Human Resources Development and Poverty Alleviation: A Study of 23 Poor Counties in China

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To reduce poverty, there first must be an improvement in human resources and increased investment in human capital

Most developing countries, including China, are faced with poverty problems. The World Development Report 1990 (World Bank, 1990) estimates that in 1985 more than one billion people in the developing world were living in poverty, earning less than US$370 per capita a year. Of these people, 210 million were in China, accounting for about 20 per cent of the poor in all developing countries. (According to China's standards, the number of poor was about 120 million in 1985.1) Since the time that economic reform was started in 1978, the Chinese economy has developed rapidly, and this has made it possible for the Government to come to grips with various poverty problems since the decade of the 1980s. The Office of the Leading Group of Economic Development in Poor Areas was set up under the State Council in 1986; it was charged with formulating and implementing a poverty alleviation plan during the period of the Seventh Five-Year Plan (1986-1990). The Office has since become a standing body of the Government and currently has branches in the provinces, prefectures and counties where poverty is a particular problem. The State and provincial governments supply huge amounts of financial support to poor areas each year; international organizations also contribute generously to poverty alleviation activities in rural China. Great achievements were made in China during the years 1986-1990, and millions of people were freed from poverty. However, since socio-economic conditions are quite backward in certain areas and development has been unequal in poor areas, by the end of 1990, there were still 90 million people living under the poverty line, i.e. about 8 per cent of the rural population, living mainly in the mountainous areas of middle and western China. There are great social, economic, cultural, geographic and population differences between the poor areas and prosperous areas of the country.

Although there are many reasons for poverty in rural China, such as remote and mountainous location, inconvenient transport, lack of natural resources, too many people and not enough arable land, one of the most important reasons is that human resources have not been developed very well. In this regard, there are problems such as low education, unskilled labour, lack of information, single occupation and limited labour force mobility. Therefore, the living standards of the people in poor areas need to be improved urgently.

The key factor in the development process is the central role of people (Jones, 1992). Streeten (1983) noted that to develop human resources involves improving the nutrition, health and skills of the people. Nadler and Nadler (1989) emphasized that the core of human resources development is enabling people to learn from experience and improve their job performance. Human resources development therefore has quite a broad meaning; in fact, some people contend that there is no precise definition for the concept. We think that in general the population's demands for employment, education and health are the main concern of human resources development. In developing countries, a human resources development strategy has often been advocated, as much for its anticipated impact on poverty and income distribution as for its impact on output productivity (Corner, 1986). This article focuses on the relationship between human resources development2 and poverty alleviation, and shows that poor health, low education and inefficient employment are not only the results of poverty, but also the reasons for poverty.

Data and methods

The research is based on the Population and Economy Sampling Survey in 23 Poor Counties of China. Conducted in 1990, it was organized by the Institute of Population Research, Peking University, and supported financially by the United Nations Population Fund (UNFPA). Twenty-one institutes all over the country were involved in this project.

The county is the basic unit of administration in rural areas of China: in 1990, there were about 2,300 counties, of which 699 were poor counties according to the national and provincial poverty standard (State Statistical Bureau, 1992), constituting about 30 per cent of the total number of counties. The Survey covered 23 poor counties in 22 provinces: Wanxian (Hebei), Daixian (Shanxi), Helin (Inner Mongolia), Fengcheng (Liaoning), Tongyu (Jilin), Qinggang (Heilongjiang), Panan (Zhejiang), Linquan and Liuan (Anhui), Fuding (Fujian), Nankang (Jiangxi), Sishui (Shandong), Shangcheng (Henan), Zigui (Hubei), Mayang (Hunan), Longchuan (Guangdong), Longsheng (Guangxi), Xuanhan (Sichuan), Luodian

(Guizhou), Luchun (Yunnan), Yichuan (Shaanxi), Dingxi (Gansu) and Shufu (Xinjiang). For each county in the Survey about 1,000 households were assessed: 500 under-developed households, 300 developing households and 200 developed households.3 This proportion reflects the distribution of households at different income levels in poor areas. Stratified random sampling with proportional three-stage allocation was adopted in the Survey; the three sampling units were poor townships, poor villages and households. The questionnaire consisted of three parts: for individuals under 14 years old, individuals 15 years and older, and households. The subjects of this research were employed individuals aged 15 years or older;4 52,114 people comprised the total effective sample. The survey data represent the demographic and economic situation of individuals and households at the end of 1989, if without special note. The analysis for each county was done by many Chinese demographers (Zhang, 1992 and 1993) and some common features have been found among these poor counties (Li and Liao, 1992), so this study takes the 23 counties as a whole and tries to explore the relationship between human resources development and changes in poverty status of China's poor rural areas.

Some two-way cross-tabulations of bivariate analysis are made in this study to compare human resource indicators among under-developed, developing and developed households in selected poor areas, and to determine whether there are some obvious differences among the three kinds of household. Chi-square (c2) is used to test the independence of two variables in a cross-tabulation, and phi-coefficient (j) tests the strength of association between the two variables. Multivariate analysis uses multinominal logistic regression to test the significant level of human resource indicators affecting poverty alleviation, and seeks the main reasons for poverty in the same external environment.

The main indicators of human resources being considered as explanatory variables are shown in table 1: health, education, skill, mobility and occupation of working people. The response in the model is the poverty status of individuals,5 which is classified into three categories: under-developed, developing and developed. All explanatory variables and response variables in the model are qualitative.

Table 1: Explanatory variables used in multivariate analysis on human resources development and poverty alleviation in 23 poor counties of China

Variable	Description
Health	Coded 1 if the person is healthy; 0, if not.
Education	Education level that the person reached: coded 1 if category applies; 0, if not.
Illiterate and semi-literate	
Primary	
Junior middle	
Senior middle or higher	
Skill	Coded 1 if the person has skill or experience in some aspect; 0, if not.
Mobility	Code 1 if the number of times the person goes away from home to pursue economic activities is more than 10 during the years 1987-1989; 0, if not.
Occupation	Occupation refers to the main one on which people concentrate and spend most time: coded 1 if category applies; 0, if not.
Farming	
Forestry, livestock, fishery and water conservation	
Non-agriculture	

Since the response variable is trichotomous, a multinominal logistic regression model is set up. The basic principle of the method is similar to ordinary logistic regression. We suppose that P1, P2, P3 are the probability that the ith individual in the sample is in categories 1, 2, and 3 of the response (P1+P2+P3 = 1), and we let X1, X2..., Xk be a vector of predictors measured on the ith individual in the sample. As in the dichotomous case, we model the log odds (odds represent the ratio of the probability that an event will occur to the probability that it will not) of being in the category of interest as a linear function of the explanatory variables. However, more than one equation is required, since there are two independent contrasts that can be constructed with the odds, instead of one. For example, we can consider the log odds of being in category 1 versus category 3; expressed as a linear function of the predictors, this becomes as follows:

ln(P1/P3) = b0+b1X1+b2X2+...+bkXk

where b0, b1... bk are the constant and coefficients of regression. Since it is easier to think of odds rather than log odds, the equation can be written in terms of odds as follows:

Odds = (P1/P3) = exp(b0+b1X1+b2X2+...+bkXk)

e raised to the power bj is the multiplicative factor by which the odds of being in category 1 versus category 3 changes when the jth explanatory variable increases by one unit. By the same procedure, the equation for odds of being in category 2 versus category 3 can be worked out. The odds of being in category 1 versus category 2 can be derived from the above two equations. In this model, the categories 1, 2 and 3 are developed, developing and under-developed households, respectively. Thus, according to the value of odds, it is possible to find which variables have a stronger effect on people changing their poverty status from under-developed to developing or to developed. The model is made by SAS procedure CATMOD (SAS Institute Inc., 1990) with the maximum likelihood estimation techniques. For more details on the method, see Halli and Rao (1992).

Results

Bivariate analysis

Table 2 shows five cross-tabulations, which indicate the relationships between health, education, skill, mobility, occupation and the three kinds of household.[6] All chi-squares are very significant (p<0.001), so the human resource indicators are obviously different among the under-developed, developing and developed households. Education levels (j = 0.169) seem to have the strongest association with response (poverty status). Occupation (j = 0.148) and skill (j = 0.144) follow education according to the values of the phi-coefficient. From table 2, we find the following information.

Table 2: Percentage distribution of working people by human resources indicators and three kinds of household in 23 poor counties of China (sample size = 52,114)

Variable	Under-developed	Developing	Developed
Health			
Poor	10.7	5.2	4.0
Good	89.3	94.8	96.0
	100	100	100
χ^2=686	df=2	p=0.000	φ=0.115
Education			
Illiterate and semi-literate	37.1	27.8	22.2
Primary	39.8	39.4	37.9
Junior middle	19.0	25.9	30.6
Senior middle or higher	4.1	6.9	9.3
	100	100	100
χ^2=1,489	df=6	p=0.000	φ=0.169
Skill			
No	83.9	74.8	69.4
Yes	16.1	25.2	30.6
	100	100	100
χ^2=1,084	df=2	p=0.000	φ=0.144
Mobility			
None or few	98.4	96.4	94.4

Many	1.6	3.6	5.6
	100	100	100
χ^2=412	df=2	p=0.000	φ=0.089
Occupation			
Farming	78.3	72.4	62.5
Forestry, livestock, fishery and water conservation	4.8	4.4	4.6
Non-agriculture	16.9	23.2	32.9
	100	100	100
χ^2=1,145	df=4	p=0.000	φ=0.148
Total number	**24,306**	**16,627**	**11,181**

The three kinds of household have different situations in terms of health (c2 = 686). In under-developed households, 10.7 per cent of working people had health disorders such as physical or mental impairment, bronchitis, anaemia, heart disease and tuberculosis; this was 5.5 percentage points higher than the people in developing households and 6.7 percentage points higher than those in developed households. Overall, 92.5 per cent of working people in the Survey were healthy; the working people living in more developed households had a higher proportion healthy.

Education level had a strong positive relationship with the economic situation of the household (c2 = 1,489); the phi-coefficient in this cross-tabulation was the highest of all. The illiterate and semi-literate accounted for 37.1 per cent of working people in under-developed households, for 27.8 per cent in developing households and 22.2 per cent in developed households. With an increase in economic income of the household, the proportion of less educated working people decreased and the proportion of better educated working people increased. The proportion of working persons with a junior middle or higher education in developed households was 39.9 per cent, i.e. 7.1 percentage points higher than that in developing households and 16.8 percentage points higher than in under-developed households.

The proportion of working people having skill or experience in non-farming production is obviously different in the three kinds of household (c2 = 1,084). The Survey shows that 25.2 per cent of working people in developing households and 30.66 per cent in developed households had one or more skills such as raising poultry, sewing, carpentry, or weaving. In under-developed households, only 16.1 per cent of working people had such skills.

As the household gets relatively richer, the number of times that working people leave home to pursue economic activities increases (c2 = 412). During the period 1987-1989, 98.3 per cent of working people in under-developed households had seldom or never gone away from home for economic activities; the proportions in developing and developed households who had seldom or never gone away for such purposes were 96.4 per cent and 94.4 per cent, respectively. The working people who often went away (over 10 times in the two years) accounted for 5.6 per cent in developed households, 2.0 percentage points higher than in developing households and 4.0 percentage points higher than in under-developed households.

The occupation variable is also related to the three kinds of household (c2 = 1,145). Working people in developed households spent more time in non-agricultural activities and 32.9 per cent of them had a non-agricultural activity as their main occupation: for example, manufacturing, construction, transport, mining, service and commerce. Compared with developed households, the proportions of non-agricultural working people in under-developed and developing households were much lower, being 16.9 per cent and 23.2 per cent, respectively, in 1989.

Multivariate analysis

Three equations of the multinominal logistic regression model are established to describe the effect of human resource indicators on poverty alleviation. The dependent variables are the odds of being in a developed versus under-developed household; developing versus under-developed household; and

developed versus developing household. Table 3 gives the odds ratios of these equations. Most classification variables are very significant, and the odds ratios of all significant variables are greater than 1, which means they have a strong positive influence on response.

Table 3: Effects of human resource indicators on poverty alleviation: results of multinomial logistic regression model (odds ratios) in 23 poor counties of China

Variables	Developed versus under-developed	Developing versus under-developed	Developed versus developing
Health			
(Poor)	1.000	1.000	1.000
Good	2.385**	1.971**	1.210*
Education			
(Illiterate and semi-literate)	1.000	1.000	1.000
Primary	1.426**	1.240**	1.150**
Junior middle	2.112**	1.584**	1.334**
Senior middle or higher	2.736**	1.894**	1.445**
Skill			
(No)	1.000	1.000	1.000
Yes	1.939**	1.618**	1.199**
Mobility			
(None or few)	1.000	1.000	1.000
Many	1.968**	1.560**	1.261**
Occupation			
(Farming)	1.000	1.000	1.000
Forestry, livestock fishery and water conservation	1.243**	n.s.	1.215*
Non-agriculture	1.973**	1.306**	1.511**
Constant	0.098**	0.248**	0.395**
Total number	**52,114**	**52,114**	**52,114**

Notes: ** $p < 0.001$

* $p < 0.005$

n.s. = not significant at 0.1 level.

Reference category is in parentheses.

The equation of developed versus under-developed household shows the relationship between human resource indicators and the elimination of poverty. The values of odds ratios in this equation are greater than relative ones in the other two equations. This shows that the explanatory variables have a stronger effect on the changes for a person from an under-developed than a developed household. Among all explanatory variables, a senior middle or a higher education level has the greatest odds ratio, at 2.7. This means that when explanatory variables change one unit, from illiterate and semi-literate to senior middle or higher, the odds of being in a developed versus under-developed household will increase by the largest margin; it seems that higher education levels would contribute most to the elimination of poverty. There are four categories in the educational variable; as the educational level increases, the odds ratios rise. The odds of senior middle or higher, junior middle, and primary are 2.7, 2.1 and 1.4 times higher, respectively, than the reference category (illiterate or semi-literate). Health status has the second largest odds ratio: with a person's health changing from poor to good, the possibility of the person's poverty status changing from under-developed to developed will be multiplied by 2.4. Working people with skill or experience have the odds of being in developed versus under-developed status 1.9 times higher than those of people without a skill or experience. Although a little mobility produces no obvious difference over no mobility in affecting the response variable, more frequent mobility has a significant function, with the odds ratio being 2.0. The odds ratio in the occupational category of forestry, livestock, fishery and water conservation is 1.2; it is 2.0 in non-agriculture. Thus, changing one's occupation from farming to non-agriculture will increase the odds of being in a developed status more than changing from farming to forestry, livestok, fishery and water conservation.

The developing versus under-developed equation describes the reduction of poverty. Similar to the previous equation, good health and higher education have a stronger influence on response; their odds ratios are 2.0 and 1.9, respectively. The odds for working people from under-developed status rising to developing status increase with the increase in their education level. Skill and frequent mobility also contribute to reducing poverty. The second equation has smaller odds ratios in all variables than the first one. The two equations also differ in the effect of the occupation variable: in the second equation, the forestry, livestock, fishery and water conservation occupations are not significant, and the odds ratio of non-agriculture occupation is smaller.

The last equation (developed versus developing) implies the process of consolidating the reduction of poverty. It appears that non-agricultural occupation and higher education have the greatest odds ratios (1.5 and 1.4), a result which is a little different from that of the other two equations. The occupation variable becomes important and the health variable loses its position. This shows that when one wants to change from developing to developed status, the two most important factors seem to be selecting a good occupation and increasing investment in education. Health, skill and frequent mobility are still significant in this equation, but their odds ratios are much smaller than in the other two; this means that the effect of these variables on response decreases.

