ASIAN POPULATION STUDIES SERIES
NO. 72

MORTALITY AND HEALTH ISSUES

Analysis of Mortality Trends and Patterns in Bangladesh

by
Ashraf Uddin Ahmed

Report of a study undertaken in Bangladesh
under the project on
Analysis of Trends and Patterns of Mortality
in the ESCAP region

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
Bangkok, Thailand

UNITED NATIONS
1986

ASIAN POPULATION STUDIES SERIES
NO. 72

MORTALITY AND HEALTH ISSUES

Analysis of Mortality Trends and Patterns in Bangladesh

by
Ashraf Uddin Ahmed

Report of a study undertaken in Bangladesh
under the project on
Analysis of Trends and Patterns of Mortality
in the ESCAP region

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
Bangkok, Thailand

UNITED NATIONS
1986

ST/ESCAP/444

ISSN: 0066-8451

PREFACE

The ESCAP secretariat with financial support from the United Nations Fund for Population Activities, initiated in 1984 the project "Analysis of trends and patterns of mortality in the ESCAP region". The first expert meeting under the project held at Bangkok in November 1984. Six researchers from the countries selected for indepth study (Bangladesh, China, Indonesia, Pakistan, Republic of Korea and Thailand) and several scholars from various research institutions and international agencies participated. The meeting reviewed the mortality situation in various countries of the region and prepared and adopted a study design for conducting the country studies. It was agreed that each country should follow a common design, which could be supplemented where appropriate with additional material, and that the basic source of information should be national compilations of data.

To achieve a reasonable degree of uniformity in the presentation, the country agreed to adopt, to the extent possible, the following structure for the study reports:

1. Country background
2. Mortality trends, age and sex patterns
3. Differential mortality
4. Causes of death and major health problems
5. Economic development and mortality change
6. Nutrition and health
7. Health services
8. Development of health and population policies
9. Health and mortality prospects
10. Bibliography, references

A series of meetings thoroughly examined different parts of the reports and made suggestion for amendments as required. Professor Lado T. Ruzicka, of the Australian National University and Ms. Penelope Kane, representing the International Union for the Scientific Study of Population (IUSSP), provided valuable assistance for the improvement of the reports. The volumes (listed below) prepared under the project present rich sources of information concerning mortality and health issues of the participating countries:

Analysis of Mortality Trends and Patterns in Bangladesh (ST/ESCAP/444)	Ashraf Uddin Ahmed Institute of Statistical Research and Training Dhaka University
Mortality Patterns and Trends of Population in China (ST/ESCAP/447)	Liu Zheng Institute of Population Research People's University of China
Mortality Transition in Indonesia 1950-1980 (ST/ESCAP/448)	Budi Utomo and Meiwita B. Iskandar Faculty of Public Health University of Indonesia
Mortality Trends and Patterns in Pakistan (ST/ESCAP/457)	Mohammad Irfan Pakistan Institute of Development Economics
The Trends and Patterns of Mortality and Health in the Republic of Korea (ST/ESCAP/449)	Kwon Tai-Hwan Department of Sociology Seoul National University
Levels and Trends of Mortality in Thailand (ST/ESCAP/456)	Yaowarat Porapakkham Faculty of Public Health Mahidol University

The important findings of these studies and their detailed analysis from the regional perspective along with a set of recommendations, will be disseminated to and form the basis of discussion among health and social planners of the region in the Seminar on Mortality and Health Issues to be held at Beijing from 22 to 27 October 1986.

TABLE OF CONTENTS

TABLE OF CONTENTS *(continued)*

LIST OF TABLES

LIST OF TABLES *(continued)*

LIST OF TABLES *(continued)*

LIST OF TABLES *(continued)*

LIST OF FIGURES

I. COUNTRY BACKGROUND

During this century, Bangladesh was handed over few times to different governments. Before 1947, it was ruled by the British government, and after 1947, it became part of Pakistan, known as East Pakistan. In 1971, the country got independance again and is known as Bangladesh.

Bangladesh is one of the most densely populated countries in the world. About 86 per cent of the people are Muslims. Hinduism is second major religion. Buddhist and Christians together constitute only about 1 per cent of the total population.

The total area of Bangladesh is 55,598 square miles where 89.9 million people live as of 1981. It lies between 21° 5′ and 26° 40′ of latitude, and between 88° 5′ and 92° 5′ of longitude. It is almost surrounded by India, which has 1,500 miles border with Bangladesh. Burma has small border with Bangladesh in south-eastern side of Bangladesh. The landscape has many large and small rivers. During the rainy season, the rivers over flow their banks, and it sometimes determines agricultural production and provides convenient and cheap way of transportation.

The year of Bengali calendar is divided into six seasons namely *Grishma* – summer, *Barsha* – rainy season, *Sharat* – early autumn, *Hemanta* – late autumn, *Sheet* – winter, and *Bashanta* – spring. Each of these seasons is of two month duration, and has climatic and cultural significance. The daily temperature in winter lies between 45° F and 55° F, and it varies from 75° F to 85° F in other time and rises upto 105° F in summer. The alluvial plain comprises about 80 per cent of the area. About 60 per cent of the people work in the agricultural sector.

A. POPULATION GROWTH AND SIZE

Bangladesh has a long tradition of conducting census and vital registration although there was always a question about the reliability. Since 1871, census has been conducted on a regular basis as a part of undivided Bengal. After 1947, it became part of Pakistan and known as East Pakistan. The censuses of 1951 and 1961 were taken by the Pakistan Census Commission. After independence of Bangladesh from Pakistan, there were two censuses, 1974 and 1981 censuses, taken by the Census Commission of Bangladesh. Table 1 presents enumerated population of censuses from 1901 to 1981, which were taken under three different governments: British, Pakistan and Bangladesh. The data of censuses of certain period are subject to serious errors for several reasons such as political, natural disasters and epidemics which affect the growth rate. The growth rates of population from 1901 to 1931 do not show much variation. There were some political reasons behind this among other reasons. During the decade 1901-1911, the partition of East Bengal and Assam in 1905 as a separate province created communal feelings which affected 1911 census from over estimation. Influenza evidence of 1918-1919 killed approximately 400,000 people (Arthur and McNicolt, 1978, p. 29). Besides, there was a political boycott against the enumeration of 1921. These were some of the plausible reasons for the lower growth rate during 1911-1921 decade in comparison with previous decade. Between 1931 and 1941, there was slight increase in growth rate. Although there was a problem for impending political reforms, the communal feelings did not much affect 1931 census. However, there is a big rise in growth rate between 1931 and 1941. This was primarily due to strong communal excitement. Every religious group over stated their size of population. Consequently, 1941

