America before the nineteenth century and the rest of the world before the twentieth century—consistently report that in virtually all societies these activities were primarily conducted by family groups (Ogburn and Tibbitts, 1933; Thornton and Fricke, 1987). While the development of non-familial institutions such as factories, schools, medical and public health organisations, police, and commercialised leisure have resulted in many important activities being done outside the family, the family remains a central institution organising many key activities of society today.

Although the list of social activities conducted primarily by families in the past is not organised along demographic lines, the list should be of interest to students of population because the central concerns of demographic analysis are represented

there. Reproduction, of course, refers directly to population renewal and is of central concern to demographic study. The protection activity refers to the efforts of mankind to defend their property, health, and ultimately their lives from harm. The success or failure of these protective efforts ultimately determines the force of mortality, the second central population parameter. And, since coresidence refers to the sharing of living quarters and geographic space, shifts of individuals among households involve a third central demographic process, migration. Thus, demographic and family behaviour are linked together in the most fundamental way. In fact, at some levels, family and demographic behaviour are inseparable because they are the same thing.

Family structure and process have been altered dramatically in many societies during the last two centuries, with important ramifications for many dimensions of life. This paper focuses attention on one aspect of family life in the United States—union formation and dissolution. We discuss changes in marriage and divorce and outline some of the important demographic consequences emanating from those changes. We note that the changes in patterns of marital formation and dissolution have important implications for a broad range of demographic attitudes and behaviour, including the marriage system itself, childbearing, household composition and living arrangements, economic well-being, migration and geographical mobility, and physical and mental health. Because of space limitations we can only indicate the general nature of some of the consequences involved and cannot provide detailed discussions of causal mechanisms. In addition, each of the areas discussed as consequences involves a wide range of potential determinants, of which marriage behaviour is only one of the possible causes. Discussion of the full range of determinants of these behaviours is also beyond the scope of this paper.

TRENDS IN MARITAL FORMATION AND DISSOLUTION

Behaviour

First marriage rates were generally quite steady in the United States before World War II, but immediately after World War II the country experienced a dramatic marriage boom. Marriage rates increased, age at marriage fell, and the fraction of the population never marrying declined. For example, median age at marriage for women declined from approximately 23 for white women born during the last few decades of the nineteenth century to just over 20 for those born in the late 1930s. Although marriage rates declined somewhat during the 1950s and 1960s, they remained high until the early 1970s when they decreased dramatically. This decline continued into the 1980s, but at a slower pace than during the 1970s (Rodgers and Thornton, 1985; Thornton, 1988a). During the early 1980s marriage rates and age at marriage were fairly similar to those observed during the decades prior to World War II.

Divorce has been on a long-term upward trajectory in the United States for well over a century (Preston and McDonald, 1979). However, during the early 1960s the pace of this increase quickened, and the rate more than doubled by the end of the

1970s (Cherlin, 1981; Thornton and Freedman, 1983). The rate, however, has remained fairly steady during the 1980s, with more than 2 per cent of the existing marriages being disrupted by divorce each year (National Centre for Health Statistics, 1987). Several researchers have estimated that the high levels of divorce observed in the late 1970s imply that about 50 per cent of all marriages will end in divorce (Preston and McDonald, 1979; Weed, 1980). More recently, it has been argued that this well-known figure of one-half may be an underestimate of the incidence of marital dissolution, and the actual figure may be closer to two-thirds (Castro and Bumpass, 1987).

Marriages, of course, are also terminated by death, and between 1860 and 1960 declining mortality generally offset the increase in divorce so that the rate of marital dissolution from the two sources combined remained steady or even declined somewhat during that period. However, with the dramatic increases in divorce during the 1960s, the total marital dissolution rate increased dramatically during the 1960s and 1970s (Thornton and Freedman, 1983).

Substantial evidence suggests that most Americans remarry fairly rapidly following marital dissolution. However, there have also been important trends in remarriage with the remarriage rate generally paralleling the first marriage rate. Remarriage rates increased dramatically following World War II, remained fairly steady through the 1960s, and then fell sharply during the 1970s. Small declines in remarriage rates continued through the 1980s. In 1983 only 54 per cent of all new marriages were first marriages for both partners (National Centre for Health Statistics, 1987).

An important new development of the last two decades has been the rapid rise in non-marital cohabitation. The number of unmarried couples living together more than tripled between 1970 and 1977, doubled again in the five years from 1977 to 1982, and rose by 19 per cent from 1982 to 1986 (Thornton, 1988a). One recent study of a birth cohort of young people born in the Detroit Metropolitan Area estimates that fully one-half of all women and two-thirds of all men entering a first union by age 23 did so through cohabitation rather than marriage. In addition, at least one-third of the young people who had married by age 23 had previously cohabited (Thornton, 1988a). Clearly unmarried cohabitation has become an important part of the life course of young Americans today. In addition, ther is evidence suggesting that the prevalence of cohabitation is higher among the previously married than among the never married (Gwartney-Gibbs, 1986; Bumpass and Sweet, 1988).

Since the 1960s the rates of entrance into marriage have been declining at the same time the rates of entrance into non-marital cohabitation have been rising in both the United States and Canada. In Canada these cohabitation rates have compensated entirely for the declining marriage rates to keep the total union formation rate steady across recent cohorts of young adults (Burch and Madan, 1986), while in the United States cohabitation rates have compensated substantially for declining marriage rates (Bumpass and Sweet, 1988). Thus, for many of those contemplating entering a union for the first time, non-marital cohabitation may be acting as a substitute for marriage.

There have also been important increases in premarital sex among teenagers. Premarital sex was already fairly common by the early 1970s and increased steadily during that decade (Thornton and Freedman, 1983; Hayes, 1987). By 1979, 46 per cent of the never married women aged 15–19 had experienced sexual intercourse (Zelnik and Kantner, 1980). However, data for the early 1980s suggest that this trend may have levelled off (Hofferth et al., 1987). Out-of-wedlock childbearing increased dramatically among teenagers across the entire period from 1940 through 1986 (Thornton and Freedman, 1983; National Centre for Health Statistics, 1988). For older unmarried women fertility also increased from 1940 through the early 1960s and then turned downward. This downward trend for older women continued until the middle-to-late 1970s when it was reversed by a sharp upward trend which continued through 1986 (Thornton and Freedman, 1983; National Centre for Health Statistics, 1988).

Norms, Attitudes, and Values

The changes in union formation and dissolution have been accompanied by dramatic shifts in norms, values and attitudes concerning marriage, cohabitation, divorce, and sexual relations outside of marriage. During the 1960s and 1970s there was a substantial weakening of norms to marry, to stay married, and to refrain from sex before marriage. During these two decades it became increasingly acceptable to choose not to marry, to choose to terminate a marriage, and to be sexually intimate before marriage. In fact, marriage may have become generally less important as a sanctioning institution for sex and cohabitation. In addition, there were substantial increases in the acceptance of childlessness (Thornton, 1988b).

While there have been important increases in the acceptance of premarital sex, cohabitation, divorce, and remaining single, these trends should not be interpreted as representing an endorsement of divorce or remaining single. The data clearly suggest that the vast majority of Americans still value marriage and family life. Most Americans still plan to marry and to have children, and optimism for achieving success in marriage remains quite high. Further, there is little evidence for growth in preferences for remaining single or for not having children. There has, however, been an increase in desired age at marriage (Thornton, 1988b). Thus, these data suggest that there has been an increased tolerance for behaviour not previously accepted, but not an increase in an active embracement of such behaviour. Americans clearly remain positive towards family life, marriage, and parenthood, but are substantially more tolerant towards those who choose alternative life courses.

While the weakening of the rules requiring marriage and parenthood are not equivalent to an endorsement of remaining single and childless, this trend still has important implications for behaviour. Although young people continue to report that they want to marry and have children, the weakening of the normative imperatives to do so, along with increases in desired age at marriage, may result in fewer marriages and more childlessness. As young people postpone marriage and having children, the decreased social pressure to do so may increase the likelihood that neither happens.

Thus, both remaining single and not having children are likely to increase in the United States even though there are still only a small minority who actively desire and expect such outcome (Thornton, 1988b).

DEMOGRAPHIC CONSEQUENCES OF CHANGED MARITAL BEHAVIOUR

Feedback Loops within the Marriage System

The rapid rise in divorce during the 1960s and 1970s was accompanied by extensive publicity, and knowledge of this family trend became widespread. A particularly important aspect of the publicity was information about the negative psychological, social, and economic consequences that can be associated with divorce. It is likely that these developments led to some questioning of the institution of marriage and decreased confidence in marriage as a way of life (Weitzman, 1985; Thornton, 1988c).

An extensive body of research shows that children of divorced parents have more positive attitudes toward premarital sex and are more sexually experienced (Thornton and Camburn, 1987). Given this empirical relationship and plausible theoretical reasons for expecting an effect of divorce on children's premarital sex, it also seems likely that the historical trend in divorce would have contributed to the trend towards more approving attitudes toward premarital sex.

It seems very likely that the growing concerns about the viability of marriage and the increased acceptability of premarital sex played a major role in the rapid increase in unmarried cohabitation. With concerns about success in marriage young people may have become attracted to the idea that they could live together without being married in order to obtain additional information about their compatibility. If they found that they were incompatible, they could break up the relationship without the trauma of divorce. This orientation may have been a major contributor to a rapid substitution of marriage with cohabitation by many young Americans. This hypothesis is buttressed by micro-level data showing that children of divorced parents have substantially higher cohabitation rates and lower marriage rates than children from continuously married families, indicating that growing up in a family with divorced parents could be leading to a substitution of marriage with cohabitation (Thornton, 1988c).

This adjustment to concern about success in marriage may actually be leading to higher rates of dissolution. A rapidly growing body of empirical data suggests that cohabitation may increase rather than decrease the rate of union dissolution. Cohabiting unions have been shown to have high rates of dissolution, and the divorce rate among married couples who had previously cohabited is substantially higher than the rate among couples who had not cohabited prior to marriage (Bumpass and Sweet, 1988). Of course, the correlation between cohabitation and divorce may also be the result of differential selectivity into cohabiting and marital unions. At this point in time there has been insufficient research to establish the causal mechanisms producing the high correlation.

Childbearing

Marital status is an important determinant of childbearing levels. Since married people continue to have substantially higher rates of fertility than the unmarried—both those who are cohabiting and those who are not—delays in first marriage, increases in divorce, decreases in remarriage, and longer periods in the unmarried state would tend to decrease family size. However, in a low-fertility population such as the United States, this tendency can be counteracted at least partially by remarried couples making up for lost time by having higher fertility in their new marriage, a pattern documented among white couples (Thornton, 1978). However, both increasing age at marriage and more remarried couples would increase age at childbirth. In addition, increased age at marriage, along with postponed childbearing within marriage, could result in childbearing being delayed to the less fecund part of the life course. This pattern, along with increased acceptance of childlessness, could result in increased levels of childlessness.

Just as the trend in cohabitation is likely to lead to a decline in overall fertility, it probably increases out-of-wedlock childbearing. While unmarried cohabitors have been shown to have lower fertility than married women (Bachrach, 1987), they probably have higher rates of pregnancy than unmarried women who are not cohabiting (Blanc, 1984). While many pregnancies to unmarried cohabitors are undoubtedly legitimated by marriage, many others probably result in abortions or out-of-wedlock births. If this line of reasoning is true, the recent increases in unmarried cohabitation may have played an important role in the rise of unmarried childbearing since 1975.

In addition to the compositional effects of changing marital patterns on childbearing just discussed, there are also potentially important behavioural effects. Earlier we argued that the dramatic rise in divorce may have produced increased concerns about the viability of marriage, the probability of personal success in marriage, and the negative outcomes often associated with divorce. Since divorce adjustments are particularly difficult for mothers with young children, these concerns may cause women to invest more of their time and energy in establishing and maintaining careers in order to be able to support themselves if that is needed (Weitzman, 1985). Given the well-known negative relationship between female employment and fertility, the likely result of this adjustment is reduced fertility. It is, thus, possible that the increased divorce rate could have been a contributor to the decline in the marital fertility rate which occurred during the 1960s and early 1970s.

Household Composition

Trends in marital patterns—particularly out-of-wedlock childbearing, divorce, and remarriage—have played a dominant role in producing the substantial increase in single-parent families. Between 1960 and 1982 the number of households headed by women with young children more than doubled. In the latter year nearly one-fifth of all households with minor children were headed by a single women (Thornton and Freedman, 1983).

Although the living arrangements of divorced men receive less scholarly and media attention than those of their ex-wives, they, of course, also must adjust their living arrangements. For many divorced men the likely outcome at least for a period of time is independent residence, either alone or with housemates.

Standard of Living

The economic consequences of living in a single-parent household have been well documented. The living standards of mothers and their children decline sharply after divorce, and the living standards of never-married mothers and their children are also often deficient (Duncan and Hoffman, 1985; Garfinkel and McLanahan, 1986). The result is that single-parent households are significantly over-represented among the poverty population. One outcome of this financial hardship may be fewer accomplishments in elementary and high school and lower aspirations and expectations for college attendance among children of divorced mothers (McLanahan, 1985). It will almost certainly negatively impact upon the ability of parents to assist their children with college expenses and ultimately reduce the educational achievements of children (Goldscheider and Goldscheider, 1988).

If the fear of divorce and its associated financial hardships motivates women to invest more in job skills and in the establishment of rewarding careers, as we argued earlier, the result could be enhanced financial well-being for continuously married couples. That is, the woman who is motivated to maintain and enhance her earning capacity in the event that she needed to rely solely on those skills may at the same time be making significant contributions to the family's budget. Thus, for such families, the lack of confidence in marriage could enhance the family's living standard. This outcome would tend to accentuate even more the income differences between married couples and single-parent households, particularly in those cases where the single mother was unprepared to financially support herself and her children.

Migration and Geographic Mobility

Recent changes in marital processes in the United States also influence patterns of migration and geographic mobility. Both empirical evidence and theoretical argument suggest that models of mobility decision-making must consider the role of the family in the decision-making process (DaVanzo, 1981). Indeed, strong evidence links changes in the family life cycle and changes in marital status to geographic mobility (Sandefur and Scott, 1981; Speare and Goldscheider, 1987). Several of the recent changes in marriage behaviour described in this paper hold likely consequences for mobility.

First, the increased prevalence of divorce in the United States is likely to increase the mobility of the individuals involved. Divorce inevitably forces a change in living arrangements and changes in living arrangements necessarily involve geographic mobility. Thus, divorce causes the migration of at least one spouse, along with the formation of a new household. Previous evidence is consistent with the conclusion that the majority of mothers live as household heads after a marital dissolution (Sweet, 1972). When only one spouse moves, the presence of children affects whether it is the man or the woman who moves (Speare and Goldscheider, 1987).

Often divorce causes both spouses to move. This situation may be induced by a need to sell the family home because of economic necessity or legal constraints (Weitzman, 1985). Divorce may also result in a chain of moves. For example, mothers may move in with others before establishing their own households (Sweet, 1972).

Divorce also affects the geographic mobility of the children of a divorcing couple, with the initial change in living arrangements often causing a move for the children. Beyond this effect, divorce may also set up a pattern of residential rotation where the children are shuttled back and forth between the homes of the parents.

Just as a marriage results in geographical mobility (Speare and Goldscheider, 1987; Sandefur and Scott, 1981), so does remarriage following divorce. This change will usually involve migration for at least one member of the remarrying couple.

The initiation and termination of non-marital cohabiting relationships are also likely to produce migration. Similar to marriage and divorce, the initiation and termination of cohabiting unions generally involve a change of living arrangements and an accompanying move, at least for one of the individuals. Because cohabiting unions have high rates of termination (discussed above), and union termination generally leads to geographic mobility, cohabitation may tend to produce more mobility than its counterpart, marriage.

Besides patterns of mobility resulting from these changes in the composition of marital and related experiences in the United States, the potential behavioural impact of changes in marriage also deserves some consideration. For instance employment opportunities, the most frequent reason for moving in the United States, might be weighed differently by those in a cohabiting union than by those in a marital union. Those in a cohabiting union may be more likely to move to take advantage of a distant employment opportunity than those in a marital union. Likewise, someone in a cohabiting union may be more likely than someone in a marital union to terminate the relationship rather than move when his/her partner moves to take advantage of a distant employment opportunity.

Morbidity and Mortality

Recent changes in marriage behaviour influence morbidity and mortality. Marital status is known to be related to both mental health and mortality risks (Bloom et al., 1978; Gove, 1973). Divorce, in particular, increases mental and physical illness and death among both adults and children (Bloom et al., 1978; Gove, 1973; Longfellow, 1979; Angel and Worobey, 1988; Mauldon, 1988). For instance, among adults divorce has been explicitly linked to stress, depression, and suicide (Bloom et al., 1978; Menaghan and Lieberman, 1986; Trovato, 1986). Thus, changes in the divorce rate probably affect trends in morbidity and mortality.

Social support may be one of the important links between marital status and illness and death. According to House, 'social supports are potent variables that can

reduce exposure to stress, promote health, and buffer the impact of stress on health, thus contributing to both the quality and quantity of life' (1986: 267). Intimate social supports such as marriage appear to be more important in this capacity than other social supports (House, 1986). Thus, the termination of marriage through divorce may reduce the amount of social support available to an individual, thereby increasing the risk of morbidity and mortality.

Divorce may also induce changes in behaviour which increase the risk of morbidity and mortality. For example, divorce may lead some individuals to take up smoking, to abuse alcohol, or to take jobs which involve irregular risks. While it is difficult empirically to explore whether such behaviours cause divorce or are the result of divorce, there is some evidence supporting the expectation of higher rates of such risk-taking behaviours among the divorced (Bloom et al., 1978).

The influence of divorce on children is complex, affecting mental and physical health (Wallerstein and Kelly, 1974; Longfellow, 1979; Angel and Worobey, 1988; Mauldon, 1988), as well as other aspects of social and personal development (Hetherington, 1972; Peterson and Zill, 1986; McLanahan and Bumpass, 1988). The effects of divorce are complicated because divorce may sometimes be a positive influence on children's well-being, particularly when one parent is 'inaccessible, rejecting, or hostile' while living in a two-parent family (Hetherington, 1979: 857). Some evidence indicates that the negative influences which do exist may impact younger children more strongly than older children (Longfellow, 1979; Hetherington, 1972).

Other recent changes in behaviours related to marriage in the United States also influence health and morbidity. The increased acceptance of sexual relations outside of marriage has been accompanied by increases in both teenage and out-of-wedlock childbearing, which in turn, are associated with higher rates of maternal morbidity and mortality (Strobino, 1987; Cramer, 1987).

CONCLUSION

During the past three decades there have been important shifts in the marriage formation system in the United States. Marriage rates have fallen, age at marriage has increased, premarital sex has become more common, non-marital cohabitation has become a frequent occurrence, and divorce rates have increased. These behavioural changes have been accompanied by value and normative transformation. Most importantly, there has been a substantial weakening of the norms to marry, to stay married, and to refrain from sexual relations outside of marriage. However, at the same time Americans remain positive towards family life, marriage, and parenthood.

Since the family is a major determinant of demographic behaviour and economic well-being, these changes in marital behaviour have important ramifications for many dimensions of American life. We have noted that increases in age at marriage and a higher prevalence of divorce has decreased the portion of the life course spent

married, which could lead to smaller families and higher ages at childbirth. Both out-of-wedlock childbearing and marital dissolution have increased the prevalence of single-parent families, with their lower levels of economic well-being and physical and mental health. New patterns of marriage, divorce, and remarriage also have implications for household composition and geographical mobility. Finally, high levels of divorce in American society may have led to a questioning of the institution of marriage and a decline in people's willingness to invest in marriage as a way of life, which may have contributed to the decline in marriage, the increase in cohabitation, and increased involvement of women with careers, and reduced fertility within marriage. Of course, while this paper emphasises the importance of marriage and divorce trends for several dimensions of American life, the determinants of these other behaviours are numerous, and changing marital behaviour is only one of their many causes.

REFERENCES

Angel, R. and Worobey, J.L., 1988. Single motherhood and children's health, *Journal of Health and Social Behaviour,* 29.

Bachrach, C.A., 1987. Cohabitation and reproductive behaviour in the U.S., *Demography*, Vol. 24, No. 4.

Blanc, A.K., 1984. Nonmarital cohabitation and fertility in the United States and Western Europe, *Population Research and Policy Review,* 3.

Bloom, B.L., Asher, S.J. and White, S.W., 1978. Marital disruption as a stressor: a review and analysis, *Psychological Bulletin*, Vol. 85, No. 4.

Bumpass, L.L. and Madan, A.K., 1986. Preliminary evidence on cohabitation, National Survey of Families and Households Working Paper No. 2, University of Wisconsin, Madison.

Burch, T.K. and Madan, A.K., 1986. *Union Formation and Dissolution: Results from the 1984 Family History Survey,* Ottawa: Ministry of Supply and Services.

Castro, T. and Bumpass, L., 1987. Recent trends and differentials in marital disruption, Center for demography and Ecology Working Paper 87-20, Madison: University of Wisconsin.

Cherlin, A., 1981. *Marriage, Divorce, Remarriage: Changing Patterns in the Postwar United States,* Cambridge: Harvard University Press, chapters 1–3.

Cramer, J.C., 1987. Social factors and infant mortality: identifying high-risk groups and proximate causes, *Demography,* Vol. 24, No. 3.

DaVanzo, J., 1981. Microeconomic approaches to studying migration decisions, in G.F. DeJong and R.W. Gardner (eds.), *Migration Decision-making: Multidisciplinary Approaches to Microlevel Studies in Developed and Developing Countries,* New York: Pergamon Press.

Duncan, G. and Hoffman, S., 1985. A reconsideration of the economic consequences of marital dissolution, *Demography,* 22.

Garfinkel, I. and McLanahan, S., 1986. *Single Mothers and their Children,* Washington, D.C.: Urban Institute.

Goldscheider, F.K. and Goldscheider, C., 1988. The intergenerational flow of income: family structure and the status of Black Americans, paper presented at the annual meetings of the Population Association of America, April, New Orleans.

Gove, W.R., 1973. Sex, marital status, and mortality, *American Journal of Sociology,* Vol. 79, No. 1.

Gwartney-Gibbs, P.A., 1986. The institutionalization of premarital cohabitation: estimates from marriage license applications, *Journal of Marriage and the Family,* 48.

Hayes, C.D. (ed.), 1987. *Risking the Future,* Vol. I, Washington, D.C.: National Academy Press.

Hetherington, E.M., 1979. Divorce: a child's perspective, *American Psychologist,* Vol. 34, No. 10.

Hetherington, E.M., 1972. Effects of father absence on personality development in adolescent daughters, *Developmental Psychology,* Vol. 7, No. 3.

Hofferth, S.L., Kahn, J.R. and Baldwin, W., 1987. Premarital sexual activity among U.S. teenage women over the past three decades, *Family Planning Perspective,*19.

House, J.S., 1986. Social support and the quality and quantity of life, in Frank M. Andrews (ed.), *Research on the Quality of Life,* Survey Research Center, Ann Arbor, Michigan: The University of Michigan.

Longfellow, C., 1979. Divorce in context; its impact on children, in G. Levinger and O.C. Moles (eds.), *Divorce and Separation,* New York: Basic Books.

Mauldon, J., 1988. The effects of marital disruption on children's health, paper presented at the Population Association of America meetings, April, New Orleans.

McLanahan, S., 1985. Family structure and the reproduction of poverty, *American Journal of Sociology,* 90.

McLanahan, S. and Bumpass, L., 1988. Intergenerational consequences of marital disruption, *American Journal of Sociology,* 94.

Menaghan, E.G. and Lieberman, M.A., 1988. Advance report of final natality statistics, 1986, *Monthly Vital Statistics Report,* Public Health Service, Hyattsville, Maryland, Vol. 37, No. 3.

Menaghan, E.G. and Lieberman, M.A., 1987. Advance report of final divorce statistics, 1985, *Monthly Vital Statistics Report,* Public Health Service, Hyattsville, Maryland, Vol. 36, No. 8.

Menaghan, E.G. and Lieberman, M.A., 1986. Changes in depression following divorce, *Journal of Marriage and the Family,* Vol. 48, No. 2.

Ogburn, W.F. and Tibbitts, C., 1933. The family and its functions, in R. Freedman et al., *Principles of Sociology,* Henry Holt.

Peterson, J.L. and Zill, N., 1986. Marital disruption and behaviour problems in children, *Journal of Marriage and the Family,* Vol. 48, No. 2.

Preston, S.H. and McDonald, J., 1979. The incidence of divorce within cohorts of American marriages contracted since the Civil War, *Demography,* Vol. 16, No. 1.

Rodgers, W.L. and Thornton, A., 1985. Changing patterns of first marriage in the United States, *Demography,* Vol. 22, No. 2.

Sandefur, G.D. and Scott, W.J., 1981. A dynamic analysis of migration: an assessment of the effects of age, family and career variables, *Demography,* Vol. 18, No. 3.

Speare, A., Jr. and Goldscheider, F.K., 1987. Marital status change and residential mobility, *Journal of Marriage and the Family,* Vol. 49, No. 2.

Strobino, D.M., 1987. Consequences of early sexual and fertility behavior, in S.L. Hofferth and C.D. Hayes (eds.), *Risking the Future,* Vol. II, Washington, D.C.: National Academy Press.

Sweet, J.A., 1972. The living arrangements of separated, widowed, and divorced mothers, *Demography,* Vol. 9, No. 1.

Thornton, A., 1988a. Cohabitation and marriage in the 1980s, *Demography,* Vol. 25, No. 4.

Thornton, A., 1988b. Changing attitudes towards family issues in the United States, Institute for Social Research, University of Michigan (unpublished).

Thornton, A., 1988c. Influence of the marital history of parents on the union formation experience of children, Institute for Social Research, University of Michigan (unpublished).

Thornton, A., 1978. Marital dissolution, remarriage, and childbearing, *Demography,* Vol. 15, No. 3.

Thornton, A. and Camburn, D., 1987. The influence of the family on premarital sexual attitudes and behaviour, *Demography,* Vol. 24, No. 3.

Thornton, A. and Freedman, D., 1983. The changing American family, *Population Bulletin,* Vol. 38, No. 4.

Thornton, A. and Fricke, T.E., 1987. Social change and the family: comparative perspectives from the West, China, and South Asia, *Sociological Forum,* Vol. 2, No. 4.

Trovato, F., 1986. Marital dissolution and suicide in Canada, *Journal of Marriage and the Family,* Vol. 48, No. 2.

Wallerstein, J.S. and Kelly, J.B., 1974. The effects of parental divorce: the adolescent experience, in J. Anthony and C. Koupernik (eds.), *The Child in his Family: Children at Psychiartric Risk,* New York: John Wiley.

Weed, J.A., 1980. National estimates of marital dissolution and survivorship: United States, *Vital and Health Statistics,* Washington, D.C.: US Government Printing Office, Series 3, No. 19.

Weitzman, L., 1985. *The Divorce Revolution: The Unexpected Social and Economic Consequences for Women and Children in America,* New York: Free Press.

Zelnik, M. and Kantner, J.F., 1980. Sexual activity, contraceptive use and pregnancy among metropolitan area teenagers: 1971–1979, *Family Planning Perspectives,* Vol. 12, No. 5.

19

CONTRASTS IN MORTALITY TRENDS

Peter JOZAN
Central Statistical Office
Budapest, Hungary

INTRODUCTION

Deaths decrease humankind by slightly more than one per cent annually. This is the magnitude of mortality at present. Human beings born in the 1980s have a life expectancy at birth of 60 years. However members of the very same human species can expect to survive 73.1 years if they were born in the 1980s, in the more developed world, but only 57.3 years if they were the offspring of deliveries in the less developed world. Also mortality contrasts can be observed within the world of industrialised countries. Expectation of life at birth was 78.1 years in Japan (1986) and 69 years in the Soviet Union (second half of 1985–first half of 1986). In France the difference between the life expectancy at birth for males and females was 8.3 years at the expense of the former in 1985.

In general the difference in life expectancy at birth is mainly determined by social factors. This means that mortality, usually, is lower in those societies which are rich, technologically advanced, well organised, highly efficient, strongly cohesive, health-conscious and have experienced the continuity in socio-economic development than in those which are poor, technologically backward, badly organised, inefficient, weakly cohesive, health-negligent and have experienced no continuity in socio-economic development.

In the age of chronic degenerative diseases mortality depends, first of all, on life-style. In this, individual responsibility cannot be overestimated. Yet individuals live and work in a given social context. The impact of man-made environment on mortality is so strong at present that it overshadows the influence on death rates of factors belonging to nature, like climate and genetic traits.

The paper highlights the changes in mortality patterns of developed countries. These are the 37 countries in the joint study by the United Nations and the World Health Organisation, *Levels and Trends of Mortality since 1950* (United Nations publication, Sales No. E.81. XIII.3).

GENERAL MORTALITY

Males

Postwar reconstruction was completed, by and large, in the early 1980s followed by a period of unexpected, steep and steady socio-economic development up to the early 1970s. Industrialised countries entered the post-reconstruction period with various levels of mortality: some of them were already rather low, others fairly high. Two groups of regions[1] could be observed by life expectancies at birth in this period: the traditionally more developed countries of Northern and Western Europe and of North America and Australia-New Zealand had high, whilst the less developed countries of Southern and Eastern Europe, the Soviet Union and Japan had low life expectancy at birth.

In the Northern European countries expectation of life at birth was 67.16 years on an average; at the other end of the scale, in Japan it was 60.5 years only.

The whole period after World War II was among the most successful ones in terms of increase in longevity. The increase has occurred in every region of the developed world, but unevenly. In Japan it was 15 years, in the Soviet Union only four years. The three decades since the mid-1950s can be divided into two distinct periods in which the rate of increase in life expectancy at birth by groups of regions was different.

The first 10–15 years were the period of spectacular progress in decline of mortality in the regions of low life expectancy at birth, which was reflected in remarkable increases in the values of e_0^0. Among the regions Japan almost reached the level of Northern Europe in terms of expectation of life at birth. In the East, South European regions and in the Soviet Union life expectancy at birth rose by about six and five years respectively, whereas the increase in the more developed regions was fairly small: 0.9–2.6 years only. Consequently this was the period when the gap between the vanguard and rearguard regions was the smallest.

Over the last 15–20 years or so longevity continued to increase dramatically in Japan. Also, substantial increase could be observed in the regions of Northern

1. *Regions and countries:*
   1. *Northern America:* Canada, United States of America
   2. *Japan:*
   3. *Eastern Europe:* Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania.
   4. *Northern Europe:* Denmark, Finland, Iceland, Ireland, Norway, Sweden, United Kingdom: England and Wales; Northern Ireland; Scotland
   5. *Southern Europe:* Albania, Cyprus, Greece, Israel, Italy, Malta, Portugal, Spain, Yugoslavia
   6. *Western Europe:* Austria, Belgium, France, Federal Republic of Germany, Luxembourg, Netherlands, Switzerland
   7. *Australia and New Zealand*
   8. *Union of Soviet Socialist Republics*

   Source: *Levels and Trends of Mortality since 1950,* New York *1982*: United Nations, 6.