Generally, higher education is the most important human resource indicator for reducing and eliminating poverty. Good health is important for reducing poverty and non-agricultural occupation is important for changing from developing to developed status.

Case studies

Poor health is a common problem in many poor households. In rural China, heavy physical labour is very common, and without a healthy body, it is difficult to take part in productive activity. The reasons for poor health include malnutrition, poor sanitation, backward medical facilities and being the offspring of parents who are close relatives. The Handicapped Population Sampling Survey of China in 1987 shows that the proportion of people with disabilities7 in poor areas was much higher than the average level for the country as a whole (He, 1992). Most of the people with disabilities surveyed were illiterate or semi-literate; their employment rate was 20 percentage points lower than that of people without disabilities and 70 per cent of them needed economic support from their families for their daily necessities of life. In Fengjie county of Sichuan Province, there were about 96,000 poor households, 15,000 of which were poor because of disability problems among those of working age in the household. Hereditary disease was the main reason for people's disabilities in poor areas of Sichuan.

Education enables a society to accumulate the technical, managerial and entrepreneurial skills needed for overcoming physical, environmental and natural resource constraints to development, for increasing productivity and for raising living standards (Farooq and Ofosu, 1992). The better is the education that people attain, the higher will be their productivity, and the more income they will be able to earn. A survey of 300 poor households in Luliang prefecture of Shanxi Province showed that the per capita income in 1988 was 253 yuan for families with illiterate and semi-literate members,8 373 yuan for families with primary education, 407 yuan for families with junior middle education and 432 yuan for families with senior middle or higher levels of education.

(Click here for photo)
Higher education is the most important human resource indicator for reducing and eliminating poverty. With education, people are able to perform higher-level tasks such as the computerized handling of population data and information.

Education is the foundation for obtaining skills, but skills differ from education, as they have a closer connection with production and have a direct effect on output. Thus, skill is often considered as one of the main factors in the alleviation of poverty in poor areas. In a survey of Longsheng county in Guangxi Province in 1989 (Zhang, 1993), 7.8 per cent of under-developed households, 10.3 per cent of developing households and 16.7 per cent of developed households thought that having no skill or experience in production was the first obstacle to the alleviation of poverty. The proportions that thought it was the second obstacle were 23.4 per cent, 20.6 per cent and 17.2 per cent of the three kinds of household, respectively. (Many people were of the opinion that a lack of capital is the leading problem of poverty.)

Mobility here means working people's leaving their place of origin for economic activities in other counties, prefectures or provinces. These activities mainly include working in enterprises, doing business, training, transporting, selling products and exporting labourers to other areas. People who are mobile move over different distances and for different periods: some of them may cross several provinces and stay away

for more than one year; others just go to the small cities nearby for three days or more and return home soon. Certainly, people can get current or future benefits from being mobile. A study of 204 poor villages in Sishui county of Shandong Province showed obvious income differences between people who migrated for work and the ordinary labour force (Mu, 1993). In 1988, there were 4,892 migrants from that county, accounting for 3.4 per cent of population of the 204 poor villages. Their total income was 3,358,000 yuan. The annual income for each migrant was 686.4 yuan, which was 116.9 yuan higher than the average income of the ordinary labourer in these villages.

The selection of occupation has a substantial effect on income levels, because the input-output ratios differ greatly in farming,9 forestry, livestock, fishery and water conservation occupations, and non-agricultural occupations. In Shangcheng county of Henan Province, although agriculture is the main economic activity, the persons of working age in developed households spent 44.7 per cent of their working time on non-agricultural pursuits and these accounted for 54.5 per cent of their total income on average in 1989; those of working age in developing households and under-developed households spent 35.2 per cent and 26.2 per cent of their working time, respectively, on non-agricultural pursuits. The input-output ratio in forestry, livestock, fishery and water conservation occupations was also higher than that in farming. The labour force in developed households spent more than 50 per cent of their working time on non-farming industries and that caused their income to increase rapidly (Li, 1992).

Discussion and conclusion

Just like the pattern of causation between population growth and poverty (Rodgers, 1989), the low level of human resources development is both a cause and a consequence of poverty. Our study's bivariate analysis shows that all explanatory variables have quite a strong positive association with the response variable. The three kinds of household have obvious differences in terms of human resource indicators. Usually, the more developed the household that the working people come from, the better their human resources are developed. The multivariate analysis indicates that the human resource variables have a substantial influence on change in working people's poverty status. Good health, higher education, the learning of skills, frequent mobility and the taking up of non-agricultural occupations contribute greatly to the reduction and alleviation of poverty; in this regard, the first two factors seem especially important. Education and health are an essential part of human resources development and significant factors in economic growth (Jones, 1990). The case studies of the 23 poor counties and other poor areas of China provide additional evidence in support of the above statements.

In almost the same external environment (with all the people living in poor townships and poor villages), why are some of them more developed and some less developed? The answer is that the most important factor is the human beings themselves. To reduce poverty, there first must be an improvement in human resources and increased investment in human capital. The local governments should put more capital and manpower into education, and meanwhile reduce the dropout rate, prevent new illiterates from appearing and increase the rate of those transferring from primary school to middle school. Occupational training can help working people to meet skilled labour requirements, so this factor also deserves more attention. Intermarriage with close family members is a very serious problem in poor areas, as it causes the birth of many physically and mentally handicapped babies and thus will have an adverse effect on the quality of the labour force in the future. Local governments should strengthen their efforts in the area of information dissemination, pass on knowledge through information, education and communication (IEC) programmes, and enhance health levels in these areas. If a place is too poor for people to live in, migration may be a good method to improve people's living conditions in a short time. Increasing working people's mobility can mean not only more income, but working in new locations can also open their eyes so that they gain more useful information. In some extremely poor mountainous areas, many people have never travelled outside the immediate vicinity of where they live. They live in a relatively small space and know little about the outside world, a situation which is unfavourable for the development of a market economy. The migration of labour to cities or developed areas has become an important means for alleviating poverty in rural China. Although migration may lead to many social problems in the cities to which the agricultural labourers move, it has some positive aspects (Zhang, 1991). If migration is organized well and has a clear purpose, it should be encouraged. However, not everybody can find a job in other places; most working people have to work on their own land.

As noted previously, changing the traditional industrial structure is an effective method for enabling people to earn income in rural areas. Enabling people to spend more time in non-farming or non-agricultural pursuits, such as raising poultry, planting fruit trees, working in township enterprises, transporting goods or selling agricultural products, also can change the people's poverty status. Improvement in the quality of local officials also a very important approach to poverty alleviation for a poor area. To a great extent, one could find a relationship between the incapable, inefficient, corrupt and irresponsible leaders who have long been in charge of areas under the poverty line and the status of the people they are supposed to serve.

Poor households or populations usually have poor human resource indicators. In the poor areas of rural China, low educational attainment, low productivity, low income and high reproductivity usually occur at the same time and interact with each other, which forms a vicious circle in some areas. The development of human resources not only is desirable in itself, but also raises productivity and lowers reproductivity. A vigorous, healthy, skilled labour force is productive, and educated, healthy families tend to have fewer children (Streeten, 1983). In view of the current situation in rural China, the development of human resources is of very great significance not only for poverty alleviation and economic development, but also for family planning and population control.

Endnotes

At the time, the country-specific poverty line in rural China was about 200 yuan (US$1 = 2.9 yuan in 1985) per capita net income; it has varied slightly by area and year (Office of the Leading Group of Economic Development in Poor Areas, 1989). The World Bank considers US$370 (purchasing power parity dollars) as the universal poverty line, which is much too high for the situation in China.

In this article, human resources development refers mainly to improving the quality of the labour force (working people) in terms of health, education and employment.

The main standard to divide households into three categories was per capita net income, but the exact criteria were decided by the relevant department of the local government, because it would be very difficult to give a uniform poverty line for 23 poor counties in various regions.

In rural areas of China, the labour participation rate of the population aged 15 and older is quite high. The Survey in 23 poor counties showed that the labour participation rate for those people reached 80.3 per cent. The distribution of non-working people was students (23.9 per cent), domestic duties (26.4 per cent), illness and disability (19.6 per cent), old and infirm (28.7 per cent) and others (1.4 per cent), so the absolute majority of the non-working people were not the unemployed. The difference in labour participation rates among the three kinds of household was small, and the main problem of employment in poor areas was the quality of employment. Working people undertake economic activities and earn money, and they play a determinative role in alleviating poverty. These are the reasons for our choosing employed people as research subjects.

The poverty status of individuals actually depends on the poverty status of households. The working people coming from each kind of household are labelled in the relevant category.

Working women usually have a lower level of human resources development than working men, but the relationships between their human resource indicators and poverty status are similar, so we do not give the crosstables or models by sex.

In this context, people with disabilities include those who are blind, deaf, speech-impaired, intellectually disabled, mobility-impaired and mentally ill.

"families with illiterate and semi-literate education", which means that the highest educational level of those in the working-age group in the families was so low that they could be classified only as illiterate or semi-literate.

In China, farming refers mainly to the cultivation of agricultural crops, which include grain crops (such as rice, wheat and maize), industrial crops (such as cotton, oil-bearing crops and sugar crops) and other farm crops (such as vegetables, melons and green manure). These aspects comprise only one part of agriculture in China.

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The Need for a National Urbanization Policy in Nepal

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Without a well-designed and well-financed urbanization strategy, the regional and rural development potentials of an agricultural country such as Nepal may not be fully realized

Nepal, with a per capita gross national product (GNP) of US$180 per annum, is one of 13 "least developed countries" in the ESCAP region. Its predominantly agricultural economy employs more than 80 per cent of the economically active population. The total population of the country is about 21.6 million (ESCAP, 1994). Nepal's population density has increased from 56 persons per sq. km in 1952 to more than 130 persons per sq. km in 1991. Even though Nepal is one of the least urbanized (9 per cent) countries in South Asia, its urban growth rate is the highest among the SAARC (South Asian Association for Regional Cooperation) countries. For instance, the level of urbanization in Bangladesh (17 per cent), India (27 per cent), Pakistan (33 per cent) and Sri Lanka (22 per cent) is much higher than that of Nepal, but the average annual urbanization rate in Nepal (7.3 per cent) far exceeds the rates in Bangladesh (6.1 per cent), India (3.7 per cent), Pakistan (4.6 per cent) and Sri Lanka (1.5 per cent) (Pudasaini, 1993:65; World Bank, 1993).

The country is characterized by rural settlements with rapidly urbanizing rural markets and towns. Urban development in Nepal is perceived as a by-product of existing development trends. The potential of urbanization as a necessary contemporary force in national socio-economic development has been ignored or dismissed by national planners (Ministry of Housing, 1991:5). In view of the high disparity in income levels, physical facilities and employment opportunities between the rural and urban areas, the pace of urbanization is inevitably going to be high in Nepal in the foreseeable future. While planned urbanization would be beneficial for development initiatives, rapid and haphazard urbanization, as is taking place in Nepal, is a matter of great concern.

Urban areas and towns lack basic infrastructure services. Safe drinking water supplies and electricity are inadequate in urban areas and towns, a situation that is endemic nationwide. There is virtually no sanitary waste disposal system, and solid waste systems are extremely inadequate. Urban road conditions are dilapidated. None of the urban areas has a functioning storm-water drainage system.

"... [In Nepal] there are indications of an increasing trend towards urbanization. The number of emerging urban centers and smaller towns (market towns, district headquarters) are evidence of this. The problems of urban unemployment, shortages of infrastructure, declining environmental quality (water pollution, presence of solid wastes, air and noise pollution, congestion), urban sprawl, slums, squatters, the increase in the price of land and buildings, and a scarcity of financial resources for investment constitute formidable policy challenges" (ADB, 1991:444).

A national development policy which does not adequately consider current trends and factors influencing human resettlement, urban growth and urbanization cannot be implemented successfully (Malla, 1990:110-117). The intent of this article is to review the process of urbanization in Nepal and formulate a rationale for the establishment of a national urbanization policy for the country. In view of the seriousness of concern over the high level of internal migration and rapid urbanization, the critical issue that needs to be addressed is the establishment of a formidable rationale through which the National Planning Authority should gain political support to formulate a national urbanization policy for an immediate and measurable development impact.

Urbanization

Within the development context of Nepal, the concept of "urbanization" is a misunderstood, as well as misinterpreted, process. Most public documents on development in Nepal make token references to the importance of spatial change, which includes regional development and urbanization. Furthermore, most of these token references to urbanization are framed within misguided assumptions about the continuation of rural economic predominance. Most of these assumptions are misguided because they completely ignore the spatial reality of rural-urban interdependence.

Regionalization and urbanization are essential elements of overall development. Both processes are human resettlement responses to the changing physical and socio-economic realities of Nepal. The human resettlement process (sometimes referred to as migration) is a survival and/or economic opportunity-based choice mechanism which results (in Nepal, as elsewhere) in the spatial re-allocation of productive activities. This fact is illustrated by the demographic data in which the share of those living in the Terai (lowlands) out of the total population increased from 37 per cent in 1971 to 47 per cent in 1991. As indicated in figure 1, between 1971 and 1991, relative populations in both the mountain areas and the hills have decreased.

Figure 1: Population distribution by ecological zone, Nepal: 1971, 1981 and 1991
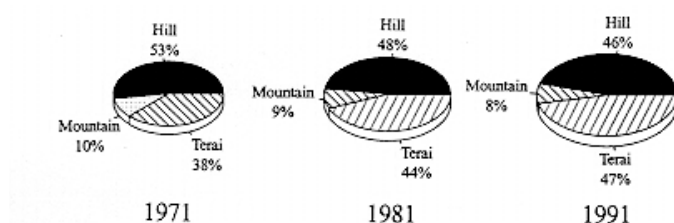
Source: Professor Bal Kumar K.C. (1993).

In terms of population density, table 1 indicates increases between 1981 and 1991 for all three geographical zones. While population density increases from 1981 to 1991 were negligible in the mountain and hill regions, density increased more than 31 per cent in the Terai. However, this substantial increase in population density in the Terai did not result in an increase in cultivation; there was actually a slight reduction in the area of land under cultivation. This situation may be interpreted as an indication that available agricultural land has been saturated, as well as over-utilization and over-cultivation of existing productive land (table 1).

Table 1: Population density of geographical regions in Nepal, by total and cultivated area: 1981 and 1991

Region	Population size	Percen-tage	Area (km2)	Percen-tage	Population density	Cultivated *area (km2)	Percen-tage	Cultivated area as percentage of total area	Agricultura density
1981									
Mountains	1,302,896	8.70	51,817	35.21	25.14	1,165.45	5.03	2.25	1,117.93
Hills	7,1663,115	47.70	61,345	41.68	116.77	8,650.05	37.34	14.10	828.10
Terai	6,556,828	43.60	34,019	23.11	192.74	12,251.00	52.88	36.01	535.21
Whole country	15,022,839	100	147,181	100	102.07	23,166.50	100	15.74	648.47
1991									
Mountains	1,444,481	7.80	51,817	35.21	27.88	1,630.80	6.93	3.15	885.75
Hills	8,411,309	45.54	61,345	41.68	137.11	8,780.60	37.32	14.31	957.94
Terai	8,606,291	46.66	34,019	23.11	252.98	12,117.20	51.50	35.62	710.25
Whole country	18,462,081	100	147,181	100	125.44	23,528.60	100	15.99	784.67

* Source: National Sample Census of Agriculture for Nepal: 1981 and 1991, Central Bureau of Statistics.

There are three major reasons for the on-going resettlement of population in Nepal:

- Availability of agricultural employment in the Terai (a pull factor);
- Employment opportunities in emerging urban centres (a pull factor); and
- Harsh physical conditions coupled with lack of cultivable land to meet the needs of the growing population in the mountain regions (push factors).