Table 1. Population and inter-censal growth rates, 1901-1981

Census year	Population[a] (in million)	Growth rates
1901 March 1	28.9	–
1911 March 10	31.6	0.94
1921 March 18	33.3	0.60
1931 February 26	35.6	0.74
1941 March 1	42.0	1.70
1951 March 1	44.2	0.50
1961 February 1	55.2	2.26
1974 March 18	76.4	2.48
1981 March 5	89.9	2.32
1985 March 5[b]	98.6	–

Source: Bangladesh Population Census 1981: Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics. (August, 1984) (Table 1, p. 33).

Note: [a] These are adjusted figures.

[b] The figure is estimated from 1981 population and growth rate condering exponential growth model: $Pn = P_o e$

census suffers from over-enumeration, which resulted in high growth rate. During the decade of 1941 and 1951, the growth rate appears to decline substantially. There are several incidence which occured in this decade. First, the famine of 1943 and epidemics of Cholera and Smallpox took a huge toll of lives. Second communal movements caused huge migration between India and Bangladesh. Besides there might be some socio-economic factors as well. The 1961 census appears to be less affected by any natural calamities or political factors. The first census after independence was in 1974. The population growth from 1961 to 1974 was affected by the cyclone and tidal bore of 1970 and the independence war of 1971. Still the population growth is found to be the highest during this period. There has not been any significant event which can affect the population growth rate during 1974-1981. However, it appears to be slightly lower than the growth rate of the preceeding decade. This is possibly due to the effect of 1974 famine, higher contraception practice, female labour force participation, late age at marriage, and economic condition of the country.

B. GEOGRAPHICAL DISTRIBUTION AND DENSITY

Climate, economic resources and other socio-cultural opportunities are not same in every part of the country. This differentials attract people differently. Table 2 presents percentage of total population live in different districts. In 1961, Mymensingh had the highest proportion of national population comparing with other districts. There is a substantial decrease in proportion of Mymensingh over the periods. It is partly because of separation of Tangail which is densely populated areas from Mymensingh district. Dhaka has maintained a consistent increase in proportion of population. Comparing the percentages of districts in 1981 with those of 1974, it appears that out of these districts – Dhaka, Rajshahi, and Dinajpur have shown increase not only in population size, but in the proportion of national population living in those districts. Rajshahi and Dinajpur may be considered as a result of immigration from India.

Dhaka being a capital city attracts people from all part of the country because of higher business facilities, educational opportunities and job opportunities. Besides, reduction of population in some districts may be for Hindu emigration to India.

Table 3 presents population density of various districts and their changes during last four census periods. In 1981, thirteen districts out of 20 districts had higher density than the national density. Dhaka district has the highest density, 3,477 persons per square mile, which is expected because of government and educational institutions, and business attraction for being capital city. Comilla ranks second with an average of 2,655 persons per square mile. In 1951, Comilla had the highest density. Once Comilla used to have high literacy rate and a good place for agriculture. Chittagong Hill Tracts, a tribal area characterised by hills and forest found to have the lowest density, 147 persons per square mile. Khulna and Patuakhali have fairly low densities compared to other districts. It is probably partly due to coastal area, where agricultural land is not so fertile. Thus, the density of a place largely depends on the characteristics of the place.

C. URBANIZATION

The level of urbanization is an indication of modernization but may not be indication for industrialization. In most developing countries,

Table 2. Population distribution by districts in census year, 1961-1981

District	Census year		
	1961	1974	1981
Bandarban	–	–	0.20
Chittagong H.T.	0.75	0.71	0.67
Chittagong	5.87	6.04	6.30
Comilla	8.63	8.14	7.90
Noakhali	4.69	4.52	4.38
Sylhet	6.86	6.66	6.49
Dhaka	10.02	10.65	11.50
Faridpur	6.25	5.68	5.47
Jamalpur	–	2.88	2.81
Mymensingh	10.88	7.70	7.54
Tangail	2.92	2.91	2.81
Barisal	6.03	5.50	5.36
Jessore	4.31	4.65	4.61
Khulna	4.82	4.98	4.97
Kushtia	2.29	2.64	2.63
Patuakhali	2.35	2.10	2.11
Bogra	3.10	3.12	3.13
Dinajpur	3.36	3.60	3.67
Pabna	3.85	3.94	3.93
Rajshahi	5.53	5.97	6.05
Rangpur	7.47	7.62	7.47
Bangladesh	100.00	100.00	100.00
Total Population (in million)	55.2	76.4	89.9

Source: Bangladesh Population Census 1981, Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics, August, 1984 table 2, p. 34.

the government in general put priority in urban development, e.g. establishment of industries, educational institutions, government offices and commercial areas. These attract people from countryside, where employment in agricultural sector become stagnent. Rural poverty push people from rural areas to urban areas, which creates unplanned growth of slum and neighbourhood.

There is a change in the definition of urban areas in 1981 census. In previous censuses, the census commission defined the places as urban areas which are normally having Municipality (Paurashava), a Town Committee (Shahar Committee) or Cantonment Board. It is a continuous collection of houses of population at least 5,000 persons having the public utilities like roads, streets, lightings, water supply, sanitation, sewerage system etc. It is normally centre for trade and commerce. That is, most people are of non-agricultural occupation. In 1981 census all the Thana/Upazila headquarters irrespective of their area and level of urbanization, and hats- a weekly market place and bazars having electricity have been considered as urban areas.