America and Australia-New Zealand. The rise in life expectancy at birth was slightly less significant in the North, South and West European regions. In the East European region the increase was infinitely small and in the Soviet Union it decreased by 1.1 year. Present expectation of life at birth is exceptionally high in Japan, and very high (between 71.1 and 72.4 years) in the five regions. A levelling up in terms of life expectancy at birth can be recognised in this group. In the Eastern European region e_0^0 is 67.3 years and in the Soviet Union only 65 years. Over the whole period of observation the gap between the region with the highest life expectancy at birth and that with the lowest has never been as big as at present: 10.5 years.

TABLE 1[a]

Life expectancy at birth in the regions of the developed world 1950–54, 1965-69 and around 1985

Males

Regions	Life expectancy at birth for males in years		
	between 1950 and 1954	between 1965 and 1969	around 1985
Northern America	66.07	67.00	71.46
Japan	60.5	68.8	75.5
Eastern Europe	60.61	66.88	67.32
Northern Europe	67.16	68.89	71.85
Southern Europe	62.04	67.64	71.12
Western Europe	65.51	68.11	71.95
Australia and New Zealand	66.76	67.79	72.40
Soviet Union	61	66.1	65.0

[a]All regional values have been calculated by using weighted averages. The intra-regional weights have been calculated according to the national populations of the countries (latest available year) in the region. World Health Statistics Annual, Geneva, 1987: 75–79.

Females

In every respect the development in life expectancy at birth was more favourable in the female than in the male subpopulation. Already in the early 1950s e_0^0 was over 70.0 years in the regions of Northern America, Northern and Western Europe and of Australia-New Zealand. The lowest value was in Japan, 64.0 years. No decrease occurred in the regions over the whole period of observation and the increases in most cases were substantially larger than in the male subpopulation or similar. Between 1950–54 and 1965–69 there was a steeper rise in the less developed regions and a less steep rise in the more developed ones: e.g. in Japan and in Eastern Europe

the increases were 10.1 and 7.35 years respectively, in the regions of Australia-New Zealand and of Northern America they were only 2.25 and 2.38 years.

Between 1965–69 and the mid-1980s Japan could continue her spectacular development in life expectancy at birth and as a result e_0^0 was 81.6 years in 1986. In the two other regions outside Europe the increase was much bigger over the last two decades or so than during the earlier period. In the more developed regions of Europe the development was even over the first and the second period. In the Soviet Union, there was no increase at all in life expectancy at birth between 1965–69 and the mid-1980s (in the earlier period e_0^0 rose by 6.8 years). In Eastern Europe the increase was rather modest; in Southern Europe it was significant by the standard of the industrialised countries; however it was smaller over the last two decades or so than in the 1950s and 1960s.

As a result of uneven development in life expectancy at birth by the mid-1980s Japan and two distinct groups of regions could be recognised: in the first one e_0^0 was between 77.3 and 79.2 years, in the second it could be found between 73.8 and 74.4 years.

TABLE 2*

Life expectancy at birth in the regions of the developed world 1950–54, 1965–69 and around 1985

Females

Regions	Life expectancy at birth for female in years		
	between 1950 and 1954	between 1965 and 1969	around 1985
Northern America	71.86	74.24	78.65
Japan	64.0	74.1	81.6
Eastern Europe	65.13	72.48	74.41
Northern Europe	71.76	74.86	77.86
Southern Europe	65.87	72.82	77.30
Western Europe	70.27	74.63	79.22
Australia and New Zealand	72.07	74.32	78.39
Soviet Union	67	73.8	73.8

*All regional values have been calculated by using weighted averages. The intra-regional weights have been calculated according to the national populations of the countries (latest available year) in the region. World Health Statistics Annual, Geneva, 1987: 75–79.

The contrast between males' and females' life expectancies at birth at the expense of the former has increased considerably in the postwar period. It is a truism that women benefited more than men from the epidemiologic transition.

Presumably a certain difference between life expectancies of the sexes is

Presumably a certain difference between life expectancies of the sexes is determined by genetics. Yet most of the difference depends on external factors. In general the lifestyle of females is much less harmful than that of males. Also females are usually more health-conscious than males.

CONTRIBUTION OF AGE GROUPS TO CHANGE IN GENERAL MORTALITY

It is justifiable to ask what have been the contributions of age groups to the increase in longevity over the period of three decades or so. Since very few life tables have been available, in order to answer this question standardised mortality rates were used in the periods 1950–54, 1965–69 and 1980–85 for the whole male and female subpopulations separately. Also standardised values have been calculated for the 0–14, 15–29, 30–64 and 65 and older age groups in the same periods and in the male and female subpopulations separately by applying the corresponding relative weights from the same age distribution of the 'European standard population.'[2]

Males

In absolute terms the decrease in mortality in the 65 and older age group has contributed the most to the decline in general mortality over the whole period of observation. The 30–64 years age group has made the second biggest contribution followed by the 0–14 age group, and the smallest by the 15–29 age group. In relative terms a general rule can be observed: if the age group is older, then the relative contribution to the decline in mortality is smaller.

In Japan under age 30 the much bigger contributions to the decline in general mortality occurred in the first period. Over age 30 the contributions were almost even in the first and the second period. In Eastern and Southern Europe the secular trends in mortality by age groups reveal convincingly the success and the failure respectively to find the adequate response to the challenge of the era of chronic diseases (ChD). The absolute decline in mortality under age 30 was bigger between 1950–54 and 1965–69 than between 1965–69 and 1980–85 in the two relatively backward regions. In infancy, childhood, adolescence and young adulthood mortality caused by endemic infectious diseases had decreased to an insignificant level both in Eastern and Southern Europe even before the late 1960s. On the other hand over age 30 when deaths attributable to ChDs are decisive in determining the level of mortality, the secular trends have become opposite in Eastern and Southern Europe. In the former in the age group 30–64 the decrease in mortality occurred only before the late 1960s, increasing considerably thereafter. Consequently in the middle-aged subpopulation death rates were almost as high in the mid-1980s as in the early 1950s and somewhat higher in the age group 65 and older in the early 1980s than in the early 1950s. In Southern Europe in the age group 30–64 mortality decreased almost evenly before and after the late 1960s. In the age group 65 and older after a temporary insignificant rise mortality fell so steeply and steadily that by the mid-1980s Southern Europe oustripped most other regions in mortality.

2. European standard population, *World Health Statistics Annual,* Geneva, 1987: xvi.

In Northern Europe and Australia-New Zealand in the age group 0–14 mortality decreased slightly more in the second than in the first period. In the age group 15–29 Northern Europe succeeded in improving mortality almost evenly in the two periods, whilst Australia-New Zealand did it better between 1950–54 and 1965-69 than between 1965–69 and 1980–85. In both regions over age 30 most of the contribution to the decline of general mortality occurred in the second period.

In Northern America in the age group 0–14 the decrease in mortality was only somewhat bigger in the first than in the second period. In the age group 15–29 an insignificant increase in mortality in the first period and a decrease in mortality in the second period could be observed. Over age 30 the contribution to the decline in general mortality occurred mainly between 1965–69 and 1980–85.

In Western Europe in the age groups 0–14 and 30–64 a more significant decrease in mortality can be observed in the first period. On the other hand in the age groups 15–29 and 65 and older the contribution to the decline in general mortality was much bigger between 1965–69 and 1980–85 than between 1950–54 and 1965–69.

In the Soviet Union in the age group 0–14 almost the total decrease in mortality occurred between 1958–59 and 1965–69. In the age group 15–29 no decrease in mortality can be found over the whole period of observation since the improvement in mortality in the first period was equal to the deterioration in mortality in the second period. In the age groups 30–64 and 65 and older respectively the increase in mortality has contributed to the rise in general mortality over the whole period of observation. It should be noted that in the age groups 30–64 and 65 and older the increase in mortality was 3.6 and 2.6 times as big between 1965–69 and 1980–85 as between 1958–59 and 1965–69.

Females

Similar contributions of age groups to the decline in general mortality can be observed in the female subpopulation.

Japan is the only country in which between 1950–54 and 1965–69 and between 1965–69 and 1980–85 the decrease in mortality was substantial in every age group. In Eastern Europe in the age groups under 64 the decrease was more significant in the first than in the second period. Improvement in the over-65 group over the whole period was insignificant. In Southern Europe under age 30 the absolute decrease in mortality was much bigger between 1950–54 and 1965–69 than between 1965–69 and 1980–85. In the latter period changes in lifestyle and progress in medical technology increased the probabilities of survival over 30 to an extent inconceivable before.

The secular trends in mortality by age groups were about the same in the region of Northern Europe as in the Region of Australia-New Zealand. In every age group except 15–29, mortality decreased more between 1965–69 and 1980–85 than between 1950–54 and 1965–69. In Northern America in the age groups 15–29 and 30–64 the decrease in mortality was almost the same in either period. In the age group 0–14 it was somewhat bigger between 1964–69 and 1980–85 than between 1950–54 and 1965–69. In the age group 65 and older the fall in mortality has been especially

TABLE 3[a]

Infant mortality in the regions of the developed world around 1950 and in 1985–86

Region	Infant deaths per 1,000 live births	
	1950	1985–86
Northern America	30.3	10.2
Japan	60.1	5.2
Eastern Europe	92.8	18.5
Northern Europe	31.8	8.7
Southern Europe	77.3	14.6
Western Europe	50.4	8.3
Australia-New Zealand	24.2	10.0
Soviet Union	80.7	25.4

[a]All regional values have been calculated by using weighted averages. The intra-regional weights have been calculated according to the number of live births of the countries in the corresponding years. Data of UN Demographic Yearbooks and World Health Statistics Annuals.

considerable since the late 1960s. In Western Europe in the age groups under 30 the decrease in mortality was more substantial before than after 1965–69. In the age groups over 30 in terms of mortality decline the last 15–20 years were more successful than the previous two decades or so.

In the Soviet Union in the age groups under 30 mortality decreased more before the late 1960s. In the age groups 30–64 it declined insignificantly prior to 1965–69 and more somewhat since then. In the oldest age groups mortality increased throughout, insignificantly before the late 1960s, but significantly in the last two decades or so.

Infant Mortality[3]

In the mid-1980s four groups can be identified by the level of infant mortality in the industrialised world. Japan is a class by herself: infant mortality was 5.2 per 1,000 in 1985–86, the lowest national figure. In 1985–86 Northern America, Northern, Western Europe and Australia-New Zealand had an infant mortality between 8.3 and 10.2 per 1,000. Southern and Eastern Europe between 14.6 and 18.5, and the Soviet Union 25.4. In every region, except the Soviet Union, infant mortality has decreased steeply and steadily during the whole postwar period. In the Soviet Union it increased temporarily between 1972 and 1976 and declined thereafter; in 1987 it was about the same as in 1969–70.

3. Infant mortality may be influenced by definition of live birth: if the definition does not follow the WHO recommendation infant mortality is usually somewhat lower than the actual figure. This should be taken into consideration in the case of Eastern, Southern Europe and of the Soviet Union.

TABLE 4

Age-standardised death rates for selected causes in the regions of the developed world in the mid-1980s[a]
Males (per 100,000 of population)

Region	All causes	Infections and parasitic diseases[b] (01–07)	Malignant neoplasms (08–14)	Diseases of the circulatory system (25–30)	Diseases of the respiratory system (31–32)	Diseases of the digestive system (33–34)	External causes of injury and poisoning (E47–E56)	Other
Northern America	1081.4	12.1	248.0	500.2	88.6	40.1	89.0	103.4
Japan	850.2	13.5	225.4	309.5	98.6	44.3	70.0	88.9
Eastern Europe	1506.3	11.8	259.7	794.8	124.7	54.3	100.8	160.2
Northern Europe	1163.6	5.7	270.4	563.1	132.3	31.6	60.8	99.7
Southern Europe	1163.1	12.4	245.6	516.8	99.5	69.3	74.8	144.7
Western Europe	1108.1	10.1	290.9	450.8	84.4	56.5	85.5	129.9
Australia-New Zealand	1103.1	5.6	260.5	518.5	113.8	35.3	74.0	95.4
Soviet Union	1633.3	—	269.0	846.6	154.1	—	175.9	187.7
				In percentage				
Northern America	100.0	1.1	22.9	46.3	8.2	3.7	8.2	9.6
Japan	100.0	1.6	26.5	36.4	11.6	5.2	8.2	10.5
Eastern Europe	100.0	0.8	17.2	52.8	8.3	3.6	6.7	10.6
Northern Europe	100.0	0.5	23.2	48.4	11.4	2.7	5.2	8.6
Southern Europe	100.0	1.1	21.1	44.4	8.6	6.0	6.4	12.4
Western Europe	100.0	0.9	26.3	40.7	7.6	5.1	7.7	11.7
Australia-New Zealand	100.0	0.5	23.6	47.0	10.3	3.2	6.7	8.7
Soviet Union	100.0	—	16.5	51.8	9.4	—	10.8	11.5

[a]All regional values have been calculated by using weighted averages. The intraregional weights have been calculated according to the national populations of the countries (latest available year) in the region. World Health Statistic Annual, Geneva, 1987, pp. 75-79.

[b]Numbers of the Basic Tabulation List of the International Classification of Diseases (ICD), 9th Revision, WHO.

TABLE 5

Age-standardised death rates for selected causes in the regions of the developed world in the mid-1980s[a]
Females (per 100,000 of the population)

Region	All causes	Infections and parasitic diseases[b] (01–07)	Malignant neoplasms (08–14)	Diseases of the circulatory system (25–30)	Diseases of the respiratory system (31–32)	Diseases of the digestive system (33–34)	External causes of injury and poisoning (E47–E56)	Other
Northern America	640.1	7.6	159.9	299.2	40.9	24.5	31.3	76.7
Japan	510.2	6.5	116.2	216.1	45.2	22.5	28.7	75.0
Eastern Europe	946.6	4.8	147.8	561.0	58.3	27.4	35.4	111.9
Northern Europe	709.8	3.8	179.9	327.8	66.6	23.6	27.9	80.2
Southern Europe	738.3	6.7	132.2	376.3	48.1	30.7	28.8	115.5
Western Europe	627.8	5.6	153.2	273.9	33.1	29.9	39.5	92.6
Australia-New Zealand	667.0	4.1	158.9	327.4	49.3	22.8	30.4	74.1
Soviet Union	908.5	—	129.5	582.2	67.4	—	48.2	81.2
				In percentage				
Northern America	100.0	1.2	25.0	46.7	6.4	3.8	4.9	12.0
Japan	100.0	1.3	22.8	42.3	8.9	4.4	5.6	14.7
Eastern Europe	100.0	0.5	15.6	59.3	6.2	2.9	3.7	11.8
Northern Europe	100.0	0.5	25.4	46.2	9.4	3.3	3.9	11.3
Southern Europe	100.0	0.9	17.9	51.0	6.5	4.2	3.9	15.6
Western Europe	100.0	0.9	24.4	43.6	5.3	4.8	6.3	14.7
Australia-New Zealand	100.0	0.6	23.8	49.1	7.4	3.4	4.6	11.1
Soviet Union	100.0	—	14.3	64.1	7.4	—	5.3	8.9

[a]All regional values have been calculated by using weighted averages. The intra-regional weights have been calculated according to the national populations of the countries (latest available year) in the region. World Health Statistics Annual, Geneva, 1987: 75–9.

[b]Numbers of the Basic Tabulation List of the International Classification of Diseases (ICD), 9th Revision, WHO.

CAUSE-SPECIFIC MORTALITY

Males

In the epidemiologic regime of chronic diseases (ChD) deaths due to diseases of the circulatory system (DCS) make a significant contribution. By the level of cause-specific mortality of DCS three groups of regions can be identified: very low in Japan, low and almost the same in Northern America, Northern, Southern, Western Europe and Australia-New Zealand; high in Eastern Europe and in the Soviet Union. In 1986 the median of cause-specific death rates was 518 per 100,000, whilst in Japan and in the Soviet Union mortality due to DCS was 310 and 847 per 100,000 respectively.

Between the regions no substantial differences exist in mortality attributable to tumours. The median was 260 per 100,000 in 1986. The two extreme values could be found in Japan and in Western Europe; they were 225 and 291 per 100,000 respectively. Albeit significant differences can be observed in mortality due to localisation and types of tumours between the regions, it can be said that the group of all tumours has about the same impact on the level of mortality in every region.

Between the regions presumably the biggest relative (or intra-group) differences exist in mortality due to violence. In this main group of diseases, third in importance after DCS and tumours, the median is 80.15 deaths per 100,000 population and the age-adjusted mortality rate is almost three times as high in the Soviet Union as in Northern Europe.

Females

The female subpopulation displays a similar mortality trend with respect to DCS. Japan has very low, Northern America, Northern, Southern, Western Europe and Australia-New Zealand have fairly low, whilst Eastern Europe and the Soviet Union have high cause-specific mortality rates. In 1986 the median of age-adjusted death rates was 328 per 100,000, whilst the frequency of deaths caused by DCS was 2.7 times as high in the Soviet Union as in Japan.

In the main group of neoplasms in 1986 the highest and the lowest age-adjusted mortality rates could be found in Northern Europe and in Japan respectively: their values were 180 and 116 per 100,000 respectively; the median was 150 per 100,000.

Violence causes much less deaths in the female than in the male subpopulation. The median of the age-adjusted cause-specific death rate was 31 per 100,000 in 1986. In Northern Europe 28, in the Soviet Union 48 deaths could be observed per 100,000 population.

Diseases of the respiratory system are responsible for more deaths than violence. In 1986 the median was 49 per 100,000 and the extreme values could be observed in Western Europe and in the Soviet Union; they were 33 and 67 per 100,000 respectively.

CONCLUSION

Is there any theoretical framework within which the described demographic/ epidemiologic phenomena can be explained? Presumably under the influence of the concept of demographic transition a theory of epidemiologic transition has been slowly emerging as an attempt to reveal the causes and circumstances responsible for the changes in mortality in the group of industrialised countries.

It is noteworthy how much socio-economic development and mortality decline are interrelated. The most remarkable mortality decline can be observed in Japan which also made the most spectacular progress in socio-economic development after World War II. On the other hand the Soviet Union which met unexpected difficulties in socio-economic development over the last two decades or so also experienced increase in mortality which had nothing to do with ageing.

Northern Europe (except Finland), Western Europe and the Anglo-Saxon countries outside Europe, were already modern societies after World War II. The countries of Eastern Europe (except Czechoslovakia and the German Democratic Republic) and of Southern Europe, Japan and the Soviet Union were in different stages of modernisation at the beginning of the post-reconstruction period. The industrialised countries succeeded in improving the quality of life, spreading affluence, developing a middle-class society and making the achievement-oriented middle-class behaviour highly acceptable. It should be taken into account that an achievement-oriented behaviour is inherently also a health-conscious behaviour. Social policy, in one way or another, improved the standard of living of the poor and of the elderly and it decreased the inequity in health. Only a relatively small group of people remained outside the protective umbrella of the affluent society.

New comprehensive knowledge relevant to health-conscious behaviour has been revealed by epidemiologic studies. Slowly a general awareness has emerged of the relationship between harmful health practices on the one hand and health on the other.

There is no consensus on the contribution of medicine to the recent decline in mortality. It is thought that medicine is unable to cure most localisation of neoplasms and also it cannot reverse the pathological processes of chronic degenérative diseases (ChDDs), if they have already caused anatomical damage. However, if medicine is considered in a broad sense, not as an application of a particular technology only, but also as an authoritative source in giving advice with respect to avoiding harmful health practices, then its relevance in decreasing mortality grows substantially. It cannot be denied that medicine has succeeded in slowing down the progression of ChDDs in the body. The frequently arising acute complications of ChDDs in many cases can be completely cured. By postponing death in these ways the role of medicine in decreasing age-specific mortality, in old age especially, and consequently general mortality cannot be neglected. In fact delay is the key word in defining the current stage of epidemiologic transition. It is called the stage of delayed chronic degenerative

diseases. This stage has been going ahead since the late 1960s and early 1970s in most of the countries with a market economy and an open society.

No similar development is found in the countries of command economy and closed society. On the contrary, since the mid-1960s there has been an unexpected rise in premature and avoidable death due to degenerative diseases and violence. In certain countries the fall in the age-specific death rates of the population under 30 could not compensate the rise in mortality mainly in the male subpopulation over 30 and even life expectancy at birth for males decreased substantially. It should be noted that these countries, except the German Democratic Republic and Czechoslovakia, have always had low life expectancy at birth by European standard, a direct consequence of socio-economic backwardness. Nevertheless they followed the most developed North and West European countries with a time-lag. By and large up to the mid-1960s the secular trends in mortality have been similar in every region of the industrialised countries.

However, the epidemiologic history of the Soviet Union is probably different. It might be inferred from the few data that albeit in the Soviet Union degenerative diseases are responsible for the majority of deaths, the proportion of deaths due to infectious diseases and external causes of injury and poisoning is presumably much higher than in other industrialised countries.

Up to the mid-1960s nothing revealed the deterioration of health of the populations of the Eastern European countries. On the contrary cause-specific mortality due to endemic, infectious diseases decreased substantially. Infant and child mortality fell by an unprecedented extent and adult mortality declined moderately. As a result of these favourable phenomena life expectancy at birth increased remarkably, and almost reached 70 years for the total population by the mid-1960s. It was relatively easy and inexpensive to decrease mortality caused by infectious diseases by using public health measures, immunisation and the new miraculous drugs: antibiotics and chemotherapeutics.

By conquering the two most important infectious lung diseases—tuberculosis and pneumonia—and by eradicating the communicable diseases of infancy and childhood as causes of death the Eastern European countries entered into the stage of ChDDs from the stage of endemic infectious diseases. This happend in the late 1950s and early 1960s.

The rising secular trend in mortality is a general phenomenon in the countries of Eastern Europe. There are many causes for the deterioration of their people's health. The direct causes of death can be easily identified. In these terms the decisive differences between Eastern Europe and other developed regions (except the Soviet Union) can be found in the group of diseases of the circulatory system in so far as the standardised mortality rate of these nosological entities is about 45 per cent higher in Eastern Europe than in the region with the next highest value.

Much more difficult is to reveal the causes at the level of socio-economic phenomena. In the postwar–post-reconstruction period a forced modernisation was started in the countries of Eastern Europe. Applying automatically the Soviet model the development of heavy industry was overemphasised at the expense of all other branches of the economy. This was an enormously investment-demanding endeavour in a region which has always been short of investment capital. In this kind of out-of-date, defence-oriented industrialisation the modestly accumulated capital and working force were taken away from agriculture, the only branch of economy where it can be found. Meanwhile huge, ineffective, socialist latifundia were organised for practical and ideological reasons. As a result, except in Hungary, agriculture cannot provide a large variety of healthy foods for the population. Even in Hungary healthy food is prohibitively expensive for a large segment of the population. These countries are situated under moderate climate. For the provision of fresh fruits and vegetables around the year imports are necessary. However the socialist countries of Eastern Europe cannot afford the 'luxury' of fresh fruit and vegetable import. To put it differently: the conditions relevant for changing traditional eating habits do not exist in this region. Unhealthy nutrition is probably the most important single factor responsible for the increase of the mortality rate due to the diseases of the circulatory system.

There is a common problem in the East European countries: the social maladaptation syndrome. Alcoholism is a frequent kind of escapism for those who adapt themselves badly to the rules of the game in society. The social maladaptation syndrome is not exclusively an East European phenomenon. Yet certain causes of this phenomenon are typically features of the regional model of modernisation. The massive internal migration from rural to urban areas uprooted peasants, most of whom became unskilled or semi-skilled workers at new industrial plants. Intensive upward mobility elevated many valuable people to higher social strata and, by this, deprived the lower social strata of their natural leaders. At the same time, according to an elaborate system of ideology a quasi-total disruption of traditional social institutions was attempted. All this created an alienated mass of people without any guidance, without values, without leaders, without institutions. This is an unprotected, fairly large minority which contributes disproportionately to premature and avoidable deaths.

Smoking is presumably no more serious a public health problem in Eastern Europe than in other developed regions. However a decrease in cigarette consumption has not yet started in this region. Physical exercise is presumably less common in the East European countries, except the German Democratic Republic, than in the Anglo-Saxon world and in some North and West European countries.

In principle every citizen of the East European countries is eligible for 'high quality health care free of charge'. However as a consequence of the neglect of the health services the medical technology in the whole region is outdated. In some countries the provision of certain medicines is irregular, many of the health institutions are overcrowded and there are long waiting lists for special treatment.

The patient's payment for treatment and care and in many instances for hospital bed is fairly common in most of the East European countries. The deteriorating quality of health care has become a serious social problem and an important factor responsible for many premature and avoidable deaths.

Recently an increasing awareness with respect to harmful health practices and to the inadequacy of health services can be observed in Eastern Europe. However even if health-conscious behaviour gains momentum gradually and the political responsibility to improve the health services will be accepted by the governments of these countries, it cannot be ignored that the growing economic difficulties in this region can deepen the epidemiologic crisis.

Up to the mid-1960s the same epidemiologic regime existed in the developed world: the regime of chronic degenerative diseases. Since then in the regions of Northern, Western and Southern Europe, Northern America, Japan and Australia-New Zealand the stage of delayed chronic degenerative diseases has succeeded.

REFERENCES

Only the most important books and papers are mentioned here.

Bourgeois-Pichat, J. Future outlook for mortality decline, in *World Population Bulletin of the United Nations,* ST/ESA/Series N/11 Sales No. 78. XIII. 7.

Bourgeois-Pichat, J., 1984. Mortality trends in the industrialized countries, *Mortality and Health Policy,* ST/ESA/SER. A/91, New York: United Nations.

Consequences of Mortality Trends and Differentials, 1986. New York: United Nations.

Doll, R., 1987. Major epidemics of the 20th century: from coronary thrombosis to AIDS, *Journal of the Royal Statistical Society,* Vol. 150, No. 4.

Hakulinen, T., Hansluwka, H., Lopez, A.D., and Nakada, T., 1986. Global and regional mortality patterns by cause of death in 1980, *International Journal of Epidemiology,* Vol. 15, No. 2.

Kunitz, S.J., 1983. Mortality since Malthus, in D. Coleman, and R. Schofield (ed.), *The State of Population Theory,* Oxford: Basil Blackwell.

Kunitz, S.J., 1987. Explanations and ideologies of mortality patterns, *Population and Development Review,* Vol. 13, No. 3.

Levels and Trends of Mortality since 1950, 1982. New York: United Nations.

Lopez, A.D. and Ruzicka, L.T., 1983. *Sex Differentials in Mortality Trends, Determinants and Consequences.* Miscellaneous Series 4, Department of Demography, Australian National University, Canberra.

Olshansky, S.J., and Adult, A.B., 1986. The fourth stage of the epidemiologic transition: The age of delayed degenerative diseases, *The Milbank Quarterly,* Vol. 64, No. 3.

Omran, A.R., 1971. The epidemiologic transition: A theory of the epidemiology of change, *Milbank Memorial Fund Quart,* Vol. 49, No. 4.

Preston, S.H., 1976. *Mortality Patterns in National Populations with Special Reference to Recorded Causes of Death,* New York: Academic Press.

Rogers, R.G. and Hackenberg, R., 1988. Extending epidemiologic transition theory: a New Stage, *Social Biology,* Vol. 34, No. 3-4.

Van de Kaa, D.J., 1987. Europe's second demographic transition, *Population Bulletin,* Vol. 42, No. 1.

Van Poppel, F. and Van Ginneken, J. Reversal of declining mortality—the case of the Netherlands in the period 1950–1980, *Mndber gezondheid* (CBS) 85/11.

Population and Planning in India

PADAM SINGH
Institute for Research in Medical Statistics
(ICMR), New Delhi

INTRODUCTION

Population and economic variables are mutually dependent in the Indian planning process. Population variables (size, distribution, etc.) are taken into account in assessing its influence in attaining specific development objectives. On the other hand economic and social policies/programmes are designed for desired population and demographic change. The population variables considered in planning relate not to size alone but also its distributions by residence, age, socio-economic groups, income/expenditure and poverty levels. This paper highlights some of the important aspects relating to treatment of population variables in planning. The methodology discussed as well as illustrations relate to the Seventh Five Year Plan.

POPULATION PROJECTIONS

Projection of population is the starting point in the planning exercise. These projections are done both for medium term i.e., immediate five years and long-term perspective period of next 15 years. For the Seventh Five Year Plan (1985-90) these projections were made up to the year 2001. The population projections are made on the basis of assumed values of fertility, mortality, expectation of life and attainment of Net Reproduction Rate of unity etc. For this a high-level Expert Group is constituted by the Planning Commission. The assumptions are based on the experience of the past and the likely performance of different programmes in future.

Tables 1 and 2 present the assumption underlying the population projections together with the projected populations.

LABOUR FORCE PROJECTIONS

For employment planning information on the backlog of unemployed and the addition to labour force is required. Labour force is defined as the total number of persons employed and those seeking or available for work. The projections of labour force are done by taking into account the population in the age group 15-59 and the age-specific participation rates. Up to the beginning of the Sixth Five Year Plan, the backlog of unemployed showed increase with time. During the Sixth Plan the employment generation was targeted to match the addition to labour force which also was

realised. During the Seventh Plan employment generation has been targeted as one million more than the addition to labour force. Further, it is targeted that by 2001 there will be near full employment. There are three concepts which can be used for measuring labour force. There are: daily status, weekly status and usual status. For planning purpose, the labour force is estimated on the basis of the usual status concept. This concept is meant to measure the usual activity status, employed or unemployed or outside labour force for the major part of the year and the activity status is determined with reference to a period of previous 365 days.

Table 1: **Population projections 1981-2001**

Period	Population at the end of the period (million as on 1st March)			General fertility rate	Expectation of life at Birth (yrs.)		Birth Rate	Death Rate	Growth Rate
	Rural	Urban	Total	Level	Males	Females			
1981-86	569	192	761	156	55.6	56.4	33.2	12.2	21.0
1986-91	607	230	837	136	58.1	59.1	29.7	10.7	19.0
1991-96	639	274	913	118	60.6	61.7	26.7	9.3	17.4
1996-2001	660	326	986	102	62.8	64.2	23.7	8.4	15.3

Source: Seventh Five Year Plan.

Table 2: **Age structure of the population and women in the reproductive age group 1980-2000**
(as on 1st March)
(Per cent of total Population)

Age Group	1980	1985	1990	2000
0-4	14.18	13.81	12.85	10.67
5-14	25.54	24.34	23.15	20.98
15-59	54.07	55.51	57.50	60.79
60 plus	6.21	6.24	6.50	7.58
Total	100.00	100.00	100.00	100.00
Total female population (million)	323.59	360.74	398.41	472.64
Women in the reproductive age group (millions) % of total female population	140.72 (43.4)	160.25 (44.4)	183.03 (45.9)	227.67 (48.2)

Source: Seventh Five Year Plan.