The eradication of malaria in the lowlands has resulted in substantial movements of people from the mountains and hills to the lowlands to seek economic opportunities in the agriculturally fertile lands of the Terai region.1 Currently, the Terai accounts for over 65 per cent of cultivated land (see table 1), over 35 per cent of roads and 63 per cent of industry (Gurung, 1989:41-43). Furthermore, the urban population of the Terai region has increased from 17 per cent of the national urban population in 1952 to over 53 per cent in 1991. Between 1952 and 1991, the urban population of the Terai region grew more than 8 per cent annually (K.C., 1993:18).

Based on these and possibly other push-pull factors, it may be said that the people of Nepal are "voting with their feet". For example, they move to rural locations, which offer them greater economic opportunities and greater social amenities. For the same reasons, some people move to emerging rural market centres and, later on, to larger established regional urban centres, finally ending up in Kathmandu, the national capital. Some people move from rural settlements directly to regional urban centres, or to the national capital. These are very dynamic and forceful rural-to-rural, rural-to-urban and urban-to-urban migratory trends which will continue to change the socio-economic fabric of Nepal in the future.

The recording of urbanization data began with the 1952 census. That census defined what is urban, not in terms of population or settlement characteristics, but rather in terms of towns which have traditionally been considered cities. Based on this traditional urban city concept, the 1952 census recognized 10 towns as urban settlements. These towns, with a total population of 238,000 persons, comprised approximately 3 per cent of Nepal's total population in 1952 (see table 2).

Table 2: Urban population of Nepal: 1952 and 1991

Municipalities	Total population	
	1952	1991
Kathmandu	105,247	421,258
Biratnagar	8,060	129,388
Lalitpur	41,334	115,865
Pokhara	-	95,286
Birganj	10,037	69,005
Dharan	-	66,457
Mahendra Nagar	-	62,050
Bhaktapur	32,118	61,405
Janakpur	7,037	54,710
Bharatpur	-	54,670
Hetauda	-	53,836
Nepalganj	10,813	47,819
Dhangadi	-	44,753
Butwal	-	44,272
Damak	-	41,321
Sidhartha Nagar	-	39,473
Tribhuvan Nagar	-	29,050
Rajbiraj	-	24,227
Birendra Nagar	-	22,973
Tulsipur	-	22,654
Gaur	-	20,434
Byas	-	20,124
Lahan	-	19,018
Bidur	-	18,694
Inaruwa	-	18,547
Kalaiya	-	18,498
Jaleswor	-	18,088
Toulihawa	-	17,126
Dhankuta	-	17,073
Bhadrapur	-	15,210
Malangwa	7,674	14,142
Tansen	-	13,599
Ilam	-	13,197
Banepa	-	12,537
Dipayal	-	12,360
Dhulikhel	-	9,812
Kirtipur	7,038 *	-
Thimi	8,657 **	-
Total	238,015	1,758,931

Source: Population censuses of 1951/52 and 1991, Central Bureau of Statistics.

Note: *   = Part of Kathmandu by 1991.

      ** = Part of Bhaktapur by 1991.

In contrast to the 1952 census, the 1961 census classified towns with populations of 5,000 or more as "urban". Thus,

16 towns were qualified as urban settlements, their total population being 336,000, or 3.6 per cent of the country's population. The 1971 census changed the requirement for an urban classification, increasing it from 5,000 or more population to a minimum population of 10,000. In addition to increasing the magnitude of population for qualification, the 1971 census added another criterion: the presence of permanent structures, such as schools, administration buildings and commercial facilities. Under the Town Panchayat Act of 1962 an urban settlement was defined as a town with permanent structures and a population size of more than 10,000. Based on the Panchayat Act of 1962 (a municipalities act), the 1971 census enumerated five new towns that qualified as urban. Five of the towns considered urban by the 1961 census were not classified as urban by the 1971 census. Accordingly, the 1971 census resulted in 16 towns being considered urban, with a population of 462,000 people, or 4 per cent of the total population. Furthermore, 12 towns with populations of more than 10,000 people were not considered urban because they did not contain permanent structures. Also, three towns with recognizable permanent structures did not qualify as urban because they did not meet the minimum population requirement of 10,000.

In 1976, an amendment to the 1962 Panchayat Act reduced the population requirement for an urban classification to 9,000 persons. Based on that adjustment, the 1981 census reported 23 towns qualifying as urban settlements. These towns accounted for a total urban population of 957,000, or 6.4 per cent of Nepal's population. By 1987, the total number of towns considered urban increased to 33. The 1991 census indicated a total urban population of 1,696,000, comprising approximately 9.2 per cent of the total population of the country.

Within the Central Bureau of Statistics definition of an "urban" population being a settlement with 5,000 or more people, the number of urban settlements increased from 10 in 1951 to 33 in 1987. In 1952, there were exactly five urban centres in the Terai; by 1987 there were 21 urban centres in the Terai (see figures 2 and 3 on following pages). This is a substantial increase in the number of urban centres, particularly in the Terai. The formation of agro-based economic regions and sub-regions created multiplicities of rural market centres which, through time, became urban service delivery points in the Terai.
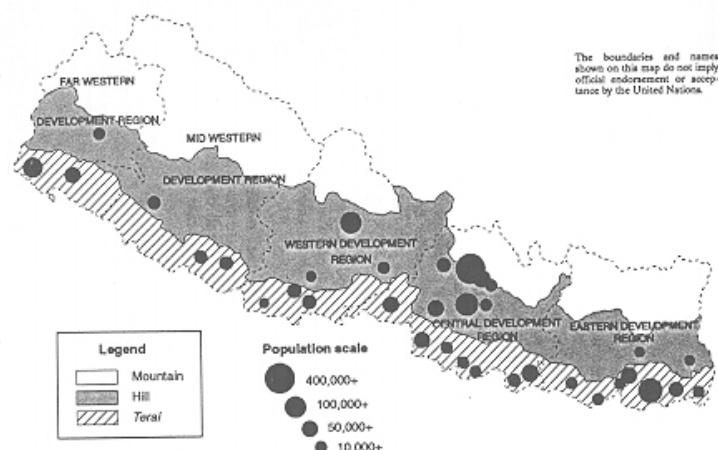
A review of figure 2 indicates that in 1952 there were only 10 urban centres in Nepal. Of these, eight were located in the Central Region of the country. Of these eight urban centres, four were located in the Kathmandu Valley. The remaining four urban centres in the Central Region were located in the Terai. Only two other regions, namely the Mid-western and Eastern Regions, were home to the remaining two urban areas in the country.

Figure 2: Distribution of urban centres in Nepal: 1952
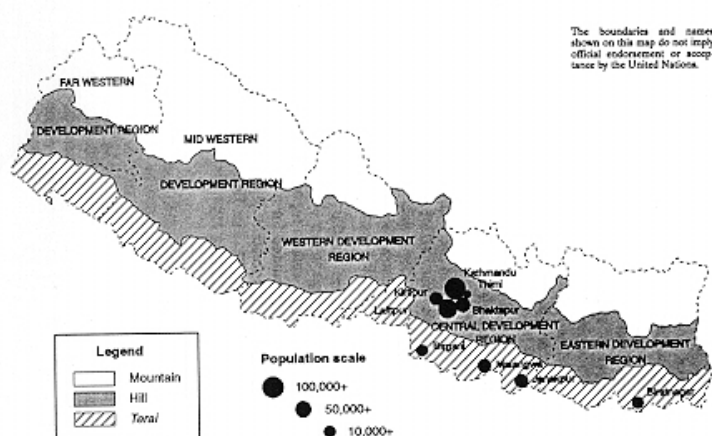
Source: Bal Kumar K.C., and others, 1991.

Figure 3: Distribution of urban centres in Nepal: 1991

Note: This map shows the increase in cities. No attempt is made to name each of the cities depicted by the black dots, because of the small space available. Refer to table 2 for the list of cities concerned.

As indicated in figure 3, by 1991 the number of urban centres increased to 36. Two regions, the Central and the Eastern, exhibited the greatest increases in the number of urban areas. These two regions may be considered to be urbanizing much faster than the other three regions. However, the urbanization trends of the other three regions between 1952 and 1991 still illustrate a substantive increase in the number of urban areas, particularly in the Western Region where there were no urban settlements in 1952; however, by 1991, seven urban areas had been established. This substantial increase in the level of urbanization in Nepal is a result of many factors. Two of these factors, namely conversion from a subsistence to a cash economy and the expansion of transport and communications systems, played a major role in stimulating greater urbanization. Conversion of extra supplies of agricultural products to cash and the availability of goods and services which can be purchased by cash raised by selling the agricultural products, have created an influx of various commercial activities into these rapidly urbanizing rural market nodes. Consequently, increased commercial and service delivery activities resulted in an increased demand for labour, which converted, through time, these small rural market centres into growing urban settlements.

In order to comprehend the ramifications of on-going human resettlement activities, one would have to synchronize analytically the rural and regional development with the overall changes occurring in the urban structures of Nepal. Figures 2 and 3 illustrate the magnitude of urbanization which occurred between 1952 and 1991.

The emerging cash-based agricultural production system naturally created its own marketing locations, which also acquired the presence of commercial establishments and public service infrastructure. By 1991, Nepal had 36 urban centres, the majority of which were recently urbanized rural market centres. As the commercialization of Nepal's agro-economic structure continues, new rural market centres, with the potential of becoming future urban nodes, are being formed.

In 1952 only the Central Region, the most heavily populated and most developed region in Nepal (in terms of transportation and communications infrastructure), had substantial urban systems in operation. In the Central Region, in addition to greater Kathmandu, there were only three other urban settlements of any substance located on the major transport arteries on the Nepal-India border. The remaining two other urban settlements in Nepal, Nepalganj in the West and Biratnagar in the East, were similarly located on the major commercial arteries entering Nepal from India. This is a clear indication of the existence of a subsistence-based and highly isolated rural economic system. However, during the 1970s and 1980s, as a result of the socio-economic changes which occurred through the opening of the country to the outside world, the subsistence-based economic nature of the rural areas started to change to a commercialized agro-economic system. It is expected that, during the 1990s, Nepal's agricultural system will be substantially commercialized, and will be coupled with agro-industrial activities in urban market locations where agro-product and agro-labour oversupply may create economic advantages for processing.

Primacy and urbanization

As indicated in figure 3, there were 36 urban settlements in 1991. A population size ranking of the urban settlements in 1991 is presented in table 3. The Kathmandu Metropolitan Area, with almost 600,000 people in 1991, is the most heavily populated urban area in Nepal. The second-ranked city is Biratnagar, with a 1991 population of 129,388 people; the third and fourth ranked cities are Pokhara (95,286 people) and Birganj (69,005 people), respectively.

Table 3: Urban primacy

Urban area	Population (1991)	Rank	Primacy	Primacy index
Kathmandu *	598,528	1	598,528	
Biratnagar	129,388	2		2.04
Pokhara	95,286	3	293,679	
Birganj	69,005	4		

Source: Central Bureau of Statistics, 1991.

* Note: Includes the municipalities of Kathmandu, Lalitpur and Bhaktapur.

In terms of primacy, it is clear that Kathmandu is Nepal's primate city. Comparing the population of Kathmandu with the combined total population of the next three cities in rank, one realizes the magnitude of Kathmandu's status as primate city -- 600,000 persons in Kathmandu versus a total of 294,000 people combined in the three cities, Biratnagar, Pokhara and Birganj. A primacy index of 2.04, as illustrated in table 3, is a clear indication of the presence of a strong primate city;2 its primacy index is among the highest in the SAARC subregion.3

The urban primacy analysis strongly indicates a lack of urbanization policy for strengthening the development capacities of middle-size cities in Nepal. The development of middle-size cities (populations of 50,000 or more) may substantially slow down the on-going migration to Kathmandu by creating economic opportunities and employment. Furthermore, the development of middle-size cities such as Biratnagar, Pokhara, Birganj and others may result in the formation of urban agro-industrial centres stimulating the overall development of the surrounding rural areas as well as peripheral market towns.

Urban institutional structures

In 1989, the Government of Nepal formed the Ministry of Housing and Physical Planning to manage the development of urban areas. The Government also established the Division of Urban Development in the Ministry of Local Development, focusing particularly on the effective and efficient financial and administrative operations of municipalities. In order to accomplish administrative and financial improvements in municipal operations, the Government created the Urban Development Training Centre at Pokhara.

All three of the above-mentioned institutions and to some extent various sectoral agencies, such as the Nepal Water Supply Corporation, Department of Roads, Nepal Electric Authority and Nepal Telecommunications Corporation, contribute to the solution of urban problems. However, none of these institutions has the technical capacity and manpower capabilities to analyze the on-going process of urbanization relative to overall development within a spatial context. Neither do these institutions have the authority to formulate policies to activate programmes to strengthen the rural economic development potentials of regional entities through systemic and guided urbanization. Such authority to formulate and activate a national urbanization policy belongs to the National Planning Commission directly under the political jurisdiction of the Prime Minister. Currently, the National Planning Commission does not contain a division or a special unit which focuses on the spatial components of Nepal's development efforts. Thus, it would seem to be imperative that the National Planning Commission form a division or a special unit to compile spatial data to be analyzed for the formulation of urbanization and regional development policies.

Urban-rural interdependencies

Neither the goals of increased agricultural productivity and income expansion nor those of greater equity in income distribution can be attained without increasing the interaction among villages, market towns, intermediate cities and metropolitan areas (Ertur, 1984:63), (see figure 4).

Figure 4: The hierarchy of central places
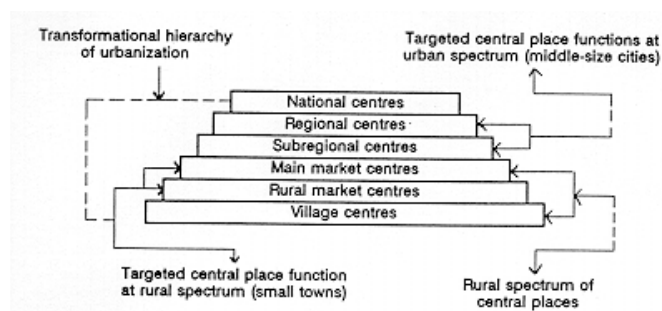
Source: Ertur, 1984:64

"[The] evolution of subsistence into commercial farming, of simple handicrafts into more specialized processing and manufacturing, of scattered and isolated economic activities into concentrated nodes of production integrated into a national system of exchange requires a well-articulated spatial structure. Settlements of various sizes, specializing in different economic and social functions, must be linked to each other through a network of physical, economic, technological, social and administrative interaction. The linkages -- patterns of transaction among groups and organizations located in spatially dispersed communities with sufficient threshold sizes of population to support their own specialized activities -- are the primary means of expanding the system of exchange and transforming underdeveloped societies" (Rondinelli, 1978:160).

As indicated in figure 4, the rural market town is the basic economic activity node in which rural people exchange their agricultural products for the goods and services they need (INFRAS, 1993:146). In the Terai, because the level of agro-economic activities increased substantially since the 1950s, so did the number of urban market centres. These newly formed urban market centres are the human settlement points at which the upward flow of agricultural products and craft items are introduced into the higher levels of the agricultural marketing system. Similarly, these urban market centres are the final effective destination of the downward movement of goods and services.

"Small scale urban development in the hill regions, an intentional as well as unintentional product of the country's overall spatial development strategy, places new demands on rural resource systems and promotes new spatial relationships between rural populations and national development" (Zurick, 1993:42).