Table 3. Population density per sq. mile by district in census years

District	1951	1961	1974*	1981*
Bangladesh	761	922	1 286	1 567
Chittagong	902	1 139	1 549	1 971
Chittagong H.T.	57	75	100	147
Comilla	1 500	1 974	2 245	2 655
Noakhali	1 424	1 468	1 591	1 877
Sylhet	628	737	995	1 283
Dhaka	1 492	1 909	2 643	3 477
Faridpur	1 051	1 311	1 521	1 785
Jamalpur	–	–	1 511	1 799
Mymensingh	917	1 093	1 488	1 775
Tangail	943	1 143	1 587	1 867
Barisal	1 031	1 176	1 407	1 672
Jessore	656	877	1 288	1 556
Khulna	432	600	768	935
Kushtia	647	882	1 404	1 708
Patuakhali	680	732	895	1 100
Bogra	868	1 075	1 486	1 817
Dinajpur	544	659	986	1 227
Pabna	869	1 157	1 477	1 796
Rajshahi	608	788	1 168	1 443
Rangpur	792	1 130	1 472	1 759

Source: Bangladesh Population Census 1981. Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics (August, 1984). Table 3, p. 35.

* Population density based on unadjusted census population and total areas.

The change in definition is part of reasons for notable increase in per cent of urban population for the country as a whole as well as for districts. The level of urbanization in 1981 appears to be almost double of the 1974 (table 4). There is variation in urbanization between the districts. Dhaka division is found to be more urbanized than other divisions although rate of growth is not as high as other divisions. Dhaka district ranks one in the level of urbanization. Some of the districts such as Chittagong Hill Tracts, Chittagong, Dhaka and Barisal have notable increase in urbanization during the period 1974-1981. By and large, almost all the districts have shown significant growth in urban population during the last intercensal period. As mentioned before, the limited scope in rural areas has contributed to this high urban population, and it will be continuing unless rural based economy is emphasized and established.

D. LAND UTILIZATION

As the pattern of population growth is changing, there is also a change taking place in land utilization. There is a direct relation between these two factors. The pressure of increased population on land can be seen in trends in land used. Table 5 presents trends in land used by various categories. The areas of land used for forest appears to have declined after 1973-1974, 3.8 per cent decline in last ten years. This implies that people are slowly converting forest areas into cultivable or noncultivable areas. A similar decline is also observed in current fallow land and culturable waste. At the same time, there is an increasing trend in net cropped area and multiple cropping land. These indicate an increasing demand for cultivable land. On the other hand, an increasing trend is observed in the types of land not available for cultivation, about 4.6 per cent in last ten years. These changes bear reflection of population pressure on land for housing and establishments. If this trend continues for another 25 years, there will be no forest and fallow land left and a large portion of land will be used for housing and establishments. The production of cultivable land will not be sufficient to feed half the size of population.

E. RELIGIOUS COMPOSITION

Table 6 presents percentage distribution of population by religious groups for all the districts. About 87 per cent of population are Muslims, 12 per cent are Hindus, 0.6 per cent Buddhists and 0.3 per cent Christian. Hinduism is the second religion in Bangladesh. Unlike Buddhist, Hindus are found in all the district. Buddhists are primarily concentrated in Bandarbon

and Chittagong Hill Tracts. Although the percentage of Christian is very small, they are spread in all the district except Patuakhali and Chittagong.

With exception in Chittagong Hill Tracts, Sylhet and Bogra, Hindu population in all the districts have shown a declining trend. Chittagong H.T. and Sylhet are the border

Table 4. Per cent and rank of urban population by district in census years 1961-1981

District/Division	1961		1974		1981	
	Per cent	Rank	Per cent	Rank	Per cent	Rank
Bangladesh	5.19	–	8.78	–	15.18	–
Chittagong Division	4.69	–	7.54	–	15.00	–
Bandarban	–	–	11.49	4	21.56	5
Chittagong H.T.	5.92	4	9.78	5	30.44	3
Chittagong	12.49	2	20.98	2	31.14	2
Comilla	3.17	12	4.24	15	8.13	18
Noakhali	1.44	18	2.15	21	10.79	11
Sylhet	2.03	16	2.77	19	8.74	16
Dhaka Division	7.01	–	13.60	–	19.99	–
Dhaka	14.79	1	29.57	1	38.52	1
Faridpur	2.47	14	2.87	18	6.94	21
Jamalpur	4.34	7	4.64	13	8.75	15
Mymensingh	1.11	19	5.95	8	10.04	13
Tangail	1.59	17	5.24	11	7.56	19
Khulna Division	4.28	–	7.39	–	14.36	–
Barisal	3.49	10	3.93	16	11.96	7
Jessore	3.44	11	5.43	10	10.82	10
Khulna	7.04	3	14.63	3	22.41	4
Kushtia	5.42	5	8.30	6	14.55	6
Patuakhali	1.03	20	2.50	20	9.02	14
Rajshahi Division	4.20	–	5.31	–	10.08	–
Bogra	2.98	13	3.71	17	7.44	20
Dinajpur	4.21	8	4.41	14	8.56	17
Pabna	5.08	6	7.62	7	11.65	8
Rajshahi	2.28	15	5.78	9	10.34	12
Rangpur	4.20	9	4.82	12	10.90	9

Source: Bangladesh Population Census 1981, Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics, (August, 1984) table 6. pp. 37-38.

Table 5. Trends in land utilization by various categories

Year	Forest	Not available for cultivation	Culturable waste[a]	Current fallows[b]	Net cropped area	Area sown more than once	Total cropped area[c]
			(in 000 acres)				
1965-1966	5 400	6 294	1 256	730	21 601	7 940	29 541
1968-1969	5 545	6 496	825	791	21 624	9 511	31 135
1970-1971	5 496	6 565	740	1 119	21 361	9 013	30 374
1973-1974	5 507	6 575	672	1 550	20 977	8 447	29 424
1978-1979	5 423	6 674	623	1 760	20 801	9 436	31 846
1982-1983	5 296	6 876	582	1 278	21 276	9 940	32 905

Source: 1983-1984 Statistical Yearbook of Bangladesh, Dhaka: Bureau of Statistics, table 5.26. p. 217.

Note: [a] Culturable waste is the area suitable for cultivation but lying fallow for more than one year.

[b] Current fallow is the area already brought under cultivation, but not cultivated during the year.

[c] Total cropped area is the sum of the net cropped area and the area sown more than once.