Estimates of participation rates for different age groups separately for males and females by rural and urban areas are provided by the NSS through surveys on employment. For the Seventh Five Year Plan, the results for the 1977-78 survey were used. The labour force projections as used in the Seventh Plan are presented in Table 3.

For estimation of employment generation a concept of 'Standard Persons Year' has been used. If one person is employed for a period of 273 days a year at the rate of 8 hours a day it is taken as one standard person year. The estimates of employment

are worked out at disaggregated level of sectors. For this sector specific employment norms have been used. The employment generated through special poverty alleviation and employment generation programmes is also included appropriately in the estimation of total employment generation. Table 4 presents the details.

Table 3: **Labour force projections (usual status) (million)**

Age Group	1985	1990	2000	Addition to labour force during	
				1985-90	1990-2000
5+	305.40	344.78	427.98	39.38	83.20
15+	287.82	326.61	407.73	38.74	81.12
15-59	269.81	306.08	379.85	36.27	73.77

Source: Seventh Five Year Plan

Table 4: **Employment profile — Seventh Plan** (Million standard person years)

Sector	Employment		Increase in Seventh Plan
	1984-85	1989-90	
Agriculture	96.108	114.092	17.984
(a) Crop sector	(58.750)	(65.092)	(6.970)
(b) Non-crop sector	(37.358)	(48.372)	(11.014)
Mining and quarrying	1.153	1.494	0.341
Manufacturing	26.790	33.466	6.676
Construction	10.427	12.624	2.197
Electricity	1.031	1.498	0.467
Railways	1.544	1.688	0.144
Other transport	9.440	11.810	2.370
Communication	0.951	1.224	0.273
Other services	39.261	49.165	9.904
Total	186.705	227.061	40.356

POVERTY MEASUREMENT

The estimation of percentage and number of persons below poverty line are needed for understanding the extent of the problem, identification of the target group and setting targets of poverty reduction. The concept of poverty line used is on the actual consumption behaviour. This concept of poverty line is on the basis of recommendations of the Task Force on minimum needs and effective consumption demand constituted by the Planning Commission which defined the poverty line as the per capita monthly expenditure of Rs. 49.09 in rural areas and Rs. 56.64 in urban areas at 1973-74 prices corresponding to the per capita daily calorie requirements of 2400 in rural areas and 2100 in urban areas. The average calorie requirement is estimated by taking into account the population composition by age, sex and occupation categories, together with the corresponding recommended calorie norms by the Indian Council of Medical Research.

Table 5: **Weighting diagram and average calorie requirements 1984-85**

Age sex and activity status group	Rural	Urban	Average calorie norm (per capita per day)
0	2.97	2.56	700
1-3	8.67	7.44	1200
4-6	8.31	7.19	1500
7-9	7.91	7.09	1800
10-12 boys	3.89	3.70	2100
girls	3.57	3.58	2100
13-15 boys	2.41	2.35	2500
girls	2.22	2.25	2200
15+ Males			
Heavy Workers	22.03	4.27	3900
Moderate Workers	2.51	9.11	2800
Sedentary Workers	2.74	15.02	2400
Non-Workers	3.29	6.39	2400
15+ Females			
Heavy Workers	10.51	1.64	3000
Moderate Workers	0.92	1.77	2200
Sedentary Workers	0.50	3.23	1900
Non-Workers	17.55	22.55	1900
Overall average	2414	2117	

Source: Planning Commission.

For obtaining the expenditure needed to satisfy the requirement of calorie norms the data on household consumption expenditure have been utilised. The poverty line defined this way covers the expenditure on food and non-food items and ensures the adequacy of calorie consumption. The poverty line is updated using the implicit CSO private cosumption deflator as proxy for price rise in the consumption basket of the persons near the poverty line. The updated poverty line for 1983-84 is Rs. 101.80 per capita per month in rural areas and Rs. 117.50 in urban areas. For the Seventh Five Year Plan, poverty line was annual household income of Rs. 6,400 in rural areas and Rs. 7,300 in urban areas at 1984-85 prices, assuming the household size of around 5.

POVERTY ESTIMATES

The estimates of percentage of persons below the poverty line have been worked out using the poverty line and the distribution of persons according to expenditure groups. Information on the distribution of persons by expenditure as available in NSS surveys on household consumption expenditure is utilised. On the basis of the data of the 32nd round (1977-78) and the 38th round (1983) the estimates of the percentage of persons below the poverty line are presented in Table 6.

Table 6: **Percentage of persons below the poverty line**

	1977-78	1983-84
Rural	51.2	40.4
Urban	38.2	28.1
Combined	48.3	37.4

TARGET SETTING

For 1984-85 the estimates of percentage of persons below the poverty line have been worked out by taking the per capita consumption as obtained from CSO and by assuming that the distribution would be the same as observed for 1983. The Seventh Five Year Plan aims at reducing the level of poverty to 25.8 per cent by 1989-90 and to around 5 per cent by 1999-2000. The detailed targets with break-up for rural and urban areas are as under:

Table 7: **Targets of poverty reduction**

	Rural	Urban	Combined
1984-85	39.9	27.7	36.9
1989-90	28.2	19.3	25.8
1999-2000	5.0%	5.0%	5.0%

The same expressed in terms of absolute numbers implies that around 62 million persons are expected to cross the poverty line during the Seventh Five Year Plan. The target of raising the number of persons above the poverty line is determined by taking into account the actual distribution of population below the poverty line and the impact of general economic growth and different direct poverty alleviation programmes like Integrated Rural Development Programme (IRDP), National Rural Employment Programme (NREP) and Rural Landless Labour Employment Generation Programme (RLEGP).

The beneficiaries of the poverty alleviation programmes are those who are below 75 per cent of the poverty line. The Seventh Plan had two categories of beneficiaries under IRDP viz., the beneficiaries assisted during the Sixth Plan but who could not cross the poverty line and the beneficiaries to be considered afresh for assistance in the Seventh Plan. For the old and new beneficiaries the level of assistance in the Seventh Plan was Rs. 1,500 and Rs. 4,000 respectively. For old beneficiaries the investment to incremental income ratio (ICOR) was taken as 2.0 and for new beneficiaries as 2.7 on the basis of the results of evaluation studies. The distribution of new beneficiaries was derived using 1983 data whereas the distribution of old beneficiaries was arrived at by adding the incremental income to the distribution of beneficiaries based on 1977-78 data. Table-8 presents the distributions.

The beneficiaries of the employment generation programmes like NREP and RLEGP are also those below 75 per cent of the poverty line and as such the IRDP beneficiaries households would also derive benefits from NREP and RLEGP. Private consumption of beneficiaries of IRDP, NREP and RLEGP is the sum total of income benefits received by them. In estimating the number crossing the poverty line, the effect of general economic growth for these beneficiaries is also taken into account.

HOUSEHOLD CONSUMPTION

Targets of output for various sectors are worked out mainly from demand consideration. For each sector the total demand is worked out by considering the final

use demand and also the intermediate use demand. The demand for intermediate use is estimated using inter-industry relations but that for final use is estimated separately for consumption, investment and external trade. Whereas demand for investment is calculated using investment-output relationships, that for consumption is mainly population based. The estimation of consumption for different items is attempted for four sub-groups of the population, namely, rural poor, rural non-poor, urban poor and urban non-poor. For each of these sub-groups the consumption norms are derived using a set of linear expenditure system and demand function parameters.

Table 8: **Distribution of persons by monthly per capita consumption expenditure (rural)**

1983		1978	
Expenditure class (Rs. per capita per month)	% of persons	Expenditure class (Rs. per capita per month)	% of persons
0-30	0.92	0-10	0.15
30-40	2.47	10-15	0.46
40-50	5.11	15-20	1.21
50-60	7.90	20-30	8.24
60-70	9.69	30-35	7.21
70-85	15.24	35-40	8.33
85-100	13.64	40-50	17.24
100-125	16.99	50-60	14.90
125-150	10.00	60-70	11.46
150-200	9.78	70-80	8.12
200-250	3.96	80-100	9.80
250-300	1.81	100-150	8.82
300+	2.49	150-200	2.28
		200+	1.74

Table 9: **Number of persons crossing poverty line during Seventh Plan** (Million)

Item	Target
Through direct anti-poverty programmes	
IRDP, NREP & RLEGP	40.0
Through general growth alone	22.0
Total	62.0

MINIMUM NEEDS

Planning for education, health, water supply, sanitation, housing, tribal development, development of backward classes etc., is basically population based. In deciding the allocation in a plan for these, the projection of the relevant population is the starting point. The magnitude of the task to be performed in a long term is estimated by taking into account the backlog not yet covered and new requirements. This task is phased over different plan periods in terms of targets to be achieved after examining their feasibility. These targets are on the basis of population-based broad norms. These norms are updated/revised in the light of experience. Further, the norms are different for different types of regions. The investment requirement is worked out by taking into account the targets and the unit cost of achieving these targets.

Elementary Education

For attaining the target of universalisation of elementary education for all children up to the age of 14 years, both the backlog of enrolment as well as the new additions due to the population increase are considered. The long-term target is phased over different intermediate plan periods. Table 10 provides the targets of elementary education.

Table 10: **Expansion of elementary stage education**

Class/Age group	Likely enrolment (1984-85)			Projected enrolment (1989-90)		
	Boys	Girls	Total	Boys	Girls	Total
I-V (6-11)	51.20 (117.48)	34.17 (69.20)	85.37 (91.84)	55.00 (110.00)	40.96 (88.15)	95.96 (99.89)
VI-VIII (11-14)	17.46 (66.90)	9.27 (38.19)	26.73 (53.07)	25.12 (92.56)	16.55 (65.44)	41.67 (79.46)
I-VIII (6-14)	68.66 (90.96)	43.44 (64.02)	112.10 (78.21)	80.12 (104.24)	57.51 (80.28)	137.63 (92.60)

Note: In brackets are percentage of total eligible population.

Primary Health Education

There is a commitment to attain the goal of health for all by the year 2000. For this primary health care has been accepted as the main instrument of action. Priority has been given to extension and expansion of rural health infrastructure through a network of community health centres, primary health centres and sub-centres on population-based norms. The targets set during the Seventh Five Year Plan are presented in Table 11.

Table 11: **Seventh Plan —Primary health care indicative targets**

Item/Programme	Total requirement	Position likely by 1984-85	Targets set for 1985-90
Health Guides	4,50,000	3,50,000	1,00,000
Sub-Centres	1,37,000	83,000	54,000
Primary Health Centres	23,000	11,000	12,000
Community Health Centres	5,417	649	1,553
Training of Female MFWs	1,30,000	80,000	60,000
Training of Male MFWs	1,30,000	80,000	60,000
Employment of Male MFWs	1,30,000	80,000	50,000
Training and Employment of Female Health Asstt.	21,500	15,000	6,500
Training and Employment of Male Health Asstt.	21,500	15,000	6,500

In the light of the progress made during the Sixth Plan, the target of reaching the net reproductive rate of unity by 2000 A.D. has been shifted to the year 2006. Consistent with this, the target of family welfare programme envisaged the goals as given in Table 12 to be achieved by the end of the Seventh Plan.

Table 12: **Targets of family welfare (by the end of the Seventh Plan)**

Item	Target
Effective couple protection rate	42.00%
Crude birth rate	29.1
Crude death rate	10.4
Infant mortality rate	90.00
Immunisation	100.00%
Ante-natal care	75.00%

Water Supply

For water supply and sanitation, the starting point is the population covered up to the base year of the plan. The total targets to be achieved over a long-term perspective period are estimated by taking into account the backlog and the new addition to the population. These targets are phased over the different plan periods. The requirement of investment is worked out by taking into account the unit costs and phasing of the target over years.

Housing

The target for housing is worked out similarly by taking into account the housing shortage at the beginning of the plan and the additional requirement in view of addition to population. In doing so, the broad norm of one house for about seven persons is assumed. The investment requirement is worked out by taking into consideration the targets under various schemes and their respective norms of unit cost/subsidy.

Status of Women

The constitution of India provides equal rights and privileges for men and women and makes special provision to improve their status in society. In setting targets concerning women special exercises are undertaken in each of the relevant sectors like education, health, rural development, integrated child development services programmes etc. The planning for women is part of the overall planning in the country. Similarly in planning, children are considered as a separate entity. The programmes for them consist of supplementary nutrition, immunisation, health services, nutrition, health education, general education etc.

Transport

In transport planning as also in planning for communication etc., the need of the population is the main consideration. The population and their traffic movements for

the present and long-term future are taken into account while preparing plans for all modes of transport namely, road, railway, air. Similarly due care of the relevant population is taken into account in planning for communication and also the relevant scientific and technological development.

Tribal Development

The programmes for tribal development and the development of scheduled castes are similarly population based. The planning for this is a part of the integral planning for the country as a whole to take care of their special characteristics and to reduce the disparity vis-a-vis the rest of the population. Their needs are assessed separately and investment requirement worked out by applying the norms relevant to these specific groups.

ALTERNATIVE POPULATION SCENARIOS IN PLANNING

In a planning exercise several alternative scenarios are considered and what is presented in the document is the preferred development scenario. In these exercises several alternatives are considered corresponding to different sets of assumptions on crucial parameters. One of the crucial parameters in planning is population. For population three alternative scenarios are considered, one corresponding to highly optimistic growth of population, the second corresponding to past trends and the third as the medium growth scenario. Generally it is the medium growth scenario which is taken as the preferred scenario as far as population variable is concerned. However, the implications of different growth rates of population are examined carefully in every planning exercise. For example, during the Sixth Plan preparation, it was observed that if the growth of population is 2.04 per cent as against 1.79 per cent as assumed in the preferred scenario, the main effect of this would be reducing the per capita income, consumption, social services investments etc. On the other hand, the demand for food, education and health services, water supply, sanitation as also demand for jobs for employment will go on increasing. It was shown that the plan and post-plan growth rates would come down from 5.2 per cent to 5 per cent and 5.5 per cent to 5.0 per cent respectively. If the post-plan growth rate is to be protected, it implies that the plan growth would further come down to around 4.8 per cent. The details of this are explained in the Technical Note on the Sixth Five Year Plan in the chapter on Alternative Scenarios and Sensitivity Analysis. Similar exercises were undertaken for the Seventh Plan also.

POPULATION-BASED TARGETS

It would appear from the discussions that the population and its distribution by age, sex, income, socio-economic groups are considered in great detail in Indian planning. Based on the requirements mainly on the basis of population and taking into account the feasibility, the targets of output and investment for a plan are worked out. The targets having bearing on population for the Seventh Five Year Plan and 1999-2000 are presented in Table 13.

Table 13: Socio-economic indicators of change (1985-2000) (Targets)

	1984-85	1989-90	1999-2000
1. Life expectancy Male (in terms of years)	56.10	58.60	63.30
2. Infant mortality rate	106.00	90.00	60.00
3. Death rate	11.90	10.40	8.20
4. Birth rate	32.60	29.10	23.10
5. Fertility rate (per thousand)	152.00	132.00	99.00
6. Urbanisation (per cent)	24.70	26.85	32.20
7. Per capita GDP (1984-85 prices) (Rs)	2,616.00	3,027.00	4,163.00
8. Per capita consumption of foodgrains (Kg)	178.00	193.00	215.00
9. Per capita consumption expenditure (1984-85 prices) (Rs)	1,979.00	2,271.00	3,124.00
10. Per capita consumption of cloth (metres)	16.16	17.78	22.36
11. Per capita generation of electricity (Kwh)	226.00	362.00	578.62
12. Saving-GDP ratio (per cent)	23.30	24.50	25.80
13. Enrolment elementary stage education (per cent)	78.20	92.60	100.00
14. Foreign saving-Investment ratio (per cent)	4.90	5.50	2.40
15. Percentage of people below the poverty line	37.00	26.00	5.00
16. Labour force (million in the age group 15 plus)	288.00	327.00	408.00
17. Employment (million standard person years)	187.00	227.00	318.00

Source: Planning Commission, 1985.

REFERENCES

Planning Seventh Five Year Plan (1985-90).
Report of the Expert Group on Population Projections, Planning Commission, Govt. of India.
Report of the Task Force on Projections of Minimum Needs and Effective Consumption Demand (1979), Planning Commission, Govt. of India.
Technical Note on Sixth Five Year Plan (1980-85), Planning Commision, Govt. of India.
Technical Note on the Seventh Plan of Inida (1985-90), Planning Commission, Govt. of India.

Human Capital Formation and Economic Development in India

PRADEEP KUMAR SAXENA
Institute of Applied Manpower Research, New Delhi

The economic progress and prosperity of a nation depend not only on the material resources at its command, but to a greater extent upon its human endowments. Human capital formation which is the process of increasing the knowledge, the skills and the capacities of the population, and its effective utilisation, plays a strategic role in economic development of both the developed and the developing countries. The upgradation of mental ability and increase in physical ability tend to the formation of human capital.

The interaction between human capital formation and economic development is a two-directional process, and has been shown at Chart 1. Education and health — the two components of human capital formation – interacting with each other result in intellectual, social and physical development of individuals which leads to higher productivity, and subsequently to higher income. Higher income paves the way for higher investment in all sectors including education and health. It results in human capital formation on one hand, and accumulation of physical capital on the other. These in turn lead to higher growth of per capita income.

This paper examines the interrelationship between human capital formation and economic development through the following three questions:

(a) What has been the level of human capital formation in the states of India?
(b) What has been the level of economic development in the states of India?
(c) Whether the interstate disparities in the level of human capital formation explain interstate income inequalities?

This paper makes the analysis of comparable cross-sectional data of 18 states of India. The per capita net state domestic product at constant prices (1970-71) has been taken as the indicator of economic development. The two important indicators of human capital formation are education and health. In this analysis, the educational level of the workers instead of population has been considered, since it is likely to provide more accurate explanation. The total main workers[1] (excluding illiterates and literates

1. The concept of main worker was introduced in the 1981 Census, and main workers of the 1981 Census are comparable with workers of the 1971 Census. The 1981 Census defines main workers as, "those who had work for the major part of the year preceding the date of enumeration i.e. those who were engaged in any economically productive activity for 183 days or six months or more during the year."

without educational level) have been divided in three major groups, (i) workers with completed first level of education (primary and middle), (ii) workers with completed second level of education, (matric/secondary/intermediate/pre-university/diploma or certificate not equal to degree), and (iii) workers with completed third level of education (graduate and above). Of these three categories, the last two are particularly important in indicating the level and composition of human capital formation. In addition, overall literacy rate of the main workers has also been considered. Regarding health indicator, child mortality rate has been taken in the analysis. It has been defined as number of deaths per 1,000 live births by age 1, and is being considered the most reliable indicator of health status of the community.

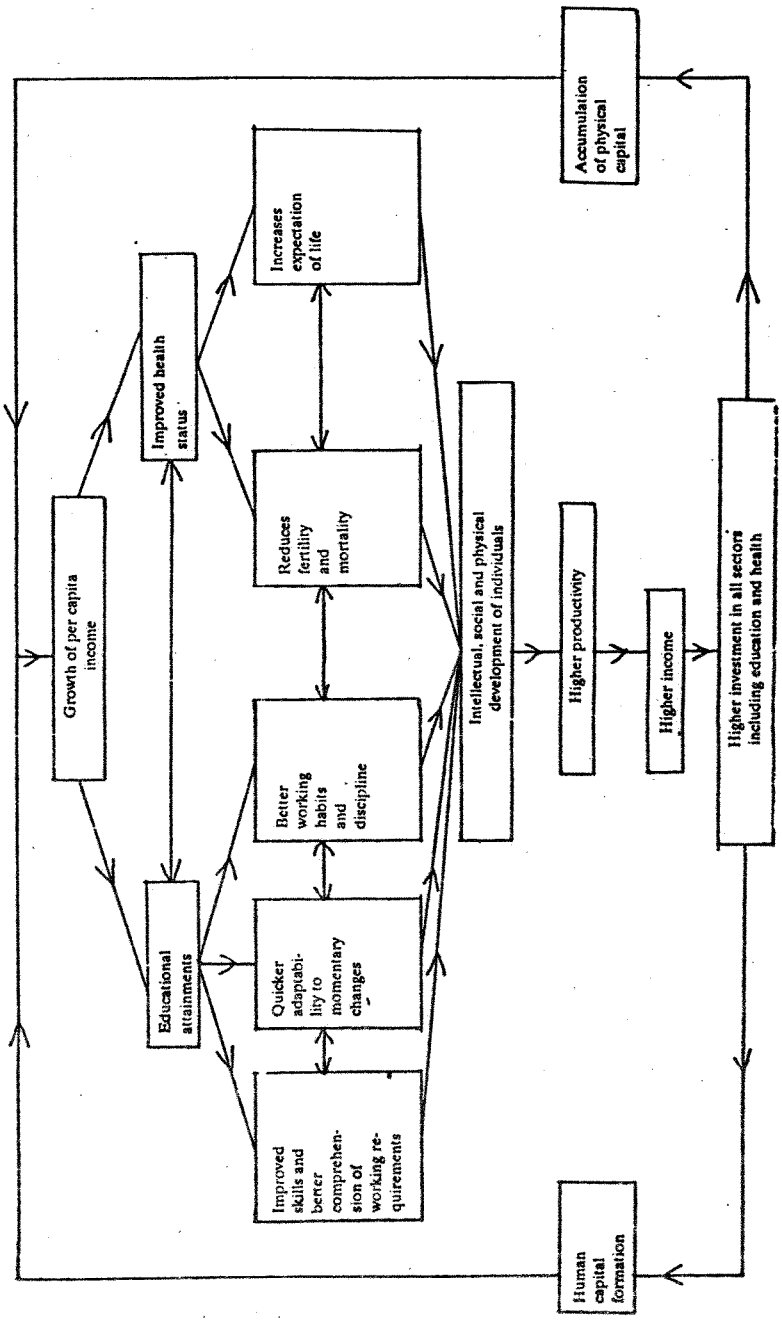
For establishing the interrelationship between human capital formation and economic development, multiple regression analysis has been applied in three sets of analysis. In the first set of analysis, the interstate income inequalities in per capita income have been tried to be explained in terms of indicators of human capital formation. In the second and third sets of analysis, the growth rates of educational indicators and population are assumed to explain the state-wise uneven growth patterns of per capita income and national income.

The 18 states of India have been classified in four groups. The criterion for classification is based on per capita income of states for 1981 and its rate of growth during 1971-81 in comparison to per capita income of all India for 1981 and its rate of growth during 1971-81. The states have been grouped as follows:

Level I:	Developed	– Higher per capita income, Higher rate of growth.
Level II:	Semi-Developed	– Higher per capita income, lower rate of growth.
Level III:	Partially Developed	– Lower per capita income, higher rate of growth.
Level IV:	Underdeveloped	– Lower per capita income, lower rate of growth.

Table 1 shows a significant relationship in these four groups of states. The developed states (level I) are characterised by high growth rates of national income, per capita income, population, and literate workers. Here child mortality is also very low i.e., 88. In level II states, the growth rates of national income, and literate workers have been moderate, whereas population increased phenomenally. These have resulted in low growth rate of per capita income. Interestingly, in the level III states, national income and literate workers increased tremendously, and population also increased by rapid strides. It has led to substantially high rate of growth of per capita income. Here the child mortality rate is the lowest i.e. 74. In the level IV states, the growth rate of national income has been very low, which can be attributed to a low rate of growth of literate workers. On the other hand, population increased substantially, which has resulted in miserably low growth rate of per capita income i.e. 0.34 per cent. In this group the child mortality rate is also the highest among the four groups.

Chart 1 : INTERACTION BETWEEN HUMAN CAPITAL FORMATION AND ECONOMIC DEVELOPMENT



The results of the multiple regression analysis for per capita income variation have been presented in Table 2. In equation I, when all the five independent variables have been considered simultaneously, the regression coefficients of the three variables, workers with completed II level of education (X3), workers with completed III level of education (X4), and child mortality rate (X5) turn out to be statistically significant.

Table 1: **States of India divided as per levels of development**

Level I. Developed			**Level II. Semi Developed**		
Punjab, Haryana, Maharashtra			Gujarat, West Bengal		
Y_{81}	:	Rs. 1133	Y_{81}	:	Rs.849
GrY_{71-81}	:	2.42	GrY_{71-81}	:	0.95
$GrNI_{71-81}$	:	5.68	$GrNI_{71-81}$	:	3.71
GrP_{71-81}	:	2.57	GrP_{71-81}	:	2.54
$GrLIT_{71-81}$	:	6.15	$GrLIT_{71-81}$	:	4.23
CMR_{81}	:	88	CMR_{81}	:	90
Level III. Partially Developed			**Level IV. Underdeveloped**		
Jammu & Kashmir, Tripura, Manipur			Karnataka, Himachal Pradesh, Andhra Pradesh, Kerala, Tamil Nadu, Rajasthan, Orissa, Uttar Pradesh, Madhya Pradesh, Bihar		
Y_{81}	:	Rs.590	Y_{81}	:	Rs.573
GrY_{71-81}	:	2.37	GrY_{71-81}	:	0.34
$GrNI_{71-81}$	:	6.33	$GrNI_{71-81}$	:	2.79
GrP_{71-81}	:	3.14	GrP_{71-81}	:	2.38
$GrLIT_{71-81}$	:	7.12	$GrLIT_{71-81}$	:	4.52
CMR_{81}	:	74	CMR_{81}	:	100

Y_{81} : Average Per Capita Net State Domestic Product in 1981 at constant prices of 1970-71.
GrY_{71-81} : Average Annual Growth Rate (%) of Per Capita Net State Domestic Product at constant prices during 1971-81.
$GrNI_{71-81}$: Average Annual Growth Rate (%) of Net State Domestic Product at constant prices during 1971-81.
GrP_{71-81} : Average Annual Growth Rate (%) of Population during 1971-81.
$GrLIT_{71-81}$: Average Annual Growth Rate (%) of Literate Work Force during 1971-81.
CMR_{81} : Average Child Mortality Rate in 1981.

However this equation explains 71 per cent variation in per capita income. Equation II which considers per capita income to be a function of these three significant variables seems to be a very significant equation because all the three variables remain significant and taken together explain 71 per cent variation in per capita income. It is very interesting to refer to equation III which consists only two significant educational indicators i.e., X3 and X4, and makes plausible explanation for about two-thirds variation in per capita income. This set of analysis has clearly shown that the workers with completed II and III levels of education have emerged as the major determinants of interstate income inequalities in India. The child mortality rate has been found significantly associated with per capita income, but contrary to our expectation it has assumed positive sign. A further explanation for it has been sought by computing zero order correlation coefficients between it and educational indicators. It shows that the child mortality rate has significant inverse relationship with the educational indicators.

In the second set of analysis an attempt has been made to explain interstate variations in growth rate of per capita income by considering growth rates of educational

Table 2: **Results of the multiple regression analysis for per capita income — 1981**

Equation number	Regression Coefficients						
	Literacy rate of workers (X_1)	Workers with completed Ist level of education (X_2)	Workers with completed IInd level of education (X_3)	Workers with completed IIIrd level of-education (X_4)	Child mortality rate (X_5)	Coefficient of multiple determination (R^2)	F
I	−x2.7259 (9.1713)	0.8417 (15.0550)	64.6367* (17.7856)	94.7735* (71.5155)	2.2900** (1.7449)	0.7105	5.889*
II	—	—	62.2759* (16.2011)	87.1327** 65.9121)	2.4768** (1.5354)	0.7024	11.016*
III	—	—	56.2959* (16.5923)	58.8063** (56.8373)	—	0.6471	13.754*

*Statistically significant at 1 per cent level of significance.
**Statistically significant at 5 per cent level of significance.
Note : Figures in Parentheses denote the standard errors of regression coefficients.

indicators and population. The results are shown in Table 3. In equation I, out of six independent variables, literate workers (X2), workers with completed II level of education (X4), workers with completed III level of education (X5), and population (X6) fail to make any significant contribution to the growth of per capita income, whereas total workers (X1) and workers with completed I level of education (X3) turn out to be statistically significant. However all these variables taken together explain 44 per cent variation in the growth of per capita income.

Interestingly, when X1 and X6 are dropped from this equation, in equation II, X_3 also becomes significant but the explanatory power of the equation is reduced to 38 per cent. Furthermore, when X2 is also excluded, X4 becomes significant but the equation is able to explain only 34 per cent variation in the growth of per capita income. Equation IV consists only two variables, of which workers with completed II level of education (X4) remains significant, but workers with completed III level of education (X5) becomes insignificant. The explanatory power of the equation remains at a very low level i.e., 20 per cent only. In this set of analysis, the growth rates of workers with completed II and III levels of education emerge as positive factors influencing marginally the growth of per capita income. On the contrary, the variable, workers with completed I level of education, has been found significantly inversely associated with the growth rate of per capita income, which may have been due to the problem of multicollinearity.

Since the growth of per capita income is a function of growth of national income, the analysis of interstate inequalities in its growth pattern is likely to provide a comprehensive and meaningful explanation for uneven distribution of per capita income. In the third set of analysis, multiple regression analysis has been applied to explain the state-wise uneven growth pattern of national income by considering the growth rates of educational indicators and population (Table 4). Equation I taking into account all the six independent variables shows a satisfactory explanatory power since it explains as much as 56 per cent variation in the growth rate of national income. However, among the individual factors, total workers (X1), and workers with completed I level of education (X3) turn to be statistically significant. When X1 and X6 are dropped from this equation, workers with completed II level of education (X4), and workers with completed III level of education (X5) also become significant, but the overall explanatory power of the equation is reduced to 45 per cent. Equation III which combines only three independent variables, explains the 37 per cent variation in the growth of national income. However, among the individual factors only X3 and X4 are significant, whereas X5 becomes insignificant. When X_3 is dropped from this equation, in equation IV, X4 and X5 remain significant and insignificant respectively, but the explanatory power of the equation is reduced to 30 per cent. In this set of analysis, the growth rate of total workers has been found significantly associated with the growth rate of national income, whereas the growth rate of literate workers became significant in one of the two equations. Here also the growth rate of workers with completed I level of education has assumed negative relationship with the growth rate of national income, which also as stated earlier may have been due to the problem of multicollinearity. But it is heartening to note that the growth rates of workers with completed II and III levels of education turn out to be reasonably positive factors influencing the growth of national income in the states of India.

Table 3: **Results of the multiple regression analysis for the annual growth rate (%) of per capita income: 1971-81**

Equation number	Regression Coefficients							
	Growth rate of total workers (X_1)	Growth rate of literate workers (X_2)	Growth rate of workers with completed I level of education (X_3)	Growth rate of workers with completed II level of education (X_4)	Growth rate of workers with completed III level of education (X_5)	Growth rate of population (X_6)	Coefficient of multiple determination (R^2)	F
I	0.5193** (0.4822)	0.1940 (0.2876)	−0.1411** (0.1121)	0.0357 (0.0790)	0.0275 (0.0936)	−0.5515 (1.1408)	0.4429	1.458
II		0.1984 (0.2186)	−0.1911* (0.0973)	0.0671 (0.0714)	0.0796* (0.0756)	—	0.3816	2.006
III			−0.1557* (0.0886)	0.0868* (0.676)	0.1013* (0.0712)	—	0.3424	2.430
IV				0.1081* (0.0709)	0.0266 (0.0610)	—	0.1974	1.844

*Statistically significant at 1 per cent level of significance.
**Statistically significant at 5 per cent level of significance.
Note : Figures in parentheses denote the standard errors of regression.