(Click here for photo) Father listens while daughter recites her lessons. Making gilded earrings, this resident of Kathmandu is one of many people involved in the manufacture of handicrafts that are introduced into the higher levels of the agricultural marketing system in Nepal. (UNICEF photo by Satyan)

There is overwhelming evidence that a considerable number of people in Nepal are moving by choice and will continue to move to locations which offer them greater opportunities and better amenities in life. These movements of people change the development profiles and potentials of the various regions of Nepal. As was indicated by the data presented in figure 1, there is a substantial movement of people from the mountain and hilly regions to the Terai. On the one hand, de-population of various parts of the hills and the mountain regions may release the pressure on land and result in greater agricultural opportunities for the remaining population. However, greater population concentrations in the Terai may result in over-utilization of arable land, unless the incoming populations are diverted into non-landbased productive activities in the agro-industrial and agro-commercial sectors. Through various public policy instruments, such as national urbanization and regional development strategies and properly enforced land-use policies and human resettlement programmes, increased population concentrations in the Terai may substantially expand agricultural production and agro-commercial activities, resulting in the formation of additional market centres and service delivery nodes. These newly formed market centres and service delivery nodes in time will become small- and medium-size urban centres, further stimulating the on-going agro-commercialization and agro-industrialization processes in Nepal.

This dynamic rural economic development process necessitates the formation of new urban nodes and the expansion of existing middle-size urban centres. The newly formed urban nodes and the expanding urban centres are essential for the continued expansion of agricultural productivity and diversification. These urban centres are also essential for meeting the increased demand for goods and services of the agricultural labour force.

The combined effects of the expansion of agro-commercialization (via formation of market centres) and the availability of goods and services (via formation of urban services nodes) will be the industrialization of the agricultural sector through increases in technological agro-product innovations.

"The locational and functional aspects of service [and market] centers -- and the non-spatial policies necessary to complement their efficacy -- are topics demanding research as well as policy attention in Nepal. [There is a] need to clarify the implications of service [and market] center concepts for the mobilization of existing resources, for development parameters, and for contingent migration processes" (Sharma, 1989:143).

Policy implications

The rationale for the establishment of a national urbanization policy in Nepal rests on the premise that urbanization is the catalyst for the formation of a graduated hierarchy of human settlements networked within an agro-industrial resource base.

"[This] premise is tied to the policy objective of reducing inter-regional disparities in development (between the hills, the Kathmandu Valley and the Terai on the one hand, and between the rural and urban areas on the other) and the deliberate creation of an integrated settlement system that is oriented inward rather than outward. The assumption is that the creation of such a settlement system will enhance the complementarity of urban and rural development efforts, on the one hand, and aid in reducing the dependency of the Nepalese state and the urban system on India, on the other. In this sense spatial policies are seen as precursors or even alternatives to structural

policies" (Sharma, 1989:139).

A systemic and guided urbanization policy, in principle, will include a development investment strategy (public and private) to strengthen and expand the territorially defined urban-rural entities existing in Nepal, particularly in the Terai. Such an urbanization policy should be based on the following:

- Levels and spatial differentiation of agricultural and agro-industrial productivity and diversification;
- Location-specific labour participation levels;
- Spatial analysis of the increased demand for goods and services;
- Location-specific exponents of expanded capacity to export; and
- Physical and territorial advantages for agro-products marketing (Friedman, 1980:200).

A regional development investment package in these areas with recognizable agro-surplus capabilities and appropriate crop diversification will have substantial developmental effects via commercialization and the industrialization of agriculture. Such expansions in agricultural industrialization and commercialization should be linked to the demand functions of the higher level urban settlements. Concurrently, a regional and/or rural development investment strategy will not be a sufficient development force without a strategy to invest aggressively in the newly formed and expanding urban entities as well as in the existing towns and cities. This necessitates the formulation of a national urbanization policy for Nepal.

A comprehensive and enforeable national urbanization policy should clearly articulate the following main initiatives, which have been presented repeatedly in various public documents during the past 10 years:

Development of market towns and service centres to form effective urban-rural linkages;
Strengthening of urban nodes around main transportation nodes;
Integrating basic infrastructure development with urban land-use plans;
Promoting non-farm employment opportunities by identifying location-specific economic growth potentials of market towns and urban service centres;
Establishing and strengthening financial and technical institutions in middle-size cities for urban development activities; and
Strengthening the role of municipalities for mobilization of local resources and self-financing of urban development activities (ADB, 1991:444-447).
A national urbanization policy with a strong strategy component to strengthen existing urban-rural interdependencies should result in the provision of appropriate urban public services, improvements in the transport and communication infrastructure, and expansion of industrial and commercial functions of the urban nodes. Without a well-designed and well-financed urbanization strategy, the regional and rural development potentials of an agricultural country such as Nepal may not be fully realized. Therefore, it is strongly suggested that the Government of Nepal give serious consideration to formulating a national urbanization policy, particularly for the formation of an urban management framework for small towns and middle-size cities to maximize the country's rural development potential.

Footnotes

Because of the open border with India, there appears to be movement of labour from India to the Terai during times when crop yields are good, and from the Terai to India when crop yields are poor.

Four-city primacy index: if the population of the largest city in a country is greater than the combined populations of the three next largest cities, then the four-city index is greater than 1 (one) and primacy can be said to exist in that country (United Nations, 1993:21).

Pakistan, with a 1.1 primacy index, is considerably less primate than Nepal and Bangladesh. India, with an index of 0.5, exhibits no primacy (United Nations, 1992:25).

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Interrelationships between Demographic Factors, Development and the Environment in the ESCAP Region

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It will take a long time to achieve minimum environmental standards required for maintaining human health

The population of the ESCAP region is currently growing at the rate of 1.6 per cent per annum. By the year 2010, the population of the region is projected to increase to 4.1 billion, or about 812 million people more than currently. This increase in the population will result in a considerable increase in the demand for food, water, fuel, shelter and naturel resources. In this region, which contains about 58 per cent of the world population, rates of population growth range from 0 to as high as 4.2 per cent per year (ESCAP, 1994). In South Asian countries such as the Islamic Republic of Iran, Maldives and Pakistan, the growth rates are approximately 3 per cent per annum. In South-East Asia and Central Asia, population growth is also higher than the ESCAP average. Thus, continued increases in the size of the regional population may be expected into the next century; this phenomenon will be especially marked in South Asia where rates remain high.

Table1: Population growth trends in ESCAP region, 1994

Region/subregion	Total population (thousands)	Per cent	Percentage annual growth		Population	
			Total	Urban	Projected to 2010	Doubling time (years)
East Asia	1,423,763	13.5	1.2	3.9	1,629,104	57
South-East Asia	477,008	14.5	1.8	3.8	609,898	39
South Asia	1,284,907	39.2	2.0	3.5	1,733,907	34
Central Asia	61,640	1.9	1.7	-	79,133	41
Pacific	28,370	0.9	1.6	2.0	35,461	44
ESCAP	3,275,688	100.0	1.6	3.7	4,087,503	42

Urbanization

In almost all countries of the region another population phenomenon is under way, and that is urbanization. Overall 32 per cent of the total population of the region live in urban localities. Among the various subregions in the ESCAP region, countries of the Pacific are highly urbanized, with 70 per cent of their populations living in urban areas. Central Asia is second with 46 per cent, South Asia is the least urbanized area. The level of urbanization ranges from a minimum of 6 per cent in Bhutan to 100 per cent and 94 per cent in Singapore and Hong Kong, respectively. The degree of urbanization and variations in levels in the ESCAP region are shown in tables 1 and 2.

Table 2: Percentage of total population living in urban areas (degree of urbanization) in ESCAP region, 1950-2000

Region/subregion	Degree of urbanization						
	1950	1960	1970	1980	1990	1994	2000
East Asia	16.8	25.0	24.7	27.4	39.4	34.0	51.4
South-East Asia	14.8	17.6	20.2	24.0	29.9	32.0	36.9
South Asia	16.0	17.3	19.5	23.1	27.3	27.0	32.8
Central Asia	-	-	-	-	-	46.0	-
Pacific	61.3	66.3	70.7	71.2	70.6	70.0	71.3

Source: 1994 ESCAP Population Data Sheet, and World Urbanization Prospects, 1990 (New York: United Nations).

From table 3 it is possible to classify countries and areas of the ESCAP region into the following categories: (a) very highly urbanized with 75 per cent or more of the total population living in urban areas, (b) highly urbanized with 51-75 per cent of the population being urban, (c) moderately urbanized with 26-50 per cent of the population being urban and (d) poorly urbanized countries where the share of urban population in the total is 25 per cent or less.

Table 3: Classification of ESCAP countries and areas by levels of urbanization, 1994

Percentage of urban population	No. of of urban countries/of urban areas	Name of countries or areas (% urban)
Poorly/low urbanized areas (up to 25%)	13	Bhutan (6), Nepal (12), Cambodia (12), Papua New Guinea (16), Solomon Islands (16), Bangladesh (17), Afghanistan (19), Vanuatu (19), Lao People's Democratic Republic (20), Viet Nam (20), Samoa (21), Sri Lanka (22), Myanmar (25)
Moderately urbanized areas (26-50%)	18	India (26), China (28), Niue (30), Tonga (31), Tajikistan (31), Maldives (31), Indonesia (32), Pakistan (33), Thailand (35), Kiribati (35), Guam (38), Fiji (40), Uzbekistan (40), Tuvalu (42), Malaysia (44), Philippines (44), Turkmenistan (45), American Samoa (48)
Highly urbanized areas (51-75%)	13	Azerbaijan (53), Commonwealth of the Northern Mariana Islands (53), Islamic Republic of Iran (58), Cook Islands (58), Kyrgyzstan (58), Kazakistan (58), Mongolia (59), Democratic People's Republic of Korea (60), French Polynesia (65), Marshall Islands (65), Republic of Palau (69), New Caledonia (70), Republic of Korea (74)
Very highly urbanized countries/areas (75% and above)	8	New Zealand (76), Japan (78), Australia (85), Brunei Darussalam (90), Hong Kong (94), Macau (99), Nauru (100), Singapore (100)

Source: 1994 ESCAP Population Data Sheet.

Very highly urbanized countries are commercially, technologically and industrially advanced and per capita income is relatively high. In low or poorly urbanized countries of the ESCAP region, the great majority of people are still engaged in various types of subsistence or semi-subsistence agriculture; in most cases, industrialization has not yet begun. Although the process of urbanization has been increasing in these countries, they will still be less urbanized in 2025 compared with the more developed countries of the region.

Growth of urbanization

Currently, the urban population of the ESCAP region is growing at 3.7 per cent per annum. The highest urban growth, i.e. 3.9 per cent per annum, was recorded in East Asia, followed by South-East Asia and South Asia at 3.8 and 3.5 per cent, respectively. The lowest growth rate, i.e. 2 per cent per annum, has been recorded in the Pacific. The urban population of the ESCAP region increased from 224 million people in 1950 to 1 billion by 1990 (excluding Central Asia), a more than three-fold increase. The urban population of the region is expected to reach almost 1.45 billion by the year 2000, an increase of 48 per cent over the 1990 level. Table 4 shows urban populations and the percentage of decennial variation/growth from 1950 to the year 2000. It indicates that the urban population will continue to grow very rapidly in the less developed countries as compared with developed countries where urban growth is already slowing down.

Table 4: Growth of urbanization in ESCAP region, 1950-2000

Regions/subregions	Urban population (thousands)					
	1950	1960	1970	1980	1990	2000
East Asia	112,473	198,210	243,952	322,215	526,784	776,832
South-East Asia	26,937	39,487	57,894	86,571	132,824	197,214
South Asia	76,916	103,306	147,441	218,757	328,157	490,473
Pacific	7,754	10,458	13,673	16,226	18,700	21,480
ESCAP (excluding Central Asia)	224,080	351,461	462,960	643,769	1,006,465	1,485,999
Regions/subregions	Percentage urban population variation or change					
	1950-1960	1960-1970	1970-1980	1980-1990	1990-2000	
East Asia	76.20	23.07	32.08	63.48	47.47	
South-East Asia	46.59	46.60	49.43	53.42	48.47	
South Asia	34.31	42.72	48.36	50.00	49.46	
Pacific	34.87	30.74	18.67	15.24	14.86	
ESCAP (excluding Central Asia)	56.80	31.70	39.05	56.30	47.64	

Table 5 classifies countries and areas by percentage annual urban growth for 1994: (a) very high urban growth of 4.1 per cent and above; (b) high growth ranging from 3.1 to 4 per cent; (c) moderate growth from 2.1 to 3 per cent and (d) low growth at less than 2 per cent. The table shows more or less the same trends as in the case of the degree and level of urbanization discussed above. Urban growth is very high in poor countries such as Afghanistan, Bangladesh, Bhutan, India, Nepal and Pakistan as compared with developed countries in the region. Natural growth and rural urban migration are the major factors responsible for rapid urban growth in less developed countries of the region.

Table 5: Classification of countries and areas in the ESCAP region by percentage annual urban growth, 1994

Percentage annual growth	No. of countries/ areas	Countries and areas (annual growth rate: per cent)
Very high growth rate (14.1% or higher)	14	Indonesia (4.2), Malaysia (4.2), Commonwealth of the Northern Mariana Islands (4.2), Pakistan (4.3), China (4.3), Cambodia (4.5), Papua New Guinea (4.6), Maldives (5.5), Bangladesh (5.9), Lao People's Democratic Republic (6.1), Bhutan (6.1), Solomon Islands (6.5), Nepal (6.9), American Samoa (8.2), Afghanistan (8.6)
High growth (3.1-4%)	10	Democratic People's Republic of Korea (2.4), Myanmar (3.3), Philippines (3.4), Mongolia (3.6), Vanuatu (3.6), Thailand (3.9), Islamic Republic of Iran (3.9), Marshall Islands (4.0), Tuvalu (4.0)
Moderate growth (2.1-3%)	12	Australia (1.4), New Caledonia (2.1), Sri Lanka (2.2), Republic of Korea (2.3), Republic of Palau (2.3), Cook Islands (2.4), Tonga (2.5), Brunei Darussalam (2.6), Kiribati (2.7), Viet Nam (2.9), India (2.9), French Polynesia (2.9)
Low growth (less than 2%)	10	Nieu (0), Japan (0.6), Samoa (0.6), Hong Kong (1.0), Nauru (1.2), New Zealand (1.3), Fiji (1.7), Macau (1.7), Guam (1.9), Singapore (2.0)

Source: 1994 ESCAP Population Data Sheet.

Growth of cities

The big cities play a major role in transforming resources into useful goods and services that contribute to national economic production. They affect both local and regional environments by consumption of goods and the generation of residuals. In many countries and territories of the ESCAP region, the rapid growth of the urban population has resulted in the formation of mega-cities, defined by the United Nations as cities with 8 million or more inhabitants (United Nations, 1991:23). Currently, more than half of the world's 30 largest urban agglomerations are located in the ESCAP region. In 1950, there were only two cities with a population of more than 5 million, namely Tokyo and Shanghai (table 6). Ten years latter, the number increased to five cities, with Beijing, Osaka and Calcutta being added to the list; by 1990, the number reached 18 cities.

