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A Socio-demographic Profile of the Population of Maldives

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The unabated growth of the population will be detrimental to the attainment of the country's cherished socio-economic development goals

It is sometimes assumed that small countries do not have population problems, or face the type of population issues that larger countries do. In this article, an attempt is made to provide a "pen picture" or socio-demographic profile of the population of Maldives using data collected by the country's 1985 and 1990 population and housing censuses. It attempts to bring out some of the issues faced by the Republic of Maldives.

An Indian Ocean archipelago located 600 kilometres south of India, Maldives extends from the Equator northward. It consists of 1,190 small islands forming a chain 820 kms in length within an area of 90,000 square kms. For administrative purposes, the 26 natural atolls of the archipelago are divided into 19 groups, also referred to as atolls. The islands are low lying with an average elevation of 1.6 metres above mean sea level. Few of the islands have a land area in excess of one square km and only 201 of them are inhabited. It is estimated that only 10 per cent of the country's total land area is suitable for agriculture.

The economic performance of the country has been very impressive in recent years. Gross domestic product (GDP) at 1985 prices grew at the rate (geometric) of 8.77 per cent per annum in the last decade (1984-1994). The GDP per capita was estimated to be around US$727 in 1994, the highest among the countries comprising the South Asian Association for Regional Cooperation (SAARC). The country's impressive economic performance was accompanied by changes in the structure of the economy from a predominantly fisheries-based economy to a multi-sectoral economy, dominated by the tourism and fisheries sectors; improved health and living conditions of the people, and universalization of primary education.

Population size and growth

The 1990 Population and Housing Census of Maldives enumerated a total population of 213,215 persons, excluding foreign passport holders residing in Maldives. This is a large increase from 180,088 Maldivians enumerated in the 1985 census, yielding an exponential growth rate of 3.37 per cent per annum, the highest ever recorded. If this rate of growth continues, it is expected that the current population will double itself within about 21 years. The potential for such growth is inherent in the young age structure of the Maldivian population.

The dramatic increase in the rate of population growth has been due mostly to the rapid fall in the mortality rate without any corresponding decline in fertility which has remained almost constant at a very high level. For example, the crude death rates obtained from vital registration data were less than 20 per thousand population in the early 1970s, declining to around 6 per thousand in 1990. This sharp decline in the crude death rate over the years was not matched by a corresponding decline in the crude birth rate, which registered a modest decline from around 46 per thousand population in the early 1970s to 43 per thousand population in 1990.

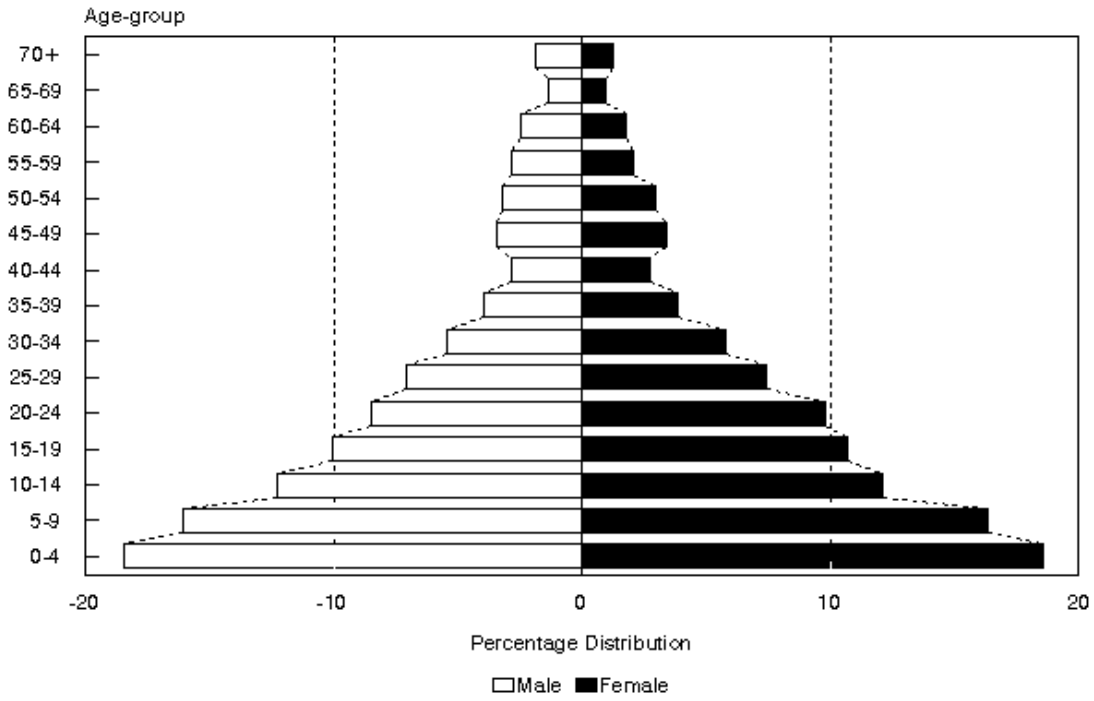
Population distribution and internal migration

The population distribution of Maldives is skewed, with more than a quarter (25.9 per cent) of its population living in Male', the capital city. Male' is the country's only urban centre. The remaining 74 per cent of the population live in 201 inhabited islands, or 19 atolls, with an increasing proportion of people over the years living in larger atolls. During the intercensal period 1985-1990, the population of Male' grew at 3.7 per cent per annum while the population of the atolls grew at 3.3 per cent per annum. Data also show that, excepting the city of Male', and Male' Atoll and Ari Atoll, which showed a population gain through migration, the rest of the atolls lost a significant number of persons through migration. The highest gain through migration was experienced by the city of Male', followed by the Male' and Ari atolls. The population of Male' City grew by 20 per cent within the short span of five years, i.e. from 45,874 in 1985 to 55,130 in 1990. The current population density of the city is about 30,000 per square km, thus posing a series of environmental problems. Most of the urban growth is due to migration. About 48 per cent of the population of Male' City had their origin in some of the country's other islands. The corresponding proportions in the Male' and Ari atolls were 45 and 17 per cent, respectively. Among the "pull" factors which have attracted migrants to Male' City are the availability of jobs, education, business, health and other facilities. The attraction in other atolls, particularly Male' and Ari atolls, can be attributed to the existence of tourist resorts in these areas which offer lucrative employment.

Age structure and dependency ratio

The age structure of the population of Maldives is pyramidal in shape (see figure 1). There is a large concentration of population in the youngest age groups, particularly under age 15, accounting for 47 per cent of the total population, and relatively few people (about 5 per cent) in the older age groups, 60 years and above, with 48 per cent in the working age group, 15-59 years. Children (below 15) and youth (15-24 years) together account for 66 per cent of the total population of Maldives, strongly suggesting that the country's population is very young owing to persistently high fertility.