Table 4 : **Results of the multiple regression analysis for the annual growth rate (%) of national income: 1971-81**

Equation number	Regression Coefficient							F
	Growth rate of total workers (X_1)	Growth rate of literate workers (X_2)	Growth rate workers with completed Ist level of Education (X_3)	Growth rate workers with completed IInd leve of Education (X_4)	Growth rate workers with with completed IIIrd level of Education (X_5)	Growth rate of population (X_6)	Coefficient of multiple regression (R^2)	
I	0.7250** (0.6266)	0.2126 (0.3737)	−0.1766** (0.1457)	0.0552 (0.1026)	0.0468 (0.1216)	0.2957 (1.4825)	0.5579	2.314
II	—	0.4264** (0.3006)	−0.2337* (0.1338)	0.1045** (0.0981)	0.1068** (0.1039)	— —	0.4506	2.665
III	—	—	−1.1575** (0.1269)	0.1468* (0.0968)	0.1535* (0.1021)	—	0.3655	2.689
IV	—	—	—	0.1684* (0.0969)	0.0779 (0.0834)	—	0.2957	3.149

*Statistically significant at 1 per cent level of significance.
**Statistically significant at 5 per cent level of significance.
Note : Figures in parentheses denote the standard errors of regression coefficients.

Annexure 1: **Per capita income, and indicators of human capital formation in states of India – 1981**

States	Per capita net-state domestic product at constant (1970-71) prices (Rs.)	Literacy rate of workers (%)	Workers with completed I level of education (%)	Workers with completed II level of education (%)	Workers with completed III level of education (%)	Child mortality rate
1	2	3	4	5	6	7
1. Andhra Pradesh	647	29.1	17.26	5.71	1.72	91
2. Bihar	425	33.3	14.59	9.30	1.76	94
3. Gujarat	901	52.4	20.22	11.58	3.15	84
4. Haryana	1058	48.1	23.98	13.85	3.20	94
5. Himachal Pradesh	668	45.4	23.25	10.47	2.60	92
6. Jammu & Kashmir	642	34.1	18.00	9.45	3.08	78
7. Karnataka	687	42.8	24.09	8.83	2.50	81
8. Kerela	620	78.6	44.67	10.79	3.21	52
9. Madhya Pradesh	518	32.4	13.58	4.69	1.99	150
10. Maharashtra	964	51.0	26.75	11.71	3.26	92
11. Manipur	506	41.1	19.34	8.16	3.35	32
12. Orrissa	529	44.2	20.57	5.02	1.555	115
13. Punjab	1378	47.5	23.76	15.40	3.62	77
14. Rajasthan	535	32.8	15.75	6.27	2.35	114
15. Tamil Nadu	584	50.7	26.74	10.77	2.07	86
16. Tripura	623	50.7	21.11	7.46	2.51	111
17. Uttar Pradesh	519	37.0	17.91	8.28	2.61	130
18. West Bengal	797	51.4	28.38	9.38	4.13	95
Coefficient of variation	34.2	25.7	31.7	31.2	26.6	28.7

Sources : Column 2 : Estimates of State Domestic Product, 1970-71 to 1984-85, Central Statistical Organisation, Government of India, New Delhi.
Columns 3 to 6 : (a) Census of India 1971, Series 1 India, Part II-B(ii),General Economic Tables, Registrar General of India, New Delhi.
(b) Census of India 1981, Series 1 India, Part III-A(i) General Economic Tables, Registrar General of India, New Delhi.
Column 7 : Census of India 1981, Occasional Paper No. 5 of 1988, Child Mortality Estimates of India, Registrar General of India New Delhi.

Annexure 2: **Annual growth rates (%) of per capita income, national income, population, and indicators of human capital formation during 1971-81 — States of India**

	States	Per capita net-state domestic product at constant (1970-71) prices	Net state domestic product at constant (1970-71) prices	Population	Total workers	Literate workers	Workers with completed I level of education	Workers with completed II level of education	Workers with completed III level of education
	1	2	3	4	5	6	7	8	9
1.	Andhra Pradesh	1.06	3.60	2.31	2.57	3.73	3.26	9.50	18.36
2.	Bihar	0.57	3.11	2.41	1.87	4.29	2.45	17.59	12.10
3.	Gujarat	0.87	3.83	2.77	3.08	5.14	9.71	13.39	18.95
4.	Haryana	2.06	5.57	2.88	3.81	8.72	5.71	16.91	25.64
5.	Himachal Pradesh	0.15	2.18	2.37	1.50	5.89	7.77	10.95	18.54
6.	Jammu & Kashmir	1.72	5.15	2.97	3.24	8.78	8.17	10.47	21.10
7.	Karnataka	0.72	3.59	2.67	3.41	5.09	2.48	8.70	21.35
8.	Kerala	0.44	2.51	1.92	0.92	2.37	1.01	5.57	14.03
9.	Madhya Pradesh	0.70	3.45	2.53	3.10	4.70	3.90	7.56	15.83
10.	Maharashtra	2.31	5.49	2.45	3.21	4.62	2.81	15.41	17.38
11.	Manipur	2.97	7.57	3.25	5.46	6.91	8.18	19.37	30.90
12.	Orrissa	1.07	3.33	2.02	2.61	3.95	−1.27	13.07	18.95
13.	Punjab	2.88	5.97	2.39	2.59	5.11	5.05	9.21	21.25
14.	Rajasthan	−1.78	0.93	3.30	2.97	6.42	9.95	8.61	20.92
15.	Tamil Nadu	0.05	1.86	1.75	2.91	3.83	2.98	13.39	19.38
16.	Tripura	2.41	6.26	3.19	4.07	5.68	−2.45	15.27	13.36
17.	Uttar Pradesh	0.68	3.37	2.55	1.85	4.94	3.81	9.32	20.95
18.	West Bengal	1.04	3.59	2.32	2.47	3.32	0.43	4.45	10.10
	Coefficient of variation	107.6	43.1	17.3	35.7	32.7	87.5	36.2	25.9

Sources: Same as for Annexure 1.

22

Population Policies and Programmes in India during the Last Ten Years

DEBABAR BANERJI
Centre of Social Medicine and Community Health
School of Social Sciences
Jawaharlal Nehru University
New Delhi

MAJOR SHIFTS IN POPULATION POLICY

There seems to be a deterministic streak in the growth and development of India's family planning programme. Under all the assertion about sound 'planning' of the 'family', there has been a strong Malthusian overtone, making family planning synonymous with birth control, stressing that, otherwise, the fruits of development will be eaten away by the increasing number of people. It was inevitable that the state machinery would be used to coerce people to get acceptance of birth control. This culminated in the naked use of state power to forcibly sterilise people during the Emergency years of 1975-76, which, in turn, provoked a mass upsurge against the programme leading to far-reaching political consequences. From the standpoint of population policy, the year 1977 can be regarded as a major watershed.

As noted earlier, in March 1977 the new government categorically ruled out the use of force or coercion in any form in implementing what by then was renamed as family welfare programme. Expectedly, the Draft Sixth Five Year Plan (revised) (1978-83) (Government of India 1979: 48) stated that a population policy should reflect concern for the individual's as well as the community's dignity, needs and aspirations, and should be such as would deal with overall development issues and not merely population control: 'At the heart of the population policy lie the questions of providing to the Indian people in the shortest time a quality of life commensurate with the nation's resources.' High priority was to be given to programmes involving social restructuring — e.g. full employment, uplift of backward classes. Extensive efforts were to be made as part of a ten-year programme to create services which would have a direct bearing upon the family planning programme and creating the demand for such services by overseeing effective implementation of the other developmental programmes and their better integration with the health and family welfare services. Enforcement of the age at marriage law, changes in the educational system as would create awareness about population problems and intensification of the involvement of women in programme implementation were also urged. The Plan document spoke against the establishment of a unified, standardised, monolithic pattern of health and

family planning for the country and urged that it should be varied to meet differing conditions and take regional variations into account. Greater participation of state governments in policy formulation and implementation would lead to greater success, decentralisation, an intensified role for voluntary agencies and, most important, public participation, which were considered essential to bring about the desired social change and attitudinal acceptance of family planning (Government of India 1979: 44-50).

The 1980 report of the Planning Commission Working Group on Population Policy (Government of India 1980) is yet another significant landmark. It stressed the need to bring about a synergistic relationship between population and development programmes and that a failure to do so would have grave social, economic and political consequences for the country. The Group laid down a long-term goal of a 'net reproductive rate' (NRR) of one on an average for the whole country by 1996 and in all the states by 2001. It suggested a detailed strategy for each state suited to its conditions and the level of its family planning achievements so far. The basic strategies for achievement of the objectives were:

(a) developing the necessary level of demand, and
(b) provision of the supply of services of all kinds needed by the people.

The principal factors having important linkages with fertility control were identified by the Group are health care, education, water supply and economic factors such as employment and per capita income and urbanisation. Given the political will and support and active involvement of the people, it was felt that the problem was amenable to solution. An institutional framework at the highest level in the Planning Commission and the Government of India was suggested to bring about a better integration at all levels. A disaggregated communication strategy and a wide range of biomedical and socio-economic research to support the population control programme were also suggested. The Group also highlighted the need for the creation of an extensive data base and a comprehensive health information system.

As a result of an extensive and intensive review of the programme, the Union Government laid down a new strategy for future implementation (Government of India 1982a: 61-66). Its important features and guidelines are:

1. Adoption of the 'small family norm' would continue to be promoted entirely on a voluntary basis.
2. Intensified efforts would be made to spread awareness and information about this concept by effective and imaginative use of multimedia and interpersonal communication strategies.
3. Couples would be free to choose whatever method was suitable to them.
4. Services would be supplied as close to the doorstep as possible.
5. The programme would continue to be an integral part of health care and socio-economic development efforts.
6. Facilities and efforts for rapid increase in female literacy would be intensified and expanded.
7. Population education would be extended to youth in schools and colleges and

those out of school. It would be introduced in all workers' education and training programmes conducted by government agencies/departments and by the organised sector.

8. Elected representatives of the people at all levels would be closely associated with the programme and be provided all encouragement and support.
9. Linkages with the ministries and departments would be strengthened..
10. Laws relating to minimum age at marriage would be effectively enforced.
11. Maintenance of records of all marriages at the village or community level would be undertaken.
12. Because of the differences in situations and achievements among the various states and areas, a selective area-specific approach would be followed with special attention to states like West Bengal, Uttar Pradesh, Bihar, and Madhya Pradesh.
13. Close monitoring and follow-up would be ensured at all levels. Steps would be taken, in consultation with the state governments, to tone up the administrative machinery and improve motivation and accountability of staff at the field level.

IMPLICATIONS FOR IMPLEMENTATION OF THE POPULATION POLICY

It is obvious that very urgent and very drastic actions were needed to stem the rate of population growth in India. This time the drastic solution suggested was qualitatively different from the drastic solutions of the past: the suggested solution was no longer in the form of escalating coercive actions or education and mass communication gimmicks and induction of brand new contraceptive products like the intrauterine device and the pill, mostly prompted by family planning experts from abroad. The policy of the government of India was to generate motivation for adoption of a small family norm by extending considerably the base of the family welfare programme: apart from providing effective and efficient family planning services, the policy envisaged inclusion of services to cover areas such as health, especially maternal and child health, nutrition, water supply and sanitation, raising status of women, education, employment, social justice and land reforms within the limit of family welfare programme.

Credit must also go to Shri J.R.D. Tata for mobilising in 1981 influential sections of the society in favour of the new policy (*Times of India* 1981). Through his efforts all the important political parties, except the communist parties, eminent business leaders, academicians, writers, artists and social workers, had lent their support to the policy.

An Association of Parliamentarians for Population and Development had been formed in 1977 (Government of India 1981) to lend an active support of people's representatives to this programme. This association claimed that it would build up a mass movement by promoting the programme at the grassroots.

Obviously, a basic shift in the policy should be accompanied by a basic change in the organisation and management of the family welfare programme. There was considerable scope for administrative action to make the programme more effective and more efficient. Similar actions were also needed in the other sectors which generate motivation for a small family norm. For example, in the Statement on National Policy of 1982 (Government of India 1982b), the existing health organisation has been

described as curative in nature and oriented to the privileged people living in urban areas and that the then existing wide cultural gap between the service providers and the people needed to be bridged. Finally, there was also the critical need for formation of a supra-ministerial agency which should provide the critical integrative linkages among the wide spectrum of services for dealing with the problem of population growth in India.

Apart from the above considerations, managers of the family welfare programme were also required to face the formidable problem of "low performance" states like Uttar Pradesh, Bihar, Rajasthan and Madhya Pradesh, which account for about two-fifths of the total population of the country (Bose 1988: 460). Their performance is low not because they belong to what has been derisively called the "Hindi Belt". They have suffered considerable neglect, deprivation and exploitation as a result of which they are also poor in terms of per capita income, prevalence of hunger, education and literacy, mortality and morbidity rates and health services. The task for the managers was to reverse these trends by improving organisation and management of an integrated family welfare programme in these states. Without such action in these states it would be unrealistic to expect a major impact on the growth of population in India.

To be able to perform such challenging tasks, managers of the programme were required to have a wide range of interdisciplinary competence. They also had to be assigned to the programme on a long-term basis and they should be held accountable for their decisions. Obviously, the leadership of the programme should not remain the exclusive preserve of generalist administrators, who come to the programme as birds of passage.

FAMILY WELFARE PROGRAMME

Against this background of the very grave nature of the problem, the prompt and appropriate response of the government to it and the wide public support to the government's new policy, it should be a matter of serious concern that there has not been corresponding changes in the organisation and management of the national programme. The programme goes in its old, wasteful, ponderous and blundering way. It continues to pursue broadly a "more of the same" approach. Generalist administrators, who cannot be expected to have the wide range of interdisciplinary competence to implement the new policy, continue to provide leadership to the programme.

Under such leadership it is not surprising that the government should have launched the very expensive Area Projects in different states, which literally amount to doubling of the "same" old programme, without *first ensuring* that the programme is made more effective and efficient and it develops the intersectoral dimensions envisaged in the government policy. Sixty-three districts in 14 states have been taken up under five Area Projects with financial assistance from World Bank, United Nations Fund for Population Activities (UNFPA), Danish International Development Agency (DANIDA), United States Agency for International Development (USAID), and Overseas Development Agency of the United Kingdom (ODA) (Government of India 1984: 20-22). Total allocation for covering all the 63 districts under Area

Projects amounts to over Rs. 2,500 million (Government of India 1984: 20-22).

These projects were designed to strengthen the infrastructure for the delivery of health and family planning services in backward rural areas, along with development of Information, Education and Communication (IEC) activities, orientation training camps for village leaders, extension of mass media and improved management, training, monitoring and evaluation. The accent was on innovative activities.

The formation of the Indian Association of Parliamentarians for Problems of Population and Development (Government of India 1981) in 1977 was a significant event. It is a non-party organisation which expresses the universal national concern for the problem. The United Nations Fund for Population Activities (UNFPA) has played a significant role in the formation, growth and development of this Association. In its first National Conference in May 1981 (Government of India 1981), it called for consolidating voluntary cooperation of people in family planning in the overall context of development programmes. It unanimously adopted a declaration which recognised family planning as a basic human right which is vital to development and as an instrument for social change. It pledged total political commitment to the programme, and resolved to keep it out of the realm of political controversy. This Association adopted a declaration and resolutions and recommendations which sum up the current consensus on the family planning movement among elected representatives of the people belonging to different political parties and their commitment to it.

ANALYSIS AND ASSESSMENT OF THE FAMILY WELFARE PROGRAMME

Perhaps by far the most tragic aspect of development of health and family planning services in India during the past ten years is that, instead of rising to the challenge of implementing the accepted policies, there has been a steep decline in the quality of the family planning and public health practice. There has been a precipitous decline in the quality of public health practitioners (Banerji 1988). As a result, some of the key public health posts in the health administration at the union and state levels are filled by clinicians and teachers from pre-clinical and para-clinical disciplines – anatomists, pharmacologists, pathologists, biochemists and physiologists. The generalist administrators have also taken advantage of this weakness among public health practitioners by taking over positions for themselves which in fact required a high degree of epidemiological and other technological competence. The technical post of commissioner, family planning at the Union Ministry of Health and Family Welfare was taken over by them in the mid-1970s.

It is significant that while the number of the other technical posts of deputy commissioners has remained the same (i.e., 3) during 1967-68 and 1986-87, during the same period, the posts of joint secretaries and directors/deputy secretaries have gone up from, respectively, one and four (Government of India 1969) to four and seven in the Union Department of Family Welfare (Government of India 1988) and from two and five to four and eight in the Department of Health. Ashish Bose (1988, 2: xlii) has drawn attention to this dominance by generalist administrators in the context of foreign-aided projects. He observes: "Since foreign aided projects must necessarily be cleared by the government of India, the bureaucrats enjoy almost a monopoly in regard to the control and supervision of these projects. We believe that such a situa-

tion does not rule out the possibility of an unholy alliance between the agents of aid givers and aid-receivers". That this fear is not misplaced is borne out by the fact that many of the bureaucrats, who had negotiated with the aid givers, have later found jobs in the aid-giving organisations. This also at least partly explains why the Government of India agreed to accept the obviously ill-conceived Area Projects funded by foreign agencies (Bose 1988: 337-45; Banerji 1985: 287-88).

During 1980-88, five generalist administrators have occupied the crucial post of additional/special secretary-cum-commissioner in the Union Department of Family Welfare. It should take more than a year for a newcomer to even get acquainted with the organisation and functioning of this enormous and highly complex programme. This provides an eloquent testimony of the commitment of the political leadership to implement the policy pronounced by them.

Later, at some places, the generalist administrators had even taken over implementation of the family planning programme at the state level. The Divisional Commissioners and the District Collectors became the main leaders for implementing the programme, with Directors of Health Services and the District Chief Medical Officers playing a subsidiary role. The Director of the Technology Mission on Immunisation, which requires such a high level of competence in epidemiology, medical technology and public health practice, is a joint secretary in the Union Ministry of Health and Family Welfare! The generalist administrators obviously do not have either the qualifications or the competence to run such complex and massive public health programmes. Worse still, unlike health professionals, they cannot be held accountable for their decisions, because they are frequently transferred to altogether different areas of responsibility: a classical instance of authority without responsibility.

The composition of the Task Force on Immunisation constituted by the Government of India (1985), which formulated the ill-conceived Universal Immunisation Programme (UIP), provides a very striking example of the quality of public health practice at the highest level of the government. It was headed by the then additional secretary-cum-commissioner of family welfare. He had come to that post on promotion from the Ministry of Finance, and later on, he was assigned a position which dealt with rural development. Significantly, the two medical personnel who were singled out for their contribution to the deliberations of the Task Force did not have any public health training or experience: one specialised in pathology, while the other was an anatomist.

The political leaders heading the governments at cabinet and health ministry levels at the centre and the states must be squarely held responsible for this sad state of affairs. They had remained inactive when there was a steep fall in the quality of public health practice in India following their decision to abolish the all-India cadre of the Indian Medical Service of the colonial days. They had approved appointment of obviously unqualified medical personnel to key public health posts. They also allowed the generalist officers to exercise authority in technical fields and for not holding them accountable for their decisions.

The neglect of some of the basic principles of public health practice has had very serious consequences for the country. Because of domination of the family welfare programme by generalist administrators, it degenerated to a game of numbers — attainment of 'targets' for contraceptive use among the 'eligible' couples. Giving the

overriding priority to achieving targets — sometimes by using foul means — led to neglect of other health services. It is now being increasingly realised that, despite the massive efforts by generalist administrators, the reduction in the rate of population growth has substantially fallen short of expectation (Government of India 1987). A major cause of this shortfall is that, instead of including the socio-economic measures for demand generation within the family welfare programme, it degenerated into a mere programme of 'catching' as many people as possible to attain the 'targets' prescribed from above. Ironically, in a country which professes to be democratic, its people become the 'targets' of its own government and often overtly coercive tactics have been used make people submit to sterilisation. Submission of false achievement reports and sterilisation of persons who are of little or marginal demographic relevance can be expected as a logical outcome of such a strait-jacketed, Malthusian approach to population control in India (Bose 1988: xliv -xlv)

There were equally glaring shortcomings in the bureaucratic approach adopted in the formulation of the Universal Immunisation Programme launched at the behest of the Task Force headed by a generalist administrator (Government of India 1985). Why, in the first place, should such a health programme be administered by the Union Department of Family Welfare? Such a massive programme involving an additional investment of Rs. 3.5 billion was launched without even defining adequately what the problem was: the size, distribution and time trends of the six diseases chosen for immunisation. Similarly, the programme was sought to be implemented through the existing health service system without ascertaining the capacity of the system to sustain the cold chain which is so vital for retaining the potency of the vaccines, and to be able to undertake the massive task of getting the immunisation coverage, over and above sustaining its work in the field of family planning and other activities included under primary health care (Banerji 1988).

This was a blatant reversal of the Alma Ata Declaration. Not only is the approach directed to a mere handful of diseases, but it was technocentric and imposed on the people. To make matters worse, the epidemiological foundation of this programme is extremely fragile, and its logistical design has serious shortcomings.

It is now over seven years since the first National Conference of Parliamentarians for Problems of Population and Development made its sweeping Declaration and elaborate Recommendations which culminated in the adoption of five resolutions. Since then there have been a number of international conferences and seminars, mostly with active support from UNFPA. These have been referred to underline the thinking amongst elected representatives from virtually the entire political spectrum of the country — only the communist parties did not participate.

It was resolved that all elected representatives, from panchayats upwards, would give a concrete demonstration of their determination to seek vigorous and speedy implementation of the programme in the very next session of their respective bodies. They would also undertake house-to-house education, contact at least 1,000 families each year, and set up constituency-level committees and promote general community involvement. One does not have to undertake an elaborate research study to come to the conclusion that not even one per cent of all that had been resolved more than seven years ago, by those who claim to represent the people of the country, has been translated into reality.

In a recent review of the impact of the programme, the Government of India (1987) has pointed what it calls a very disqueiting demographic scenario: mean (wife's) age of vasectomy and tubectomy acceptor being 31.8 and 30.3 and mean number of living children 3.3 and 3.5, respectively; the birth rate in the four Hindi-speaking states remains around 40 while the range of total fertility rates is 5.0 to 6.0, against the all-India level of 4.5. The rural infant mortality rate is 152 for Uttar Pradesh against a national average of 105.

In his Presidential Address to the Indian Association for the Study of Population in 1985, 1986 and 1987, Ashish Bose had consistently expressed his strong disapproval of the obsession of the demographers and managers of the programme with decimal points. Elaborating his contentions, he has asserted (Bose 1988, 1: xlix): Our family welfare programme should not degenerate into a body-snatching sterilisation programme relying on high-tech methods of sterilisation and use of money power in the name of motivation. Our analysis of the demographic scene and the working of the family planning programme during the last three decades or so, leads us to believe that we are still on the wrong track. Reeling out figures on targets and achievements, on births averted and harping on the magic number of NRR of unity by 2000 A.D. will not lead us anywhere. There is no short-cut to population stabilisation. Development is indeed the best contraceptive. We must move away from the cold calculus of aggregate numbers reflected in population and move to people in flesh and blood. Our masses will not let us down if we do not let them down.

CONCLUSION: POLITICAL ECONOMY OF POPULATION CONTROL

It is quite understandable that the rich and the powerful, who have benefited so much from the fruits of development of the past four decades, should be so deeply worried about the grave threat to the system by the rising numbers. However, by the same token, it is not adequately understood by them (or perhaps they pretend not to) that population growth is not perceived as a threat by the bottom half of the population of the country who constitute some 400 million people. These people have been virtually bypassed in the development activities of the past four decades. They suffer from hunger; they live in the most degrading conditions; they have virtually no access to health and education services, there is blatant social, economic and political discrimination against them; they have not much to look forward to, nor do they see much of a future for their children and grandchildren. How can such a group of people have a stake in a system which has treated them so harshly?

The very nature of the colonial and post-colonial development process has ordained that the rich and the powerful will become richer and more powerful, leaving vast masses of people poor and weak. Under such conditions of social relations it is also inevitable that the rich will blame the victims for the latter's poverty and degradation. The spectre of rapid population growth comes as a convenient alibi to explain the prevalence of extensive poverty and degradation within the population of the country. Was the failure to meet the constitutional directives to provide universal primary education by 1960 due to the rapid rise of population? Again, was it rapid rise in population which came in the way of implementing the policies concerning land reform, providing health services to the deprived sections and ensuring social,

economic and political justice to the scheduled castes and tribes? Can it be that the basic failures in the alleviation of conditions of poverty and degradation of the masses of the population were at the root of the population problem of the country?

Indeed, in their thoughtful moments, at least some among the rich and the powerful did think of this possibility. For instance, on May 7, 1981, J.R.D. Tata brought together 84 very eminent persons from different walks of life in India to make an impassioned plea for inclusion of a "package of social and economic development and well-structured health measures" within the family planning programme to build what they called a better future for India. "High fertility is both the consequence and the cause of destitution... Unfortunately, the thrust towards equity and basic needs has been halting although the family planning programme is central to national development and human rights" (*Times of India* 1981).

The forces which have made the rich and powerful richer and more powerful also have ensured that when threatened by the spectre of unbridled population growth among the poor and the weak, this group will use the raw coercive power of the state to force the poor to accept contraception.

Looking back at the family planning work of the last three decades, one can discern an aura of inevitability in its development. When population growth seemed to threaten the vital interests of the rich and powerful, the state was bound to come on their side and unleash a coercive sterilisation drive against the helpless, poor people. One obvious outcome was the increasing dominance of the programme by bureaucrats-generalist administrators.

Invoking their colonial past, with full connivance of their political mentors, the bureaucrats let loose a reign of terror among the weak and helpless. All sorts of means were employed to 'catch' people and sterilise them. Family planning became a menace to the masses of people. Fortunately, this terror-inspiring onslaught on the poor seems to have once again got stuck in a *cul-de-sac*. The rate of population growth remains alarmingly high. There is often no correlation between 'couple protection' and fall in birth rate. The figures given are often fake. Many of the acceptors already have a large number of children.

This crisis is a sign of a deep contradiction in the system. Are the political leaders now prepared to put into practice the package of programmes which J.R.D. Tata and the 84 eminent concerned citizens so passionately pleaded for on May 7, 1981 as a blue-print 'For a Better Future' for India? If not, it is condemned to re-live another bout of self-deception and yet another spurt of population growth when India takes its plunge into the twenty-first century.

REFERENCES

Banerji, D., 1988, Crusaders for population control. *Economic and Political Weekly.* Vol. 23. No. 31, July 30.

Bose, A., 1985, *Demography Beyond Decimal Points: Address. Tenth Annual Conference.* Bangalore. Indian Association for the Study of Population.

——, 1986, *Population Stabilisation through Bureaucratic Targetism or Social Transformation: Presidential Address Eleventh Annual Conference.* Varanasi, Indian Association for the Study of Population.

——, 1987, *For Whom the Target Tolls? A critique of Family Planning Incentives, Cash Awards and Targets; Presidential Address. XIIth Annual Conference of the Indian Association for the Study of Population.* Allahabad. Allahabad University.

——, 1988, *From Population to People. Delhi*, B.R. Publishing, 2 vols.
Government of India, 1969, *Report 1968-69*, New Delhi, Ministry of Health and Family Planing and Works, Housing and Urban Development.
——, 1979, *Draft Sixth Five Year Plan Revised*, New Delhi. Planning Commission.
——, Working Group on Population Policy, 1980, *Report*, New Delhi, Planning Commission.
——, 1987, *First National Conference of Indian Association of Parliamentarians for Problems of Population and Development, New delhi, May 25, 1981:* New Delhi Declaration of Parliamentarians, New Delhi, Ministry of Health and Family Welfare.
——, 1982a, *Annual Report 1981-82*, New Delhi, Ministry of Health and Family Welfare.
——, 1985, *Universal Immunization Programme by 1990: Report of a Task Force*, New Delhi, Ministry of Health and Family Welfare.
——, 1987, *India's Population: Demographic Scenario*, New Delhi, Ministry of Health and Family Welfare.
——, 1988, *Annual Report 1987-88*, New Delhi, Ministry of Health and Family Welfare.
Tata. J.R.D., 1981, Incredible, Controllable Blast, *Times of India*, May 8.

23

Stalling of Fertility Decline in India

K. SIVASWAMY SRIKANTAN
and
K. BALASUBRAMANIAN
Gokhale Institute of Politics and Economics, Pune

BACKGROUND AND OBJECTIVES

India was the first country in the world to introduce an official programme for family planning as an integral part of its socio-economic development plan as early as 1951. Since then the Indian Family Planning Programme has grown steadily in coverage and today it is the largest voluntary programme administered by any Government. During the initial stages of the programme, success was limited because a number of new strategies were tried out. Moreover, time was needed to build the programme infrastructure and to strengthen the motivation for adopting small family norms.

It was only after 1966, when the family planning programme was expanded and reorganised, and a separate Department of Family Planning was created in the Ministry of Health, that the birth rate started to decline significantly.

Analysis of available data indicates that fertility had declined substantially between the late 1960s and early 1970s. However, since 1976, the decline in fertility has slowed down. According to the Sample Registration System (SRS), the crude birth rate for rural India has been around 34, while the rate for urban India has been around 27 since 1976.

Questions about the effectiveness of the family planning programme and the quality of data provided by the Department of Family Welfare have been raised. According to family planning service statistics, the couple protection rate (CPR) by both sterilisation and non-terminal methods, such as IUD and condom, has been gradually increasing since the inception of the programme and more rapidly since 1982.

The CPR has recorded a significant increase from 10.4 per cent in 1970-71 to 37.5 per cent in 1986-87, by 27.1 percentage points in 16 years. During the recent period, the CPR has increased from 22.8 per cent in 1980-81 to 37.5 per cent in 1986-87, an increase of 15 percentage points in just six years. But this quantum of increase in CPR has not produced a matching decline in the crude birth rate. The SRS figures indicate that the birth rate has remained constant at 33.7 between 1979 and 1984, and then it has declined slightly to 32.4 in 1986.

Given this anomaly between the trends in CBR and CPR and considering the urgency of achieving the long-term demographic goals for India, the stalling of the birth rate decline naturally evokes concern among planners and programme

administrators. This paper investigates the important factors accounting for a slow decline in CBR, in the face of an increasing couple protection rate in the major states of India. While unravelling the underlying reasons for the observed anomalies between CBR and CPR trends, the paper also explores some of the linkages between fertility and contraception and their determinants.

The data sources for this study are population censuses, the Sample Registration System (SRS) and family planning service statistics provided by the Department of Family Welfare Programme of the Government of India. Data from contraceptive prevalence surveys carried out in various developing and developed countries have also been examined to understand the nature and strength of the association between the levels of contraception and fertility.