Table 6: Largest urban agglomerations in ESCAP region, ranked by population size, 1950-2000

City	1950	1960	1970	1980	1990	1995	2000
Tokyo	6.7	10.7	14.9	16.9	18.1	18.5	19.0
Shanghai	5.3	8.8	11.2	11.7	13.4	15.1	17.0
Calcutta	4.4	5.5	6.9	9.0	11.8	13.6	15.7
Beijing	3.9	6.3	8.1	9.0	10.8	12.3	14.0
Osaka	3.8	5.7	7.6	8.3	8.5	8.6	8.6
Bombay	2.9	4.1	5.8	8.1	11.2	13.1	15.4
Tianjin	2.4	3.6	5.2	7.3	9.4	11.0	12.7
Jakarta	2.0	2.8	3.9	6.0	9.3	11.4	13.7
Hong Kong	1.8	2.6	3.4	4.5	5.5	5.8	6.1
Metro Manila	1.5	2.3	3.5	6.0	8.5	10.1	11.8
Delhi	1.4	2.3	3.5	5.6	8.8	10.9	13.2
Bangkok	1.4	2.2	3.1	4.7	7.2	8.6	10.3
Madras	1.4	1.7	3.0	4.2	5.7	6.7	7.8
Seoul	1.0	2.4	5.3	8.3	11.0	12.2	12.7
Tehran	1.0	1.9	3.3	5.1	6.8	7.5	8.5
Karachi	1.0	1.9	3.1	5.0	7.7	9.5	11.7

| Bangalor | 0.8 | 1.2 | 1.6 | 2.8 | 5.0 | 6.5 | 8.2 |
| Dhaka | 0.4 | 0.6 | 1.5 | 3.3 | 6.6 | 9.1 | 12.2 |

Source: World Urbanization Prospects, 1990 (New York: United Nations).

Mega-cities in industrially advanced countries such as Japan grow relatively slowly. However, owing to a large population base, the mega-city of Tokyo, for instance, will reach 19 million population by the year 2000. The city of Osaka will reach 8.6 million at the turn of the century. Shanghai, Bombay and Calcutta, which are located in developing countries, are each expected to grow to 15 million or more by that time. Beijing, Tianjin, Jakarta, Delhi, Seoul and Dhaka are projected to exceed 12 million each, while Karachi and Metro Manila will exceed 11 million each.

Owing to the rapid development of these mega-cities, the environmental repercussions will be profound. They will place enormous burdens on the infrastructures of these cities in terms of demand for sewage disposal, transportation and general utilities. Except for the developed countries of Japan, Australia and New Zealand, the developing countries of the region will find it difficult to tackle the problems of urban degradation, industrial pollution, waste generation and general congestion. Ultimately mega-cities will place huge stress on the urban environment which in many cases has already grown beyond carrying capacity. None the less big cities continue to attract more and more people, even though those cities are the least capable of meeting the basic needs of their populations.

Rural-to-urban migration

Although rural-to-urban migration is not the only, nor necessarily the main, cause of urban population increase in the ESCAP region, it is often singled out as the main contributor to urban problems. In the case of Pakistan, 70 per cent of urban population growth is from natural increase while only 22 per cent is due to migration; the remaining 8 per cent is due to reclassification or upgrading of rural settlements into urban areas. Many Governments in the region attempt to reduce the growth of their respective primate cities, primarily by curbing rural-to-urban migration. But economic opportunities for the people appear to be better in the urban areas, as compared with the rural areas. Therefore, urban areas become magnets attracting people from less advantageous regions of a country, creating problems in big cities that most Governments find difficult to solve.

Environmental problems and concerns

There is increasing concern that urban areas should be made more environmentally sustainable. In this context, sustainability involves a reduction of both the urban use of natural resources and the urban production of waste and pollution. The concern here is how to reduce these problems and hence improve the prospects for urban sustainability.

Land loss

In the ESCAP region, productive activities such as manufacturing are becoming increasingly concentrated in towns and cities at the expense of the rural areas. Economic forces have been a major determinant of land use in and around urban areas. The conversion of natural and agricultural ecosystems to provide urban infrastructure, such as housing, roads, factories and other facilities, is a typical example of the increasing use of land for developmental purpose. Most susceptible to urban encroachment is high quality agricultural land and open spaces. In Pakistan, for example, it is estimated that on average about 60,000 hectares (ha) of agricultural land and open spaces are lost every year owing to urban expansion (Khan, 1989). A similar situation prevails in India where more and more agricultural land is steadily being converted to urban uses; the rate has been estimated at about 75,000 ha per year.

Long-term land use change records show that the areas built-up with human settlements in countries of the ESCAP region increased from more than 2.5 times in the case of Pakistan to more than 11 times in the case of Brunei Darussalam between the 1950s and the 1980s, when building and infrastructural development increased rapidly. The projected increases in the built-up urban areas of selected cities in the region vary from 180 ha annually for Hong Kong to 2,900 ha annually each for Bangkok and Karachi. During the past three decades, China has utilized about 6 million ha of land largely for the construction of factories, public building, housing and roads. In Japan, build-up areas constitute 4 per cent of the total area of the country. In the Republic of Korea, 2 per cent of the total land area is devoted to residential purposes alone.

A unique features of land use in urban areas of many countries within the ESCAP region is the existence of pockets of agricultural land and open spaces within city boundaries. For instance, a survey of 407 towns and cities in India by the Town and Country Planning Organization revealed that about half of the land within cities is either vacant or still used for agriculture. This situation is indicative of the fact that urban expansion in the initial phases either surrounded or leap-frogged fertile agricultural lands, which often are maintained as such for speculation.

Deforestation and loss of habitats

There is now increasing concern about the threat to flora and fauna posed by the development of natural habitats. Agricultural practices which affect vast areas of land can be equally damaging. The threat from development must, therefore, be put into perspective. In the ESCAP region, the evidence is that considerable damage in being done to forests in the areas surrounding big cities. Between 1972-75 and 1980-82 the forested area within 100 kilometres of India's nine largest cities collectively diminished by one-third owing to the energy demands of those cities. Delhi imports some of its fuel-wood from Assam State, which is about 1,000 km away. Owing to deforestation in and around urban areas, the habitats are also under pressure. Thus, the importance of "green-belts" in and around cities is being emphasized increasingly as a means for creating or preserving natural habitats. Closely related to the question of habitats is that of urban "greening". There is a growing conviction that cities must be planted with more trees and other vegetation for aesthetic and ecological reasons. Lusser (1991) and Khan (1991) argued that trees and parks act as important pollution filters and absorbers, as well as havens for wildlife (DOE, 1993).

Transport in cities

There is now recognition, which is clearly stated in "This Common Inheritance" (DOE, 1990), that towns and cities are major contributors to the world's environmental problems. Metropolitan areas are simultaneously enormous consumers of natural resources and producers of waste and pollution. Inextricably bound up with urban areas are transport systems. Transport is a major contributor to energy depletion and pollution problems. All the indications are that, unless corrective action is taken, mobility will increase, journeys will become more complex and urban land uses more dispersed. Hence, all the problems associated with energy consumption and pollution will get worse in the future, particularly in the less developed areas of the ESCAP region.

It is now recognized that urban settlements are a major determinant of travel patterns and hence energy consumption. The implications are that, by guiding urban development efficiently into more appropriate forms in the future, planners could contribute to a reduction of energy consumption and emissions. ECOTEC (1993) pointed out that over the longer term more efficient urban forms could have a major influence on transport usage and hence energy efficiency and reducing the problems of air pollution. A Department of Energy (1990) report on energy use and efficiency in the transport sector over the next 20 years concluded that decentralized forms of urban development might produce lower levels of energy consumption than centralized forms and ultimately reduce the level of emissions and pollution.

Shelter and the environment

Slums and squatter settlements

Owing to rapid increases in population in countries of the region, many people are being drawn to cities by the prospect of finding jobs and making a better life. But in the cities, they find themselves facing a host of obstacles, many man-made, that effectively deny them any kind of permanent decent shelter with a minimum of basic amenities: clean drinking water, lighting, sanitation and waste disposal. Most migrants, therefore, gravitate to squatter colonies where they build some kind of shelter for themselves. As a result, many countries and territories of the ESCAP region suffer from the spread of slums and marginal human settlements. The urban population inhabiting such settlements range from a low of 15 per cent in Singapore to over 50 per cent in Bombay and Delhi. Bombay's slum dwellers increased from 3.25 million in 1976 to 4.2 million in 1981. In 1994, the situation has become even worse, with the outlook for the future being bleak. The proportion of slum dwellers in the total metropolitan population increased from 41 to 51 per cent during the same period and is likely to reach 75 per cent by the year 2000. Slums and squatter settlements are generally characterized by the absence or severe lack of a basic infrastructure with services such as sanitary water supply, sewerage and drainage, roads, health care and education. Dwellings are generally made of discarded materials such as scraps of used wooden planks, bits of plastic, corrugated metal, asbestos sheeting and even cardboard. Population densities in such communities are high and malnutrition is often widespread. Inadequate water supply and sanitary facilities result in a high incidence of environmental diseases, the most recent being the outbreak of plague in India during 1994.

In many cases, the squatters encroach upon lands which are hazard-prone, such as active flood plains. Each time a flood strikes, squatters occupying the flood-prone banks of the Lyari River in Karachi suffer from loss of life and property. In some cities in the Pacific subregion, such as Nuku'alofa in Tonga and Ponape in the Federated States of Micronesia, land shortages have led to encroachment into mangrove and other swampy areas where public health risks are high.

Inner-city slums are usually rental tenements which have deteriorated owing to lack of proper and regular maintenance or repair. These are located in the older sections of cities and are characterized by a low standard of infrastructure and high person-to-floor space ratios. A significant number of urban residents in some cities of the ESCAP region have no shelter at all. Numerous pavement dwellers sleep on the roadside and in public parks in the cities of Calcutta, Bombay and Dhaka. A majority of these pavement dwellers have lived in the same situation for

more than a decade, although a number are only recent migrants from the rural areas who have not yet consolidated their positions in cities.

There are three critical components in confronting the urban shelter problem. These are, firstly, the availability of low-cost urban land which could be utilized for housing the poor; secondly, the provision of access to affordable financing to help the poor to improve their housing; and thirdly, the organization and participation of the community in planning and implementing low-income housing. The most critical limiting factor in the acquisition of shelter is its non-affordability, i.e. the poverty of those who need shelter.

According to various estimates, the incidence of urban poverty in most countries of the ESCAP region ranges anywhere between 15 and 86 per cent. More importantly, the absolute number of urban poor in the Asian and Pacific region is expected to increase by 20 million before the year 2000 (Lee, 1987).

Water supply and sanitation

Within each city there are trunk infrastructural networks, such as water supply, sanitation, solid waste collection, roads and transit systems. Most countries of the ESCAP region have been experiencing deficits in their existing infrastructural networks in spite of the significant investments made over the last 20 years. For the rapidly growing urban populations in low-income countries, it is difficult to meet the requirements for expansion that would be needed to service more people and to support economic development. The reasons for this are well known: the large capital investments required, inadequate cost-recovery from previous investments, the use of inappropriately high standards and technologies, and poor maintenance and operation (Huyck, 1987).

Having access to safe drinking water and sanitation facilities is a basic human right without which people cannot achieve a quality of life consistent with human dignity. Recognizing this, the International Drinking Water Supply and Sanitation Decade was proclaimed by the United Nations General Assembly in November 1980. Among individual countries, the availability of water supply connections in urban areas varied from 24 per cent in Bangladesh to 100 per cent in Singapore, with the sanitation status ranging from 5 per cent coverage in Afghanistan to 100 per cent in Singapore and Tuvalu.

Regarding access to safe drinking water and sanitation services in the ESCAP region, many Asian capital cities, such as Jakarta, Manila and Bangkok, have been and currently are implementing sizeable water supply and/or sewerage projects, and the percentage of households with access to safe drinking water and sewerage has increased as it is expected to do even more so during the next few years. Improvements in the supply of urban water in the Pacific subregion are also continuing, although, in some cases, these may be threatened by catchment disturbances or simply by the over-exploitation of limited ground-water resources. Most urban centres in the Pacific have also advanced their treatment of sewage. Fiji's approach, i.e. dispersing secondary effluent into mangrove areas, is one example that is proving to be an effective way of avoiding eutrophication problems.

Solid wastes

In low-income countries, large cities such as Calcutta and Karachi generate around 0.4-0.7 kg of solid waste per capita per day, while cities in middle-income countries, such as Manila, Bangkok and Kuala Lumpur, generate around 0.5-1.0 kg of waste per capita per day. In high-income countries, principal cities such as Tokyo and Singapore produce daily over 0.8-1.5 kg of solid waste per capita. Waste characteristics also vary with the economic level of the cities. In high-income cities, domestic solid waste contains a bigger fraction of combustible materials such as paper and plastic, whereas waste from low-income cities contains a bigger fraction of compostable materials, mainly food wastes and other biodegradable materials.

The storage, collection, transport, treatment and final disposal of solid wastes also vary, depending mainly on the economic development of the country. In many cities in developing countries, refuse is stored for disposal in a variety of containers ranging from old kerosene cans and rattan baskets to used grocery bags. In many instances, the refuse is dumped on roads or pavements rather than in proper refuse bins. Collection is done mainly using open dump-trucks and a few compactor-type collection vehicles. Disposal is normally by burning as well as dumping in sites where scavengers collect whatever saleable items they can find. With often limited land available for disposal sites, it was revealed in 1981 that 18 Pacific island countries had major waste disposal problems; there has been little improvement in this situation in the ensuing years. Cities of developing countries usually have problems related to inadequate budgets, lack of technical know-how and lack of public cooperation regarding proper storage and disposal of solid wastes.

Ambient environmental situation

Air pollution

Good air quality is essential for human health and for the environment as a whole. Polluted air can adversely affect

the quality of life, especially for those with asthma, bronchitis and similar respiratory problems. Polluted air can damage historic buildings and kill or damage sensitive plant life. In the long term, it can even change the quality of the soil and water. With few exceptions, most large urban areas in the ESCAP region suffer from air pollution, mainly in the form of suspended particulates and sulphur dioxide. Generally, in high-income countries, cities such as Tokyo, Osaka, Melbourne and Sydney have relatively lower levels of air pollution than cities in developing countries: for instance, Shenyang, New Delhi, Tehran and Jakarta, where World Health Organization guidelines on particulates and noxious gases are invariably exceeded. It should be mentioned that pollution caused by nitrogen oxides is one of the major problems faced by cities of developed countries such as Japan.

The deterioration of air quality in urban areas is mainly the result of increases in industrial and manufacturing activities and in the number of motor vehicles. Motor vehicles normally concentrate in the urban areas and contribute significantly to the production of various types of air pollutants, including carbon monoxide, hydrocarbons, nitrogen oxides and particulates.

In several countries of the region, the increase in per capita energy consumption has been quite dramatic. For instance, over the period 1965 to 1985, the per capita energy consumption of Indonesia, in kilograms of oil equivalent, increased from 91 to 219; in Thailand, from 80 to 343; in Malaysia, from 312 to 826; and in Singapore, from 670 to 2,165.

There is another environmental dimension to this aspect of development besides related air pollution problems, namely, the depletion of non-renewable natural resources. Like the air pollution problem, the depletion of non-renewable sources of energy has global implications.

There is a corresponding relationship between the increase in air pollution and the rise in respiratory diseases. Air pollution pushes up the incidence and severity of emphysema and chronic bronchitis, and dirty air severely aggravates the symptoms of many kinds of asthma. Air pollution also boosts the frequency with which people, especially children, develop short-term respiratory ailments. Mortality due to cardiovascular disease, particularly of people over 65 years of age, can increase with air pollution because laboured breathing strains the heart. Studies in China have revealed that air pollution, along with smoking, also greatly increases the risks of lung cancer.

Water pollution

Water is essential to human life and is used for all aspects of daily living. Although it is the responsibility of mankind to keep the environment clean, in the majority of the cities in the developing countries of the ESCAP region, urban rivers are heavily polluted with domestic sewage, industrial effluent and solid wastes. Typical examples are the Lyari and Malir rivers in Karachi, the Ravi in Lahore, the Kabul River in the cities of Kabul and Peshawar, the Chao Phraya River and the numerous canals in Bangkok, the Pasig and Tenajeros-Tullahan rivers in Metro Manila, and the Ganges in several cities of India.