Figure 1: Population pyramid of Maldives, 1990

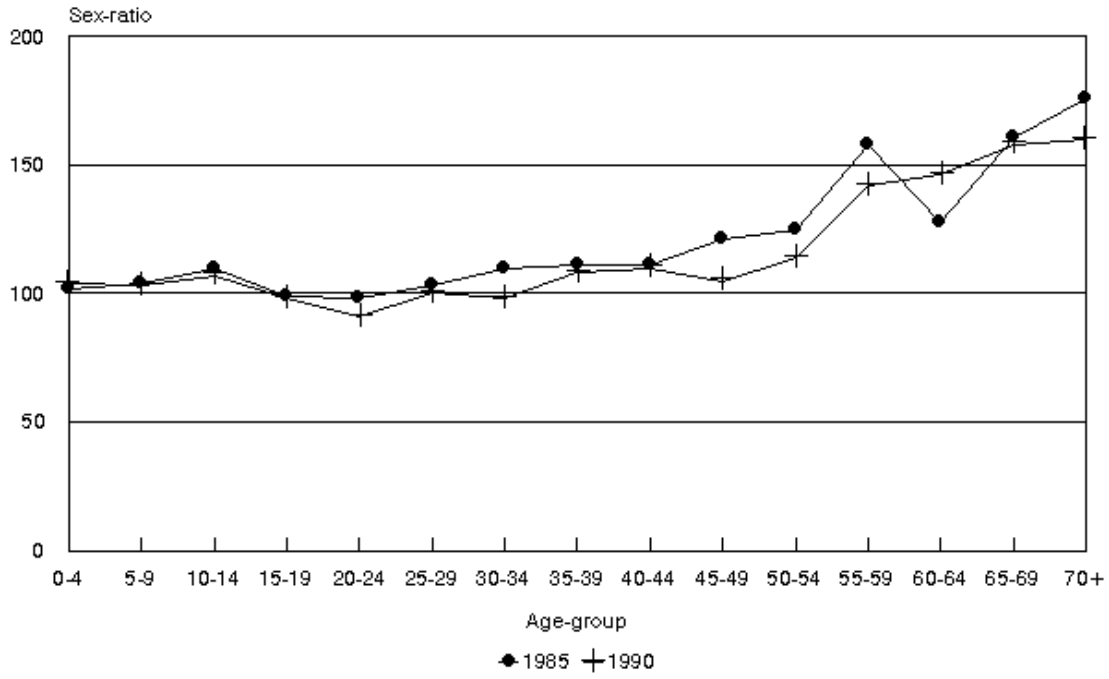


One of the consequences of persistently high fertility or the preponderance of children under age 15 is a high dependency ratio. The dependency ratio, defined as the number of children under age 15 and the older population, aged 60 years and older, per 100 population in the working age-group, 15-59, was 108 in 1990. In other words, every 100 persons in the productive ages had to support 108 persons in terms of food, clothing, shelter, education, health care and the like. The dependency ratio is much higher in the atolls (i.e. rural areas) than in Male' City. This is because the proportion of children under age 15 is considerably higher in the atolls than in Male'. Conversely, the proportion of people in the working ages, particularly at young adult ages (15-24 years), is higher in Male' than in the atolls. The finding of a higher proportion of children under 15 in the atolls than in Male' is attributed to fertility in the former being higher than in the latter, while the higher proportion of youth in Male' than in the atolls may be a result of migration of young adults from the latter to the former in search of jobs, pursuing business opportunities, education and better health care.

Sex ratio

The data show persistent dominance in the total population of males over females, although their dominant position has been declining over the years. The overall sex ratio for the population was 108 in 1985 and 105 in 1990. This is attributed mostly to higher female than male mortality in the total population (see figure 6). The data also show an increasing trend in the sex ratio with the advancement of age, reaching its highest level in the oldest age-group, 70 years and older (see figure 2). The increasing deficit of females with the advancement of age is also due to a higher risk of death among females than males with the advancement of age (see figure 6), as there is no evidence to show that females more often than males tend to move out of the country in the older age groups.

Figure 2: Sex-ratio of Maldives by age group, 1985-1990



The age-specific sex ratio by rural and urban areas (i.e. atolls vs. Male' City) reveals an excess of males over females in all age-groups in the capital city. The excess of males over females is also observed for the majority of age groups in the rural atolls, except for those in the age group 15-39 years. The deficit of males at the young adult ages in the atolls, on one hand, and the excess of males, particularly at young adult ages in Male' City, on the other, may be attributed to migration of a substantially higher proportion of males in these prime working age groups from the rural areas to the capital city in search of jobs and other opportunities in life.

Nuptiality

Marriage is universal in Maldives. Almost 90 per cent of females are married by age 30-34 years. Permanent celibacy, measured by the proportion of men and women in the age group 45-49 remaining single, is virtually non-existent in the Republic of Maldives. The age at marriage, although increasing over the years, is still very low and women tend to marry earlier than men. The singulate mean age at marriage1 increased by one year between 1985 and 1990, from 23 years to 24 years for men and 18 years to 19 years for women. In general, in Maldives, wives are junior to their husbands by about five years. This overall trend in the increase of mean age at marriage for both males and females has also been observed in Male' City as well as in the atolls. In 1990, mean age at marriage in the capital city was higher than that of the national average by two years for females and one year for males.

The incidence of widowhood is also very high and is higher for females than males. For example, in 1990, 2 per cent of men as compared with 5 per cent of women reported being widowed.

The incidence of divorce, although declining, is still very high in Maldives and is higher among females than males. Almost 9 per cent of women and 6 per cent of men were divorced in 1990. The comparable figures for women and men were 0.69 and 0.46 per cent, respectively, in Nepal and 0.62 and 0.05 per cent, respectively, in Bangladesh in 1990.

One very important feature of marriage practice in Maldives is that both men and women tend to marry more than once. Over half of the ever-married women aged 40 years and older contracted for marriage at least four times during their lifetime. Frequency of marriage tends to increase with age (see table 1). Female education is inversely related to frequency of marriage, i.e. the higher the level of educational attainment of women, the lower the frequency of marriage (see table 2). And this relationship holds even when allowance is made for age. In other words, the frequency of marriage tends to decline with the level of education in every age group. Higher frequency of marriage leads to higher completed family size. However, this relationship becomes weak when adjustment is made for the effect of age on frequency of marriage and fertility (see table 3).