FERTILITY TRENDS

Prior to 1960 fertility in India was relatively high and remained virtually constant. Our knowledge on the level of fertility is sketchy for this period because of paucity of information on important demographic variables. Efforts to understand the level of fertility in the Indian subcontinent were made, among others, by Davis (1951) and Mukerjee (1976) who estimated the birth rate using the census age-sex data for different decades from 1901-11 to 1931-41. Although much credibility cannot be attached to these estimates because of limitations of data quality and methods of estimation, it may be noted that the Indian birth rate did not exceed 50 at the beginning of this century.

For the period 1951-61, available estimates suggest that the birth rate was about 45 (Rele and Sinha, 1970). For the next decade 1961-71, different estimates of the birth rate based on census data of 1961 and 1971 vary between 40.5 and 42.0 (Adlakha and Kirk, 1974).

For the recent decade 1971-81, using the age-sex data available from the 1981 census, the birth rate for India has been estimated by the reverse-survival method (Srikantan and Balasubramanian, 1987). This method gives an estimated CBR of 39.8 during 1971-76 and 35.0 during 1976-81. These estimates come close to estimates of 39.3 and 34.4 which are obtained using a different method of estimation based on child-woman ratios (Rele, 1987). On this basis, the CBR for India seems to have declined by 4.8 points per 1000 population between 1971-76 and 1976-81.

Estimates of CBR for 1961,1971 and 1981

The SRS was implemented on a pilot basis in a few selected states of India in 1966, but since 1970 the entire country has been covered. SRS data are subject to sampling and non-sampling errors with a likely downward bias in the estimates of vital rates. An intensive enquiry of a 10 per cent sub-sample of SRS units in some of the larger states of India conducted in 1980-81 revealed that at the national level the extent of underenumeration of births was of the order of 3 per cent (Registrar General, 1984). The adjusted birth rate in 1981 would be 34.9 which is close to the rate of 35.0 obtained by the reverse-survival method for the period 1976-81. In view of this, 34.9 has been taken as the birth rate for 1981.

The recorded age-specific marital fertility rates in the 1972 Fertility Survey (Registrar General, 1976) conducted by SRS, when applied to the 1971 census age distribution of married women of reproductive ages, produce a CBR of 40.1 which again comes close to the SRS adjusted birth rate of 40.0 in 1971 (Registrar General, 1983). Therefore, the CBR for 1971 is placed at 40.1.

As already mentioned, there is agreement among demographers that the birth rate during 1951-61 (centred at 1956) was about 45. Assuming a linearly declining trend in the birth rate between the level of 45 in 1956 and 40.1 in 1971, a birth rate of 43.4 is interpolated for 1961.

To sum up, the CBR in India seems to have declined from 43.4 in 1961 to 40.1 in 1971 and further to 34.9 in 1981, an 8 per cent decline in the birth rate between 1961 and 1971 and a 13 per cent decline between 1971 and 1981.

Decomposition of CBR Decline during 1961-71 and 1971-81

Since the crude birth rate is influenced by factors other than changes in marital fertility, it is necessary to decompose the CBR decline into its major components in order to assess what part of the decline in CBR could be attributed to changes in marital fertility. The standardisation method given in Manual IX of United Nations (1979) is used here for decomposing the changes in CBR during 1961-71 and 1971-81. The basic data used for the decomposition of the CBR are given in Tables 1 and 2.

Table 1: **Proportions married females by age and age specific marital fertility rates, India, 1961-81**

Age group	Proportion married females*			Age specific marital fertility rates (per 1000)		
	1961	1971	1981	1961@	1971+	1981**
15-19	.6957	.5541	.4347	232.7	213.5	219.9
20-24	.9176	.8883	.8444	323.1	312.8	309.2
25-29	.9417	.9495	.9433	291.8	299.1	260.3
30-34	.9143	.9406	.9481	231.7	239.7	187.1
35-39	.8702	.9135	.9317	165.3	161.1	116.3
40-44	.7766	.8419	.8781	71.9	86.7	52.9
45-49	.6973	.7803	.8293	28.4	29.4	24.9

* The data on proportions married females are from respective censuses of 1961, 1971 and 1981.

@ Age-specific marital fertility rates from the Fourteenth Round of National Sample Survey (Government of India, 1963) have been inflated by a correction factor to give a birth rate of 43.4.

\+ Age-specific marital fertility rates are from 1972 Fertility Survey of SRS (Registrar General, 1976).

** The age-specific fertility rates from SRS for 1981 were inflated prorata (34.9/33.0) to obtain a CBR of 34.9; and then converted to age-specific marital fertility rates using the 1981 census proportions of married women.

The results of the decomposition of changes in CBR attributable to the four components — age structure, marital status, marital fertility and proportion of women in reproductive ages — are summarised in Table 3. The changes in marital fertility between 1961 and 1971 accounted for only 6.4 per cent in the CBR decline, while the other three components accounted for more than 95 per cent decline, of which the proportion of women in reproductive ages to the total population is the largest

component, accounting for 40 per cent.

Table 2: **Data utilised in the decomposition of the crude birth rate, India**

		Census Year		
		1961	1971	1981
1.	Total population (in 000's)	439235	548160	685185
2.	Female population (in 000's)	212942	264110	330787
3.	Female population in reproductive age group 15-49 (in 000's)	100347	121431	157908
4.	Per cent of females in 15-49 to the total population	22.85	22.15	23.05
5.	Number of married females in 15-49 (in 000's)	84713	101274	127432
6.	Per cent of married females in 15-49	84.42	83.40	80.70
7.	Crude birth rate (per 1000)	43.4	40.1	34.9
8.	General fertility rate (per 1000)	190	181	151

By contrast, the relative importance of the four components in the decline of the birth rate during 1971-81 is entirely different. Over this decade, the CBR declined by 5.2 points per 1000 population. The decomposition shows that changes in marital fertility accounted for the largest percentage decline (94 per cent) in the birth rate. Marital status accounted for 27 per cent and the age structure of women accounted for only 6 per cent of the decline. On the other hand, the changes in the proportion of women in reproductive ages to the total population had an increasing effect and accounted for +31.3 per cent of the change in birth rate during this period (Table 3).

During 1971-81, changes in the proportion of women in childbearing ages were unfavourable to a decline in the birth rate. This proportion increased from 22.2 per cent in 1971 to 23.1 per cent in 1981. On the other hand, in the previous decade 1961-71, the decline in the proportion of women in childbearing ages declined form 22.9 per cent in 1961 to 22.2 per cent in 1971 and was favourable to birth rate reduction. These opposing effects are reflected in the results of decomposition given in Table 3.

It may be noted that an increase in the proportion of women in childbearing ages would tend to stall the decline in the birth rate even when marital fertility falls. This could be one of the reasons for the birth rate to have remained nearly constant since 1977. It is estimated that the increasing trend in the proportion of women in childbearing ages is likely to continue up to the end of this century. Therefore, to offset the fertility-increasing effect of this proportion, contraceptive prevalence has to be enhanced substantially in the years ahead for achieving a perceptible decline in the birth rate.

As already noted, the decomposition technique reveals that changes in marital fertility accounted for a significant part of the decline in the CBR during 1971-81. Likewise, decomposition of the total fertility rate (TFR) would throw light on the effect of nuptiality changes vis-a-vis changes in the marital fertility in the overall decline in the TFR. Using the data on proportions of women married by age and age-specific marital fertility rates as given in Table 1, the TFR in 1971 and 1981 can be computed. The TFR in 1971 and 1981 worked out as 5.74 and 4.78, a decline of

Table 3 : **Results of decomposition of changes in crude birth rate (CBR), India, 1961-81**

Changes accounted for by	1961-71 (Base Population 1961)		1971-81 (Base Population 1971)		1961-81 (Base Population 1961)	
	Absolute change in CBR per 1000	Relative change(per-centage)	Absolute change in CBR per 1000	Relative change (per-centage)	Absolute change in CBR per 1000	Relative change (per-centage)
Age structure	−0.89	−27.0	−0.30	−5.8	−0.97	−11.4
Marital status	−1.06	−32.1	−1.40	−26.9	−2.61	−30.7
Marital fertility	−0.21	−6.4	−4.89	−94.0	−5.07	−59.6
Proportion of women of reproductive ages (15-49) in total population	−1.33	−40.3	+1.63	+31.3	+0.38	+4.5
Total change explained	−3.49	−105.8	−4.96	−95.4	−8.27	−97.2
Total change observed	−3.30	−100.0	−5.20	−100.0	−8.50	−100.0

Notes : The difference between observed and explained changes is due to the neglected interaction terms.
The percentage change are computed relative to the observed change in CBR, not to the explained change.
Negative changes represent declines in rates, while positive changes represent increases in rates.

0.96 births per woman during this decade. Had there been no change in the proportions of women married between 1971 and 1981, the TFR would have declined from 5.74 in 1971 to 4.95 in 1981, a decline of 0.79 births per woman over this period.

In other words, of the total decline in the TFR between 1971 and 1981, changes in marital fertility accounted for 82 per cent decline, while nuptiality changes accounted for the remaining 18 per cent. Because of the effect of non-programme factors on marital fertility, the entire decline in marital fertility between 1971 and 1981 cannot be credited to the family planning programme per se. But a significant part of it is undoubtedly due to the programme.

CONTRACEPTION AND FERTILITY

Contraception is one of the proximate determinants of fertility. The principal characteristic of a proximate determinant is its direct impact on fertility, when other proximate variables remain constant. An increase in contraceptive prevalence need not necessarily be associated with a decline in fertility. It is possible for a population to have a rising level of contraceptive use with constant fertility or sometimes with temporarily rising fertility, if, for example the duration of lactation declines concurrently. Likewise, improvements in mortality result in a decline in the proportion of widowhood and this contributes towards a rise in marital fertility, when other factors remain constant. The linkage between contraception and fertility is complex because other proximate variables have a direct bearing on fertility and are correlated with contraception.

On the one hand, many developing countries with high fertility levels have policies and programmes to reduce their fertility rates by increasing the use of contraception among married couples. On the other hand, demographic goals are often set in terms of the crude birth rate. It is, therefore, necessary to examine the relationship between the contraceptive prevalence rate (CPR) and the crude birth rate (CBR). First, the worldwide pattern of association between contraceptive level and crude birth rate is examined cross-sectionally by taking countries as units. Next the trends in CPR and CBR for India are presented and the factors accounting for the relationship between CPR and CBR are discussed.

Relationship between Contraception and Birth Rate: World Pattern

The empirical relationship between contraceptive prevalence and fertility at the global level is obtained by using the available cross-sectional data on CPR and CBR with countries as units. The contraceptive prevalence rate is defined as the percentage of currently married couples, in the reproductive ages 15 to 44, currently using contraception. Data on contraceptive prevalence for selected countries are available from World Fertility Surveys and Contraceptive Prevalence Surveys conducted during the 1970s and early 1980s. The data on CPR are taken from Mauldin and Segal (1986), while the estimates of CBR are drawn from the *World Development Report 1986* (World Bank, 1986).

A scrutiny of contraceptive prevalence rates reveals that there exists a wide range in this rate among countries in the world. In most African countries, the prevalence

rates are generally low. In countries of Asia and the Pacific region, the contraceptive prevalence rate ranges from 2 to 3 per cent in Afghanistan and Pakistan to as high as 70 per cent in China, Hongkong and Singapore. In countries of South America, the contraceptive prevalence rates are moderately high ranging from 26 per cent in Bolivia to 69 per cent in Puerto Rico. Most of the developed countries have prevalence rates of 70 per cent or over (Mauldin and Segal, 1986).

Cross-country comparison of data reveals the existence of an inverse relationship between contraception and fertility. This inverse relationship is quite strong when CPR is either very low or very high. But, at intermediate levels of contraception, the association between CPR and CBR becomes weaker.

The empirical relationship is obtained as the regression of CBR on CPR, taking countries as units of analysis. The regression for 71 countries (62 developing and 9 developed countries) *circa* 1984 is:

$$CBR = 49.04\text{-}0.45\ CPR,$$
$$R^2 = 0.85, N=71.$$

The data for this exercise are taken from Srikantan and Balasubramanian (1987).

The association between contraceptive prevalence and fertility level is very close, judged by the proportion of variance explained (0.85). If we exclude all the developed countries, then R^2, based on 62 developing countries, reduces slightly to 0.81.

It is important to emphasise that the strong association between CPR and CBR (R^2 = 0.85) should not be interpreted as a direct and complete causal relationship between CPR and CBR. There are many proximate variables that may offset this relationship. While contraception affects fertility within marriage, crude birth rate is affected by a number of factors such as age structure, changes in the nuptiality pattern and the proportion of women in the reproductive ages and also by the relative effectiveness and continuation rates of the contraceptive methods used. It is to be noted that such non-contraceptive factors as duration of lactation, length of post-partum amenorrhoea, the prevalence of induced abortion and the frequency of coitus can affect fertility within marriage.

Although the empirical relationship between contraceptive prevalence and CBR cannot be considered as a causal one, there is an interest in knowing the general level of birth rate associated with a given level of contraceptive prevalence. The above relationship can be used in situations where data are lacking on either variable only on the assumption that other factors remain unchanged.

Relationship between Contraception and Birth Rate: Indian Pattern

Trends in Couple Protection Rate

For assessing the fertility impact of family planning programme, two measures, namely, the number of births averted over the years and percentage of couples effectively protected against conception, termed as couple protection rate (CPR), are currently being used by the Department of Family Welfare. These measures are indirectly estimated from family planning programme statistics on the number of new

acceptors and the number of contraceptives distributed annually. For examining the trends in family planning, the CPR, estimated by the Department of Family Welfare, is used. The quality of service statistics and the methodological limitations in the estimation of contraceptive prevalence levels from acceptor data are discussed later.

The data given in Table 4 bring out the uneven trends in the performance of family planning programme in India as measured in terms of the couple protection rate (CPR). The CPR had increased gradually from 10.4 per cent in 1970-71 to 14.5 per cent in 1972-73 and then remained at around this level for the next two years. A large increase of about 9 percentage points in the CPR was recorded in the subsequent two years between 1974-75 and 1976-77, mainly due to the measures adopted during the Emergency period to accelerate the rate of acceptance. The major thrust during the Emergency period was on vasectomy which increased over ten-fold compared to 1974-75. This resulted in an upsurge in the couple protection rate which increased from 14.8 per cent in 1974-75 to 23.5 per cent in 1976-77.

Table 4: Trends in Couple Protection Rate and Crude Birth Rate, India, 1970-86

Year	Couple Protection Rate				Crude Birth Rate		
	S	I	CC	All	Rural	Urban	Total
1970-71	8.0	1.4	1.0	10.4	38.9	30.1	36.9
1971-72	9.7	1.4	1.2	12.2	38.9	30.5	36.6
1972-73	12.2	1.1	1.2	14.5	35.9	28.9	34.6
1973-74	12.2	1.0	1.5	14.7	35.9	28.4	34.5
1974-75	12.6	1.0	1.2	14.8	36.7	28.5	35.2
1975-76	14.2	1.1	1.7	17.0	35.8	28.4	34.4
1976-77	20.7	1.1	1.7	23.5	34.3	27.8	33.0
1977-78	20.1	0.9	1.5	22.5	34.7	27.8	33.3
1978-79	19.9	0.9	1.6	22.4	35.1	27.6	33.7
1979-80	19.9	1.0	1.4	22.3	35.1	27.8	33.7
1980-81	20.1	1.0	1.7	22.8	35.6	27.0	33.9
1981-82	20.7	1.1	2.0	23.7	35.5	27.6	33.8
1982-83	22.0	1.4	2.5	25.9	35.3	28.3	33.7
1983-84	23.7	2.2	3.6	29.5	35.3	29.4	33.9
1984-85	24.9	2.9	4.3	32.1	34.3	28.1	32.9
1985-86	26.5	3.7	4.7	34.9	34.1	27.0	32.4

Notes : The crude birth rate refers to calendar year. For example, the crude birth rate corresponding to 1970-71 refers to 1971.
S — Sterilisation; I — IUD; CC — Conventional contraceptives;
All — all methods.

Sources: Ministry of Health and Family Welfare (1988) and Registrar General (1988).

Following the period of the Emergency, the programme suffered a setback and the percentage of couples protected declined to 22.5 in 1977-78. The backlash effect of the Emergency continued for some more years and this is reflected in the CPR, which remained steadily around 22 per cent till 1980-81. The family planning programme had fully recovered by 1980-81 and since then there has been a rapid increase in the CPR. Between 1980-81 and 1986-87, in just six years, the CPR recorded a significant increase of about 15 percentage points, representing an annual increment of 2.5 percentage points. In 1986-87, 37.5 per cent of couples were protected by all methods of family planning (Table 4).

Although sterilisation has been the major component of the family planning programme, spacing methods have been receiving importance in recent years. In 1970-71, 8.0 percentage of couples were protected by sterilisation and 2.4 percentage by spacing methods. By 1980-81, the protection rate by spacing methods rose marginally to 2.7 per cent. But since 1980-81, there has been a steady increase in this rate and by 1986-87, about 10 per cent of couples were protected by spacing methods (Table 4).

The uneven trend in the performance of family planning is conspicuous also among major states of India (figures not given). Three different trend patterns in CPR could be identified during the period 1976-77 to 1980-81. In the states of Andhra Pradesh, Karnataka, Kerala, Orissa and Tamil Nadu, a constant CPR has been noted during this period. A downward trend in the CPR was observed in most of the northern states of Bihar, Haryana, Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh. This reflects that the backlash effect of Emergency was more severely felt in these states. Maharashtra and West Bengal could also be included in this category, but the declining trend in CPR continued only until 1978-79. Gujarat is the only state where the CPR has shown an uninterrupted upward trend since 1976-77.

After 1980-81 a more consistent trend in CPR emerges. All the states have shown an upward trend in CPR. The states of Gujarat, Haryana, Maharashtra and Tamil Nadu have recorded significant increases in CPR, between 18 and 25 percentage points, between 1980-81 and 1986-87. Punjab stands out as the only state in India where the CPR has registered a dramatic increase from 24.9 per cent in 1980-81 to 62.4 per cent in 1986-87 and the protection rate by spacing methods has increased from 5.7 per cent to 28.5 per cent during this period.

Trends in CBR from SRS

During the period of rapid increase in the couple protection rate, a slowing down of the birth rate decline has been observed in India (Table 4 and Figure 1). According to SRS, the CBR for the country as a whole has declined from 36.9 in 1971 to 33.0 in 1977, and then it remained at around this level during the next several years and then declined marginally to 32.4 in 1986. A linear regression fitted to the birth rates for the 16-year period 1971-86 does not give a very close fit (R^2 = .64). If we consider the post-Emergency period 1977-86, a linear regression is found to give a poor fit to the data on birth rates (R^2 = .06), as there was no significant trend in the birth rate between 1977 and 1986.

In examining the fertility trends in each major state, the various sampling and measurement errors in SRS have to be kept in mind. The state level analysis of SRS data (figures not given) indicates that the birth rate has stalled in most of the states of India during 1977-84. In the states of Bihar, Haryana and Rajasthan, the CBR has shown a slightly rising trend during this period. Kerala is the only state where CBR has declined significantly from 26.8 in 1980 to 22.7 in 1984 and then it has remained around that level in the two subsequent years. The state of Tamil Nadu where CBR was around 28 between 1977 and 1984, has registered a large fall in fertility in the next two years. The CBR in this state declined from 28.0 in 1984 to 23.7 in 1986, a decline of 15 per cent in two years. Most of the other major states have shown only marginal decreases in the birth rate between 1984 and 1986.

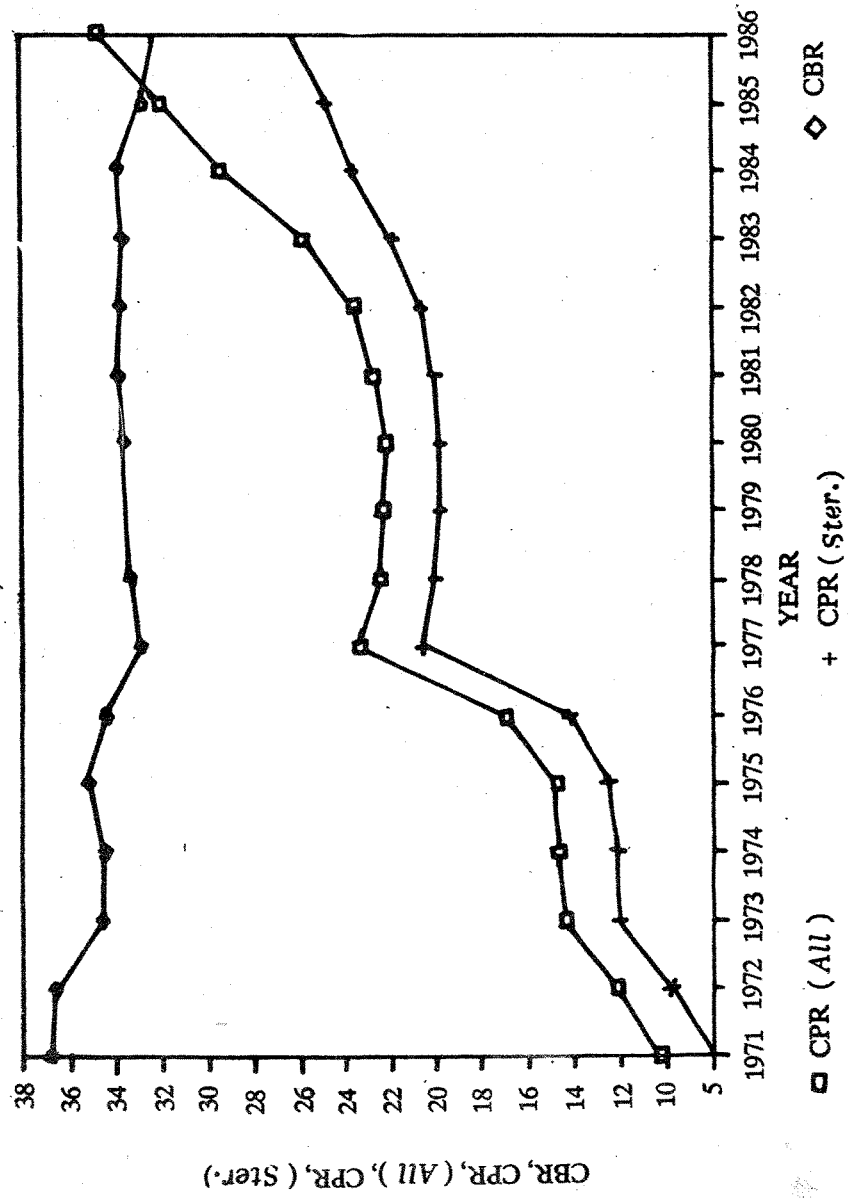


Figure 1 : Trends in CPR and CBR
INDIA, 1971 — 1986

Correlations between CPR and CBR

The strength of the association between contraceptive prevalence and fertility can be studied by means of correlation coefficients over time between CPR from family planning programme statistics and CBR from SRS for different years. Correlation coefficients between CPR and CBR for time series data for India as given in Table 4 have been computed.

For the 16-year period 1971-86, the correlation coefficients between CPR (all methods) and CBR is —.861 and that between CPR (sterilisation) and CBR is —.903, indicating a fairly high degree of negative association between CPR trends and CBR series. However, the strength of the association between CPR and CBR weakens if we consider the period 1977-86. The correlation coefficient between CPR (all methods) and CBR is —.645, while that between CPR (sterilisation) and CBR is —.649. It may be noted that both CPR and CBR are in the nature of cumulative indices, with some serial correlation.

The strength of the association between CPR and CBR weakens further if correlation coefficient are computed taking the annual changes in CPR and annual changes in CBR for the two periods, 1971-86 and 1977-86 as this would remove the effect of the serial correlation in the two cumulative indices. The correlation coefficients between CPR (all methods) and CBR and between CPR (sterilization) and CBR are —.644 and —.694, respectively, for the period 1971-86 and —.549 and —.567, respectively, for the period 1977-86. Therefore, the analysis of time series data for the country as a whole suggests that, although correlation coefficients between CPR trends and CBR are negative, they are generally weak, especially for the period 1977-86 or if annual changes are considered.

The strength of the association between CPR and CBR can also be studied by analysing the cross-sectional data for different states of India at one point of time. Sixteen major states, with population size of 5 million or more in 1981, have been taken as units of analysis for the computation of correlation coefficients for various years from 1975 to 1986.

Table 5 gives the correlation coefficients between CPR and CBR from 1975 to 1986. The correlation coefficient between CPR by all methods and CBR is denoted by r1, while r2 denotes the correlation coefficient between CPR by sterilisation and CBR. A perusal of the figures given in Table 5 reveals that, although the correlation coefficients are negative as expected, they are generally weak for all the years studied. The correlation coefficient, r1, ranges between —.216 and —.580 and r2 ranges between —.335 and —.720. It is found that the absolute value of r2 is greater than that of r1 for all the years examined. This implies that CPR accounted for by sterilisation is a better measure of family planning than by including other methods.

A comparison of CPR series with CBR for different states reveals some inconsistencies between these two series. In some states like Gujarat, Haryana, Orissa, Punjab and Tamil Nadu the upward trend in CPR is accompanied by almost unchanging birth rate during 1977-84. In some other states like Karnataka, Maharashtra and Rajasthan, both CPR and CBR show a rising trend. The apparent inconsistencies between CPR series and CBR trends account for the generally low and annually fluctuating correlation coefficients between the two variables, taking the major states as units of analysis.

Table 5: **Correlation coefficients between couple protection rate (CPR) and crude birth rate (CBR) taking major states of India as units**

CPR in year	CBR in year	Correlation Coefficient	
		r1	r2
1975-76	1976	−.216	−.335
1976-77	1977	−.228	−.373
1977-78	1978	−.419	−.474
1978-79	1979	−.495	−.552
1979-80	1980	−.471	−.530
1980-81	1980	−.580	−.609
1981-82	1982	−.519	−.541
1982-83	1983	−.576	−.606
1983-84	1984	−.537	−.677
1984-85	1985	−.538	−.720
1985-86	1986	−.493	−.711

Notes: r1 is the correlation coefficient between CPR (All methods) and CBR, while r2 is the correlation coefficient between CPR (sterilisation) and CBR.
Data on CPR are taken from Family Welfare Programme Year Books for various years. Data on CBR are taken from SRS. Sixteen major states of India have been taken for the computation of correlation coefficients.

DISCUSSION

This paper analyses the trends in fertility and family planning in India. It investigates the factors responsible for slowing down the decline in fertility in recent years, when the couple protection rate given by the family planning programme statistics shows a consistently rising trend.

This study reveals that during the recent decade 1971-81, CBR declined significantly by 5 points per 1000 population, from the level of about 40 in 1971 to about 35 in 1981. The decomposition technique shows that changes in marital fertility accounted for a significant part of the decline in CBR. The increase in the proportion of women in reproductive ages was unfavourable to a decline in the birth rate during 1971-81. This could be one of the reasons for the birth rate stalling around 33 between 1977 and 1981. It is estimated that the upward trend in the proportion of women in reproductive ages is likely to continue to the end of this century. Therefore, in order to offset the stalling effect of the rising proportion of women in reproductive ages on the birth rate decline, the level of contraceptive use has to be increased significantly. Other nuptiality and social changes beyond family planning are also necessary to bring down the birth rate sharply.

The pattern of relationship between contraception and fertility has been examined. At the global level, the strength of association between CPR and CBR is strong (with $R^2 = 0.85$) with countries as units of analysis. Taking states of India as units of analysis, the strength of association between couple protection rate from service statistics and CBR from SRS is found to be weak. This suggests that the relationship between contraceptive use and fertility among Indian states is much weaker than the corresponding relationship among countries of the world. One important reason for the differences between the Indian pattern and the global pattern of relationship between contraception and fertility is that the former is in the process of demographic

transition, whereas in the cross-country analysis, there are few countries undergoing demographic transition and many that are at the pre-transition or post-transition stage.

Another important reason for the observed weak association between CPR and CBR among Indian states is the questionable quality of data obtained from the family planning programme. With a target-oriented and time-bound programme, family planning workers are compelled to bring in a certain number of cases every year. This leads to some fudging of programme figures in order to fulfil the targets in time. In view of the various incentives provided by the programme, the likelihood of inflating the number of acceptors is increased. Therefore, while examining the linkages between contraception and CBR, the couple protection rate based on reported family planning performance figures cannot be accepted at face value. There is a need to adjust the performance figures for ineligible cases, bogus figures, and wastage in the distribution of condoms and oral pills.

The couple protection rate estimated from family planning programme statistics is generally above the CPR obtained from surveys, particularly for spacing methods (Bhate and Srikantan, 1987). To estimate the prevalence rate from acceptor data of the Family Welfare Programme, the number of new and previous acceptors of family planning and the number of contraceptives distributed over a year have to be converted to figures of current users. The methodology adopted by the Department of Family Welfare, for estimating the current users from acceptor data, is subject to numerous assumptions and limited and out-of-data information on the various parameters that enter into the calculation of couple protection rate.

It is necessary to update these parameters using the latest available information. It is also necessary to develop state-level parameters because of variations between states. Field studies have to be undertaken to obtain state-wise estimates for IUD retention rate, use-effectiveness of IUD and conventional contraceptives and age distribution at first acceptance of a family planning method.

The CPR that is currently provided by the Department of Family Welfare is a general rate for all reproductive ages. But acceptance of family planning varies greatly by age. For gaining a better understanding of the relationship of contraceptive prevalence to fertility, age-specific couple protection rates have to be correlated with age-specific marital fertility rates.

The total fertility impact of contraception cannot be assessed solely on the basis of data from the official Family Welfare Programme. What is more important in the long run, for achieving specified demographic goals, is the rate of contraception in the population from both programme and non-programme sources. There is a need to conduct contraceptive prevalence surveys periodically in order to assess the use of contraception in the population. Such surveys, if designed carefully and conducted periodically, would yield enough information on the extent of prevalence of both traditional and modern contraception and also the extent of contraceptive use in the programme and outside.

Information on such non-contraceptive factors as lactation, post-partum amenorrhoea, post-partum abstinence, incidence of abortions and the prevalence of various taboos governing sexual intercourse is also required. Current knowledge is inadequate to examine whether changes in these variables are occurring in society and to assess

the negative and positive fertility impact of modernisation.

Although the quantum of demographic information available in India is quite impressive by the standards of developing countries, serious gaps and deficiencies exist in terms of the quality of data obtained. Of all the demographic data, SRS is the most usable source that provides trends in fertility and mortality both at the national and state levels. Hence the system has to be strengthened and the quality of data obtained improved. It is necessary to standardise the field procedures and improve the training imparted to local registrars. The possibility has also to be explored for devising a rotation scheme whereby a certain proportion of the sample is rotated every year systematically. This would maintain the representative character of the sample and allow for efficient estimation procedures to be developed for trend comparisons.