While many rivers flowing through urban areas in the developing countries of the ESCAP region have deteriorated in quality, significant efforts are also being exerted to reverse this trend. The Ganga Action Plan in India is one. In the Philippines, the Department of Environment and Natural Resources has launched the Ilog Mo, Irog Ko ("My River, My Love") project aimed at cleaning up the Tenajeros-Tullahan River in Metro Manila. The project is patterned after the highly successful 10-year programme to clean up the Singapore River and Kallang Basin. Similar efforts are planned or under way in a number of other countries in the region. For example, in Pakistan, IUCN and the Government are preparing an action plan to clean the Kabul River.

Industrial, toxic and hazardous wastes

The majority of industries in the ESCAP region are located in and around urban centres. For this reason, the adverse effects of the effluent and emissions from industrial plants are more visibly felt by the urban population. The lack of central sewerage systems and the congestion that exists in many urban areas make more difficult the management of wastes coming from chemical plants and other manufacturing firms. Halogenated hydrocarbons known to be injurious to human health are the most frequently transported of such pollutants.

Noise pollution

Urban noise and traffic congestion are emerging problems in many of the principal cities of the region, although in some cities, such as Bangkok, Hong Kong and Jakarta, these constitute the most visible urban environmental problems. A major source of urban noise is motorized traffic, particularly motorcycles equipped with two-stroke engines and sawn-off silencers. In Japan, noise is a major cause of complaints. Road traffic is also a major source of noise in Australia. If current trends continue, there will be more acoustically unacceptable areas and the number of Australians affected will increase by more than 40 per cent by the year 2000 (Australian Government, 1986). As the standard of living in the region improves, people will become more sensitive to the level of noise in the environment. Currently, only the developed countries in the region, such as Japan and Australia, consider it a major

problem. However, highly urbanized countries and territories, such as Singapore and Hong Kong, have already started comprehensive programmes to monitor and control noise pollution. Increases in population, urbanization and industrialization wherever they occur will significantly increase noise pollution.

Conclusions and recommendations

Owing to the rapid economic, demographic and urban growth that has taken place in the region, the pressure on natural resources and environmental amenities has been increasing rapidly, particularly in mega-cities. Urban growth is very high, particularly in the developing countries of the region, mainly due to natural increase and migration. Urban areas, particularly mega-cities, account for a large share of economic activities. With the exception of China and India, in many countries these growth patterns are centred in only one or two major cities while, without intervention, the other urban centres remain too small to attract economic activity.

The adverse consequences of continuing urban expansion and over-urbanization are being felt in areas surrounding cities as well as inside the cities. The principal problems in the surrounding areas are the utilization of agricultural lands and open spaces to provide the necessary infrastructure. Deforestation, particularly near big cities, is also taking place to meet the energy and other needs for an expanding population. This leads to irreversible loss of land which should be available for food production and its natural ecological potential. The disproportionate increases in urban populations result in urban congestion and tremendous pressure on the urban infrastructure. Consequently, most of the principal cities in the ESCAP region, particularly in the developing countries, face problems related to inadequate housing, which results in the growth of slums and marginal settlements. Also, there is a shortage of water supply, especially in the dry hot season, and inadequate sanitation, deficient solid waste collection, poor treatment and disposal systems, traffic noise and congestion as well as air, water and noise pollution. These are the common attributes of urban areas. They have been in existence in the past and are likely to remain so for some time into the future.

In response to these problems, a number of newly industrializing and developing economies in the ESCAP region have implemented, or are starting to implement, measures to alleviate the environmental problems in their principal cities. These measures include the cleaning of rivers close to urban areas, landscaping, through the planting of trees, and reserving urban areas as "green belts", site and service schemes, and the provision of planned land use, the upgrading of slums and providing for the people's basic needs and social services, as well as reducing the use of fossil fuels, among other measures. These steps will not remedy the situation over night. It will take a long time to achieve minimum environmental standards required for maintaining human health and the well-being of other living organisms. This can be achieved only by adopting effective environmental policies and implementing programmes aimed at bringing about sustainable development.

In order to ameliorate the current population, urbanization and environmental conditions, the following recommendations may be helpful for Governments to choose from. Because of countries' geographical, ecological and socio-cultural diversity, some options may be suitable to only some countries; others may already have implemented them.

1. Inter-agency/governmental cooperation and coordination
There are strong links between population, development and the environment. Therefore, Governments should strengthen mechanisms to coordinate policies and programmes, and give unified direction for integrating environmental and population concerns into development policy and planning. Particularly when formulating socio-economic policies, plans and programmes, their implications with regard to demographic trends, patterns of production and consumption, protection of the environment and the conservation of natural resources, should be taken fully into account.

2. Use of environmental technologies and methods
Environmental technologies and methods, such as geographic information systems (GIS), remote sensing and environmental impact assessment, should be used for integrated policy formulation and decision-making, evaluation and monitoring. In developed countries, environmental technologies are already being used. Ideally they should help developing countries with regard to aspects such as the supply of pollution control technology, hardware, software, access to remote sensing data and human resource development, with short courses, workshops and seminars being held as appropriate.

3. Regional and rural development
In cities, environmental problems are due mainly to over-population. Besides natural growth, migration from rural areas also contributes to very high urban growth in the developing countries of the ESCAP region. Therefore, more emphasis should be given to making rural areas more livable by providing basic amenities and social services which are either non-existent or inadequate. At the same time, jobs in the ecological and environmental sectors should also be created in rural areas. Such jobs include reforestation, small-scale agro-based industries and local tourism. This would help in reducing the number of people moving from rural areas to the cities. Reforestation would also improve the condition of natural habitats and the supply of wood for energy purposes.

4. Strengthening of family planning programmes

Population growth in cities of the ESCAP region is very high, mainly as a result of natural growth. This situation could be improved by implementing family planning programmes, especially among the poor at their door-step. Religious leaders should also be encouraged to play a part in this regard.

5. Efficient urban planning

Plans for urban areas should be prepared and preventive measures should be adopted to stop urban sprawl by imposing regulations on unregulated urban housing. Services could be provided to people who pay for it or at least share the cost. At the same time, curative measures such as upgrading slums should also be carried out with the involvement of the community. Furthermore, the efficient allocation of land use to different urban functions and good urban form could reduce the problems of air and noise pollution created by automobile traffic, which in certain urban areas is very high.

6. Development of a comprehensive environmental database

For environmental planning and management, environmental data comprise an essential prerequisite. The environmental planner should have access to a body of well-researched environmental data, which can be regularly updated. Because some environmental issues do not have political boundaries, the ESCAP secretariat could also play an important role in the collection and dissemination of such data, which can be used for comparison and analysis at the regional or subregional levels.

7. Environmental education and awareness

Lack of environmental awareness is a very important factor in the process of environmental degradation. This situation needs to be tackled, particularly in developing countries where literacy levels are low and many people live in marginal economic circumstances. Both formal and non-formal methods of education should be adopted through means such as local media, seminars, celebrations, workshops, walks and student competitions. Also, to sensitize government representatives about these issues, ESCAP should continue to hold workshops and meetings regularly, ideally involving people from other walks of life, too.

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Lee, B.K. (1987). "Major urban development issues: an overview", In: Urban Policy Issues (Manila: Asian Development Bank).

United Nations (1991). World Urbanization Prospects, 1990 (New York: United Nations, Department of International Economic and Social Affairs).Table 1: Population growth trends in ESCAP region.

The Demography of Kiribati: Estimates from the 1985 Census (Demographers' Notebook)

Heather Booth *

Since the Second World War, censuses have been held in the Republic of Kiribati in 1947, 1963, 1968, 1973, 1978, 1985 and 1990. This paper presents an analysis of the 1985 census and compares projections made on the basis of that analysis with the 1990 enumeration. Comparison is made throughout with the estimates derived from 1978 census.

Before presenting the analysis, it would be worth describing some of the characteristics of Kiribati. This country comprises 33 atolls scattered over 3 million sq. km of the central Pacific Ocean. The main group, the Gilbert Group, consists of 16 atolls and accounts for more than 90 per cent of the population. Included in this group is the urban area, South Tarawa, with a land area of 16 sq. km and 33 per cent of the total population (in 1985). The Line Group is located some 3,000 km east of the Gilberts and consists of a chain of eight atolls spread over 2,000 km. The Phoenix Group also comprises eight atolls and lies midway between the Gilbert and Line Groups. Only 21 of the 33 atolls are inhabited. The atolls vary considerably in length, and are seldom more than 1,500 metres in width. Consisting of coral and sand with very poor soil, they rarely rise more than five metres above sea level. The average temperature is 26-32EC; droughts occur in the south.

Population growth

The de facto indigenous population of Kiribati was 55,439 in 1978 and 63,496 in 1985, with a growth rate of 2.1 per cent per annum, roughly equal to the growth rate in the period 1973-78. The birth rate (1981-85) was 37.5 per thousand and the death rate 13.9 per thousand: natural increase was thus 23.6 per thousand, an increase since the 1973-78 rate of 21 per thousand. Net migration was -2.4 per thousand and consisted mainly of movement between Kiribati and Nauru, and the movement of sailors and students.

The de jure population included an additional 2,227 I-Kiribati known to be overseas on census night (9 May), including sailors, students and contract workers and their families in Nauru (though the latter were believed to be underenumerated by about 175 people). The de jure growth rate was thus estimated at 2.1 per cent per annum.

Data quality

The single year age distribution is shown in figure 1. Age was derived from date of birth, although in some cases date of birth will have been calculated from age during fieldwork. Though some digit preference occurs (on digits 0, 2, 8 and 9), the quality of age reporting is generally good. The Myers' Blended Index (Myers, 1940) of digit preference (based on ages 20 to 69 in order to avoid the effects of past changes in fertility) is 3.6 for males and 3.4 for females. Other variables were well reported, with low levels of non-response. Data used in fertility and mortality estimation are discussed in the relevant sections.

Figure 1: Reported age distribution in single years
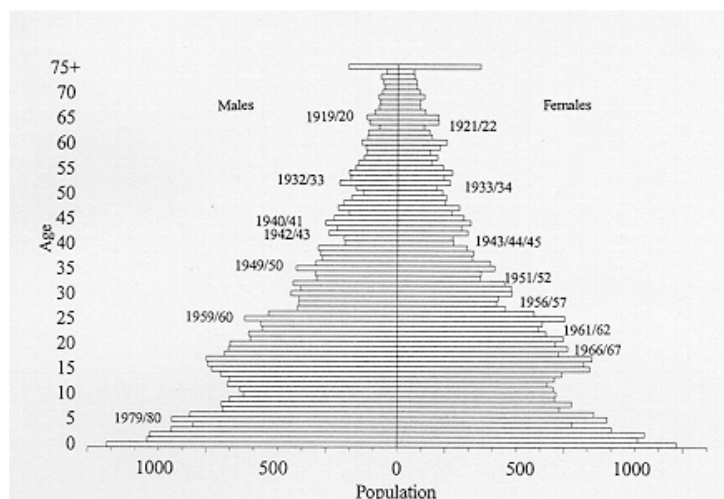
Population structure

The sex ratio of the de facto indigenous population is 980 males per thousand females. The proportion of the population aged under 15 years is 38.9 per cent. Based on a working age of 15-59 years, the dependency ratio is 808 dependents per thousand population of working age, but if a working age of 15-49 is adopted, in keeping with the retirement age of 50 years, the dependency ratio increases to 1,012 per thousand.

Urban-rural differentials in population structure are the result of greater reductions in fertility in the urban area and rural-to-urban migration. Based on a working age of 15-59, the dependency ratio in the urban area is 686 per thousand compared with 873 in rural areas. In practice, however, rural-to-urban migrants often support dependants in rural areas. Differentials also exist between the Catholic and Protestant populations, with dependency ratios of 907 and 707 per thousand, respectively, owing mainly to higher fertility among Catholics. Figures 2 and 3 show the relevant population structures.

Figure 2: Reported age distribution in urban and rural areas
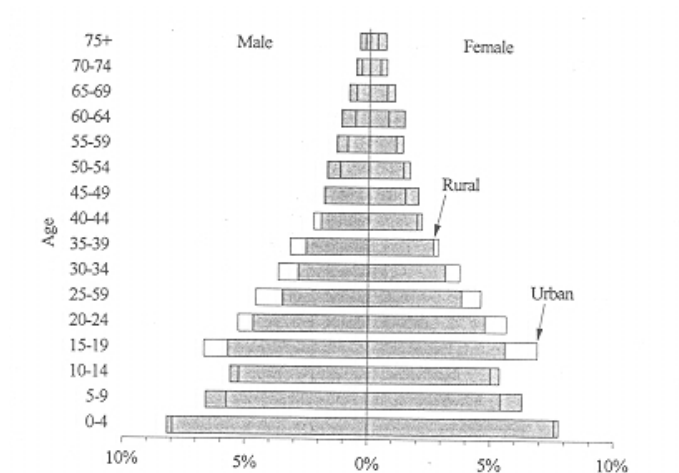
Figure 3: Reported age distribution for Protestant and Catholic populations
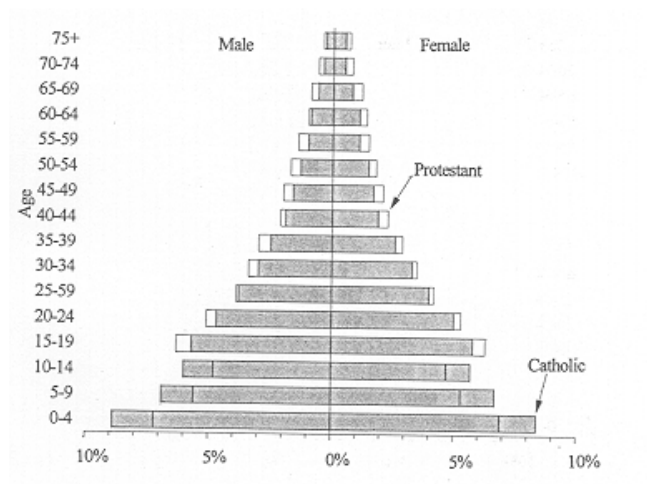
Mortality

Child mortality

Child mortality was estimated from proportions surviving among children ever born (Brass and others, 1968) using the Trussell (1975) variant. Since neither of the assumptions of constant fertility and constant child mortality in the recent past are true of Kiribati, two modified versions of the technique were also applied (United Nations, 1983:86-96).

Table 1 shows the estimation of child mortality assuming constant fertility and mortality. The effects of reporting errors and small numbers were minimised by graduating the probabilities of survival, l(2), l(3) and l(5), using the Brass logit system and the General Standard (Brass, 1976). This produced a graduated l(2) equal to 0.8916 referring to February 1983. Comparison with the estimate from the 1978 census (l(2)=0.8840; Macrae, 1983) indicated that mortality had decreased.

The effects of changing fertility and mortality on estimates of child mortality were examined separately using data for 1978, adjusted to refer to 1980 and 1985. The estimates obtained are also shown in table 1. For changing mortality, the graduated estimate of l(2) is 0.8907, only marginally lower than the basic estimate. For changing fertility, the graduated estimate of l(2) is 0.8916 referring to February 1983, identical to the basic estimate. The final estimate was taken as l(2)=0.8907, based on changing mortality and referring to November 1982. Based on a sex ratio at birth of 105, this corresponds to West model life table level 16.03, giving l(2)=0.8998 for females and 0.8821 for males. Analysis by sex confirmed this differential.