Table 1: Frequency distribution of marriages by age of ever married females, Maldives, 1990

Number of marriages	Age-group (years)									
	<20		20-29		30-39		40-49		50+	
	%	Cumulative %	%	Cumulative %	%	Cumulative %	%	Cumulative %	%	Cumulative %
4	2.4	2.4	17.3	17.3	35.7	35.7	51.0	51.0	50.3	50.3
3	4.9	7.3	15.5	32.8	17.7	53.4	16.4	67.4	16.4	66.7
2	18.2	25.5	25.6	58.4	22.2	75.6	16.4	83.8	16.4	83.1
1	72.3	97.8	40.5	98.9	23.8	99.4	15.5	99.3	15.5	98.6
Not stated	2.2	100.0	1.1	100.0	0.6	100.0	0.7	100.0	1.3	100.0

Total	4,171	16,137	9,874	6,373	9,254

Source: Population and Housing Census of Maldives, 1990.

Table 2: Number of marriages by level of education of ever married females, Maldives

Number of marriages *	Illiterate	Percentage distribution			
		Level of education *			
		Non-formal	Primary (Grade 0-5)	Middle (Grade 6-7)	Secondary and higher (Grade 8 and above)
1	18.7	33.5	27.5	57.6	74.6
2	17.7	22.1	21.7	18.4	14
3	16.7	15.8	16	9.6	4.8
4	46.8	28.6	34.8	14.4	6.6
Total number	1,921	5,178	34,170	2,719	1,126
Per cent	100	100	100	100	100

* Note: Number of marriages and education status "not stated" cases are excluded.

Source: Population and Housing Census of Maldives, 1990.

Education

The Republic of Maldives has achieved a remarkably high level of literacy for both the male and female population. Over nine-tenths of its population aged six years and older were reported to be literate in 1990, the rates being 90 per cent for males and 91 per cent for females.

As expected, the literacy rate is higher in urban areas (i.e. the capital city) than in rural areas (atolls), and this holds for both males and females. The literacy rate, for both males and females, was 96 per cent in Male' City in 1990. The corresponding rates for males and females in the atolls were 87 per cent and 89 per cent, respectively.

Table 3: Number of children ever born alive per ever married woman by age and number of marriages, Maldives, 1990

Age group	Children ever born			
	Number of times mother married			
	1	2	3	>4
15-19	0.61	1.07	1.39	1.53
20-24	1.71	2.32	2.56	2.76
25-29	3.19	3.71	3.88	4.09
30-34	4.82	5.14	5.22	5.23
35-39	6.29	6.66	6.7	6.31
40-44	7.59	7.61	7.5	7.01
45-49	7.78	7.73	7.51	6.99
All ages	2.86	4.13	4.78	5.41
Standardized for age *	3.92	4.32	4.43	4.41

* Note: Standardized on the basis of the age distribution of ever-married women in 1990.

Source: Population and Housing Census of Maldives, 1990.

Males predominate in the labour force in Maldives and, owing to the machanization of traditional industries such as fish processing, there are decreasing economic opportunities for women in the labour force.

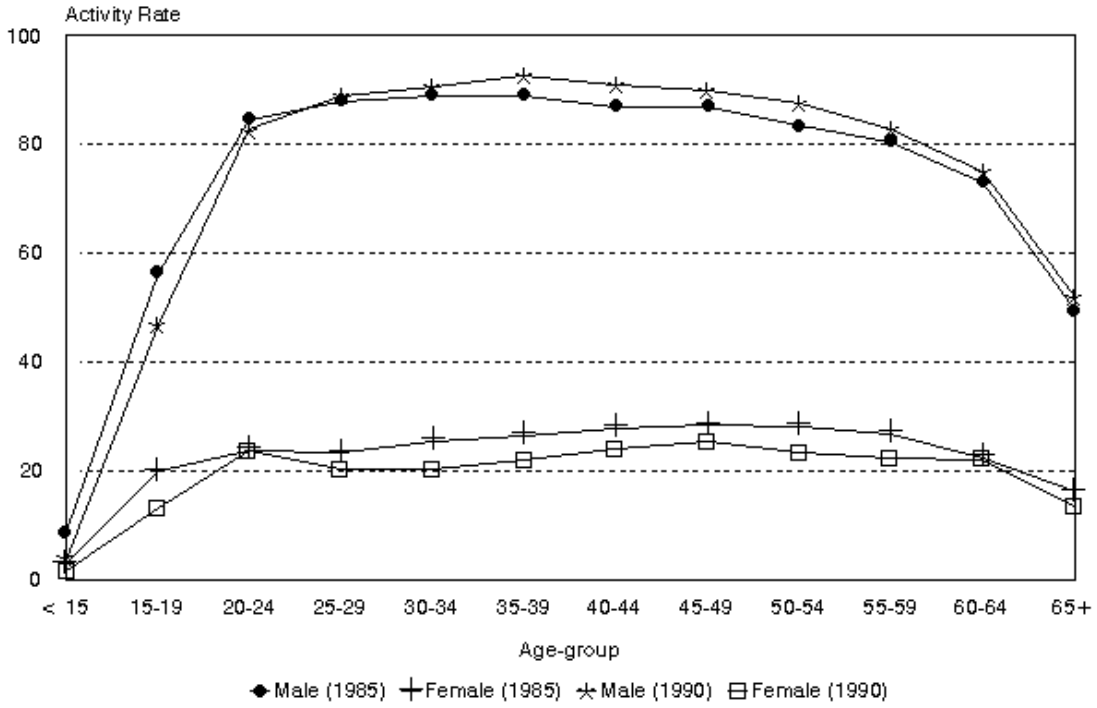
Although the country has achieved a very high level of literacy, the educational attainment of the population is still very low. Little over 11 per cent (11.3 per cent) of the population aged six years and older, have completed primary education, while only a handful of people completed secondary (1.06 per cent) and university level (0.15 per cent) education. The educational attainment is lower for females than for males and lower in the atolls than in the capital city. The country has almost attained universal enrolment at the primary level, particularly in Male' City. However, a sizeable proportion of the student population, particularly at the secondary level, are still outside the purview of the school system. About 16 per cent of children of middle school (grades 6-7) age and 77 per cent of those of secondary school (grades 8-10) age could not be brought under the education system as of 1990.

The enrolment ratio is higher in the capital city than in the rural areas. The total enrolment ratio (i.e. proportion of student population aged 3 to 15 years enrolled in pre-school to grade 10) in Male' City was over 100 per cent2 in 1990. The corresponding ratio in rural areas was only 67 per cent.

Economic activity

The labour force participation rate, defined as the proportion of the population aged 12 years and older who are economically active, was reported to be 46.7 and 43.9 in 1985 and 1990, respectively. This is one of the lowest such rates in the SAARC region. The participation rate for males is higher than for females. The rates for males and females were 69.6 and 21.4, respectively, in 1985. The corresponding rates were 68.4 and 18.0 in 1990. The sex pattern of the labour force participation rate observed for the country as a whole, also holds for Male' City and in every atoll and for every age group and each census year. Data show a declining trend in the participation rate, particularly for females, during the last intercensal period 1985-1990. The decline in the female participation rate observed for the country as a whole also holds for the absolute majority of the atolls, except for Male'. The intercensal comparison of the age/sex participation rate suggests that this rate has increased for males at every age, except for the first three age groups (12-14, 15-19 and 20-24 years), while it has decreased for females at every age (see figure 3), indicating overall increasing economic opportunities for men with a corresponding decline in economic opportunities for women. The decline in home-based fish processing, owing to the mechanisation of the processing, and handicraft (cottage) industries, the traditional sources of employment for women, may explain the finding of a drastic decline in female participation in the labour force.