REFERENCES

Adlakha, Arjun and Dudley Kirk, 1974, "Vital Rates in India, 1961-71", *Population Studies*, Vol. 28, No. 3 (November).

Bhate, Vaijayanti and K. Sivaswamy Srikantan, 1987, "Family Planning Behaviour in Maharashtra", *Artha Vijnana*, Vol. 29, No.1.

Davis, K., 1951. *The Population of India and Pakistan*, Princeton University Press, Princeton.

Government of India, 1963, *Fertility and Mortality rates in India*, National Sample Survey, Fourteenth Round, July 1958 – June 1959, No. 76, The Cabinet Secretariat, New Delhi.

Mauldin, P.W and S.J. Segal, 1986, *Prevalence of Contraceptive Use in Developing Countries*, The Rockefeller Foundation, New York.

Ministry of Health and Family Welfare, 1988, *Family Welfare Programme in India, Year Book 1986-87*, Government of India, New Delhi.

Mukerjee, S.B., 1976, *The Age Distribution of the Indian Population : A reconstruction for the states and Territories, 1881-1961*, University Press of Hawaii, Honolulu.

Registrar General, 1976, *Fertility Differentials in India'1972 : Results of the Fertility Survey in a sub-sample of SRS*, Office of the Registrar General, New Delhi.

——, 1983, *Sample Registration Bulletin*, Vol. XVII, No. 1, June.

——, 1984, *Sample Registration Bulletin*, Vol. XVII, No. 2, December 1983.

——, 1988, *Sample Registration Bulletin*, Vol. XXI, NO. 2, December 1987.

Rele, J.R., 1987, "Fertility Levels and Trends in India, 1951-81", *Population and Development Review*, Vol. 13, No. 3 (September).

—— and U.P. Sinha, 1970, "Fertility and Mortality in India, 1951-60", in Ashish Bose et al. (eds.). *Studies in Demography*, George Allen and Unwin Ltd., London.

Srikantan, K.S. and K. Balasubramanian, 1987, *Factors Underlying Stalling of the Birth Rate Decline in India*, Family Planning Foundation, New Delhi (mimeographed).

United Nations, 1979, *The Methodology of Measuring the Impact of Family Planning Programme on Fertility*, Manual IX, United Nations, New York.

World Bank (1986). *World Development Report 1986*, Washington, U.S.A.

Epidemiologic Transition in India

P.H. REDDY
Population Centre, Bangalore

INTRODUCTION

While Third World countries suffer from the problem of overpopulation, the developed countries suffer from a different kind of population problem. The latter drastically reduced mortality rates and considerably increased life expectancy. Birth rates also fell sharply. The result is considerable decrease in the proportion of children and enormous increase in that of old people in the populations. The number and types of problems presented by the sudden increase in the proportion of old people in the populations far exceed those the gerontologists claim to know. They are deeper and more complex than generally realised. They are not confined to the provision of food, shelter and clothing to the aged; they represent a whole gamut of social, psychological and health, both physical and mental, problems. One of the problems is that high infant and child mortality is replaced by high mortality among the aged. A consequence of this is that infectious and parasitic diseases are replaced by chronic illnesses and senility. The epidemiologic transition took place before the developed countries were prepared to cope with it. Analysing the problems created by the demographic and epidemiologic transitions in Europe, Imhof (1986a:79) observes:

> Instead of being confronted with a massive infant and child mortality as was previously the case, we are now faced with a concentratedly high mortality in old age. Instead of dealing with infectious and parasitic diseases as in earlier times, we now have to cope with long-lasting chronic illnesses and with the corresponding dependency and senility in the old and still older ages.

Although it has often been acknowledged that India was the first country in the world to have started an official family planning programme in 1951 in order to reduce the high fertility, the efforts made and still being made in India to reduce morbidity and mortality to increase life expectancy are not as often acknowledged. Between the beginning of the present century and now, crude birth rate has declined from about 49 per 1,000 population per year to about 33; crude death rate has been reduced from about 43 per 1,000 population per year to about 11; life expectancy at birth has increased from about 23 years to over 54 years. Life expectancy has been projected to increase to about 65 years by the end of this century (Department of Family Welfare 1988: 77). This has resulted in an increase in the number and proportion of old people

in the population and in the concomitant problems. We shall examine this point a little more closely later. Demographers and social scientists in India and abroad have been studying and helping to hasten the demographic transition in India, that is, transition from high birth rate and high death rate to low birth rate and low death rate. But they have not been paying adequate attention to the epidemiologic transition that has been taking place in India along with the demographic transition, and to its consequences. The objective of the present paper is to demonstrate that epidemiologic transition has been taking place in India and that there is need to make preparations to cope with its consequences. Before examining the epidemiologic transition in India, it would be helpful to clarify its meaning.

EPIDEMIOLOGIC TRANSITION

Epidemiology has been variously defined. Some defined it vaguely as follows: 'Epidemiology is what an epidemiologist does' (Sartwell 1972:4). Epidemiology traditionally concerned itself with the study of epidemics. More specifically, it focussed attention on '. . . contagious diseases during epidemic outbreaks' (Coe 1970: 33). But in recent years, the scope of epidemiology has been broadened considerably. Now it is 'the field of science dealing with the relationships of the various factors which determine the frequencies and distributions of an infectious process, a disease, or a physiological state in a human community' (Maxcy 1965:45). To put it briefly, epidemiology is concerned with '. . . the discovery of who in a population is ill' (Denton 1978: 52). Epidemiology deals not only with the distribution of a disease in a given population, but also with the factors that influence the distribution of the disease. Thus, epidemiology encompasses the study of not only epidemic diseases, but also of a variety of chronic diseases and other illnesses such as senility, mental illness, depression, suicides, accidents, etc. For example, the epidemiologic studies include those of malaria (Gunaratne 1980: 242-43), of disability (Cornoni-Huntley et al. 1985: 350-76), of cancer (Brue 1982: 95-101), of measles (Jajoo 1984: 204-7), of guineaworm infection (Mehta and Gupta 1985: 247-56), of depression (Quesada, Spears and Famos 1978: 77-85) and so on. Epidemiology is divided into two parts: one is called descriptive epidemiology and the other analytic epidemiology. The former is concerned with the *'distribution* of disease in human population' and the latter with the *'search* for the *underlying* causes of disease prevalence' (Park and Park 1977: 283).

Demographic transition leads to shifts in the composition of population by age groups. More specifically, demographic transition reduces the proportion of the young people and increases that of the old people in the population. It is common knowledge that the diseases children and young people suffer from are different from those old people are afflicted with. Thus, demographic transition leads to epidemiologic transition which is defined as 'a long-term shift in mortality and disease patterns whereby pandemics of infection are gradually displaced by degenerative and man-made diseases as the chief forms of morbidity and primary causes of death' (Omran 1977: 9).

Epidemiologic transition, like the demographic transition, takes place in stages. The stages of epidemiologic transition are explained as follows:

> In the first stage of the epidemiological transition, with mortality concentrated in early life, a very large proportion of the population is young. As a country enters the second stage, mortality falls, the growth rate rises, and the population in the younger age groups increases. With a decline in fertility in the third stage, the proportion in the younger groups declines and the proportion of people of working age and above increases. If there is a general decline in mortality (including a decline in the older age groups), there will be a further rise in the proportion of the elderly (WHO 1984: 10).

As compared with the foregoing description of stages of epidemiologic transition with emphasis on shifts in the proportions of young and old people in populations, Omran (1977: 9) divides it, following closely the stages of demographic transition, into three stages with emphasis on shifts in disease pattern and on longevity. The three stages are: (a) the age of pestilence and famine, (b) the age of receding pandemics, and (c) the age of degenerative and man-made diseases.

In the first stage, both mortality and fertility are high and life expectancy at birth ranges from about 20 to 40 years. In the second stage, mortality declines considerably as the incidence of epidemics becomes low or virtually disappears and fertility continues to be high. Life expectancy at birth ranges from about 30 to 50 years. In the third stage, mortality and fertility both decline considerably and life expectancy at birth exceeds 70 years. It is obvious that the two descriptions of the stages of epidemiologic transition are same albeit couched in different words.

COMPOSITION OF POPULATION

Let us first examine the composition of population by age group and changes in it in India. Table 1 presents data on the percentage distribution of population in India by age group from 1901 to 1981. A number of important observations can be made on this table. Children aged 0-14 years accounted for 38-39 per cent for the total population between 1901 and 1951. Their proportion increased to 41 per cent in 1961 and to a maximum of 42 per cent in 1971. But it decreased to 39.5 per cent in 1981. The trend in the proportion of children shows that until about 1951, India was in the first of the three stages into which epidemiologic transition is divided by Omran. In this stage, both mortality and fertility were high — the former was between 27 and 43 deaths per 1,000 population per year and the latter between 40 and 49 births per 1,000 population per year — and life expectancy at birth was between 20 and 32 years. India may be said to have moved into the second stage after 1951 and continues to be in it. Mortality rate fell to about 15 deaths per 1,000 population per year during 1971-81, but birth rate continued to be high at 37 births per 1,000 population per year; and life expectancy at birth crossed 54 years in 1980.

Table 1 further shows that the proportion of people aged 55 years and above increased from less than 7 per cent of the total population in 1901 to about 9 per cent in 1981. The increase is not dramatic, but the trend is unmistakable.

A projection from 1980 to the year 2000 has revealed that the number of those aged 65 years and over will be 17 million in India, as compared with 138 million in the entire world, 10 million in the USSR, 7 million in the USA and 21 million in the

People's Republic of China (WHO 1984: 9). Thus, by the end of this century, the number of those aged 65 years and over in India will be equal to the number of their counterparts in the USSR and the USA combined. The same projection has revealed that the number of the very old, that is, those aged 80 and over will increase by 2.3 million in India, as compared with 0.6 million in Brazil, 1.3 million in Japan and 5.7 million in the People's Republic of China (WHO 1984: 9).

Table 1: **Percentage distribution of population in India by age group, 1901-81**

Age group	1901	1911	1921	1931	1941	1951	1961	1971	1981
0-4	12.56	13.58	12.35	13.18	13.53	13.48	15.06	14.51	12.59
5-9	13.61	13.48	14.65	14.00	14.29	12.74	14.73	14.96	14.07
10-14	11.87	10.78	11.68	11.32	11.33	12.20	11.23	12.55	12.88
15-19	8.46	8.28	8.09	8.55	7.91	9.12	8.18	8.66	9.63
20-24	8.42	8.81	8.21	8.67	8.13	8.37	8.51	7.86	8.61
25-29	8.86	9.05	8.72	8.98	8.58	8.29	8.33	7.45	7.63
30-34	8.58	8.44	8.41	7.59	7.66	7.37	7.03	6.60	6.38
35-39	5.89	5.95	6.10	5.48	6.28	6.20	5.80	6.00	5.85
40-44	6.69	6.48	6.37	5.76	5.77	5.73	5.21	5.16	5.14
45-49	3.63	3.66	3.76	4.23	4.33	4.34	4.11	4.18	4.40
50-54	4.59	4.52	4.50	4.02	4.27	4.16	3.90	3.75	3.82
55-59	1.77	1.73	1.78	2.12	2.23	2.50	2.24	2.34	2.47
60+	5.07	5.24	5.38	5.10	5.69	5.50	5.63	5.96	6.49
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
N	237.51	251.17	250.43	278.05	317.04	356.79	439.23	548.16	685.18

N = Total population in millions.

Sources: Mukherjee, Sudhansu Bhusan, 1976. *The Age Distribution of the Indian Population*, Honolulu: East-West Center, East-west Population Institute.
Registrar General, 1983, *Census of India, 1981 — Series-1, Part-II-Special: Report and Tables Based on 5 per cent Sample Data*, New Delhi: Government of India.

PROPORTION OF DEATHS

Table 2 turns to consider the proportion of deaths by age group in India in selected years. A number of interesting observations can be made on the table. Infant deaths, which accounted for 22.4 per cent of the total deaths in 1968, were reduced to 16.8 per cent in 1983. Similarly, deaths among the children aged 1-4 years have been almost halved from 14.2 per cent of the total deaths in 1968 to 7.8 per cent in 1983. The reduction in the proportion of deaths among infants and children aged 1-4 years has been steady and continual. Deaths among children aged 5-14 years have been reduced considerably from 6.4 per cent of the total deaths in 1968 to 4.6 per cent in 1983. When deaths among all children, that is, those aged 0-14 years are considered, they have been reduced from 43 per cent of the total deaths in 1968 to 29.2 per cent in 1983.

Infant and child mortality rates are coming down due to various reasons. Important among them are improvements in medical technology, provision of more and better maternal and child health (MCH) services and increase in the percentage of the literates and the educated, especially among women.

Deaths among those aged 15-34 years, 35-54 years and 55 years and over, as proportions of total deaths, have increased with varying percentages during the period under consideration. The increase in the proportion of deaths among those aged 15-34 years was only marginal, rising from 9.4 per cent in 1968 to 9.8 per cent in 1983. But the increase in the proportion of deaths among those aged 35-54 years was slightly more, that is, about one per cent. What strikes the eye most in Table 2 is increase in the proportion of deaths among those aged 55 years and over; the proportion increased from 35.7 per cent of the total deaths in 1968 to 48.2 per cent in 1983. One of the reasons for this without doubt is increase in the proportion of people aged 55 years and over. Thus, it is quite clear from Table 2 that deaths among children, as proportion of total deaths, have been decreasing and those among the adults, especially among those aged 55 years and over, have been increasing.

Table 2: **Percentage distribution of deaths by age group in rural India in selected years**

Age group	1968	1973	1978	1983
Below 1 year	22.4	20.3	19.2	16.8
1-4	14.2	12.3	9.9	7.8
5-14	6.4	6.5	5.3	4.6
15-34	9.4	9.8	9.2	9.8
35-54	11.9	12.7	12.7	12.8
55+	35.7	38.4	43.7	48.2
Total	100.0	100.0	100.0	100.0

Source: Reports on Census of Death Surveys conducted in 1968, 1973, 1978 and 1983 by the Vital Statistics Division of the Office of the Registrar General, Ministry of Home Affairs, Government of India, New Delhi.

CAUSES OF DEATH

For a couple of reasons, it is indeed very difficult to obtain in surveys information on causes of death in India. For one thing, a very high proportion of deaths occur in the homes and not in the health institutions. This means that no medical attendant, who can identify the cause of death, is present at the time of death. And secondly, a high proportion of people are illiterate and, therefore, ignorant about the causes of death. In recent years, the situation has become somewhat better. In response to a recommendation of the All-India Conference on Improvement of Vital Statistics held at New Delhi in April 1961, the Vital Statistics Division of the Office of the Registrar General started on a limited basis in 1965 what is called Model Registration Scheme or Survey of Cause of Death aimed at collecting information on causes of deaths in the rural areas of the country. One of the good features of the survey is that data on causes of deaths are collected by paramedics attached to the primary health centres. In the present paper, data collected by the 1968, 1973, 1978 and 1983 surveys are made use of, covering a period of 15 years.

Table 3 presents data on the percentage distribution of deaths by cause-group in the rural areas of the country in 1968, 1973, 1978 and 1983. In 1968, 1973 and 1978, the 'cough' group of diseases (disorders of the respiratory system) claimed the highest

percentage of deaths. However, in 1978, the percentages of deaths due to 'other clear symptoms' group of diseases and to 'senility' were not very low; deaths due to 'other clear symptoms' group of diseases accounted for 20.4 per cent of the total deaths and those due to 'senility' for 19.2 per cent, as compared with 20.6 per cent due to 'cough' group of diseases. Further analysis of the data revealed that of the total deaths due to the 'cough' group of diseases, those among the people aged 55 years and over accounted for 39.5 per cent in 1968, 39.6 per cent in 1973, 45.7 per cent in 1973 and 45.6 per cent in 1983. The percentage of deaths due to the 'cough' group of diseases was higher among those aged 55 years and over than in any other age group in all the four years under consideration. Another point worthy of note is that the proportion of deaths due to the 'cough' group of diseases among those aged 55 years and over has increased from about 40 per cent in 1968 to about 46 per cent in 1983.

Table 3: **Percentage distribution of deaths by major causes of death in rural India in selected years**

Cause group	1968	1973	1978	1983
Violence or injury	4.3	4.0	4.9	5.5
Childbirth and complicated pregnancy	1.3	1.2	1.0	1.2
Digestive disorders	9.4	9.6	9.3	7.4
Cough (disorders of respiratory system)	24.6	22.0	20.6	20.2
Fever	19.4	14.5	9.6	10.2
Other infant deaths	11.0	11.8	13.0	11.0
Other clear symptoms	5.2	16.5	20.4	21.0
Senility	16.8	13.9	19.2	23.2
Others	8.0	6.5	2.0	0.3
Total	100.0	100.0	100.0	100.0

Source: Reports on Census of Death Surveys conducted in 1968, 1973, 1978 and 1983 by the Vital Statistics Division of the Office of the Registrar General, Ministry of Home Affairs, Government of India, New Delhi.

Before proceeding further, it may be mentioned that the 'other clear symptoms' group of diseases includes many age-dependent diseases such as cancer, diabetes, hyperplasia of the prostate, obstructed hernia, paralysis or cerebral apoplexy, congestive heart disease and heart attack (ischaemic heart disease). By age-dependent diseases we mean 'diseases whose incidence continues to rise in a geometric or exponential fashion as a function of age' (Katzman 1988: 69). As can be seen from Table 3, deaths due to 'other clear symptoms' group of diseases accounted for only 5.2 per cent of the total deaths in 1968, but sharply increased to 16.5 per cent in 1973, 20.4 per cent in 1978 and 21 per cent in 1983. Further scrutiny of the data revealed that of the total deaths due to 'other clear symptoms' group of diseases, those among the people aged 55 years and over accounted for about 33 per cent in 1968, about 40 per cent in 1973 and about 45 per cent each in 1978 and 1983. Incidentally, the percentage of deaths due to 'other clear symptoms' group of diseases was higher in the age group 55 years and over than in any other age group in all the four years under consideration. As in the case of deaths due to the 'cough' group of diseases, the percentage of deaths due to 'other clear symptoms' group among the people aged 55 years and over has increased. As can be seen from Table 3, deaths due to senility, which is an age-

dependent disease, accounted for 16.8 per cent of the total deaths in 1968. But, surprisingly, the proportion came down to 13.9 per cent in 1973. This may be an artifact of the 1973 cause of death survey. However, the proportion rose sharply to 19.2 per cent in 1978 and to 23.2 per cent in 1983. Thus, it is quite clear that deaths among the aged, as percentage of total deaths, have been increasing, not only because of the increase in their proportion in the population but also because of the higher death rate in the ageing population.

CHANGING PATTERN

A further insight can be gained into the problem by examining the changing pattern of the incidence of death by cause-group. Table 4 presents the rankings of deaths due to various cause-groups in 1968, 1973, 1978 and 1983. Deaths due to the 'cough' group of diseases (disorders of the respiratory system) occupied the first rank in 1968, 1973 and 1978. But in 1983, they were pushed down to the third rank. Deaths due to 'other clear symptoms' group of diseases, which includes many age-dependent diseases, occupied the seventh rank in 1968, but improved to the second rank in 1973, 1978 and 1983. Senility, which is an age-dependent disease, occupied the third rank in 1968, but slid to the fourth rank in 1973, regained the third rank in 1978 and improved to the first rank in 1983. All this further indicates that deaths among the aged as percentage of total deaths have been steadily increasing in India.

Table 4: **Rankings of deaths due to cause groups in selected years**

Cause group	1968	1973	1978	1983
Violence or injury	8	8	7	7
Childbirth and complicated pregnancy	9	9	9	8
Digestive disorders	5	6	6	6
Cough (disorders of respiratory system)	1	1	1	3
Fever	2	3	5	5
Other infant deaths	4	5	4	4
Other clear symptoms	7	2	2	2
Senility	3	4	3	1
Others	6	7	8	9

Source: Reports on Census of Death Surveys conducted in 1968, 1973, 1978 and 1983 by the Vital Statistics Division of the Office of the Registrar General, Ministry of Home Affairs, Government of India, New Delhi.

DISCUSSION

It is clear from the foregoing data that, alongside the demographic transition, epidemiologic transition has been taking place in India. The epidemiologic transition in India is in the second of the three stages into which it is divided by Omran. It will move into the third stage before the end of the second decade in the twenty-first century. The proportions of the old and the very old have been increasing and will increase considerably in the not too distant future in the population in India. It would be futile to expect that, as in the past, children will take care of their aged parents and

grandparents. There are already unmistakable signs that grown-up children do not like their aged parents and grandparents to live with them. It is axiomatic that the proportion of the nuclear families has been increasing in the country. This trend towards the nuclearisation of the family is a clear indication that the old and the very old have to learn to live away from their children and grandchildren. In future, the aged will have to be taken care of by the state, as in the developed countries. Comparing survival rates for female populations in India in 1976 and in Germany in 1901-10, Imhof (1968b: 15) says that they were more or less the same; if the epidemiologic transition in India followed that in Germany, its stages in India in 2000 A.D. and around the middle of the next century will be the same as those in Germany in 1932-34 and 1981-83. Should this prognosis hold, India is only 70 years behind Germany in epidemiologic transition. It is time we considered the problem before it is too late and started preparations to face it squarely. This means that we should start constructing more and more homes for the aged, training personnel, including geriatricians, in the problems of the aged, establishing wards in the hospitals, and so on. In fact, creation of health facilities for the aged should become an important part of our efforts to realise the goal of 'Health for All by A.D. 2000'.

Sooner or later, the proportion of the aged will increase and the epidemiologic transition will take place not only in India but also in other developing countries. Therefore, some action is necessary at the international level. The United Nations may consider starting an agency to alleviate the problems of the aged in the world, similar to UNICEF which alleviates the problems of the children. Alternatively, the United Nations Population Fund (UNFPA), which has been concerned overwhelmingly with the issues associated with the rapid population growth, or the World Health Organisation (WHO), which has been engaged in promoting the health of people in general, may devote part of their attention and resources to alleviate the problems of the ageing population.

A controversy has been slowly gaining momentum about the desirability of increasing life expectancy. Analysing the epidemiologic transition in Germany, Imhof (1986a: 74) observes,

> Certainly it is correct to say that the traditional causes of death claimed their victims from all age groups and that life at that time was therefore a much riskier business than it is today. But isn't it also correct to say that death was often more humane then, since most of the infectious and parasitic diseases kill quickly? Today, precisely because we have defeated those diseases, we are living longer, growing older. Simultaneously, however, the dying process in many cases has been lengthened. Chronic suffering no longer just extends over a period of a few days or weeks but can often last for many months and years so that death is ultimately viewed as liberation.

Others argue that the number of people being kept alive in misery and poor health has been increasing in the developing countries primarily because of the import of modern medical technology and expansion of primary health programmes by foreign aid which have reduced mortality without sufficiently improving levels of health. They further argue that increasing life expectancy is not such an undesirable thing provided

levels of health are improved by effectively organising and adequately staffing the health care delivery system (Pansluwka 1986: 3). Without getting entangled in the ethical controversy we may proceed further with the assumption that despite the antagonists and protagonists of the increasing longevity, the number and proportion of the elderly will increase in the populations of developing countries, including India.

Indian demographers are excessively concerned with the study of fertility, mortality, migration and family planning. In fact, as Bose (1988: 1-31) says, they are stuck up in decimal points. It is time they came out of the decimal points and started throwing light on the issues associated with epidemiologic transition in India. Such a light will not only convince the policy-makers and planners about the need for making preparations to meet the needs of the elderly, but also enable them to adopt more effective approaches.

Demography and epidemiology appear to converge neatly in more ways than one. The scope of one discipline overlaps that of the other. Demography is concerned, *inter alia*, with morbidity, mortality and fertility, and differentials in them by various demographic and socio-economic variables. So is epidemiology. Most concepts employed in both disciplines are the same. The stages in which demographic and epidemiologic transitions take place are the same; the only difference is that the latter follows the former. The theoretical foundations of the two disciplines appear to be common. There is, however, need for systematic work on the convergence of demography and epidemiology.

The data used in this paper, especially the data on causes of death, seem to have some limitations. The sample villages do not appear to be fully representative of the cross-section of the rural population; the number of deaths recorded in the surveys do not seem to constitute a high proportion of total deaths occurring in rural India. These limitations of the data have been kept in mind while drawing conclusions.

REFERENCES

Bose, Ashish, 1988, *From Populations to People*, Vol. I, Delhi: B.R. Publishing Corporation.

Brue, Armstrong, 1982, The epidemiology of cancer in China, *World Health Forum*, 3, 1.

Coe, Rodney M., 1970, *Sociology of Medicine*, New York: McGraw-Hill Book Company.

Carnoni-Huntley, Joan C. et al., 1985, Epidemiology of disability in the oldest old, *Milbank Memorial Fund Quarterly*, 63(2).

Denton, John A., 1978, *Medical Sociology*, Boston: Houghton Mifflin Company.

Department of Family Welfare, 1988, *Family Welfare Programme in India: Year Book, 1986-87*, New Delhi: Ministry of Health and Family Welfare.

Gunaratne, V.T. Herat, 1980, *Voyage Towards Health*, New Delhi: Tata McGraw-Hill.

Hansluwka, Harold, 1986, The epidemiological situation in the Asia-Pacific region: facts, fallacies, and implications, *Population Research Leads*, 24.

Imhof, Arthur E., 1986a, Can India learn lessons from Europe's demographic and epidemiologic transitions, *Indian Journal of Community Medicine*, XI(2).

_____, 1986b, What has the longevity in Europe and Japan to teach India, *Demography India*, XV(1).

Jajoo, U.N., 1984, Measles epidemic in a rural community near Sevagram (Vidharbha), *Indian Journal of Public Health*, 28(4).

Katzman, Robert, 1988, Alzheimor's disease as an age-dependent disorder, in David Evered and Julie Whelan (eds.), *Research and the Ageing Population*, Chichester: John Wiley & Sons.

Maxcy, Kenneth F., 1965, *Dorland's Illustrated Medical Dictionary*, 24th ed., Philadelphia: Saunders.

Mehta, Saroj and Gupta, A.N., 1985, Epidemiological survey of guineaworm infection, *Indian Journal of Public Health*, 20(4).

Omran, Abdel R., 1977, Epidemiologic transition in the U.S., *Population Bulletin*, 32(2).

Park, J.E. and Park, K., 1977, *Text Book of Preventive and Social Medicine*, Jabalpur: Banarsidas Bhanot.
Quesada, Gustavo M., Spears, William and Ramos, Petra, 1978, Interracial depressive epidemiology in the South-West, *Journal of Health and Social Behaviour*, 19(1).
Sartwell, Philip E., 1972, Trends in epidemiology, in Gorden T. Stewart and Charles C. Thomas (eds.), *Trends in Epidemiology*, Springfield, Illinois.
WHO, 1984, *The Uses of Epidemiology in the Study of the Elderly*, Technical Report Series 706, Geneva: World Health Organisation.

Planning for the 1991 Census of India

N. RAMA RAO
Deputy Registrar General (Census & Tabulation)
New Delhi

INTRODUCTION

The 1991 census will be the thirteenth in the series of decennial counts of India's population and the fifth since independence. With a population of 685 million at the last census in 1981, India ranks as the second most populous country in the world. It is a land of many races, religions and languages who live in amity in different geographical regions even while preserving their individual traditions and cultures.

The decennial census has been providing the trends in the population size of the country and serving as a population barometer as it were, to the Government.

India embarked on the path of planned economic development with the First Five Year Plan in 1951. In this process of development, the size of the population and its growth rate are recognised as the most important factors influencing economic and social progress. The implementation of the five-year plans called for a variety of census data at different levels of administration, e.g. population growth, its distribution, urbanisation, manpower, employment, literacy, migration and housing. Information on working population, fertility patterns, age and education levels interest not only the planners and administrators but also research workers in different organisations including universities. Indian census, in recent times has, therefore, shown a greater degree of sophistication in the methods of collecting, tabulating and analysing the statistical data.

ENUMERATION METHOD AND DATE

Of the two well known methods of enumeration, viz. canvasser method and householder method, the former is followed in India. Under this method, the enumerator visits every household and fills in the questionnaire based on the answers given by the respondent. The credit for the success of the Indian census, which is the largest single administrative exercise in the country, goes mainly to the people of India themselves and to the vast army of devoted enumerators, supervisors, charge officers, district and city census officers who bear the brunt of the huge task at every stage.

1. The views expressed in this paper are of the author and not of the organisation to which he belongs.

The houselisting operations constitute the first phase when houses are numbered and listed. It is proposed to have the next houselisting in 1990 and enumeration in 1991. It is also proposed that sunrise of March 1, 1991 may be the reference date for the census. The enumeration would be made during February 9 to 28, with the enumeration of houseless people on the night of February 28. The revisional round would be made during March 1 to 5 for updating the data collected as at the reference time.

PLACE OF ENUMERATION

In census, information about each person can be collected where he is found at the time of the census or at his usual residence. The first method is called *de facto* approach while the second method is referred to as *de jure* approach. The Indian census has, of late, been taking censuses by the 'extended *de facto*' approach. Under this method, an enumeration period of two or three weeks is fixed and the data are brought up to date with reference to the Census date by a revisional round after the enumeration period is over. The following extract from the 'Instructions to Enumerators' issued for the 1981 census will explain how the extended *de facto* method is adopted (an enumerator had to cover):

(i) All those who normally stay and are present in that household during the entire period of enumeration i.e., from February 9 to February 28, 1981 (both days inclusive);

(ii) Also those who are known to be normally residing, and had actually stayed during a part of the enumeration period (February 9-28, 1981) but are not present at the time of the enumerator's visit;

(iii) Also those who are known to be normally residing and are not present at the time of enumerator's visit but are expected to return before February 28, 1981; and

(iv) Visitors who are present in household censused by the enumerator but are away from the place(s) of their usual residence during the entire enumeration period. For the purpose of enumeration such visitors will be treated as normal residents of the household where they were actually found during the enumeration period provided they have not been enumerated elsewhere.

The houseless population is generally counted on the last night of the enumeration period; it was the night of February 28 in 1981. In the 1991 census also the extended *de facto* approach on the above lines is proposed to be adopted.

THE PROPOSED 1991 CENSUS SCHEDULES

Planning the census in a vast country like India cannot be rushed. The scale of the operations and the importance of the results require careful planning of each stage of the census operations. Since one individual slip will be canvassed and filled in for every single person in the country, irrespective of sex or age, the census operations would, in 1991, call for the handling of about 840 million slips, 170 million household

schedules, innumerable charge registers, maps, houselists, etc. It is estimated that about 1.6 million enumerators and other staff will be involved in the field operations, calling for vast training programmes, distribution systems for the forms, extensive storage and filing systems, etc.