Table 6. Regional distribution of population by religious community (in per cent), 1974 and 1981

District	1974						1981					
	Total	Muslim	Hindu	Buddist	Christian	Others	Total	Muslim	Hindu	Buddist	Christian	Others
Bandarban	–	–	–	–	–	–	100.0	41.5	2.9	43.9	8.2	3.5
Chittagong H.T.	100.0	18.9	10.4	66.5	2.6	1.6	100.0	32.4	11.4	55.0	0.9	0.3
Chittagong	100.0	83.8	14.1	1.9	0.1	0.1	100.0	84.5	13.0	2.2	0.1	0.2
Comilla	100.0	90.2	9.7	–	–	0.1	100.0	91.6	8.2	0.1	–	0.1
Noakhali	100.0	92.8	7.2	–	–	–	100.0	43.0	6.9	–	0.1	–
Sylhet	100.0	82.6	16.9	0.1	0.2	0.2	100.0	81.3	18.0	–	0.3	0.4
Dhaka	100.0	87.8	11.4	–	0.7	0.1	100.0	90.5	8.9	0.1	0.4	0.1
Faridpur	100.0	76.4	23.3	–	0.3	–	100.0	80.9	18.8	–	0.3	–
Jamalpur	–	–	–	–	–	–	100.0	96.8	2.7	–	0.4	0.1
Mymensingh	100.0	93.4	6.0	–	0.5	0.1	100.0	91.8	7.4	–	0.6	0.2
Tangail	100.0	87.6	12.0	–	0.2	0.2	100.0	90.6	9.0	–	0.2	0.1
Barisal	100.0	82.8	17.0	–	0.1	0.1	100.0	84.5	15.1	–	0.3	0.1
Jessore	100.0	78.0	21.9	–	0.1	–	100.0	80.3	19.6	–	0.1	–
Khulna	100.0	71.2	28.3	–	0.4	0.1	100.0	71.9	27.2	–	0.8	0.1
Kushtia	100.0	95.2	4.7	–	–	0.1	100.0	95.1	4.5	–	0.3	0.1
Patuakhali	100.0	88.8	10.9	0.3	–	–	100.0	90.3	9.4	0.2	–	0.1
Bogra	100.0	92.1	7.2	–	0.4	0.2	100.0	91.1	8.4	–	0.1	0.4
Dinajpur	100.0	75.1	23.7	–	0.5	0.7	100.0	75.9	21.9	–	0.6	1.6
Pabna	100.0	90.4	9.2	–	0.3	0.1	100.0	92.5	7.3	–	0.1	0.1
Rajshahi	100.0	86.0	13.0	0.1	0.2	0.7	100.0	88.6	9.5	–	0.4	1.5
Rangpur	100.0	87.6	12.0	–	0.2	0.2	100.0	88.0	11.6	–	0.1	0.3
Bangladesh	100.0	85.4	13.5	0.6	0.3	0.2	100.0	86.6	12.1	0.6	0.3	0.3

Source: Bangladesh Population Census 1981. Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics (August, 1984) table 4. p. 75.

districts, so these increase in Hindu population may be due to temporary Hindu immigration from border areas of India.

Khulna has the highest percentage of Hindu population. Although Kushtia is a border district like Khulna, it has the lowest percentage of Hindu population. The nearness of Calcutta city might be a plausible reason for attracting Hindus. Dinajpur, Jessore, Sylhet and Faridpur have fairly high percentage of Hindu population. Thus areal variation in the distribution of population of various religious groups exists in Bangladesh.

F. AGE COMPOSITION

Age-sex composition of a population provides an important component for demographic analysis. It bears the reflection of fertility, mortality and migration of the past. Furthermore, age-sex structure also influences the present and future birth, death and migration pattern of a country. Age-sex composition provides crucial information for policy makers. From age-sex composition policy makers can have idea about labour force population, school age population, voting population, and old age and young age dependency ratios. These information are indispensible for various types of planning.

Table 7 summerizes the age-sex composition of the population for the census years from 1961 to 1981. There has been no notable change in population distribution over the period. However, there is some declining trends in the population of age groups 0-4 and 5-9 years, and some increase in population of age groups 10-14 and 15-19. That means, increase in school age population and decrease in childhood population. The difference between the percentage of age group 0-4 in 1961 and that of the 1974 partly resulted from the higher child mortality due to famine of 1974. Similarly the effect of famine is also reflected in age group 5-9 of 1981 census. But the proportion of population in age group 0-4 in 1981 might have declined due to the decline in fertility because the decline in the proportion of the same age group of 1974 was partly resulted from the effect of famine.

The age composition in general shows the characteristics of young age population. About 46.5 per cent of female population and 46.8 per cent of male population in 1981 census, which constitute one-third of the total population, are under age 15. The young age dependency ratio for 1981 is 98.4 as against 103.7 per 100 for 1974, and the old age dependency ratio is 12.0 against 12.3 in 1974. The change is observed for young age only. By and large, the age-composition does not show much significant sign of the recent fertility decline.

G. EDUCATION

Education has been observed as one of the most important variables in socio-economic and demographic research. Very often social scientists use education as socio-economic indicator. From the point of importance, the figures in table 8 present some gloomy picture for the researcher because literacy rates of certain category in 1981 are observed to be lower than those in 1974. However, the situation may not be such, if the census definition of literacy was not changed.

In 1961, the literacy was defined as the ability of a person to read in any language with understanding. This definition includes the persons who can read any clear print with understanding whether they can write it or not. In 1974, it was defined as the ability of a person to both read and write in any language. In the last census, 1981, the definition was followed with international standard. A person has been treated in line with international usage as literacy if he can write a letter in any language. The definitions of three censuses are not completely similar. The literacy definition of 1961 was found to be much liberal compared to other definitions. It increased the literacy rate for 1961 than otherwise it would have been as the 1981 definition was more strict. The literacy ratio for 1981 are found to be somewhat lower than that of the 1974. It is partly because of changing definitions.

The table shows big differences in literacy rates between male and female. The female literacy rate in 1961 was less than one-third of the male literacy rate and in 1981, it was about half of the male rate. The difference is gradually converging. For urban area, the rates for both male and female are very much stable, and so the male-female difference. The female literacy rate is little more than half of the male literacy rate.