Figure 3: Age-specific activity rate by sex, Maldives, 1985 and 1990



The unemployment rate is higher for females (4.6) than males (2.8) at the national level. This overall pattern also holds for the rural atolls, but in the capital city, the unemployment rate is higher for males (3.6) than females (2.8).

A Maldivian male at birth is expected, on average, to spend 41 years in the labour force and 26 years as a dependent, out of his total life expectancy of 67 years. On the other hand, a Maldivian woman is expected, on average, to spend only 11 years in the labour force and 56 years as a dependent, out of her total life expectancy of 67 years.

The data also indicate that the number of job seekers far outweigh the number of jobs vacated, either due to retirement or death. On average, there are three job seekers for every job vacated. The findings clearly indicate that higher investment will be required to generate a greater number of jobs to absorb the growing labour force.

Fertility levels, trends and differentials

Summary measures of fertility

Table 4 presents some summary measures of fertility based on data collected by the 1990 census. The crude birth rate3 for the country as a whole was 43 per thousand population in 1990. For the same year, the general fertility rate4 for the Republic was 203 per thousand women in the reproductive age group. The total fertility rate (TFR),5 gross reproduction rate6 and average parity were 6.4, 3.2 and 7.3, respectively, in 1990.

Fertility, measured by any index, is higher in the rural atolls than in Male' City. For example, the crude birth rate, general fertility rate, TFR, gross reproduction rate and the average parity were 28.3, 121.1, 3.9, 2.0 and 6.5, respectively, in Male' in 1990; the corresponding figures for the atolls were 48.4, 235.0, 7.4, 3.6 and 7.5.

Table 4: Summary measures of fertility based on reported birth data, Maldives, 1990

	Measures of fertility				
Year/sector	Crude birth rate	General fertility rate	Total fertility rate	Gross reproduction rate	Average parity at 45-49 years
Country	43.2	202.68	6.40	3.16	7.30
Male' City	28.33	121.11	3.88	1.98	6.46
Atolls	48.4	235.02	7.40	3.63	7.53

Source: Same as in table 1.

Age-specific fertility rates and trends

Table 5 presents data on age-specific fertility rates for Male' City, the atolls and for the country as a whole for the census year 1990. The age-pattern of fertility that emerges from data in table 5 may be summarized as follows: (a) the age-specific fertility schedule

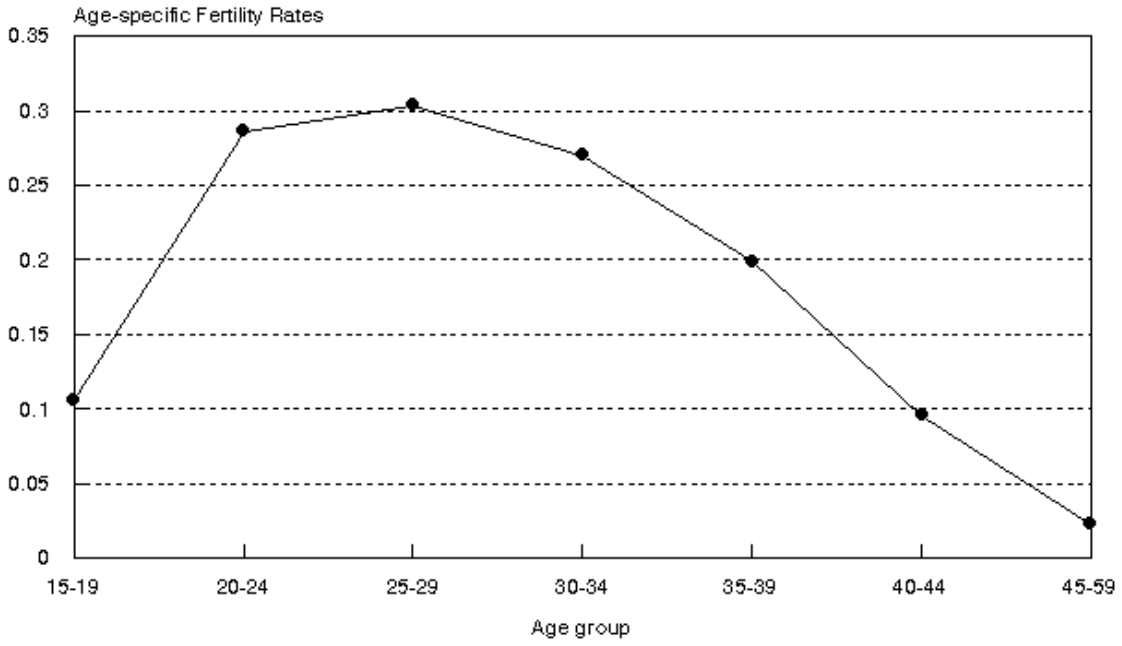
assumes an "inverted U" shape distribution with "broad peaks", starting from the early twenties to the late thirties, indicating a prevailing high level of fertility in the country (see figure 4); (b) the absolute majority of births occurring in the year preceding the census, accounting for over three-fourths of the total, were delivered by women in the age-range of 20-39 years; (c) women in their late twenties (25-29 years) are the most fertile group, followed by their immediate younger and senior counterparts in their early twenties (20-24 years) and thirties (30-34 years). This overall pattern of fertility by age group observed for the country as a whole also holds for Male' City and the atolls.

Table 5: Reported age-specific fertility and total fertility rates for country, Male' City and atolls, Maldives, 1990

Age group	Age-specific fertility rates		
	Country	Male	Atolls
15-19	.1060	0.0418	0.1374
20-24	.2864	0.1809	0.3271
25-29	.3032	0.2070	0.3413
30-34	.2704	0.1765	0.3044
35-39	.1992	0.1067	0.2331
40-44	.0957	0.0486	0.1123
45-49	.0227	0.0136	0.0254
Total	1.2836	0.7751	1.4809
TFR	6.42	3.88	7.40

Source: Same as in table 1.

Figure 4: Age-specific fertility rates, Maldives, 1990



Cumulative fertility

Fertility levels and trends were also analysed using data on the number of live children ever born by age of women. The data on the number of children ever born by age of women, collected by the censuses of 1985 and 1990, are presented in table 6.