The content of the census questionnaires is governed by certain factors. These include the need to collect basic demographic data bearing in mind the U.N. recommendations, the desirability and comparability with previous censuses and the special needs of data users, including government departments. The demands for data by the data users cover a wide range of topics based on their specific needs and it is quite often necessary to determine the priorities of such demands and the feasibility of meeting them. In considering the variety of demands for data, certain constraints operate. The census organisation has to examine (a) what topics can reasonably be included in a widespread and vast field operation like the census, taking into consideration the capacity of the enumerator and the reactions and comprehension of the respondent; (b) what topics can be canvassed in quick visits to households, given the time constraints of the census; and (c) can any of these demands be met from other sources or by other agencies?

In determining the topics that are included in the questionnaires, certain standards have to be applied. If the census has to be operationally successful and its results beyond doubt, the questions included in the questionnaires have to be factual and clear. Only those questions which can be expected to be easily understood and reliably answered, can be included. Equally important are the workload of the enumerator and the cooperation of the public. The enumerator in the Indian census is a public official, usually the school teacher, who is pressed into service and paid an honorarium for the work he or she performs as a census enumerator, and is expected to visit each household for canvassing the census schedules, ask questions and note down the answers. This has to be completed by each enumerator for a population of about 600 to 750 within a specified time limit of just 18 to 19 days. A heavily loaded questionnaire is most unlikely to be received kindly by the enumerator or the public.

Suggestions relating to the contents and coverage of the 1991 census received from individuals and organisations from time to time have been systematically listed for consideration at the appropriate time.

Draft questionnaires for the 1991 census were developed on the basis of past experience, current needs and international recommendations and these were presented at the First Data Users' Conference (April 1988). The schedules developed, based on the suggestions of the Advisory Committee and its sub-groups and experiences of the pre-test (November-December 1988) conducted with the help of the staff of the census directorates selected in enumeration blocks, are the houselist, household schedule and the individual slip. It is also proposed to canvass the enterprise schedule during houselisting operations in 1990, as part of the Third Economic Census of Central Statistical Organisation. All these schedules were pretested again in the second pre-test (June-July 1989) in selected blocks with the help of the regular enumeration machinery, namely primary school teachers etc. Based on the feedback the final 1991 census schedules will be finalised and printed in the required number.

IMPROVEMENTS MADE IN THE CENSUS SCHEDULES FOR 1991

1. The houselist has been expanded to cover some information relating to household amenities/housing which was collected during the main enumeration in 1981. By thus advancing the collection of this information during houselisting which will be roughly 6-8 months ahead of the main census, we will be in a position to commence tabulation of this data earlier and get important information on housing characteristics and household amenities which will be useful for the government. Apart from general improvements mentioned above, a question is being canvassed for the first time regarding type of fuel used for cooking by the household. This will help in knowing the impact of the fuel consumption patterns on environment and forest resources and also reveal the extent to which alternatives like LPG and bio-gas are being used.
2. In the houselist, the availability of the facility of toilet to the household will be collected in respect of rural areas also, as against only urban areas in 1981.

In the household schedule, provision has been made to categories the workers into nine industrial categories (as against four industrial categories in the 1981 census). This will help in generating the primary census abstract with nine-fold industrial categories for which there is a great demand from all sections of the data users. The household schedule has also been so designed as to record the data on mother tongue and religion for each individual.

This will help in using the household schedule for manual tabulation of:

(i) the primary census abstract with nine-fold industrial categories up to village level for state/district/tehsil/taluka/town/village.

(ii) the mother-tongue and religion data upto the tehsil/town level. This will help in releasing the above mentioned important tables within reasonable time after the census taking (about two years). Further, this will permit simultaneous commencement of computerised data processing with individual slip for generation of B, C, D and F series tables on a suitable sample basis.

A new feature of the individual slip of the 1991 census is that it contains a question on ex-serviceman and whether he is a pensioner or non-pensioner.

Sufficient thought was given to the formulation of economic questions. A separate group went into this aspect and care was taken to frame the questions in such a way that it would help in netting the unpaid workers on farm or in family enterprise. This will go a long way in netting the women workers in the country, most of whom are engaged in such type of work.

The question on seeking/available for work is proposed to be asked in the 1991 census, only in respect of non-workers and not for marginal workers also as was done in the 1981 census. Further, information is also proposed to be collected in the 1991 census if one is seeking/available for work, whether one has ever worked before. This will help in obtaining the information on fresh entrants to the labour force.

While collecting the information on reasons for migration, two more reasons, i.e.,

'business' and 'natural calamities like drought, floods, etc.' have been added for the 1991 census by giving separate codes.

DATA PROCESSING

Prior to the 1971 census, the entire census data were processed manually. Computers were introduced for data processing for the first time in the 1971 census. At that time, though tabulations of individual slip data for urban areas (based on 20 per cent sample) were made on computer, the rural data, based on a 10 per cent sample of individual slips were processed manually. For the first time in the 1981 census, most of the data were processed on computer, barring some minimal manual compilations. In the 1981 census, direct data entry systems were used to expedite the processing. Lack of an in-house computer in the census organisation proved a major handicap in the processing of the 1981 census data. Steps are being taken to acquire for the Organisation a main framecomputer system.

TABULATIONS

The following details are furnished in respect of the tabulation done on the basis of the 1981 census data:

1. Table H-1 on the use to which the census houses were put was processed on the computer based on 20 per cent sample of census houses for bigger states and 100 per cent houses for smaller states and released in July, 1982.
2. Table H-2 on disabled population was processed manually on 100 per cent basis and released in March 1983.
3. Provisional results giving figures of population and literates were announced within a few days after the completion of census enumeration. The details of rural-urban break-up and economic characteristics of population were released a few months thereafter.
4. An advance tabulation based on the sample of 5 per cent enumeration blocks for the country and the major states was done on the computer for the immediate use of the data users and planners. The tables based on 5 per cent sample were released in October 1983.
5. The A series tables on general population (including the primary census abstract) were manually tabulated and published for India/state/union territories.
6. District census handbooks giving basic population data at village/urban ward level and amenities available in these areas were processed manually and finalised for all the states and union territories by the end of 1986. The majority of these volumes have been printed while a few are in the press.
7. Tabulation of religion and language data based on the religion of the head of household and the language usually spoken in the household, respectively was manually done and published.
8. Individual slips of 20 per cent sample of enumeration blocks in respect of bigger states and 100 per cent blocks in respect of smaller states and union territories

with less than 10 million population were processed on the computer for generating the B series – General Economic Tables, C series – Social and Cultural Tables, D series – Migration Tables, F series – Fertility Tables and HH series – Household Tables. Separate volumes for India/State/Union Territory contain these economic, social and cultural, migration, fertility and household tables.

9. The special tables for Scheduled Castes and Scheduled Tribes of the SC series and ST series have been brought out state by state. Some selected tables of the B and C series are also being generated on the basis of 20 per cent systematic sample of individual slips ('p' slips).

In the 1991 census, it is proposed to bring out some basic tables like the primary census abstract and tables on religion and language by manual tabulation of household schedules and simultaneously process a sample of individual slips for computerisation to bring out the tables of B, C, D and F series. The houselist will also be processed on the computer on a sample basis. For the generation of special tables for Scheduled Castes and Scheduled Tribes, the slips concerned are proposed to be processed on the computer on cent per cent basis. Further, to enable to have economic data at district and development block levels, the slips pertaining to "Workers in Household Industry" and "other workers" are proposed to be fully computerised.

USE OF SAMPLING

Sampling has been used in the Indian censuses from time to time for tabulation purposes. Sampling for tabulation was adopted as early as 1941, due to stringent financial restrictions. 2 per cent systematic sample of individual slips was selected and data on age and means of livelihood were based on this sample. In the 1951 census, while many of the tabulations were made from cent per cent data, some detailed cross classifications of age and civil conditions were made from a 10 per cent sample of individual slips selected systematically. Again in the 1961 census, household economic data collected in the household schedules were tabulated on a 20 per cent sample basis.

In the 1971 census, extensive use of sampling was made for tabulation. Most of the B, C, D and F series tables relating to economic, social, cultural, migration and fertility aspects of the population were tabulated on a sample basis. The sample size was 10 per cent in rural areas and 20 per cent in urban areas. The sample was selected systematically after arranging the individual slips by age, sex and industrial categories at stratum level. The strata adopted for sample section were city, non-city urban areas of a district and rural areas of tehsil. Apart from this, an advance tabulation at the national level was undertaken on the basis of one per cent sample of individual slips. For housing tabulations, a 20 per cent systematic sample of census houses was drawn from the houselist separately for rural and urban areas. The strata adopted were city, non-city urban areas of a district and rural areas of each tehsil.

In the 1981 census, for the first time, sampling was adopted at the enumeration stage. The sample enumeration was simultaneously carried out with complete enu-

meration. Two slips were canvassed. These were termed universal and sample slips. The universal slip was canvassed for every individual. The sample slip was canvassed for all persons living in 20 per cent sample of enumeration blocks in the major states, that is, all the states with an estimated population of 10 million and above in 1981. In all other states and union territories, both the universal and sample slips were canvassed for all the individuals. The sample individual slip contained questions on migration and fertility.

In the 1981 census sampling was also used at the tabulation stage as already explained. As it is, sampling is proposed to be adopted in the 1991 census at the tabulation stage only.

MAPPING

Mapping has been an important adjunct of census taking in India. The census organisation is a major producer of maps in India. To achieve proper coverage in the Census, it is necessary to have complete and up-to-date maps of all administrative areas – states and union territories, divisions, districts, tehsils and villages. Maps of proper scale are obtained and the boundaries of each administrative area identified. In order to simplify the map-making tasks and to make it possible to update all maps before the census is conducted, administrative boundaries are frozen a year before the census.

After identifying every village and town on each tehsil map, code numbers are allotted to the units that are to be accounted for at the census. Notional maps are prepared of every village and of every ward and block of towns. These notional maps show the location of every house to be visited and proved extremely helpful at the time of enumeration. They served as the frame for the clear demarcation of each enumerator's jurisdiction and enabled him to cover household in his block and to take notice of additions that might have taken place after the preparation of the notional map. Complete coverage of areas is thus ensured. Preliminary work on mapping for the 1991 census has already been taken up by the mapping units in the Directorates of Census Operations in states and union territories under the overall guidance of the Map Division in the headquarters.

EVALUATION OF CENSUS

The census results have been evaluated through post enumeration checks (PEC) since the 1951 census to assess the extent of omission and duplication in the count. The main objective of the PEC was to quantify likely omissions or duplications in enumeration and to measure errors and responses for certain selected characteristics.

The PEC results have been presented at the national level as well as for the five zones — the Southern, Eastern, Central, Western and Northern. At the 1981 census, the estimated net omission rate at the national level according to PEC was 17.95 per thousand persons enumerated in the census count.

A census evaluation study (CES) was also conducted soon after the 1981 census enumeration was to estimate the extent of misreporting of age at younger ages at census. A report on the CES was brought out as Paper 1 of 1983. In the 1991 census also

the PEC and CES are proposed to be undertaken.

STATISTICAL QUALITY CONTROL (SQC)

For the first time SQC was adopted in the 1981 census with a view to achieve an adequate level of accuracy of coding the schedules. This project was somewhat exploratory in nature. The application of the SQC was restricted to the coding of responses to the economic questions in the individual slips. Further, this SQC was restricted to certain areas only.

The SQC scheme was designed to ensure that data of a satisfactory quality for electronic data processing and tabulation are obtained effectively and economically. Specifically, its primary purpose was to screen errors made in the course of coding so that only a tolerable proportion remain in the data passed for further processing. It is designed to achieve this with the minimum amount of checking.

By using sampling techniques, much of the checking that was necessary with a 100 per cent check could be avoided. The use of sampling implied, however, a risk that some proportion of the unchecked coding would be in error.

The quality control check allowed substantial precision in assessing the accuracy of the census results. It increased the depth of understanding of the causes of errors arising in coding census data and suggested measures to reduce these errors in future censuses.

The first experiment in the 1981 census in SQC in coding of schedules had brought out that if SQC was adopted in controlling the quality of coding, routine extra checks might be dispensed with. This would result in considerable saving in terms of money and manpower requirements. Further studies in statistical quality control may be made in 1991.

DISSEMINATION

The census data are disseminated through a number of publications brought out by the Office of the Registrar General, India. The headquarters office at Delhi publishes volumes relating to India as a whole. These are termed Series 1. Data relating to each state and union territory are published in separate series. These are numbered Series 2 to Series 32. In each of the series (for all India and each state/union territory) different series of tables are brought out in separate volumes. Apart from these publications containing the census tables the following publications are brought out: Reports on selected towns and villages based on surveys, craft studies, ethnographies notes on Scheduled Castes and Scheduled Tribes, census atlas both at all-India and state levels. Further, census papers, occasional papers and monographs each devoted to an important topic are also brought out.

Copies of tapes containing the census data, blanking off certain individual details in view of the confidentiality of the schedules, are released. In the 1991 census, the same procedure for dissemination may be adopted with increased emphasis on release of data tapes.

REFERENCES

Government of India, 1988, *Summary Proceedings of the First Data Users' Conference (April 18-20, 1988). Census of India 1991.* Office of the Registrar General and Census Commissioner India, New Delhi.

——— 1985, *General Population Tables (Tables A-1 to A-3). Census of India 1981, Part II A (i), Series-1, India* Office of the Registrar General and Census Commissioner, India, New Delhi.

——— 1981, *Provisional Population Totals, Paper ... of 1981 Census of India, 1981,* Office of the Registrar General and Census Commissioner, India, New Delhi.

——— 1980, *Tabulation Plan, Census of India, 1981,* Office of the Registrar General and Census Commissioner, India, New Delhi.

——— 1980, *Instructions to Enumerators for filling up the Household Schedule and Individual Slip, Census of India, 1981.* Office of the Registrar General and Census Commissioner, India, New Delhi.

United Nations, 1978, *Asian and Pacific Recommendations for the 1980 Population and Housing Censuses,* ESCAP, Bangkok.

United Nations, 1980, *Principles and Recommendations for Population and Housing Censuses,* Series M No. 67 Department of International Economic and Social Affairs, Statistical Office, U.N. New York.

ANNEXURE 1

CENSUS OF INDIA 1991 — HOUSELIST

PAGE No

CONFIDENTIAL

Name of State/UT.................................. Code No..............

Name of District.................................. Code No..............

Name of Tehsil/Taluk/P.S/Dev Block.......... Code No..............

Name of village/town.................................. Code No..........

Name or No. of ward/mohalla/hamlet.......... Code No..........

Enumeration block No..........................

Line No.	Building No. (Municipal or local authority or census No.)	Census house No.	Predominant construction material of census house: Wall	Roof	Floor	Purpose for which census house is used (if wholly or partly used for running one or more enterprises, fill enterprise list)	If used wholly or partly as a residence: Household No	Serial No. of the household	For Head of Household only, write: Name	Male (1)/Female (2)	SC (1)/ST (2) (If SC ascertain religion and write 'H' for Hindu and 'S' for Sikh within bracket after code 1)	Does the household live in owned or rented house? Write 1 for owned 2 for rented 3 for others	No. of living rooms in the occupation of a household	Facilities available to the household: Drinking water Supply: Source	Within premises (1) outside premises (2)	Electricity: Yes (1)/No (2)	Toilet: Yes (1)/No (2)	Type of fuel used for cooking	Is the household or one or more members of the Household engaged in one or more enterprises outside this census house and without premises or in the open air? If yes, fill enterprise list.	No. of persons normally residing in the household: Male	Female	Persons	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	* Total					* Total													Total				

Key to Codes :

WALL (Col. 4) : Grass, leaves, reeds or bamboo (1) Mud (2) Unburnt bricks (3) Wood (4) Burnt bricks (5) G.I. Sheets or other metal sheets (6) Stone (7) Cement concrete (8) Ekra (9) and Others (10)

ROOF (Col. 5) : Grass, leaves, reeds, thatch, wood, mud, unburnt bricks or bamboo (1) Tiles, slate or shingle (2) Corrugated iron, zinc or other metal sheets (3) Asbestos cement sheets (4) Brick, stone and lime (5) Stone (6) Concrete R B C / R C C (7) and Others (8)

FLOOR (Col. 6) : Mud (1) Wood/planks (2) Bamboo or logs (3) Brick, stone and lime (4) Cement (5) Mosaic/Tiles (6) and Others (7)

SOURCE OF DRINKING WATER SUPPLY (Col. 15) : Well (1) Tap (2) Handpump/tubewell (3) River/canal (4) Tank (5) and Others (6)

TYPE OF FUEL USED FOR COOKING (Col. 19) : Wood (1) Cowdung cake (2) Charcoal (3) Coal/Coke/lignite (4) Cooking gas (5) Electricity (6) Kerosene (7) Bio-gas (8) and Others (9)

Signature of Enumerator ____________ date ____________ Signature of Compiler ____________ Date ____________

Book No. .....Form No. .....

Location code No. .....

Serial number of household .....

CENSUS OF HOUSEHOLD

Sl. No.	Name	Relationship to head	Sex		Age	Marital status	Mother tongue	Religion	Whether SC(1) or ST(2)	Name of scheduled caste/tribe	Male					
			M	F							Literate	Illiterate	Entry in 14 A		Entry in 14 B	
													Yes	No	Yes	No
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Checked and found correct				X	X					SC	ST	Total					
	M		X	X	X												
	F	X		X	X												
Signature of Supervisor	P			X	X												

INDIA 1991

SCHEDULE

CONFIDENTIAL

*Type of household (Institutional or Houseless)

Sl. No.	Male				Female									If OW in 15A indicate		
	Entry in 15A				Literate	Illiterate	Entry in 14A		Entry in 14B		Entry in 15A			Name of establishment	Nature of industry, trade or service	Description of work
	C	AL	HHI	OW			Yes	No	Yes	No	C	AL	HHI	OW			
1	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Total																	

For office use only

Category	M	F	Category	M	F	Category	M	F
III			VI			IX		
IV			VII			Marginal Workers		
V(b)			VIII			X Non-Workers		

*For Institutional write 1 for Houseless write 0

**Industrial code to be given in office

Signature of Coder

Signature of Enumerator

ANNEXURE III

CENSUS OF INDIA 1991 INDIVIDUAL SLIP CONFIDENTIAL

PaC No.....

Slip No.....

Location Code..... ( ) Sl. No. of Household [ ]

1 Name .....

2 Relationship to head .....

3 Male (1)/Female (2) .....

4 Age .....

5 Marital status .....

6 Mother tongue .....

7 Two other languages known .....

8 Religion .....

9 Whether S.C. (1) or S.T. (2) .....

10 Name of Scheduled caste/tribe .....

11 Literate (1)/Illiterate (2) .....

12 Educational attainment .....

13 Attending school/college, Yes(1)/No(2)

14A Did you work any time at all last year? Yes / No (H/ST/D/R/B/I/O)
(including unpaid work on farm or in family enterprise)

14B If yes in 14A, did you work for major part of last year? Yes(1)/No(2) .....

15A Main activity last year? Yes in 14B (C/AL/HHI/OW) / No in 14B (H/ST/D/R/B/I/O) .....

If HHI/OW in 15A

(i) Name of establishment .....

(ii) Nature of industry, trade or service .....

(iii) Description of work .....

(iv) Class of worker .....

15B 'Yes' in 14B—Any other work any time last year? Yes (C/AL/HHI/OW)/No
'No' in 14B—Work done any time last year? (C/AL/HHI/OW)

If HHI/OW in 15B

(i) Name of establishment .....

(ii) Nature of industry, trade or service .....

(iii) Description of work .....

(iv) Class of worker .....

16A If no in 14A, seeking/available for work? Yes (1)/No(2) .....

16B If yes in 16A, have you ever worked before? Yes(1)/No(2) .....

Pattern of Internal Migration in India: Some New Dimensions

M.K. PREMI
Centre for the Study of Regional Development
Jawaharlal Nehru University, New Delhi

INTRODUCTION

In India information on migrants' characteristics, particularly relating to their economic activity at the time of leaving the communities of origin and at the destination, has been collected in a number of large-scale and localised sample surveys, yet the population census has remained the most important source of migration data. Analysis of interstate migration streams has been made in the past from birthplace statistics which have been collected of all people enumerated in all the censuses from 1881 onward (Davis 1951, Zachariah 1960, 1964; Mathur 1962; George 1965). It was not until 1961, however, that the birthplace was classified as rural or urban, and as (a) within the district of enumeration, (b) outside the district but within the state of enumeration, (c) outside the state of enumeration but within India, or (d) outside India. Information on duration of residence at the place of enumeration was also collected for the first time in the 1961 census. The 1971 census refined these statistics by including a question on 'place of last at residence' (POLR), and the 1981 census included yet another question on 'reasons for migration'. With the availability of these data, several studies have been undertaken by researchers in recent years to study the quantum and pattern of migration flow (Bose 1967, 1980; Kumar 1967; Mitra 1967; Gosal and Krishan 1975; Premi 1981, 1982, 1984b to name a few). Characteristics of the migrants in terms of sex, age, marital status, educational attainment, and employment status have also been studied from census data by several researchers (Zachariah 1968; Mahmood 1975; Mitra, Mukherji and Bose 1980; Premi and Tom 1985).

The available migration data from the various censuses, particularly from the 1961, 1971 and 1981 censuses, have been generally analysed in various migration streams at micro level, that is, they present the analysis for the country as a whole or at the state level. In India, after intradistrict movement, interdistrict migration (within the state of enumeration) accounts for the major share in total migration. Using certain tables of the 1971 and 1981 censuses, it is possible to study the pattern of interdistrict in, out, and net migration in different migration streams — rural-to-rural, rural-to-urban, urban-to-rural, and urban-to-urban. This type of analysis has not been carried out in the past to the best knowledge of this researcher. This paper, therefore, examines the

patterns of interdistrict migration in India by making the case study of Rajasthan. Before presenting this analysis, the paper describes the principal population movements at macro level. The third section of the paper discusses reasons for migration of males and females in Rajasthan in relation to those discerned for India. The analysis presented here, of course, suffers from all those limitations of the concept, definition, and classification errors from which the census data suffer (Premi 1984a; forthcoming).

PRINCIPAL POPULATION MOVEMENTS

In the 1961 census 144.8 million persons (constituting 33 per cent of the total population) were enumerated at places other than their birthplaces and, hence, counted as lifetime migrants.[1] In the 1971 census, 166.8 million persons (or 30.4 per cent of the population) were counted as migrants by the same criterion. The number of migrants increased further to 203.6 million at the 1981 census and constituted 30.6 per cent of the total population.[2] Thus, proportion of the birthplace lifetime migrants in the total population declined somewhat at the 1971 census and remained almost at the same level at the 1981 census.

As one would expect, the proportion of lifetime migrants in the rural population in 1981 (28.2 per cent) was lower than in the urban population (38.4 per cent) but the proportion of male migrants (17.8 per cent) was much less than that of female migrants (44.3 per cent) (Table 1). This was true for both rural and urban areas.

Table 1: **Percentage of lifetime migrants in the total population by sex and type of residence, India, 1961-81**

Type of residence	Year	Both sexes	Males	Females
Total	1961	33.0	20.8	46.0
	1971	30.4	18.9	42.8
	1981	30.6	17.8	44.3
Rural	1961	30.4	15.4	46.0
	1971	28.2	14.1	43.1
	1981	28.2	12.3	44.9
Urban	1961	44.8	43.7	46.1
	1971	39.3	37.5	41.3
	1981	38.4	34.9	42.3

Source: Census of India 1981, 1985a:63.

1. Lifetime migrants are those who came to the place of enumeration at some point during their life and have been living there ever or at some other place different from birthplace. Whether this happened just a week before the census or a couple of decades ago is immaterial. When the movement is counted on the basis of last residence, it is the unbroken period of the shift from the previous place to the present one.

2. The 1981 figure excludes Assam where no census could be conducted at that time. If Assam figures are excluded from the total population and total migrants, the lifetime migration rate for 1971 becomes 30.3 per cent instead of 30.4 per cent; change of similar magnitude is observed in the 1961 figure.

DISTRIBUTION OF MIGRANTS BY MIGRATION STREAMS

Based on place of birth (or last residence) and place of enumeration, internal migrants can be classified into three migration streams roughly indicative of migration distance:

1. intradistrict migrants — persons born (or with last residence) outside the place of enumeration but within the same district;
2. interdistrict migrants — perhaps born (or with last residence) outside the district of enumeration but within the same state/union territory; and
3. interstate migrants — persons born (or with last residence) in the states/union territories of India, but beyond that of enumeration.

Based on the rural or urban nature of the birthplace (or POLR) and the place of enumeration, internal migrants can also be classified into four migration streams — rural-to-rural, rural-to-urban, urban-to-rural, and urban-to-urban. A combination of two types of migration streams gives rise to 12 streams. Table 2 depicts these streams for India according to birthplace statistics separately for male and female lifetime migrants for 1961, 1971 and 1981 respectively. There is a substantial decline in the proportion of intradistrict migrants and a corresponding increase in interdistrict and interstate migrants. This seems partly due to increase in the number of districts in the country from 336 in 1961 to 360 in 1971, and to 412 in 1981. This is clearer in Bihar and Haryana where several new districts were formed breaking the erstwhile districts.[3]

Rural-to-rural migration formed the most dominant stream at the national level but its importance declined over time for both males and females in all the three distance categories. The decline was more for males which reduced the sex ratio (males per 1,000 females) still further to 257 which was only 311 in 1961 (Table 2). While a very large proportion of female interdistrict rural-to-rural migration is due to 'marriage' high male rural-to-rural intradistrict migration seems to be due to their migration from areas of low agricultural productivity within the district to areas of higher agricultural productivity with better wages, or to areas which have construction and other similar projects. There could be several other reasons for this phenomenon which need detailed probing with the help of micro-level data.

While there has been substantial increase in the proportion of rural-to-urban lifetime migrants from 1961 to 1981 in all the three distance categories, there has also been an increase in the proportions of urban-to-rural migrants (Table 2). Intradistrict, interdistrict, and interstate migration streams contributed almost equally in the net rural-to-urban male lifetime migration over the period under consideration. The

3. In Bihar, there were 17 districts of 1971 which were made into 31 districts in 1981. In Haryana, 7 districts of 1971 were converted into 12 districts prior to 1981 census. Similar changes have also taken place during the 1970s in some other states/union territories. Intradistrict lifetime migration in Bihar declined from 76.8 per cent of the total inmigration in 1971 to 68.0 per cent in 1981, and from 48.8 per cent to 37.9 per cent in Haryana. In contrast, interdistrict lifetime migration increased from 17.2 per cent to 26.3 per cent in Bihar, and from 19.8 per cent to 30.2 per cent in Haryana during the same period.

proportion of net rural-to-urban lifetime female migration, however, declined with increasing distance.

Table 2: **Per cent distribution of lifetime migrants of each sex by migration streams based on place of birth and place of enumeration, India, 1961, 1971 and 1981**

Type migration stream	1961			1971			1981		
	Males	Females	Sex ratio	Males	Females	Sex ratio	Males	Females	Sex ratio
Intradistrict									
Rural-to-rural	40.15	65.48	273	38.42	62.01	277	31.26	56.02	230
Rural-to-urban	9.03	4.32	835	9.42	5.19	811	10.65	5.82	755
Urban-to-urban	2.97	1.65	801	2.47	1.47	746	3.61	2.13	699
Urban-to-rural	2.30	1.83	561	3.27	2.92	500	3.36	2.96	467
Sub-total	54.45	73.78	329	53.58	71.59	334	48.91	67.00	302
Interdistrict									
Rural-to-rural	11.28	12.44	404	10.14	12.23	370	10.05	13.80	301
Rural-to-urban	8.80	3.15	1,245	9.02	3.42	1,178	10.79	4.27	1,041
Urban-to-urban	5.22	2.45	947	6.00	3.04	881	7.68	3.99	794
Urban-to-rural	1.48	0.96	686	2.08	1.51	617	2.40	1 86	533
Sub-total	26.78	19.00	628	27.24	20.20	602	30.98	23.97	534
Interstate									
Rural-to-rural	5.31	3.38	702	4.97	3.51	633	4.17	3.41	505
Rural-to-urban	7.83	1.76	1,984	7.55	1.91	1,766	8.53	2.36	1,491
Urban-to-urban	4.87	1.72	1,266	5.48	2.17	1,127	6.05	2.52	989
Urban-to-rural	0.76	0.36	946	1.18	0.63	844	1.21	0.70	710
Sub-total	18.77	7.22	1,161	19.18	8.22	1,043	20.11	9.04	918
All streams									
Rural-to-rural	56.74	81.30	311	53.53	77.75	308	45.48	73.23	257
Rural-to-urban	25.66	9.73	1,175	25.99	10.52	1.104	29.97	12.45	993
Urban-to-urban	13.06	5.82	1.000	13.95	6.69	913	17.34	8.64	828
Urban-to-rural	4.54	3.15	644	6.53	5.05	578	6.97	5.53	520
Total migrants (million)	41.44	92.97	446	48.35	108.25	447	57.17	138.61	413

Notes: 1. The figures of total migrants exclude immigrants.
2. The 1981 figures of total migrants include those persons also whose birthplace as rural or urban could not be ascertained. Hence, the column totals do not add up to exactly 100 per cent.
3. Sex ratio has been computed as number of males per 1,000 females.

Sources: Census of India, 1961, 1966:16; Census of India, 1971, 1977:15; Census of India 1981, 1988a:63.

The share of urban-to-urban migration of both males and females was comparatively low in the intradistrict stream but it increased very substantially in the interdistrict and interstate streams. As institutions of higher learning, particularly professional and technical, are not available in each district, an urge for higher education motivates urban dwellers as also some of the rural people to migrate over long distances. This is also due to availability of modern sector jobs in the metropolises and other big cities.

As migration distance increases, sex ratio improves sharply in all the four migration streams. Among interstate migrants, the sex ratio was favourable to males upto 1971, but in 1981, females outnumbered males. This probably reflected a greater tendency in recent years towards family migration in long distance moves, wives moving in of those married males who came earlier, and, probably, a certain amount of independent female migration as well.

PATTERN OF INTERDISTRICT MIGRATION

The 1971 census provided information on the movement of birthplace lifetime migrants from one district to another within the state of enumeration urban-to-rural with their breakdown into rural-to-rural, rural-to-urban, urban-to-rural and urban-to-urban streams. Some states published these data in their state volumes as an appendix to Table D-1 while others published this information for each district separately in the *District Census Handbooks*.[4] Similar information in the 1981 census is published in Table D-13 in the state volumes. As an illustrative example, this paper presents an analysis of interdistrict migration for Rajasthan. Its selection is guided partly by the fact that it did not undergo any changes in the number of districts between 1971 and 1981.

In the country intradistrict migration accounted for almost half the male and two-thirds of female lifetime migration in 1981. This proportion was 55 per cent and 67 per cent for males and females respectively in Rajasthan (Table 3). It was therefore felt that a major portion of the interdistrict migration would be from the neighbouring districts only. This paper also examines such migration.