The rates of rural areas are almost half of the urban rates. The rates for female in rural areas are almost one-third of the urban female rates, but female literacy rate in rural areas has an increasing trend as opposed to somewhat declining trend in urban areas. Unlike female rates, the male rates have shown somewhat declining trend. The table does not present very encouraging picture for the country.

Table 9 presents a comparative picture of school attending population from two censuses.

Table 7. Population and percentage by age and sex for three censuses

Age	Population (in thousand)						Percentage					
	Male			Female			Male			Female		
	1961[a]	1974[b]	1981[c]	1961[a]	1974[b]	1981[c]	1961	1974	1981	1961	1974	1981
All Ages	26 349	37 069	46 295	24 491	34 409	43 617	100.0	100.0	100.0	100.0	100.0	100.0
0 – 4	4 580	6 015	7 718	4 684	6 058	7 615	17.4	16.2	16.7	19.1	17.6	17.5
5 – 9	4 869	6 599	7 363	4 661	6 519	7 181	18.5	17.8	15.9	19.0	18.9	16.5
10 – 14	2 610	4 986	6 442	2 037	4 194	5 595	9.9	13.5	13.9	8.3	12.2	12.8
15 – 19	1 922	3 154	4 290	1 983	2 764	4 223	7.3	8.5	9.3	8.1	8.1	9.7
20 – 24	1 824	2 416	3 359	1 989	2 495	3 635	6.9	6.5	7.2	8.1	7.2	8.3
25 – 29	2 002	2 353	3 369	1 998	2 512	3 261	7.6	6.3	7.3	8.2	7.3	7.5
30 – 34	1 693	2 036	2 551	1 545	2 027	2 520	6.4	5.5	5.5	6.3	5.9	5.7
35 – 39	1 558	2 035	2 426	1 254	1 779	2 128	5.9	5.5	5.2	5.1	5.1	4.8
40 – 44	1 254	1 744	1 982	1 113	1 514	1 811	4.8	4.7	4.3	4.5	4.4	4.2
45 – 49	1 016	1 379	1 613	801	1 097	1 304	3.9	3.7	3.5	3.3	3.2	2.9
50 – 54	947	1 284	1 440	801	1 105	1 321	3.6	3.5	3.1	3.3	1.7	3.2
55 – 59	611	776	932	435	576	721	2.3	2.1	2.1	1.8	3.2	1.6
60 – 64	1 464	919	1 074	1 190	763	956	5.5	2.5	2.3	4.9	2.2	2.2
65 – 69		430	1 736		305	1 346		1.1	3.7		0.9	3.1
70 – 74		488			365			1.3			1.1	
75+		455			331			1.2			1.0	

Source: [a] 1983-84 Statistical Yearbook of Bangladesh. Dhaka: Bangladesh Bureau of Statistics, table 3.23, p. 73.

[b] 1980 Statistical Yearbook of Bangladesh. Dhaka: Bangladesh Bureau of Statistics, table 2.31, p. 60.

[c] Bangladesh Population Census 1981. Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics (August 1984) table 6. p. 22.

Table 8. Literacy rate[a] by sex and place of residence, 1961-1981

Area	1961	1974	1981
Bangladesh:			
Male	26.0	27.6	25.8
Female	8.6	12.2	13.2
Both sexes	17.0	20.2	19.7
Urban:			
Male	47.7	45.3	42.3
Female	26.1	27.9	25.5
Both sexes	38.7	37.7	34.8
Rural:			
Male	24.5	25.7	22.6
Female	7.8	10.8	14.2
Both sexes	16.5	18.5	17.0

Source: Bangladesh Population Census 1981. Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics (August 1984), tables 2 & 3, p. 80..

Note: [a] The literacy rate for population of all ages has been defined as the ratio between literate population of aged 5 years and above to the total population expressed in percentage.

It provides information on both trends and differentials due to sex and place of residence. For age group 5 to 9 years, the urban rates for both male and female remains almost unchanged from 1974 to 1981, but in rural areas the rates have fairly increased, particularly female rates.

On the other hand, in urban areas, the rates of school attendance for age group 10-14 years, are found to have declined for both sexes, which is more for male. On the contrary, the female rate for rural area has increased to some extent but the male rates have shown a reverse situation. A similar pattern of trends are also observed for age groups 15-19 and 20-24 of urban areas, but the decline is more prominant particularly in urban area than rural area.

Male population has declined significantly in age groups 10-14, 15-19 and 20-24, over the intercensal period, but female population maintained somewhat increasing trend in school population. This may be the reflection of present job market and economic condition of the country.

Table 9. School attendance population and rates of age group 5-24 by sex and residence, 1974-1981

Residence	Sex	5-9 years		10-14 years		15-19 years		20-24 years	
		Number (000)	Attendance rate	Number (000)	Attendance rate	Number (000)	Attendance rate	Number (000)	Attendance rate
				1974					
Bangladesh	Both sexes	2 464	18.7	3 105	33.8	1 113	18.8	373	7.5
	Male	1 454	22.0	2 022	40.5	916	29.0	345	14.2
	Female	1 010	15.4	1 083	25.8	197	7.1	28	1.1
Urban	Both sexes	305	31.5	430	50.7	217	34.6	93	15.9
	Male	165	33.7	242	54.4	140	40.6	77	21.7
	Female	140	29.2	188	46.5	77	27.2	16	7.0
Rural	Both sexes	2 159	17.7	2 675	32.1	896	16.9	280	6.4
	Male	1 289	21.0	1 780	39.1	776	27.6	268	12.9
	Female	870	14.4	895	23.6	120	4.8	12	0.5
				1981					
Bangladesh	Both sexes	3 185	22.5	3 883	33.3	1 384	17.0	476	7.0
	Male	1 777	24.7	2 358	37.9	1 049	25.4	396	12.2
	Female	1 408	20.2	1 525	28.1	335	8.3	80	2.3
Urban	Both sexes	580	31.6	803	44.8	371	27.1	172	13.2
	Male	313	33.4	451	47.7	241	32.4	136	18.3
	Female	267	29.7	352	41.5	130	20.8	36	6.5
Rural	Both sexes	2 605	21.1	3 080	31.3	1 013	14.9	304	5.5
	Male	1 464	23.4	1 907	36.1	808	23.9	260	10.4
	Female	1 141	18.8	1 175	25.6	205	6.0	44	1.5

Source: Bangladesh Population Census 1981. Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics (August 1984), table 12 p. 88.