Table 6: Average parity by age group in Male' City, atolls and country, Maldives, 1985 and 1990

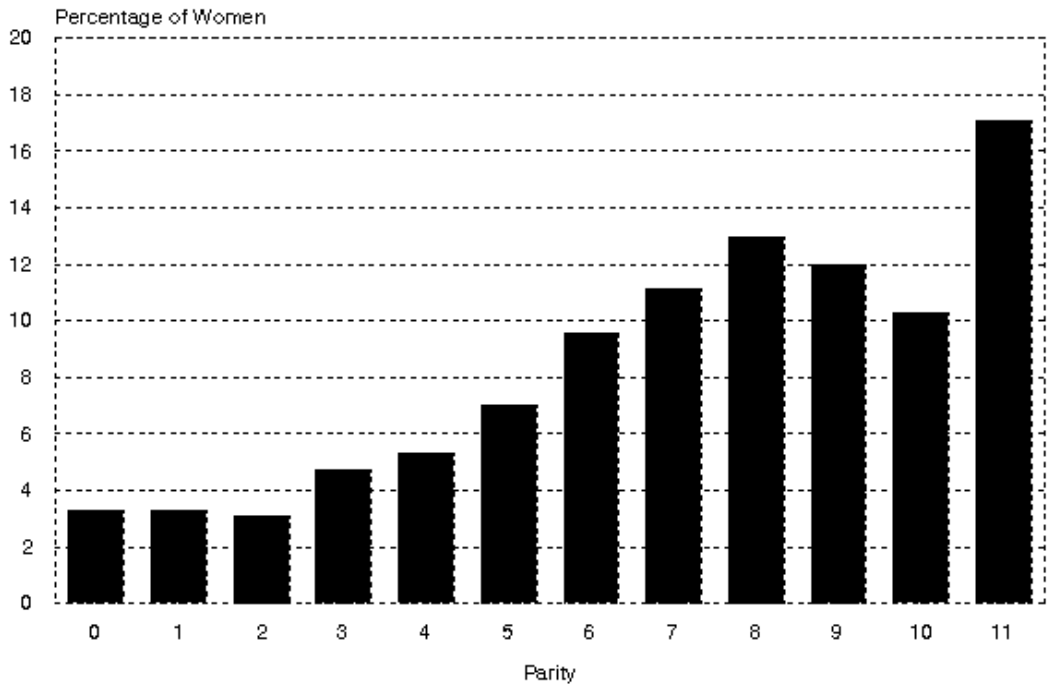
Age group	Country		Male'		Atolls	
	1985	1990	1985	1990	1985	1990
15-19	0.3834	0.2835	0.2463	0.1268	0.4385	0.360
20-24	2.0044	1.8196	1.5514	1.2059	2.1673	2.0529
25-29	3.6737	3.5329	3.0235	2.6652	3.9044	3.877
30-34	5.2629	5.0393	4.3327	3.9906	5.5754	5.4183

35-39	6.6778	6.4123	5.8418	5.088	6.9544	6.8963
40-44	6.9683	7.2568	6.1587	6.336	7.23	7.5814
45-49	7.0907	7.29	6.0091	6.4579	7.3483	7.5339

Source: Same as in table 1.

The data show the persistence of high fertility in Maldives. At the end of her reproductive period, the typical Maldivian woman produces on average over seven children, which is one of the highest rates in the SAARC region. The corresponding figures in Bangladesh, India and Nepal were 6.86 (BDHS, 1993-1994),7 5.11 (NFHS, 1992-1993)8 and 5.9 (NFHS, 1991)9, respectively. Over half of the women completed their reproductive period with eight or more children (see figure 5). The completed fertility implied by number of children ever born to a woman in the age group 45-49 years was reported to be 7.10 and 7.30 children in the 1985 and 1990 censuses, respectively. This indicates not only the persistence of high fertility but also increasing fertility over the years in which women born during the period 1940-1945 were found to be finishing their reproductive cycle with higher completed family size than their counterparts who were born five years previously. Data in table 6 also show that the typical woman resident of the atolls produces a higher number of children at the end of her reproductive period than her counterpart living in the capital city. The difference is about one child, and this holds for almost every age group and for both censuses.

Figure 5: Percentage of women aged 45-49 by parity, Maldives, 1990



Estimated birth rate

Births reported in the census are usually under-reported. To account for this under-reporting and in the absence of reliable vital statistics, various indirect techniques were employed to arrive at a plausible estimate of the birth rate. These included the stable population method, Coale's method and the reverse survival method. All these methods utilize data on age distribution of the population collected by census, including information on childhood mortality and/or rate of population growth in estimating birth rates.10

A close look at the estimates of fertility, derived by employing various methods, shows a clear convergence, attesting to the robustness of the estimates (see table 7). The fertility estimates vary within a narrow range of one child per thousand population, for a low estimate of 45.5 per thousand to a high of 46.5 per thousand population. The average of the three estimates is taken as the measure of the birth rate, which is 47.07 per thousand population.

Table 7: Estimated crude birth rate using various indirect techniques

Method of estimate	Birth rate based on reported age data
Stable population corresponding to $C_{(40)}$ and West Mortality Level 15.38 and r = .034	.0462
Coale method based on $C_{(15)}$, $I_{(5)}$= .8640 and r= .034, West Mortality Level 15.15	.04651
Reverse survival method (1984-89) based on	

$l_{(2)}$=.8813 * , and r = .034 and West Mortality Level 15.45	.0455

Key: r = Intercensal (1985-90) growth rate;
l(5) = Probability of surviving to age five. This was obtained from the information on the proportion of children dead among children ever born collected by the 1990 Population and Housing Census;
C(15) = Proportion of population under age 15 for two sexes combined in 1990 census; and
C(40) = Proportion of female population under age 40.
* Note: The estimate of birth rate by "reverse survival method" was obtained by utilizing life tables consistent with l(2) (i.e. probability of survival to age two). The estimate of l2 was obtained from the information on the average proportion dead among children born to women 20-24, 25-29 and 30-34 years of age. The value was estimated to be .8813 and the corresponding Model Life Table for both sexes was 15.45.

Estimated total fertility rate

In the absence of reliable vital statistics and because of the under-reporting of births, the age-specific and total fertility rates were also estimated indirectly by using the P/F ratio technique (Trussell Multipliers).11 The TFRs estimated by the P/F ratio method are 7.72, 5.85 and 8.35 for the Republic, Male' City and the atolls, respectively. However, the TFR estimated by the P/F ratio method may not give the best possible estimate of fertility in a situation of changing fertility, as indicated by the finding of lower mean parity of the youngest women, 15-19 years, entering the reproductive period in 1990 compared with their counterparts who had entered the reproductive period five years previously, i.e. in 1985 (see table 6). In view of this situation, total fertility was estimated by the Arriaga technique12 in which the P/F ratio was modified and extended to the situation of changing fertility.