Table 1: Estimation of child mortality under different assumptions

Age of women i	Proportion of children dead D(i)	Multiplier k(i)	Age x	Probability of surviving to age x l (x)	West model life table level	Years before census t(x)
Constant fertility and mortality						
15-19	>0.1151	>1.0883	>1	>0.8747	>13.28	>1.01
20-24	>0.1066	>1.0570	>2	>0.8873	>15.81	>2.26
25-29	>0.1123	>1.0050	>3	>0.8871	>16.32	>4.13
30-34	>0.1406	>1.0128	>5	>0.8576	>15.29	>6.37
35-39	>0.1454	>1.0301	>10	>0.8502	>15.55	>8.86
40-44	>0.1596	>1.0178	>15	>0.8376	>15.41	>11.55
45-49	>0.1987	>1.0099	>20	>0.7993	>14.40	>14.50
Changing mortality, constant fertility						
15-19	>0.1128	>1.0971	>1	>0.8762	>13.38	>2.50
20-24	>0.1065	>1.0558	>2	>0.8876	>15.83	>2.50
25-29	>0.1105	>1.0020	>3	>0.8893	>16.45	>2.50
30-34	>0.1276	>1.0096	>5	>0.8712	>15.99	>2.50
35-39	>0.1342	>1.0266	>10	>0.8622	>16.13	>2.50
40-44	>0.1315	>1.0143	>15	>0.8666	>16.74	>2.50
45-49	>0.1488	>1.0064	>20	>0.8503	>16.54	>2.50
Changing fertility, constant mortality						
15-19	>0.1151	>-	>1	>-	>-	>-
20-24	>0.1066	>1.0601	>2	>0.8870	>15.80	>2.22
25-29	>0.1123	>1.0000	>3	>0.8877	>16.36	>4.16
30-34	>0.1406	>1.0153	>5	>0.8572	>15.27	>6.28
35-39	>0.1454	>1.0373	>10	>0.8492	>15.50	>8.68

Comparison of estimates from the 1978 and 1985 censuses for the period for which they overlap shows good agreement: the estimate from the 1985 data for July 1976 (West level 15.55, equivalent to l(2)=0.8830) corresponds to Macrae's estimate (0.8840) which refers to roughly the same date. The apparent recent increase in mortality is explained by higher mortality among first births and births to teenage mothers, and possibly by shorter birth intervals in that women aged 25-29 will have given birth to a greater proportion of their children during the period of lower fertility when birth intervals may have been longer. The effect of graduation is to reduce this bias in the final estimate.

Urban-rural and Protestant-Catholic differentials in child mortality were derived assuming constant fertility and mortality. The graduated estimates of l(2) are 0.8950 for urban and 0.8898 for rural areas; and 0.9220 for Protestants and 0.8723 for Catholics. Table 2 shows that the extent of variation within rural island groups in proportions dead among children ever born is much greater than between urban and rural areas. In fact, the differentials between the three groups of rural islands can largely be attributed to Protestant-Catholic differentials: Catholics comprise 73 per cent of the population in the northern islands, 55 per cent in the central islands, and 18 per cent in the southern islands. In the urban area, 53 per cent of the population is Catholic.

Table 2: Proportions dead among children ever born by area and religion

| Area/religion | Age of women | | |
	20-24	25-29	30-34
Urban	0.102	0.110	0.141
Rural	0.109	0.113	0.140

Northern	0.124	0.127	0.177
Central	0.114	0.110	0.123
Southern	0.067	0.087	0.101
Protestant	0.079	0.081	0.116
Catholic	0.122	0.134	0.154

Note: Northern includes Makin, Butaritari, Marakei, Abaing, North Tarawa; Central includes Maiana, Abemama, Kuria, Aranuka, Nonouti, Tabiteuea North, Tabiteuea South; Southern includes Beru, Nikunau, Onotoa, Tamana, Arorae. Rural total includes Banaba, Line and Phoenix Islands.

Infant mortality, derived from life tables, was 82 per thousand live births for 1981-85. This compares with 87 per thousand in 1974-78 (Macrae, 1983). Differentials by sex and religion are shown in table 3; in 1974-78 rates were 94 for males and 81 for females.

Table 3: Infant mortality and life expectancies by religion and sex

Religion	Infant mortality (per thousand)		Life expectancy (years)	
	Male	Female	Male	Female
Protestant	61	52	54	59
Catholic	103	91	49	54
Total	87	76	51	56

Adult mortality

Estimates of adult morality were derived by the orphanhood technique (Brass and Hill, 1973). Intercensal survival methods using the 1978 and 1985 censuses did not prove useful owing to migration and reporting error.

Table 4 shows proportions aged n to n+4 with surviving mother, S(n). With a mean age at maternity of 27.18 years, female mortality was estimated by the orphanhood technique to be West level 17.67 (life expectancy of about 62 years) in 1980 and West level 14.24 in 1970, with the apparent rapid decline being more marked in the earlier part of the decade. The Hill and Trussell (1977) and intercensal (United Nations, 1983) variants gave similar estimates. Such results are clearly biased by the "adoption effect": dead mothers are under-reported because adopted mothers are reported as real mothers. Age exaggeration may also have added to the under-estimation.

Table 4: Estimation of partial conditional female life table

Age n	Proportion with mother surviving S(n)	Adult survivorship probability l (25+n)/l(25)	Age x	Person-years lived L(x)	Life expectancy L(x)	>beta
10	>0.9471	>0.9638	>35	>4.7595	>33.90	>0.976
15	>0.9189	>0.9400	>40	>4.6320	>29.70	>0.984
20	>0.8777	>0.9128	>45	>4.4667	>25.51	>0.996
25	>0.8223	>0.8739	>50	>4.2360	>21.53	>1.004
30	>0.7351	>0.8205	>55	>3.9120	>17.77	>1.012
35	>0.6350	>0.7443	>60	>3.4798	>14.34	>1.017
40	>0.5101	>0.6476	>65	>2.9147	>11.10	>1.034
45	>0.3575	>0.5183	>70	>2.1670	>8.25	>1.064
50	>0.2274	>0.3485	>75	>1.3135	>6.05	>1.087
55	>0.1284	>0.1769	>80	>0.7950	>4.49	>1.100

In order to minimise this bias, child and conditional adult mortality were combined into a complete life table following Blacker (1977), as shown in table 4. The conditional probabilities, l(25+n)/l(25), were derived using Brass-Hill multipliers for n# and n=55 and Hill-Trussell multipliers for n=35 to 50 in order to maximise reliability. Comparison of the corresponding life expectancies with those based on the Brass General Standard (denoted s), by means of the Brass logit life table system with l(2)=0.8998, gave the beta coefficients shown in table 4, where Y(x) = alpha + beta Ys(x) and Y(x) is the logit transformation of the survival probabilities. Averaging over x = 40 to 55 gave beta=1.00, corresponding to alpha=-0.3823, resulting in the life table seen in table 5 and a life expectancy of 55.6 years. The corresponding female death rate is 12.8 per thousand.

Table 5: Life table for females, 1981-85

Age x	Life table survivors l(x)	Life table population L(x)	Probability of dying q(x)	Age-specific mortality rate m (x)	Life expectancy e^o (x)
0	>1000	>945	>0.076	>0.0804	>55.6
1	>924	>3575	>0.051	>0.0131	>59.2
5	>877	>4358	>0.013	>0.0027	>58.3
10	>866	>4307	>0.010	>0.0020	>54.0
15	>857	>4248	>0.017	>0.0035	>49.5
20	>842	>4161	>0.024	>0.0048	>45.4
25	>822	>4058	>0.025	>0.0051	>41.4
30	>801	>3953	>0.027	>0.0055	>37.4
35	>780	>3838	>0.031	>0.0063	>33.4
40	>755	>3706	>0.038	>0.0077	>29.4
45	>727	>3546	>0.049	>0.0100	>25.4
50	>691	>3343	>0.066	>0.0137	>21.6
55	>646	>3078	>0.094	>0.0196	>18.0
60	>585	>2726	>0.137	>0.0294	>14.5
65	>505	>2267	>0.205	>0.0457	>11.5
70	>402	>1699	>0.307	>0.0727	>8.8
75	>278	>1078	>0.449	>0.1159	>6.6
80	>153	>529	>0.618	>0.1790	>4.9
85	>58	>178	>0.782	>0.2568	>3.7
90	>13	>35	>0.905	>0.3309	>3.0
95	>1	>3	>1.000	>0.4000	>2.5

The improvement over the 1978 estimate of 53.8 years (Macrae, 1983) is due partly to the use of the Hill-Trussell multipliers at n=35 to 50 (these were not used by Macrae). If this refinement were not used, an estimate of 54.9 would be obtained, suggesting an improvement of 1.1 years.

Table 6: Estimation of partial conditional male life table

Age n	Proportion with father surviving S(n)	Adult survivorship probability l (35+n)/l(32.5)	Age x	Person-years lived L(x)	Life expectancy e^o(x)	>beta
10	>0.9029	>0.9184	>45	>4.4695	>23.05	>1.122
15	>0.8459	>0.8694	>50	>4.1500	>19.20	>1.134
20	>0.7559	>0.7906	>55	>3.7285	>15.87	>1.132
25	>0.6759	>0.7008	>60	>3.1877	>12.58	>1.145
30	>0.5584	>0.5743	>65	>2.4990	>9.80	>1.151
35	>0.4346	>0.4253	>70	>1.6528	>7.36	>1.173
40	>0.2935	>0.2358	>75	>0.8705	>6.27	>1.036
45	>0.1855	>0.1124	>80	>0.3487	>5.41	><0.9
50	>0.0974	>0.0271	>85	>0.0925		
55	>0.0481	>0.0099	>90	>0.0248		

For male mortality, based on paternal orphanhood, only the Brass-Hill multipliers are available (based on a mean age at paternity of 30.83 years). Again a rapidly declining trend in mortality was suggested: the West level ranged from 11.43 in 1969 to 16.50 in 1980. Comparison with life expectancies based on the General Standard with l(2) =0.8821 produced the beta coefficients shown in table 6 with an average of 1.14, corresponding to a life expectancy of 49.7 years. This is low in relation to the female estimate and lower than the 1978 estimate of 50.3 years. Adjustments made to the conditional probabilities of survival at older ages (in keeping with the use of Hill-Trussell multipliers) resulted in beta=1.10, alpha=-0.2195, with a life expectancy of 50.6 years and death rate of 14.9 per thousand. The corresponding life table is shown in table 7.

Table 7: Life table for males, 1981-85

Age x	Life table survivors l(x)	Life table population L(x)	Probability of dying q(x)	Age-specific mortality rate m (x)	Life expectancy e^0 (x)
0	>1000	>938	>0.087	>0.0931	>50.6
1	>913	>3496	>0.065	>0.0169	>54.4
5	>853	>4230	>0.017	>0.0035	>54.1
10	>839	>4165	>0.013	>0.0027	>50.0
15	>827	>4090	>0.023	>0.0046	>45.6
20	>808	>3978	>0.032	>0.0065	>41.7
25	>783	>3847	>0.034	>0.0069	>38.0
30	>756	>3712	>0.036	>0.0074	>34.2
35	>729	>3567	>0.042	>0.0086	>30.4
40	>698	>3402	>0.051	>0.0104	>26.6
45	>663	>3204	>0.066	>0.0136	>22.9
50	>619	>2958	>0.089	>0.0185	>19.3
55	>564	>2646	>0.124	>0.0264	>16.0
60	>494	>2251	>0.178	>0.0391	>12.9
65	>406	>1769	>0.258	>0.0593	>10.1
70	>301	>1228	>0.370	>0.0909	>7.8
75	>190	>706	>0.513	>0.1378	>5.9
80	>92	>307	>0.671	>0.2017	>4.5
85	>30	>90	>0.818	>0.2766	>3.5
90	>6	>15	>0.926	>0.3448	>2.9
95	>1	>1	>1.000	>0.4000	>2.5

For both sexes, life expectancy was 53.0 years and the death rate 13.9 per thousand. The differential in infant mortality between Protestant and Catholic populations results in the differential in life expectancies seen in table 3 (when adult mortality is assumed equal: data to examine adult differentials were not available). Urban-rural differentials in adult mortality (derived by the Brass-Hill method using mean ages at maternity/paternity for the total population) showed slightly lower rural mortality among females but no difference among males.

Marriage and first birth

Marriage (including de facto marriage) is almost universal with 98 per cent of females and 96 per cent of males being ever-married by age 50 in 1985. Remarriage rates following divorce or widowhood are higher for males than for females: by age 25-29, 11 per cent of females are without a spouse owing to widowhood or divorce compared with only 3 per cent of males, and by age 50-54 as many as 29 per cent of females but only 8 per cent of males are without a spouse. The singulate mean age at marriage (Hajnal, 1953) was 21.1 years for females and 24.2 years for males. A slight increase in age at marriage had occurred: 1978 estimates are 20.8 for females and 23.8 for males. Earlier and intercensal estimates confirm this trend (Booth, 1994).

Age at first birth, derived from proportions nulliparous (Booth, 1994), was 22.5 years. This compares with 22.2 in 1978. The increase is corroborated by the average age at first birth of 22.8 years for first births occurring in the 12 months preceding the census and by intercensal estimates (Booth, 1994). The interval between marriage and first birth had not changed since 1978. Proportions nulliparous and never married are shown in table 8, as are first births occurring during the preceding 12 months.

Table 8: Proportions nulliparous and never-married and reported births during the preceding 12 months

Age	Proportion nulliparous	Proportion never-married	First births in preceding 12 months Number	Rate
15-19	>0.887	>0.765	>176	>0.0462
20-24	>0.458	>0.318	>285	>0.0893
25-29	>0.197	>0.127	>97	>0.0377
30-34	>0.118	>0.072	>19	>0.0090
35-39	>0.076	>0.041	>7	>0.0004

40-44 >0.070	>0.032	>0	>-	
45-95 >0.070	>0.021	>0	>-	
50-54 >0.064	>0.031	>0	>-	

Urban-rural and Protestant-Catholic differentials pointed to later ages at marriage (for females) and first birth for the urban area and for Protestants, with urban-rural differentials being the greater. Females married at 21.9 years on average in the urban area compared with 20.7 in rural areas; whereas Protestant females married at age 21.4 years compared with 20.8 for Catholics. Average age of mothers when their first child was born was 23.5 years in the urban area compared with 22.0 years in rural areas, and 22.8 years among Protestants compared with 22.3 among Catholics. The interval between marriage and first birth was thus 1.6 years in the urban area and 1.3 in rural areas, and 1.4 years among Protestants and 1.5 among Catholics. For males, no urban-rural differential existed in age at marriage, whereas Protestant males married at 24.6 years compared with 23.8 for Catholic males.

Fertility

The total fertility rate (TFR) was estimated by the P/F (Brass and others, 1968), intercensal parity (Arretx, 1973) and own-children (Cho, 1973) techniques. The El Badry adjustment (El Badry, 1961) was not appropriate for parity not stated, and the 141 cases (0.9 per cent of women) were assumed to be zero parity. In fact, 71 were never-married women aged 15-19 and a further 31 were never-married and aged 20-24.

Average parities, P(i), seen in table 9, show no clear evidence of omissions. Under the assumption of constant fertility, the P/F technique (i=2) gave TFR=5.07, indicating an increase over the 1978 estimate of 4.7. This and the decline in fertility of the late 1960s and 1970s are seen in the pattern in P/F over age. The technique was thus applied to intercensal data (1980 rates were obtained by interpolation between 1978 and 1985), as seen in table 9, resulting in a TFR of 4.95 and birth rate of 37.7 referring to November 1982. It is noted that the pattern in the intercensal P/F ratios remains the same, but variation is reduced: the remaining variation is at least partly due to omissions at older ages in the 1978 census.