In recent years education is not perceived as profitable as used to be. Under present market condition, an employed person cannot maintain a family of 3 to 4 dependents from his salary. Therefore, the attraction for higher education has decreased for male. On the other hand, female population consider education essential for them for two reasons. One is to keep them busy in education until they find suitable persons to marry. The second is that some people think female education is now indespensible in order to get employment for subsidizing family income. Besides, the enhanced cost of books and materials, and other related expenses have created negative incentive for continuing education. However, there might be other causes as well.

Table 10 presents the distribution of population in completed different education level. In the country as a whole only 26.5 per cent population have completed secondary or more educational level. In urban areas, about 41 per cent of population have completed secondary or more education level as opposed to 22 per cent for rural areas. It is expected that the urban area will have higher average completed level of education. About 85 per cent of male literate have education level lower than secondary level against 95 per cent of female literates.

A large number of school population drop out from school after their primary education, and it is more prominant for female than male. Another large drop out is observed after class ten. Although the number of educated people is increasing, the proportion of educated people is decreasing eventhough population growth has modest decline. This will cumulate the problems associated with illiteracy.

H. LABOUR FORCE

Table 11 presents refined activity rates for different categories of different years. The activity rates do not show any systematic changes over the period. This is partly due to changes of definition of economically active population. In 1961 a person of age 10 years and above was considered as economically active if he or she was working for profit or earning wage or salary, unpaid family helpers, and those who were looking for job. The 1974 census adopted the definition of 1961 excluding housewives from labour force. The 1981 census used slightly modified definition of 1974. Both males and females engaged in household work (not outside home) were excluded from labour force. The labour force survey of 1983-1984 used the definition of 1981 census.

In 1961, the refined activity rate for the whole nation was 48.6 per cent in comparison to 44.3 per cent in 1974. This unusual pattern is due to two important reasons. First, the change of definition in 1974 has excluded all housewives from economically active population. Second, 1974 census suffers from under-

Table 10. Persons[a] completed different educational levels and their percentage distribution, 1981

Sex/Residence	Total (in 000)	Per cent				
		Class (I-V)	Class (VI-IX)	S.S.C. and H.S.C.	Degree and above	Total
Both sexes:						
Bangladesh	23 671	64.5	23.7	9.6	2.1	100.0
Urban	5 553	48.0	28.8	17.3	5.9	100.0
Rural	18 118	69.6	22.2	7.3	0.9	100.0
Male:						
Bangladesh	15 399	58.9	25.8	12.4	2.9	100.0
Urban	3 645	43.8	28.3	20.3	7.6	100.0
Rural	11 754	63.6	25.0	10.0	1.4	100.0
Female:						
Bangladesh	8 272	75.0	19.8	4.5	0.7	100.0
Urban	1 908	56.1	29.5	11.7	2.7	100.0
Rural	6 364	80.6	17.0	2.3	0.1	100.0

Source: *Bangladesh Population Census 1981.* Analytical Findings and National Tables. Dhaka: Bangladesh Bureau of Statistics (August, 1984), table 12, p. 90.

Note: [a] Educational attainment of persons 5 years and over has been classified into four categories. Persons having religious education have been merged with the equivalent general education groups.

enumeration (Alamgir, 1981). The small decline in the national rate of 1981, 43.1 per cent, may be attributed partly to the change of definition in 1981, where people of both sexes engaged in household work inside home were not considered economically active. Besides, change in age structure, slight increase in the proportion of population of age 10 years and above, and increase in school enrolment might have some impact on this small decline in activity rates. However, comparing the rates of censuses, it becomes difficult to make any meaningful conclusion on changes of activity rates.

A noticeable increase in growth rate is observed for female labour force of both the categories over the period. This increase may be due to the impact of recent growth of garment industries in the cities. Besides, the government reservation of certain percentage of job for female has contributed this notable increase in female labour force. Participation of rural women in economic activities outside household has also increased substantially. Women now-a-days find employment in agriculture and road construction work. A substantive number of women earn their living from Food-For-Work Program.

Urban-rural differences in activity rates are not very sharp. However, the overall activity rates in urban areas are higher than the rural areas. This is partly due to higher female activity rates in urban areas which resulted from better scope of job opportunity and conducive working environment for women in urban areas. Woman in rural areas did not have much choice other than being housewives. They are recently participating in agricultural and other non-household work. The male activity rates in rural areas are significantly higher than the urban rates. In rural areas, men start participating in gainful work in their early ages, but men in urban areas spend considerable time in school before entering in job market.

Female labour force participation in Bangladesh is still very low compared to other developed and developing countries. The cultural factors such as purdah system creates an impediment for female participation. Pardah encourages women to stay at home. This system to some extent is equally observed by both Muslims and Hindus. This is mainly observed in South Asian subcontinent.

Table 12 presents female labour force composition by area of residence from 1961 to 1983-1984. The rates based on censuses appear to be somewhat lower than those estimated in 1980 Manpower Survey and Labour Force Survey of 1983-1984. Before making comparison among the rate at different time periods, it is advisable to bear in mind the changes of definition. Based on the information of censuses, female labour force participation is found to have increased somewhat. In 1981 census, six per cent of the total labour force was female population in urban areas, and it was 5.7 per cent in rural areas. Still unemployment rate in urban areas is more than five per cent as observed in 1980 survey.

Table 13 shows the proportion of labour force engaged in agriculture and non-agriculture sectors. In 1961 census, about 84.6 per cent of labour force engaged in agriculture sector as opposed to 58.6 per cent in 1983-1984, which is about 31 per cent decline. This is a significant decline in agriculture labour force. High

Table 11. Refined activity rates by residence and sex

Residence	Sex	Refined activity rate[a]				
		1961 Census	1974 Census	1980 Manpower Survey	1981 Census	1983-84 Labour Forece Survey
National	Both sexes	48.6	44.3	44.3	43.1	45.3
	Male	87.6	80.3	79.0	78.2	80.0
	Female	5.1	4.0	5.7	5.1	7.9
Urban	Both sexes	51.7	45.8	45.5	46.1	48.5
	Male	78.2	73.7	71.9	73.2	74.7
	Female	7.6	5.8	8.4	6.8	12.2
Rural	Both sexes	48.4	44.2	44.2	42.7	44.9
	Male	88.3	81.1	80.0	79.0	81.0
	Female	5.0	3.0	5.4	5.0	7.4

Source: Preliminary Report on Labour Force Survey 1983-84. Bangladesh Bureau of Statistics. October, 1984. table 5. p. 25.