Table 8 presents data on adjusted age-specific fertility rates and estimates on TFRs for the country, Male' City and the atolls for the census year 1990 using the Arriaga technique. Data in table 8 shows the persistence of high fertility with the estimated TFR being 7.53 children per woman for the country. The corresponding rates were 5.08 in Male' City and 8.13 in the atolls. The finding of high fertility in Maldives is not unexpected in view of the low contraceptive prevalence rate. The use of modern contraceptive methods was estimated to be around 2 to 3 per cent in the late 1980s.

Table 8: Adjusted a age-specific and total fertility rates in Male' City, atolls and country, Maldives, 1990

Age-group	Adjusted age-specific fertility rates		
	Country	Male' City	Atolls
15-19	0.1466	0.0671	0.1785
20-24	0.3483	0.2503	0.3695
25-29	0.3562	0.2725	0.3738
30-34	0.3114	0.2242	0.3280
35-39	0.2242	0.1323	0.2458
40-44	0.1001	0.0571	0.1100
45-49	0.0194	0.0129	0.0206
TFR	7.5310	5.0820	8.1310
Mean age of child-bearing	28.32	28.92	28.20

Notes: Arriaga technique was employed to derive these adjusted rates. The adjustment factor applied was that provided by age-group 25-34; and Obtained by using the formula: (2.25(P(3)/P(2)) + 23.95) where P(2) and P(3) refer to children ever born to women in the age-groups 20-24 and 25-29, respectively.

The mean age at child bearing, consistent with prevailing high fertility, was also found to be low at 28.0, 29.0 and 28.0 years for the country as a whole, Male' City and the atolls, respectively.

The age-specific fertility pattern obtained indirectly closely corresponds to that of the pattern obtained using reported data. In both cases, the pattern reflects a "broad peak type" in which peak reproduction begins in a woman's early twenties and continues through her mid-thirties (see figure 4).

From the preceding analysis, it is clearly evident that the fertility of Maldivian women remained persistently very high, and is higher in the rural atolls than in the urban area, i.e. the capital city, Male'.

Mortality levels, trends and differentials

Reported mortality level

Crude death rate

In the absence of relevant census data, vital registration data were used to obtain crude and infant mortality rates and these are presented in table 9. Examination of the data in the table reveals a very low crude death rate of 6 per thousand population for the country in

1990. The corresponding rates in other SAARC countries estimated by the United Nations were 14.7 in Bangladesh, 16.2 in Bhutan, 10.8 in India, 14.2 in Nepal, 11.6 in Pakistan and 5.9 in Sri Lanka in 1990 (ESCAP, 1990). The finding of a considerably lower death rate in Maldives, compared with other SAARC countries (except for Sri Lanka) may be difficult to justify in the absence of strong evidence to suggest that Maldives had a much better health care delivery system than other countries in the region in 1990. The lower death rate in Maldives may be attributed to under-reporting of deaths in the registration. The implied crude death rate obtained for Maldives by subtracting the growth rate (0.0343) from the estimated birth rate13 (0.04651) turns out to be 12.2 per thousand during the inter-censal period. This is also consistent with the death rate (12.2) estimated for Maldives in 1990 (ESCAP, 1990) and therefore is considered the most plausible estimate.

Table 9: Reported crude and infant death rates by sex for Male' city, atolls and country, Maldives, 1990

Place of residence	Crude death rate (1990)			Infant death rate (1989)		
	Male	Female	Total	Male	Female	Total
Country	7	6	6	45	39	42
Male' City	5	5	5	46	45	45
Atolls	7	6	7	39	40	40

Source: Ministry of Planning, Human Resources and Environment, Statistical Year Book of Maldives, 1991.

Estimates of infant and childhood mortality and expectation of life at birth

Using census data on infant deaths among the live births that occurred during the year preceding the census, the infant mortality rate calculated for the Republic of Maldives was 40 per thousand live births in 1989. The corresponding rate obtained from registration data was 42 per thousand live births for the country as a whole in 1989. The mortality situation of Maldives, measured by the above-mentioned indicators, appears to be much better than in other countries (excepting Sri Lanka) in the SAARC region. The corresponding infant mortality rates estimated for other SAARC countries were 116.0, 125.0, 96.0, 125.0, 112.0 and 32.0 per thousand in Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka, respectively, in 1989 (ESCAP, 1989). The finding of a very low infant mortality rate for Maldives, compared with other countries in the SAARC region (excepting Sri Lanka), is inexplicable in the absence of convincing evidence to prove that Maldives had a relatively better health care delivery system in 1989 than the other SAARC countries.

The reported low crude death rate and infant mortality rate in Maldives are the outcome of under-reporting of deaths in the census and registration. Census and registration data on deaths, particularly infant deaths, are grossly under-enumerated in developing countries and using these sources of data will provide the lower bound of the mortality level. In view of the incompleteness of infant deaths recorded by these sources, an indirect technique was employed to arrive at plausible estimates of childhood mortality rates and corresponding life expectancies at birth, using information on children surviving among children ever born collected by the population and housing census.

The infant and childhood mortality rates with corresponding mortality level and life expectancies at birth estimated by the Trussell Method14 from 1985 and 1990 census data are presented in table 10. These estimates are based on q1 values for the West Model Life Table. Data in table 10 show a considerable decline in infant and childhood mortality rates and a corresponding increase in life expectancy at birth from 1982 to 1987. This decline is noticed in both rural (atolls) and urban (Male' City) areas. The estimated infant mortality rate, i.e. number of infant deaths under one year of age occurring per thousand live births in a given year, for the country as a whole declined by 27.3 per cent, from 121 per thousand births in 1982 to 88 per thousand in 1987. The corresponding decline in the infant mortality rate for Male' City was 23.2 per cent, from 95 per thousand births in 1982 to 73 per thousand in 1987. The infant mortality rate in the atolls declined by 28.3 per cent, from 127 per thousand births in 1982 to 91 per thousand in 1987. The decline in the under-five mortality rate has also been very dramatic, from 177 per thousand births around 1982 to about 125 per thousand births in 1987 for the country as a whole. If the current trend, i.e. the trend observed between 1982 and 1987 in (infant and under-five) mortality decline persists into the future, the infant mortality rate will decline by 58 per cent, from an estimated 88 per thousand births in 1987 to 37 per thousand in 1995, while under-five mortality will decline by 64 per cent, from an estimated 125 per thousand births in 1987 to 45 per thousand in 1995.

Table 10: Estimated infant and child (under five) mortality rates and corresponding mortality level and expectation of life at birth along with reference period for Male' City, atolls and country, Maldives, 1985 and 1990

Locally		q_o *	q_5	Mortality level (West)	e^o_o	Reference period
Male'	1985	.095	.135	15.67	55.1	Sept. 1982
	1990	.073	.101	17.55	59.6	Feb. 1988
Atolls	1985	.127	.187	13.16	48.9	June 1982
	1990	.091	.130	15.92	55.6	Aug. 1987
Country	1985	.121	.177	13.60	50.1	July 1982
	1990	.088	.125	16.17	56.3	Sept. 1987
	1995	.0372 * *	.0450 * *		65.84 * *	Sept. 1995

Notes: q0 = Infant mortality rate, eoo = expectation of life at birth;
q5 = Probability of dying between birth and age 5 (under-five mortality)

* = Estimate of infant mortality rate (1q0) is obtained by accepting 2q0 to exclude child survival data reported by women aged 15 to 19.
* * = These estimates were made on the basis of trend observed between 1985 and 1990.