Table 9: Fertility estimation by the P/F technique under different assumptions

Age i	Average parity P (i)	Period fertility f (i)	Cumulated fertility *phi* (i)	Parity equivalent F (i)	P/F ratio P(i)/F (i)
Constant fertility					
15-19	>0.1460	>0.0627	>0.3135	>0.1292	>1.1300
20-24	>0.9934	>0.2177	>0.4020	>0.9314	>1.0666
25-29	>2.2066	>0.2408	>0.6060	>2.1278	>1.0370
30-34	>3.4355	>0.2062	>0.6370	>3.2458	>1.0584
35-39	>4.5330	>0.1487	>0.3805	>4.1116	>1.1025
40-44	>5.4390	>0.0595	>0.6780	>4.5741	>1.1891
45-49	>5.8929	>0.0144	>0.7500	>4.7331	>1.2450
Changing fertility					
15-19	>0.1460	>0.0621	>0.3105	>0.1277	>1.1433
20-24	>1.0003	>0.2157	>0.3890	>0.0291	>1.0766
25-29	>2.1812	>0.2278	>0.5280	>2.0741	>1.0516
30-34	>3.3408	>0.1999	>0.5275	>3.1487	>1.0610
35-39	>4.3242	>0.1433	>0.2440	>3.9904	>1.0837
40-44	>4.8737	>0.0576	>0.5320	>4.4330	>1.0994
45-					

| 49 | >5.2160 | >0.0133 | >0.5985 | >4.5829 | >1.1381 |

The intercensal parity estimates were also used in the intercensal parity technique giving a TFR of 5.25. This is an overestimate because of the technique's sensitivity to differential quality of reporting in the two censuses.

The own-children technique was applied using "mother number" data to match mothers to children aged 0-14 in the same household. Mortality estimates from the 1978 census analysis (Macrae, 1983) were used for 1971-79, and the estimates derived above for 1980-85. As many as 27 per cent of children were unmatched; any bias incurred is unquantifiable. The estimates are otherwise considered fairly accurate since neither the underenumeration nor the migration of women and children were significant. Figure 4 shows that for the period for which they overlap, the single year TFR estimates are almost the same as those obtained by this method from 1978 data; and the average for 1974-78 from 1985 data is 4.48, compared with 4.51 from 1978 data. Age-specific fertility rates for 1971-75, 1976-80 and 1981-85 are shown in table 10. For the most recent period, a birth rate of 37.2 is implied.

Figure 4: Own-children estimates of total fertility from 1978 and 1985 data

Reverse survival gave a birth rate of 37.3 for 1981-85 and 33.6 for 1976-80. These were regarded as minimums given the sensitivity of the technique to underenumeration, especially of 0-4-year-old children.

The final estimate of fertility for 1981-85 was taken to be the average of the estimates derived by the intercensal P/F and own-children techniques: a TFR of 4.9 and the age-specific rates seen in table 10. The corresponding birth rate is 37.5 referring to November 1982, with an average of 2,241 births per year occurring during the five-year period. The average age at child-bearing was 29.6 years, and the median 29.8 years.

Table 10: Own children estimates of fertility for 1971-85 and final estimates for 1981-85 and 1974-78

Age	Own-children estimates			Final estimate	Final estimate *
	1971-1975	1976-1980	1981-1985	1981-1985	1974-1978
15-19	>0.0926	>0.0712	>0.0730	>0.0699	>0.0757
20-24	>0.2237	>0.2078	>0.2105	>0.2213	>0.2271
25-29	>0.2378	>0.2462	>0.2494	>0.2473	>0.2298
30-34	>0.2075	>0.2097	>0.2083	>0.2118	>0.2076
35-39	>0.1289	>0.1501	>0.1574	>0.1558	>0.1392
40-44	>0.0557	>0.0546	>0.0698	>0.0659	>0.0513
45-49	>0.0147	>0.0155	>0.0153	>0.0149	>0.0101
TFR	>4.8045	>4.7755	>4.9185	>4.9350	>4.7040

* Source: Macrae (1983)

The TFR of 4.9 confirmed that fertility had increased slightly since 1978. It is seen in table 10 that this increase occurred at ages 25+. In fact, rates at ages 15 to 24 declined slightly owing to increasing average age at first birth. While a simple and corresponding shift in the fertility curve would result in higher rates at ages 25+, this would not account for the entire increase found at these ages. The average age of child-bearing increased by 0.5 years since 1978.

Reasons for the increase in fertility can be found in the temporary success of the pre-independence family planning programme. The family planning campaign began in earnest in 1968. By 1974, about one-quarter to one-third of all women aged 15-49 were using some form of contraception, but by 1978, this figure had declined to about one-fifth, the campaign as such had ended and family planning had been integrated into maternal and child health services (Macrae, 1983). Fertility levels had already begun to stabilise by 1973 (see figure 4) and their subsequent increase can be attributed to reduced contraceptive use. The stabilisation of contraceptive use rates indicated by the 1982-86 levels of roughly one-fifth suggested that further increases in fertility were unlikely. However, a reversal of the increase, in line with government policy (Ministry of Health and Family Planning, 1983), would require an increase in contraceptive use.

Differentials were examined using the P/F technique (i=2) with assumed constant fertility and the own-children technique with assumed zero underenumeration. The P/F estimate for urban areas was 5.01 and 5.11 for rural areas; the own children estimates for 1981-85 were 4.47 and 5.18, respectively. The average differential of 0.40 was divided in the ratio 62:38 around the overall estimate of 4.9, giving an urban TFR of 4.68 and a rural TFR of 5.08. This differential is about the same as that indicated by mean parities in 1978. Variation within the rural area is greater than between urban and rural areas and is related to the large differential by religion. P/F estimates are 3.88 for Protestants and 6.28 for Catholics; while own-children estimates are 4.19 and 5.56, respectively, for 1981-85.

The average differential of 1.88 was divided in the ratio 52:48 around the overall estimate to give a TFR for Protestants of 3.96 and a TFR for Catholics of 5.84. This differential is considerably greater than that indicated by mean parities in 1978 (1.05 at age 40-44 and 0.80 at 45-49).

These differentials can be attributed largely to differential contraceptive use and/or efficiency rates, with the effect of earlier age at first birth among rural women and Catholics being relatively small. The Protestant population underwent a far greater reduction in fertility than the Catholic population, giving rise to sensitivities about relative population size and contraceptive use, with the Catholic Church accepting (and promoting) only the Billings Method. Such sensitivities contributed to increased fertility in both populations.

Population projections

The enumerated de jure population was used as the base population for projection, and the projected de facto population was derived by subtracting an overseas population assumed equal in number (2,227) and structure as the population known to be overseas in 1985. This was based on the fact that these absentees are temporary in nature: diminishing opportunities in Nauru were assumed to be counterbalanced by increased opportunities for study and work at sea, and structural differences were assumed to be insignificant. Graduation of the age distribution was not considered appropriate given the fertility changes affecting the population aged up to 30 years.

Projection assumptions are shown in table 11. The assumptions of declining fertility and mortality were based on the objectives of the Ministry of Health and Family Planning (1983) and were formulated in terms of TFR, infant mortality and life expectancy, with alpha and beta values determined by trial and error. The pattern of fertility was assumed to remain constant as in 1981-85. Net international migration of the de jure population was assumed to be nil. Also shown are the birth, death and growth rates of the de facto population. Both birth and death rates decreased over the period. For the death rate, this is partly a result of age structure: if input parameters are assumed constant over the projection period, the death rate would decline to 13.8, 13.6 and 13.3 for the three periods, respectively. For the birth rate, the structural effect is one of initial increase (to 38.8) owing to the large cohort aged 15-19 moving into the higher fertility ages, followed by decreases (to 38.1 and 36.6) owing to the counterbalancing effect of the smaller cohort aged 10-14.

Table 11: Projection assumptions: declining fertility and mortality

Parameter		Estimate 1981-1985	Assumptions 1985-1990	1990-1995	1995-2000
TFR		>4.9	>4.7	>4.5	>4.3
IMR	Male	>87	>82	>76	>71
	Female	>76	>72	>68	>6
e^o_{60}	Male	>50.6	>51.8	>53.0	>54.2
	Female	>55.6	>56.5	>57.3	>58.2
alpha	Male	>-0.219	>-0.259	>-0.300	>-0.340
	Female	>-0.382	>-0.412	>-0.440	>-0.472
beta	Male	>1.100	>1.095	>1.095	>1.091
	Female	>1.000	>1.000	>1.000	>1.000
Parameter		Estimate 1981-1985	Projected de facto 1985-1990	1990-1995	1995-2000
Birth rate		>37.5	>37.0	>35.2	>32.6
Death rate		>13.9	>13.0	>12.2	>11.3
Natural increase		>23.6	>24.0	>23.0	>21.3
Parameter		Estimate 1985	Projected de facto 1990	1995	2000
Population		>63,700	>72,072	>81,083	>90,401
Dependency ratio		>812	>837	>846	>806
Dependency ratio (child)		>706	>737	>747	>709

Notes: Periods refer to mid-year to mid-year. Population and dependency ratios refer to mid-years, including 1985. The dependency ratio is defined as all dependents per thousand persons aged 15-59; the child dependency ratio is dependants aged 0-14 per thousand persons aged 15-59.

Table 11 also shows projected total population size: a de facto population of 90,401 is indicated for the year 2000. Projected dependency ratios, also shown, indicate that the economic "burden" on the population of working age will

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initially increase, owing to increasing child dependency (aged dependency decreases over the period), before decreasing to just below the 1985 level in 2000.

Comparison of the projected 1990 values with the 1990 enumeration is based on the projected mid-year population adjusted at each age by a constant growth rate (0.0235) to November 1990 and the enumerated population excluding Banabans. The ratio of projected to enumerated is 1017:1000 for males and 1011:1000 for females. If the projection assumptions are correct, underenumeration in 1990 is suggested. On the other hand, if the enumeration is accurate, the projection assumptions are in error: fertility is too high, mortality too low and/or net out-migration has occurred. The agreement at age 0-4 (999:1000) suggests that assumed fertility is unlikely to be too high, while the possibility that assumed mortality is too low seems unlikely in view of the modest improvement suggested. The possibility that net out-migration has occurred is also unlikely in view of the known net return migration from Nauru between 1985 and 1990. While estimates from the 1990 census (Tesfaghiorghis, unpublished) suggest that both fertility and mortality have fallen to below the assumed levels, the use of such estimates as projection assumptions would clearly lead to greater discrepancy between the projected and enumerated populations. Further analysis of the 1990 data is thus required to resolve these discrepancies.

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International Conference on Population and Development (Demographers' Notebook)

The challenge before the International Conference on Population and Development, which will meet at Cairo from 5 to 13 September 1994, will be to reach agreement on a strategy for stabilizing world population growth by addressing reproductive health needs, responsibilities and choices of individuals and incorporating population considerations in efforts to achieve sustainable development.

To meet that challenge, the Conference is expected to endorse a draft programme of action for the next 20 years whose central themes are that efforts to slow population growth and to achieve sustainable development are mutually reinforcing, and that in striving for progress in those areas it is imperative to empower women and to guarantee choice in regard to family planning.

The 16-chapter, 113-page draft programme is the outcome of three sessions of work in a Preparatory Committee for the Conference. As it goes to Cairo for final negotiations, the draft contains agreement on 85 per cent of the wording expected to be adopted by the Conference. The remaining 15 per cent is in square brackets, signifying language still subject to negotiation and agreement.

The main outstanding issues requiring further negotiations, and therefore bracketed in the document, are: universal completion of primary education, especially for girls; reduction in infant, child and maternal mortality; and universal access to family planning information and services, in the context of reproductive health services; the estimates of financial resources that will be required to provide reproductive health services, including family planning; to operate programmes for the prevention of sexually transmitted diseases; and to meet population data, policy and research needs; issues dealing with the definition of terms such as "reproductive rights", "reproductive health" and "safe motherhood". In addition, the first two chapters of the draft programme, namely, the preamble and the principles, remain in brackets as they were not discussed during the preparatory process owing to a lack of time.

United Nations Secretary-General Boutros Boutros-Ghali will open the Conference on 5 September 1994 at the Cairo International Conference Centre. A five-day general debate, in plenary sessions, is expected to focus on experiences in population and development strategies and programmes. It will be held concurrently with negotiating meetings of the Main Committee charged with resolving pending issues and finalizing the draft programme of action, which will then be submitted to the plenary for adoption. The opening of the Conference will be preceded by two days of informal consultations on organizational and procedural matters.

Over 180 governmental delegations are expected to participate in the Conference, several of them led by Heads of State or Government. Nearly 1,000 non-governmental organizations (NGOs) have been accredited to attend the Conference. A greater number will also participate in a parallel event, the NGO Forum '94, to be held from 4 to 13 September at Cairo. Two other Conference-related events scheduled to take place on 3 and 4 September are the 1994 International Conference of Parliamentarians on Population and Development and a "journalist's encounter".

The International Conference on Population and Development is the third United Nations conference on population issues. It follows the 1974 World Population Conference, held at Bucharest, and the 1984 International Conference on Population, at Mexico City. At those gatherings, actions to address issues relating to rapid population growth were spelled out, and it was affirmed that all couples and individuals have the right to decide freely and responsibly the number and spacing of their children, and to have the information, education and means to do so.

Compared with the outcomes of those two conferences, the stress of the 1994 Conference draft programme of action on family planning services to meet reproductive health needs, particularly of women, is considered as a qualitative shift of emphasis by the international community in addressing population issues.

The countries and areas in the ESCAP region met in August 1992 in preparation for the Cairo Conference. That meeting, the Fourth Asian and Pacific Population Conference, adopted the Bali Declaration on Population and Sustainable Development, which will serve as one of the important regional inputs to the Cairo meeting.

The Bali Declaration is divided into several parts: Preamble, a statement of Population Goals, and 67 Recommendations under 10 headings, as follows: Population, Environment and Development; Urbanization, Internal and International Migration; Family Planning and Maternal and Child Health; Population and Human Resources Development; Women and Population; Population and Poverty Alleviation; Mortality and Morbidity; Ageing; Population Data and Information Dissemination; and Resource Mobilization.

Like the Bali Declaration, the draft programme of action is divided into a number of parts. The main points are as follows:

Chapter 1 (Preamble): In this portion of the programme Governments would be urged to recognize that their response to population and development challenges for the remainder of this decade will affect future generations. It stresses the need for greater investments in people and to make women full partners with men.

Chapter 2 (Principles): The draft states that implementation of the action programme should be consistent with each country's development priorities, national laws, religions, ethical values and cultural backgrounds and should conform with universal international human rights.

Chapter 3 (Inter-relationships between Population, Sustained Economic Growth and Sustainable Development); Chapter 4 (Gender Equality, Equity and Empowerment of Women); Chapter 5 (The Family, its Roles, Rights, Composition and Structure); Chapter 6 (Population Growth and Structure); Chapter 7 (Reproductive Rights, Reproductive Health, and Family Planning); Chapter 8 (Health, Morbidity and Mortality); Chapter 9 (Population Distribution, Urbanization and Internal Migration); Chapter 10 (International Migration); Chapter 11 (Population, Development and Education); Chapter 12 (Technology, Research and Development); Chapter 13 (National Action); Chapter 14 (International Cooperation); Chapter 15 (Partnership and Non-Governmental Sector); and Chapter 16 (Follow up).

In addition to negotiating the final wording of the draft programme of action, the Conference will consider other issues too, i.e. the report of the Secretary-General on the fourth review and appraisal of the World Population Plan of Action; the report of the Secretary-General containing a synthesis of the national reports of countries on their experiences concerning population and development strategies and programmes; the report of the Preparatory Committee for the Conference on its third session; and various other organizational and procedural matters.

The December issue of this Journal will provide more detailed highlights of the action programme.

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