Note: [a] Refined activity rate is the ratio of economically active population (employed + unemployed) of ages 10 years and above to the population of the same ages expressed in percentage.

Table 12. Female labour force composition by area of residence, 1961 to 1983-1984

Year and Characteristics	National	Urban	Rural
1961 Census:			
Labour force (millions)	0.8	0.1	0.8
Per cent of total labour force	5.0	5.5	4.9
Participation rate	5.1	7.7	5.0
Unemployment rate	0.2	0.3	0.1
1974 Census:			
Labour force (millions)	0.9	0.1	0.8
Per cent of total labour force	4.2	5.2	4.1
Participation rate	4.0	5.8	3.8
Unemployment rate	3.6	5.6	3.3
1980 Manpower Survey:			
Labour force (millions)	1.6	0.2	1.4
Per cent of total labour force	6.1	7.6	5.9
Participation rate	4.5	8.2	3.9
Unemployment rate	3.6	5.2	3.3
1981 Census:			
Labour force (millions)	1.5	0.2	1.3
Per cent of total labour force	5.7	6.0	5.7
Participation rate	5.1	6.8	5.0
Unemployment rate*	—	—	—
1983-84 Labour Force Survey:			
Labour force (millions)	2.4	0.4	2.0
Per cent of total labour force	8.4	10.5	8.1
Participation rate	7.9	12.2	7.4
Unemployment rate	7.4	5.2	7.8

Source: 1983-84 Statistical Yearbook, table 4.36. p. 171.
* Data were not available.

population growth in rural area has created pressure in agricultural sector; and the limitation of absorbing population push people to other occupation. In 1983-1984, about 59 per cent of labour force were in agricultural sector, which is little more than half of the labour force.

Table 14 presents more detailed information about the major sectors of employment, and changes in the percentage of employed labour force. From the national figures, it appears that with exception of agriculture, and production and transport, employed male labour force have shown somewhat increasing trend. There is a substantial increase of employed male population in sales sector, but for female the sale sector has shown a very rapid increase in employment. Female employment has also shown rapid decline in agriculture sector. In production and transport sectors, the level or female employment is much higher than the male, and it is maintaining an increasing trend.

In urban areas the employment of male in sales sector is almost five times higher than that of the female. On the other hand, female employment in service sector is almost three times higher than that of the male. More than 70 per cent of women are employed in service sector. The main sectors of male employment are sales, production and transport, and service.

In rural areas, agriculture is the main sector for male employment. It used to be major for female as well, but there is a sharp decline in female employment in agriculture sector. This decline may not be as sharp as it appears. Part of this may be due to the variation in reliability and coverage. However, the decline of employed women in agriculture may be attributed to compound push and pull effect arising out of lower land-man ratio, low wage, underemployment, gradual increase of non-agricultural job in rural areas as against quality of city life, better wage, better employment opportunities. Service sector has recently become main place for female employment. The second important sector appears to be production and transport, where level of female employment is higher than the male.

Table 15 explains the sectoral shares of Gross Domestic Product (GDP). About 46 per cent of GDP comes from agriculture, and only 9.7 per cent from industry. Among the subsectors of agriculture, about 36 per cent comes from crops.

Table 13. Employment in broad agriculture and non-agricultural sector, 1961 to 1983-1984

Broad Economic Sector	Census 1961	Census 1974	Census 1981	LFS 1983-1984
Agriculture:				
Number (000)	14 239	16 839	15 425	16 389
Per cent	84.6	78.7	61.0	58.6
Non-agriculture:				
Number (000)	2 589	4 569	9 869	11 583
Per cent	15.4	21.3	39.0	41.4

Source: 1983-84 Statistical Yearbook of Bangladesh. Dhaka: Bureau of Statistics, table 4.16, p. 154.

Table 14. Employed population by broad occupation group and sex, 1974-1983-1984

Broad Occupation Group	Male			Female		
	1974	1980	1983-1984	1974	1980	1983-1984
	(Per cent)					
National:						
Professional and technical	1.9	2.2	3.3	2.6	2.4	5.4
Administrative and managerial	0.2	0.3	0.5	0.1	–	0.1
Clerical	1.1	1.8	1.8	0.3	1.5	1.3
Sales	4.8	5.5	11.4	1.3	4.2	5.5
Services	2.0	3.7	6.2	10.5	19.6	52.7
Agriculture	78.7	74.0	63.0	72.6	47.7	8.9
Production and Transport	11.4	12.5	11.8	12.6	24.6	21.2
Not reported	–	–	1.8	–	–	4.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Urban:						
Professional and technical	4.3	9.8	7.8	11.8	4.5	4.3
Administrative and managerial	1.2	1.6	2.9	0.4	–	0.5
Clerical	5.9	8.8	4.9	1.6	7.7	1.7
Sales	20.9	21.1	23.9	3.0	5.8	5.7
Services	7.5	15.2	22.7	58.3	74.4	72.0
Agriculture	14.7	10.8	19.8	7.7	4.5	1.2
Production and Transport	45.4	32.6	20.8	17.3	3.2	7.7
Not reported	–	–	7.3	–	–	6.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Rural:						
Professional and technical	1.6	1.7	2.6	1.4	2.1	5.6
Administrative and managerial	0.1	0.1	0.3	–	–	–
Clerical	0.6	1.0	1.3	0.1	0.5	1.2
Sales	3.1	3.8	9.5	1.1	2.9	5.5
Services	0.9	2.5	3.6	4.3	11.6	48.6
Agriculture	86.1	80.1	71.7	81.1	54.7	10.6
Production and Transport	7.5	10.4	10.4	12.0	28.2	24.0
Not reported	–	–	1.0	–	–	4.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: 1983-84 Statistical Yearbook of Bangladesh. Dhaka: Bureau of Statistics, table 4.17. p. 155.