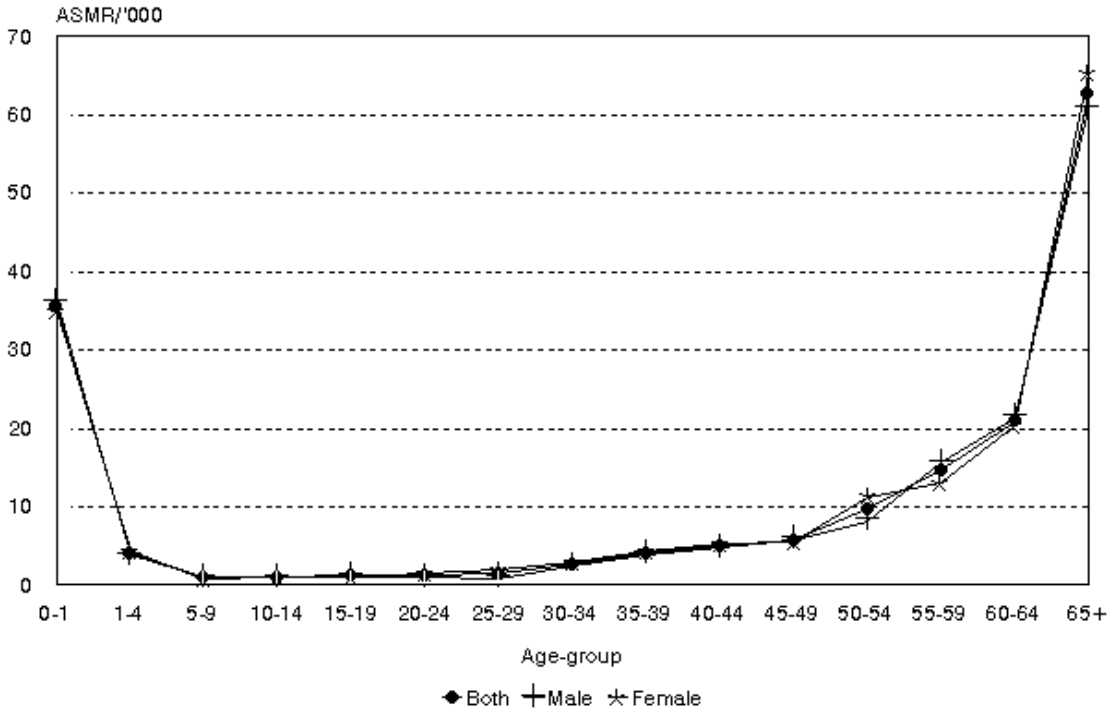
The estimated expectation of life at birth increased by 6.2 years, from 50.1 years in 1982 to 56.3 years in 1987; 6.7 years, from 48.9 years in 1982 to 55.6 years in 1987, and 4.5 years, from 55.1 years in 1982 to 59.6 years in 1987, for the country as a whole, the atolls and Male' City, respectively.

Mortality is higher in the rural than urban areas. For example, the infant mortality rate of the atolls is about 25 per cent higher than that of Male' City in 1987/88, the rates being 73 per thousand live births, and 91 per thousand births in Male' City and the atolls, respectively, in 1987/88. Consistent with the above findings, one can also observe that expectation of life at birth is lower in the atolls than in Male' City by about four years on average. The life expectancies at birth for the atolls and Male' were estimated to be 55.6 years and 59.6 years, respectively, in 1987/88.

The age-specific death rates, obtained from registration data, show higher death rates for females than males in the majority of age groups, particularly during the reproductive period. This may be attributed to excess risk of death associated with pregnancy and delivery of babies (see figure 6).

Figure 6: Age-specific mortality rate for Maldives, 1990

Physical amentities



Physical amenities of households were determined in terms of quality of housing, access to safe drinking water, sanitary latrine, electricity and possession of consumer durables such as radio, television, video tape recorder (VCR) and sewing machine.

Data show that the majority of the dwelling units in Maldives are of a permanent nature, in which the walls are made of mostly coral and bricks and the roofs are made of corrugated iron sheets. The dwelling units are mostly medium to large in size with four or more rooms: crowding appears to be relatively higher in urban (Male' City) than in rural (atoll) housing units. However, the majority of housing units, particularly those of the atolls, have limited access to the basic amenities of life such as safe drinking water and sanitary latrines. For example, rain water is the single most important source of drinking water and the absolute majority of the housing units drink untreated water and very few housing units, particularly those in the atolls, have access to sanitary latrine facilities. However, the situation is reversed in Male' City where the overwhelming majority (over 90 per cent) of the housing units have access to sanitary latrine facilities (see table 11).

Table 11: Distribution of housing units by sources of water supply, methods of purifying drinking water and type of toilet facility for the country, Male' City and atolls, Maldives, 1990

(percentage distribution)

Basic amenities	Country	Male' City	Atolls
Sources of drinking water			
Rain water	49.9	71.7	44.8
Well water	45.9	13.8	53.3

Ground-hole water	1.1	0.1	1.3
Imported water	0.1	0.3	0.1
Others	2.5	12.7	0.1
Not stated	0.5	1.4	0.3
Total number	29,823.0	5,613.0	24,210.0
Total percentage	100.0	100.0	100.0
Methods of purifying drinking water			
Boiling	2.2	4.9	1.6
Chlorination	11.5	12.0	11.4
Filtration	2.9	5.8	2.3
No treatment	82.3	75.3	83.9
Not stated	1.0	1.9	0.8
Total number	29,823.0	5,613.0	24,210.0
Total percentage	100.0	100.0	100.0
Type of toilet facility			
Latrine	32.3	92.1	18.4
Septic tank	11.2	1.6	13.5
Main sewer	21.1	90.5	4.9
Beach	50.3	0.3	61.9
Gifili (enclosed area used both as a shower and toilet)	15.0	2.6	17.8
Others	1.6	3.4	1.3
Not stated	0.8	1.6	0.6
Total number	29,823.0	5,613.0	24,210.0
Total percentage	100.0	100.0	100.0

Source: Ministry of Planning, Human Resources and Environment, Population and Housing Census 1990 - Volume 2, Housing Table H-14 and H-16.

Firewood has been and continues to be the most important source of fuel used for cooking by the majority of housing units, particularly those in the atolls. However, the use of fossil fuel, particularly kerosene, has been increasing over the years and this increase is noticed in both Male' City and the atolls, particularly in the former. In Male' City, the use of kerosene turned out to be the most important source of fuel for cooking in 1990.