Table 3: **Percentage of intra-district, interdistrict and interstate migration in total lifetime migration within India, by sex, India and Rajasthan, 1981**

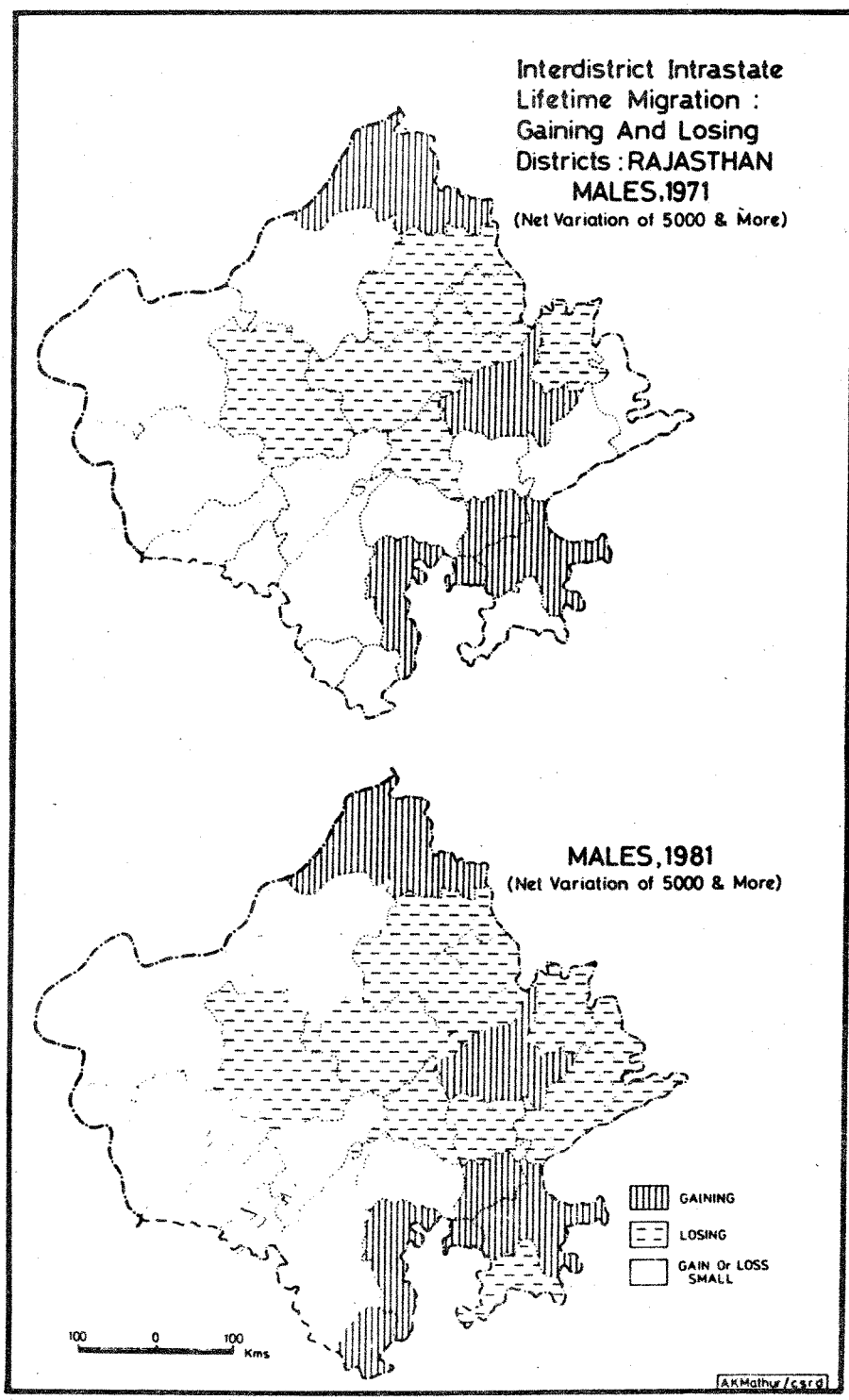
Area	Sex	Intra-district	Inter-district	Inter-state
India	M	48.9	31.0	20.1
	F	67.0	24.0	9.0
Rajasthan	M	54.7	27.3	17.9
	F	67.2	22.6	10.2

Table 4 presents a classification of the gaining and losing districts of Rajasthan on the basis of net lifetime interdistrict migration of males and females as of 1971 and 1981 respectively. The analysis is presented in each of the four migration streams — rural-to-rural, rural-to-urban, urban-to-urban and urban-to-rural. Similar analysis of net lifetime migration to and from the neighbouring districts has also been carried out.

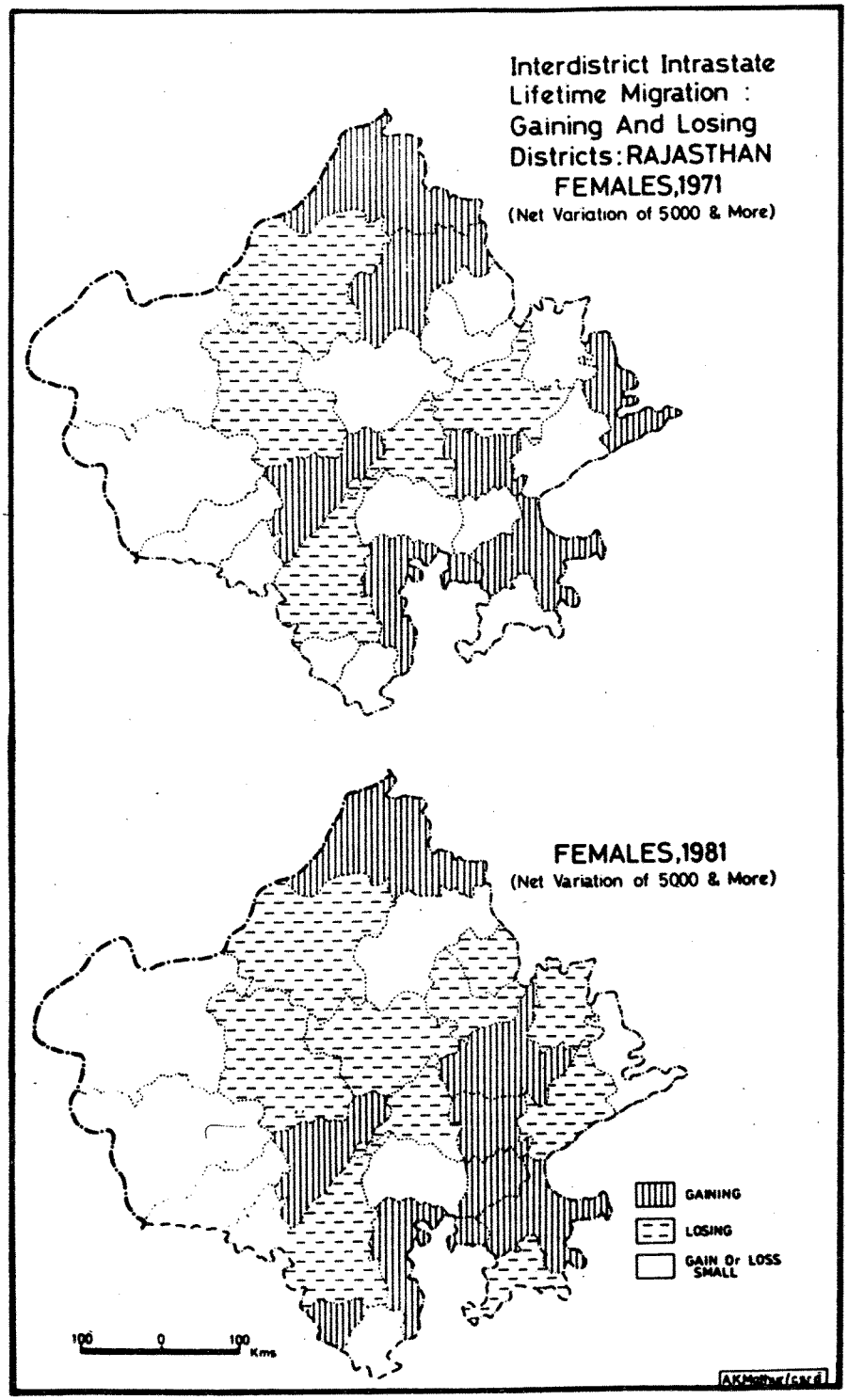
In order to focus on real differences in inmigration and outmigration in different streams, only those districts have been listed in Table 4, where the net differences were larger than the quantities mentioned in column 1. The pattern of gaining or losing districts was very similar between 1971 and 1981 for both males and females (Maps 1 and 2).

For male migrants Ganganagar district in the north and Jaipur in the centre emerged as two individual net inmigrating districts. Besides them, Chittorgarh, Bundi, and Kota in 1971; and Chittorgarh, Bundi, Banswara, and Kota in 1981 formed the third cluster of inmigrating districts.

4. If any *District Census Handbook* of 1971 census in a particular state is missing, it is impossible to generate complete matrix of in- and out-migration for that state.



Outline based on map published in the Census of India 1981, Series 18, Rajasthan, Part II D, *General Population Tables*, Delhi, Controller of Publications.



Outline based on map published in the Census of India 1981, Series 18, Rajasthan, Part II D, *General Population Tables*, Delhi, Controller of Publications.

Table 4: **Classification of gaining and losing districts on the basis of net interdistrict lifetime migrants by sex and migration stream, Rajasthan, 1974 and 1981**

Migration Stream	Gaining districts				Losing districts			
	Males		Females		Male		Females	
	1971	1981	1971	1981	1971	1981	1971	1981
Total Difference greater than 5,000	Ganganagar, Jaipur, Chittorgarh, Bundi, Kota	Ganganagar, Jaipur, Chittorgarh, Banswara, Bundi, Kota	Ganganagar, Churu, Bharatpur, Tonk, Pali, Chittorgarh, Kota	Ganganagar, Jaipur, Tonk, Pali, Chittorgarh, Bundi, Kota	Churu, Jhunjhunu, Ajmar, Jodhpur, Nagaur	Churu, Jhunjhunu Alwar, Bharatpur S. Madhopur, Sikar, Ajmer, Tonk, Jodhpur, Nagaur, Jhalawar	Bikaner, Jaipur, Ajmer, Jodhpur, Udaipur	Bikaner, Jhunjhunu Alwar, S. Madhopur Sakar, Ajmer, Jodhpur Nagaur, Udaipur, Jhalawar
Rural to Rural	Ganganagar, Chittorgarh	Ganganagar, Bikaner	Ganganagar, Churu	Ganganagar, Alwar	Bikaner, Churu	Churu, Jhunjhunu	Bikaner, Jaipur	S. Madhopur, Jaipur
Difference greater than 2,000 in 1971 and 4,000 in 1981	Bundi, Kota	Chittorgarh, Bundi, Kota	Bharatpur, Sikar, Tonk, Nagaur, Pali, Chittorgarh, Bundi	Tonk, Nagaur, Pali, Chittorgarh Kota	Jhunjhunu, Jaipur, Ajmer, Jodhpur, Nagaur, Udaipur	Sikar, Ajmer, Jodhpur, Nagaur	Ajmer, Jodhpur Udaipur, Banaswara	Ajmer, Jodhpur, Udaipur
Rural to Rural	Ganganagar, Bikaner, Jaipur	Ganganagar, Bikaner, Jaipur	Ganganagar, Churu, Jaipur	Ganganagar, Bikaner, Jaipur	Jhunjhunu, Alwar S. Madhopur	Churu, Jhunjhunu, Alwar, Bharatpur,	Jhunjhunu, Alwar, Sikar	Jhunjhunu, Alwar S. Madhopur
Difference greater than 2,000 in 1971 and 3,000 in 1981	Ajmer, Jodhpur, Kota	Ajmer, Jodhpur, Kota	Ajmer, Jodhpur Sirohi, Kota	Ajmer, Jodhpur Kota	Sikar, Nagaur, Pali	S. Madhopur, Sikar Tonk, Nagaur, Pali	Nagaur, Pali,	Siker, Tonk, Nagaur, Pali
Urban to Rural	Ganganagar, Pali, Jalor	Ganganagar, Nagaur, Pali	Ganganagar, Jhunjhunu, Alwar	Ganganagar, Jhunjhunu, Alwar	Jaipur, Ajmer, Jodhpur	Jaipur, Ajmer, Jodhpur,	Bikaner, Churu, Jaipur	Bikaner, Churu, Jaipur

Difference greater than 1,000 in both 1971 and 1981	Chittorgarh, Bundi,	Jalor, Bhilwara, Chittorgarh, Bundi	Bharatpur, Sikar, Tonk, Nagaur, Pali Barmer, Bhilwara	Tonk, Naga.., Pali, Jalor, Bhilwara, Chittorgarh, Bundi		Churu	Ajmer, Jodhpur Chittorgarh, Kota	Ajmer, Jodhpur, Udaipur, Kota
Urban to Urban	Ganganagar, Jaipur, Pali	Ganganagar, Jaipur, Pali	Ganganagar, Churu, Jaipur	Ganganagar, Jaipur, Pali	Bikaner, Churu, Jhunjhunu	Bikaner, Alwar, Bharatpur	Bikaner, Alwar, Bharatpur	Bikaner, Alwar, Ajmer
Difference greater than 1,000 in 1971 and 3,000 in 1981	Sirohi, Bhilwara, Kota	Kota	Sirohi, Bhilwara, Kota	Kota	Alwar, Bharatpur, Sikar, Ajmer, Tonk, Jodhpur, Nagaur	Sikar, Ajmer, Jodhpur,	Sikar, Ajmer, Tonk, Jodhpur	Jodhpur, Nagaur

The losing districts were generally in central Rajasthan. The number of losing districts increased in 1981 with the inclusion of Bharatpur, Sawai-Madhopur, Tonk and Jhalawar in that category. These districts mostly sent their migrants to Jaipur, and partly to Kota. It is noteworthy that all the districts around Jaipur became net outmigrating districts in 1981.

As regards females, the gaining districts in Rajasthan formed four clusters in 1971 — Ganganagar and Churu forming one cluster, Bharatpur second, Pali third, and Tonk, Kota and Chittorgarh forming the fourth cluster. In 1981, Churu and Bharatpur did not remain gaining districts, but Jaipur and Bundi got added to the third cluster, and Dungarpur appeared as an independent cluster in the southwest.

The pattern of losing districts with respect to female migrants was similar between 1971 and 1981, except that certain districts — Jhunjhunu, Alwar, Sawai Madhopur, Sikkar, Nagaur, and Jhalawar also became losing districts in 1981 enlarging such area substantially.

The four maps also indicate that the quantum of net in or out migration in western and southwestern Rajasthan was generally small because of small populations of those districts.

The pattern of net in- and outmigration in different migration streams was also quite similar with few variations. For example, Jaipur gained very substantially through interdistrict rural-to-urban and urban-to-urban migration but lost population in movements towards its rural areas. Ajmer was a gaining district only with respect to rural-to-urban migration, otherwise it was a losing district in all other streams in both 1971 and 1981 censuses.

FACTORS RESPONSIBLE FOR NET IN AND OUTMIGRATION

In Rajasthan, Jaipur has developed in recent years not only as the state capital but also as the leading industrial district. Printed textiles, precious stone cutting, enamel work, marble statues, etc., are some of the more important industries whose products are exported not only to different parts of India but to other countries also. Kota is another industrially advanced district in the state and has been developing at a fast pace. Ganganagar has grown in the past and attracted migrants because of availability of canal waters. But it is difficult to indicate the basis of net inmigration in Chittorgarh, Bundi, and Banswara districts as they are not industrially very much advanced.

The losing districts west of Jaipur have been basically arid and industrially backward. The districts on the east and south of Jaipur have also not been industrially developed and have generally sent their interdistrict migrants to Jaipur and Kota respectively. Unless the Rajasthan State Industrial Development and Investment Finance Corporation brings new development impulses into the hitherto industrially backward districts, they would continue to remain net outmigrating districts.

MIGRATION FROM THE NEIGHBOURING DISTRICTS

When the interdistrict migration is considered from or to the neighbouring districts, the pattern was quite similar to the one described above. Here again, Ganganagar, Jaipur, Chittorgarh and Kota emerged as net inmigrating districts, while Churu, Alwar, Ajmer, Nagaur, and Jhalawar generally turned out as net outmigrating

districts.

It was hypothesised earlier that a large proportion of both male and female migration in India would be from the bordering districts. Table 5 gives the proportions of migrants from the bordering districts as an average of the district figures in the four migration streams for 1971 and 1981 respectively. The table also presents the maximum and minimum proportions of inmigrants and outmigrants as well as their standard deviation for each migration stream. It is readily seen that the proportions in different migration streams were alike in 1971 and 1981. As one would expect, females migrated in substantially greater proportion from or to the neighbouring districts than males, further supporting the view that female migration is mostly short-distance migration.

It is noteworthy that the proportion of migrants from the neighbouring districts was the highest in both 1971 and 1981 in the rural-to-rural stream. It was followed by urban-to-rural, rural-to-urban and, lastly, by urban-to-urban stream. This implies that migrants to rural areas travel shorter distances than those to urban areas.

The districts with high to very high values of inmigration from and outmigration to the neighbouring districts are surrounded on all sides by districts of the same state. They do not have strong economic base to attract migrants from longer distances. Most of the people migrating from such districts are probably unskilled, and do not possess information about better employment opportunities available at longer distances. It also seems that these migrants are generally with low incomes and do not possess necessary entrepreneurship.

Table 5: **Interdistrict lifetime migration from bordering districts within the state of enumeration as percentage of total in or out intradistrict migration of each district by sex and migration stream, Rajasthan, 1971 and 1981**

Sex	Year	Migration Stream	Inmigration				Outmigration			
			Average	Maximum	Minimum	S.D.	Average	Maximum	Minimum	S.D.
Males	1971	R-R	81.5	95.6	52.4	10.6	80.8	95.0	52.1	12.0
		R-U	68.7	89.3	34.4	13.2	68.4	94.5	19.4	16.7
		U-R	68.8	95.7	38.4	16.5	71.8	89.1	54.4	9.6
		U-U	59.2	87.5	20.7	16.6	59.8	90.1	22.8	17.1
	1981	R-R	80.1	94.8	40.4	12.9	80.1	95.5	39.1	13.3
		R-U	69.4	86.6	37.6	11.0	66.2	94.7	15.9	22.2
		U-R	66.7	91.4	40.2	14.1	69.5	89.9	41.4	13.1
		U-U	59.9	98.3	25.0	17.5	59.8	86.2	21.4	17.5
Females	1971	R-R	90.9	99.1	60.7	8.6	92.7	99.4	74.8	5.6
		R-U	80.3	94.5	49.2	9.4	78.8	94.6	53.4	9.7
		U-R	80.6	95.7	64.5	7.9	84.1	98.3	67.1	9.0
		U-U	67.4	91.9	26.7	15.9	68.3	95.0	33.8	15.7
	1981	R-R	91.3	98.0	68.5	6.4	91.9	98.2	79.4	4.2
		R-U	79.1	95.7	48.4	9.6	77.9	95.1	51.0	11.2
		U-R	80.4	95.3	56.6	8.9	82.2	97.0	57.0	8.0
		U-U	68.2	93.2	33.1	15.7	68.1	89.6	36.1	15.5

In contrast, the districts with low inmigration from or outmigration to neighbouring districts generally share a large part of their boundaries with other states. Within the state, they send their migrants to districts which provide better employment

opportunities. Alternatively, districts with high employment potential attract migrants from all parts of the state instead of getting only from the neighbouring districts. These generalisations are also likely to hold good in different parts of the country.

If migration from neighbouring districts is so important in the interdistrict migration as indicated by Table 5, it is expected that a large amount of interstate migration would be from the bordering districts of other states. An effort was made to examine the extent of interstate in migration in the total lifetime migration according to the extent of common border with the neighbouring state(s). The extent of commonness of the border was determined purely on a visual basis. Table 6 supports our contention that the larger the commonness of the border, the greater the extent of interstate in-migration. It is believed that most of this migration is from the bordering districts of the neighbouring state(s).[5]

If one takes the quantum of intradistrict migration, interdistrict from the bordering districts and also interstate from the bordering districts, almost 90 per cent of female rural-to-rural migration is covered by such short distance movements. The proportions decline in other migration streams but still the bulk of migration in Rajasthan was short distance in the past.

Table 6: **The proportion of common boundary of district with other state(s)* in percentage and the per cent of lifetime migration in interstate stream, Rajasthan, 1981**

District	Males				Females			
	Less than 20	20-40	40-60	60 or more	Less than 20	20-40	40-60	60 or more
Ganganagar			31.03				28.59	
Churu	14.50				8.29			
Jhunjhunu		23.85				10.83		
Alwar		20.03				20.19		
Bharatpur			31.77				32.84	
Sawai Modhopur	12.99				5.36			
Sikar	10.14				2.82			
Barmer	3.51				1.58			
Jalor		10.69				5.81		
Sirohi		21.10				11.13		
Bhilwara	5.86				2.17			
Udaipur	11.30				3.95			
Chittorgarh			18.51				14.26	
Dungarpur		12.98				13.45		
Banswara			15.92				7.30	
Kota			22.43				14.70	
Jhalwar				24.63				26.16
Average of the Districts	9.72	17.73	23.93	24.63	4.03	12.28	19.54	26.16

* The extent of commonness of boundary of district with other state(s) was determined by visual inspection only for the classification in this table. Hence, there can be some likelihood of marginal classificatory errors.

5. The ideal would have been to compute exact amount of lifetime migration from one district to another. The 1981 (or for that matter, 1971) census tabulations do not permit this type of analysis of migrants from one state to another as, in the case of interstate migration, the name of the district from which or to which migration has taken place is not known.

REASONS FOR MIGRATION

As indicated earlier, the 1981 population census collected for the first time information on 'reasons for migration' which was classified into (1) employment, (2) education, (3) family moved (or associational), (4) marriage, and (5) others. The data are available separately for each sex (but not below the state level) according to the four migration streams — rural-to-rural, rural-to-urban, urban-to-rural, and urban-to-urban, and by intradistrict, interdistrict, and interstate movements. Table 7 presents percentage distribution of male and females lifetime migrants by reasons for migration in different migration streams for India and Rajasthan. Employment as a reason for male lifetime migration was more prominent in Rajasthan than in the country except in the interstate stream. The intensity of employment as a reason for migration increased significantly from intradistrict level to interstate level. In contrast, the proportion of associational migrants and those moving for 'other causes' declined with distance. Education in Rajasthan accounted for 6.1 per cent of the male migrants (as compared to 5.2 per cent in case of India) but its proportion in rural-to-urban stream was more than twice (12.5 per cent).

Employment accounted for more than half the male migrants in rural-to-urban stream and was followed by urban-to-urban, urban-to-rural, and rural-to-rural streams. The proportion of migrants in the category of others was higher for those who moved to rural areas; 'family moved' also turned out as an important reason for male migration.

Among females, as one would expect, marriage was the most important reason for migration and accounted for four-fifths of the lifetime migrants. In the rural-to-rural migration stream, marriage accounted for 86.5 per cent of the migrants. The second important reason for female migration was associational covering one-tenth of the migrants. The remaining three reasons — employment, education and others accounted for another one-tenth of the migrants.

In the interstate migration stream, marriage accounted for two-thirds of the lifetime migrants, family moved about one-fifth of the migrants, and the rest was due to employment, education, and other reasons. Similarly, in the urban-to-urban stream, marriage as a reason for migration was comparatively weak while family moved gained further importance in explaining female migration.

CONCLUSION

In analysing the data on interdistrict lifetime migration within the state of enumeration, this paper has identified net inmigrating and outmigrating districts in Rajasthan in different migration streams. By comparing the net lifetime migration as of 1971 and 1981, the paper has emphasised the general constancy of the pattern.

It was hypothesised in this paper that a large proportion of both male and female migration would be from the bordering districts. This was found to hold true. Further, it was highest in the rural-to-rural stream and was followed by urban-to-rural, rural-to-urban, and urban-to-urban streams. Females migrated in substantially greater proportion from (or to) the neighbouring districts than males supporting the view that female migration is mostly short distance migration.

Table 7: **Percentage distribution of lifetime migrants of each Sex sn different migration streams by reasons for migration, India and Rajasthan, 1981**

Area and migration stream	Males						Females					
	Employ-ment	Educa-tion	Family moved	Marriage	Other	Total	Employ-ment	Education	Family moved	Marriage	Others	Total
India												
Total	30.8	5.2	30.6	3.0	30.4	100.0	1.9	0.9	14.7	72.3	10.1	99.9
Intradistrict	21.7	6.0	32.4	4.6	35.2	99.9	1.3	0.7	10.5	78.2	9.3	100.0
Interdistrict	37.9	5.9	29.9	2.1	24.2	100.0	2.9	1.2	19.4	66.4	10.1	100.0
Interstate	50.5	3.8	24.3	1.1	20.3	100.0	4.7	1.5	28.4	53.6	11.8	100.0
Rural-to-rural	19.7	4.3	33.6	5.6	36.7	99.9	1.1	0.4	8.5	81.7	8.3	100.0
Rural-to-urban	47.6	8.4	23.3	1.2	19.6	100.1	4.3	2.6	29.0	51.9	12.2	100.0
Urban-to-rural	26.3	3.5	31.3	2.3	36.6	100.0	3.2	1.1	20.9	59.1	15.7	100.0
Urban-to-urban	40.8	5.3	31.2	1.0	21.7	100.0	4.5	2.3	35.3	43.7	14.3	100.1
Rajasthan												
Total	39.6	6.1	27.2	3.3	23.9	100.1	1.8	0.5	10.3	80.5	6.8	99.9
Intradistrict	35.7	6.9	26.9	4.4	26.1	100.0	1.4	0.3	7.8	84.3	6.3	100.1
Interdistrict	46.4	6.7	26.5	2.5	17.8	99.9	2.4	0.7	13.2	77.2	6.5	100.0
Interstate	47.3	3.6	27.6	1.8	19.7	100.0	3.6	1.1	18.8	68.5	8.0	100.0
Rural-to-rural	33.8	4.1	27.6	5.1	29.5	100.1	1.3	0.2	6.4	85.9	6.2	100.0
Rural-to-urban	53.1	12.5	22.1	1.5	10.8	100.0	3.6	1.5	23.6	65.1	6.2	100.0
Urban-to-rural	38.6	3.6	27.2	2.0	28.5	99.9	3.0	1.0	14.4	73.5	8.1	100.0
Urban-to-urban	46.6	5.9	31.1	1.7	14.7	100.0	3.9	1.6	28.4	58.0	8.1	100.0

Source: Derived from Table D-3; Census of India, 1981. 1986: 232-33, 282-83. 332-33. and Census of India 1981. 1988: 4-5, 54-55, 104-105.

The districts with high to very high values of inmigration from and outmigration to the neighbouring districts are generally surrounded on all sides by districts of the same state. They do not have strong economic base to attract long distance migrants. In contrast, districts having low population of interdistrict migration from and to the neighbouring districts generally had varying proportions of their borders common with other states. Alternatively, districts with strong economic base attracted migrants from longer distances.

Combining the interdistrict migration pattern with reasons for migration, one can safely conclude that male migration to urban destinations was largely for employment. These destinations attracted migrants from longer distances besides those from the neighbouring districts. The male lifetime migration to rural areas could not, however, be explained fully by the specific reasons of employment, education, family moved, and marriage, as reasons like returning back after retirement, to meet relatives, returning back home as one could not secure employment at destination, etc., fell into the category of 'others'.

The pattern of interdistrict migration observed in Rajasthan is expected to hold good virtually throughout India, and, probably, in some of the South Asian countries. The similarity in the pattern found between 1971 and 1981 may continue in the near future as well. In future urban development planning at the district level, it would be good to take note of net in- and outmigration as found in this paper.

REFERENCES

Bose, Ashish, 1984. Migration policies in Asian countries: an overview of some critical issues, paper presented in the Symposium on 'Population Policies in Asian Countries', Hong Kong 9-14 January.

———, 1980. *India's Urbanisation, 1901-2001*, Second revised edition, New Delhi: Tata-McGraw Hill.

———, 1967. Migration streams in India, in *International Union for the Scientific Study of Population, Contributed Papers, Sydney Conference*, Australia, 21-25 August.

Census of India, 1981. (1986), Series 18, Rajasthan, Part V-A &B, *Migration Tables*, Delhi: Controller of Publications.

———, 1981. , 1988a Series 1. India, Part-V-A & B(i) *Migration Tables*, (Table D-1 and D-2), Delhi, Manager of Publications.

———, 1981. 1988b. Series 1, India, Part V-A & B(ii) *Migration Tables*, (Table D-3). Delhi: Controller of Publications.

———, 1971. 1977, Series 1, India, Part II-D(i) *Migration Tables*, Delhi: Manager of Publications.

———, 1961. 1966, Series 1. India, Part II-C(iii) *Migration Tables*. Delhi: Manager of Publications.

Davis, Kingsley. 1951. *The Population of India and Pakistan*, Princeton: Princeton University Press.

George, M.V., 1965. Internal migration in Assam and Bengal 1901-61, Ph.D. Thesis, Canberra: Department of Demography, Australian National University, (Unpublished).

Kumar, Joginder, 1967. The pattern of internal migration in India during 1951-61, in *International Union for Scientific Study of Population Contributed Papers*, Sydney Conference, Australia, 21-25 August.

Mahmood, Aslam, 1975. Patterns of migration into Indian cities and their socio-economic correlates — a multi-variate regional analysis. M.Phil. dissertation, New Delhi: Centre for the Study of Regional Development. Jawaharlal Nehru University (Unpublished).

Mathur, P.C., 1962. Internal migration of India, 1941-51, Ph.D. dissertation, Chicago: Department of Sociology, University of Chicago (Unpublished).

Mitra, Asok, 1967. Internal migration and urbanisation. Part 1-Text, papers for the meeting of the ECAFE's Expert Working Group on Problems of Internal Migration and Urbanisation, Bangkok, New Delhi, Office of the Registrar General, India (mimeo).

———, Mukherjee, Shekhar, and Bose, Ranendranath, 1980. *Indian Cities: Their Industrial Structure, Immigration and Capital Investment*, New Delhi: Abhinav Publishers.

Premi, Mahendra, K. (forthcoming). Internal migration in India, in Charles B. Nam et al. (ed.) *International Handbook of Internal Migration*, Greenwood Press.

———, 1984a. A case for microlevel studies on internal migration in India, paper presented at the IUSSP Seminar on Micro-Approaches to Demographic Research, Australian National University, Canberra, 3-7, September.
———, 1984b. Internal migration in India, 1961-81. *Social Action*, 34, July-September.
———, 1982. *Demographic Situation in India*, Papers of the East-West Population Institute, No. 80, Honolulu, East-West Centre.
———, 1981. Role of migration in the urbanisation process in third world countries; a case study of India, *Social Action*, 31, July-September.
Zachariah, K.C., 1968. *Migrants in Greater Bombay*, Bombay: Asia Publishing House.
———, 1964. *A Historical Study of Internal Migration in the Indian Subcontinent, 1901-1931*, Bombay: Asia Publishing House.
———, 1960. Internal migration in India, 1941-51. Bombay: Demographic Training and Research Centre, (mimeo)