One of the major achievements of the country has been the widespread introduction of electricity. By 1990, the majority of housing units in both Male' City and the atolls had access to public electricity for lighting. However, as may be expected very few housing units in the rural atolls possess modern consumer durables such as television, VCR, refrigerator, washing machine, air-conditioner and telephone; the exception is for radio and sewing machines. The reverse is the situation in Male' City where a considerable proportion of the housing units possess each of the consumer durables listed above, except for air-conditioners. This finding was not unexpected in view of the fact that the residents of Male' City have an income higher than the national average and therefore could afford to possess such consumer durables (see table 12).

Table 12: Distribution of households by availability of appliances, for country, Male' City and atolls, Maldives, 1990

Locality	Year	Appliances																Total	
		Radio		TV		VCR		Sewing machine		Refri-gerator		Washing machine		Air con-dition		Tele- phone			
		N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent
Country	1990	24,719	82.89	4,416	14.81	3,103	10.40	14,291	47.92	2,783	9.33	3,689	12.37	238	0.80	2,465	8.27	29,823	100
Male' City	1990	4,825	85.96	3,774	67.24	2,565	45.70	3,573	63.66	2,224	39.62	3,012	53.66	177	3.15	2,370	42.22	5,613	100
Atolls	1990	19,894	82.17	642	2.65	538	2.22	10,718	44.27	559	2.31	677	2.80	61	0.25	95	0.39	24,210	100

Source: Ministry of Planning and Environment, Population and Housing Census of Maldives 1990, Volume 2, Table H23.table 12

Policy recommendations

Even though Maldives has witnessed rapid socio-economic development in the last decade, the country will find it difficult to sustain the tempo of development in the face of rapid population growth.

The population of Maldives was growing at the rate of 3.4 per cent per annum during the last inter-censal period, 1985-1990. At this rate of growth, the population of Maldives will double in about 21 years, i.e. from 213,215 in 1990 to 426,430 in 2010. Even if fertility is reduced dramatically in the near future, the absolute size of the population of Maldives will continue to increase for many years, owing to the built-in momentum created by the large base of the population structure. The unabated growth of the population will be detrimental to the attainment of the country's cherished socio-economic development goals. This growth will not only put a severe burden on the economy to provide for the increasing population, but it will also further exacerbate the burden by increasing the per capita cost of providing services to the growing population, settled unevenly across widely dispersed islands.

The strains on the economy and environment, resulting from the high rate of population growth, are already visible. For example, analysis of 1990 census data on economic activity of the male population shows that the male labour force will be growing at the annual rate of 26 per cent per thousand of the initial labour force and, for every job vacated, due either to death or retirement, there will be three job seekers. The findings clearly indicate that higher investment will be required to generate a greater number of jobs to absorb the growing labour force. And the volume of this investment will increase many-fold, if the activity rate of women rises to the same level as that of men, although, at the moment, women account for only 20 per cent of the labour force.

The symptoms of environmental degradation associated with rapid population growth are also evident in many over-crowded islands. This could be seen in the depletion of vegetation, decline in firewood and potable water supplies, deforestation and mining of coral and sand. Excessive deforestation and mining of coral and sand to meet the need for firewood and construction materials for the growing number of people have led to massive soil erosion, threatening in many places the sustainability of the island population.

The implications of the high rate of population growth on the attainment of sustainable development is being increasingly recognized by the decision-making authorities at the highest level, as reflected in statements made in recent years by the President of the Republic of Maldives. H.E. President Maumoon Abdul Gayoom, in his address to the "Earth Summit" held at Rio de Janeiro on 12 June 1992, stated that "the balance which existed between people and the island environment has now been irrevocably changed by the over-exploitation of natural resources and the unprecedented population growth". In his inaugural speech at the National Conference on the Year of Productivity, held at Male', 20 December 1993, the President was more forthcoming on the need to contain population increase in order to accelerate the process of socio-economic development of the country.

The Third (1991-1993) and Fourth (1993-1996) National Development Plans, particularly the latter, have also emphatically identified the rapid rate of population growth as one of the major developmental constraints and called for the pursuit of more vigorous population control programmes to check the unabated population growth. However, the Government has yet to develop a comprehensive national population policy and programme, although some elements of it exist in the form of service delivery relating to child-spacing, information and communication in support of maternal and child health/family planning (MCH/FP) and population education.

This is possibly the most appropriate time to formulate a comprehensive population policy and programme by closely examining the implications of population growth and spatial distribution, especially in the longer time perspective, for employment, environment, health care, quality of life and overall sustainable development, and draw up plans of action to address these issues.

Footnotes

1. This measure is an estimate of the average number of years lived by a cohort of women before their first marriage, giving a good approximation of the age at marriage in a population.

2. An enrolment ratio over 100 per cent may result from enrolment of under-aged and over-aged children.

3. This rate refers to the total number of births occurring per thousand population in a given year.

4. This rate refers to the total number of births occurring per thousand women in the reproductive period (15-49 years) in a given year.

5. This rate refers to the number of children a woman is likely to produce at the end of her reproductive period given the current age schedule of fertility rates.

6. This rate refers to the number of female children a woman is likely to produce at the end of her reproductive period given the current age schedule of fertility rates.

7. Bangladesh Demographic and Health Survey 1993-94 (Preliminary Report).

8. National Family Health Survey 1992-93 (India: Introductory Report).

9. Nepal Fertility, Family Planning and Health Survey 1991 (Main Report).

10. For details, see United Nations (1983). Manual X: Indirect Techniques for Demographic Estimation, Population Studies, No. 81, New York, pp. 168-172.

11. The method derives these estimates using information on the number of births during the 12-month period preceding the enumeration and children ever born to women in the reproductive period. The P/F ratio method utilizes the current age-schedule of fertility

in combination with average parities of young women, usually women in the age group 20-35 years, to adjust the level of the reported fertility rate which is assumed to be under-reported. For details, see T.J. Trussell (1975). "A re-estimation of the multiplying factors for the Brass technique for determining children survivorship rates" Population Studies 29(1):97-108.

12. The Arriaga technique is a modified version of the P/F ratio method in which reported children ever born data are transformed into estimates of age-specific fertility through graduation by a ninth degree polynomial. The two sets of age-specific fertility rates (reported and transformed) are then cumulated by age and the ratios of these cumulated figures provide possible adjustment factors.

13. See section "Estimated birth rate".

14. The technique involved calculating the proportion of children dead among children ever born by age group of women (15-19, 20-24, 25-29, 30-34 etc.) and converting the proportion of children dead, that is D1, D2, D3, D5 .... etc., into probabilities of dying between birth and ages 1, 2, 3, 5 .... etc., that is q1, q2, q3, q5 .... etc.