The contribution to the GDP from agriculture sector has shown somewhat declining trend although there has not been any sign of increase in industrial sector. But there is a slight indication of increase in professional services. Transport and Trade Services also make noticeable contribution to gross domestic product.

From the analysis, it is evident that Bangladesh economy is primarily based on agriculture. Industrial sector does not play significant role as yet in the economy of the country.

I. AGE OF MARRIAGE

In a traditional society like Bangladesh marriage is vertually universal. This varies as the society undergoes in transition from undeveloped to developing and developed. If the cultural and traditional values of the society are strong, changes in age at marriage becomes slower. Again changes of social condition have strong relation with the timing of family formation.

Mean age at marriage indicates average time of family formation. Table 16 presents mean age at marriage by sex for 1931 to 1981. For both male and female, there is an increasing trend in mean age at marriage. The patterns of changes do not differ between the sexes. However, in comparison to other developing and developed countries, the mean ages are observed to be very low for the country. The mean ages at marriage for men and women in 1983 are observed to be 25.6

Table 15. Sectoral shares of gross domestic product at current prices for selected years

Sector	1978	1981-1982	1983-1984
		(Per cent)	
1. Agriculture	52.9	45.9	45.7
i) Crops	40.0	35.8	35.2
ii) Forestry	2.8	2.4	2.7
iii) Livestock	6.1	4.8	4.9
iv) Fisheries	4.0	2.9	2.9
2. Mining and Quarrying	.006	.002	.001
3. Industry	9.2	9.7	9.6
i) Large scale	5.3	5.6	5.4
ii) Small scale	3.9	4.1	4.2
4. Construction	5.6	6.0	4.6
5. Power, Gas, Water and Sanitary Services	0.3	0.4	0.4
6. Transport, Storage and Communication	5.5	8.6	8.5
7. Trade Services	9.0	8.3	8.7
8. Housing Services	7.4	7.4	7.4
9. Public Admn. and Defence	2.1	3.6	3.8
10. Banking and Insurance	1.3	1.6	1.5
11. Professonal Misc. Services	6.7	8.5	9.8
12. GDP at Market Prices	100.0	100.0	100.0
Per capita income GDP at factor cost (Tk.)	734	747	757
Per capita income GNP at factor cost (Tk.)	742	765	788

Source: 1983-84 Statistical Yearbook. Dhaka: Bangladesh Bureau of Statistics, tables 12.2 and 12.3, pp. 570-71.

Table 16. Singulate mean age at marriage by sex, 1931-1982

Year	Sources	National	
		Male	Female
1931	Population Census	19.0	12.6
1941	Population Census	21.5	13.7
1951	Population Census	24.4	14.4
1961	Population Census	22.9	13.9
1965	PGE	22.9	14.8
1974	Population Census	24.0	15.9
1974	BRSEM	23.9	16.6
1975	BFS	24.5	16.4
1980	BLDS, BBS	24.9	16.4
1981	Population Census	23.9	16.8
1981	VRS (Direct) BBS[a]	25.8	17.8
1982	VRS (Direct) BBS[a]	25.6	17.7

Source: Bangladesh Population Gensus 1981, Analytical Findings and National Tables (August 1984, table 8, p. 67.

Note: PGE = Population Growth Estimation
BRSFM = Bangladesh Represpective Survey of Fertility and Training
BFS = Bangladesh Fertility Survey
BLDS = Bangladesh Longitudinal Demographic Survielance
VRS = Vital Registration System
BBS = Bangladesh Bureau of Statistics

[a] These are not singulate mean age marriage but the weighted means.

and 17.7 respectively. The average age difference is about eight years.

Table 17 shows differentials in age at marriage due to residence and religion. The urban-rural difference in age at marriage is about 2 years for both male and female in three time periods. From 1961 to 1981, the marriage age of rural women increased about 3.8 years as opposed to 3.2 years for urban women. Similarly, for men this change was 2.7 years in rural areas against 1.9 years for urban areas. Therefore, rural people have experienced faster change in marriage age than the urban people.

The difference in marriage age due to religion is about one year for both the periods. Hindus have somewhat higher mean age at marriage than Muslims. This is partly because Hindus require more time for searching mates which conform to castes and social status. Besides, the higher searching time the fact of differential literacy and prevalence of dowry system might be other causes for higher mean age for Hindus.

Some regional differences are also observed in mean age at marriage. Chittagong has the highest mean age as opposed to the lowest for Rajshahi. There are number of factors which

Table 17. Singulate mean age at marriage for selected characteristics, 1961, 1974 and 1981

Characteristics	1961		1974		1981	
	Male	Female	Male	Female	Male	Female
Residence:						
Urban	25.2	15.9	26.1	18.1	27.8[a]	19.1[a]
Rural	22.7	13.8	24.3	16.5	25.4	17.6[a]
Religion:						
Muslim	22.1	14.2	24.4	16.3	–	–
Hindu	23.1	15.1	25.5	17.4	–	–
Region:						
Rajshahi	21.9	13.0	23.1	15.7	22.7[b]	16.1[b]
Khulna	22.3	13.6	23.9	16.0	23.0[b]	16.5[b]
Dhaka	23.3	13.9	24.9	16.9	23.7[b]	16.7[b]
Chittagong	23.7	14.8	25.8	17.4	24.7[b]	17.7[b]

Source: *Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality,* table 2.7. p. 63.

Note: [a] These are based on the data of the Vital Registration Systems (direct), Bangladesh Bureau of Statistics.

[b] These are averages of the Singulate Mean Age at Marriage of the districts in each division of 1981 census.

may be considered for this differentials, such as literacy, ethnic composition etc.

J. FERTILITY

Fertility level of Bangladesh is considered to be the highest among south Asian countries. Since last two decades the government of Bangladesh has been striving for controlling human fertility. The population control programme has been functioning in mass scale with different approach since 1962. The question is still at stake about the success of the programme as the population growth is considered as number one problem of the country. The government has launched an integrated programme to curb the high population growth.

Table 18 presents mean number of children ever born by current age of ever-married women from different sources, at various periods between 1961 and 1983. Before drawing any conclusion, it has to be borne in mind that the reliability and coverage of the sources of the estimates are not the same. Some are more reliable than others. The table reveals trends in cummulative fertility levels. It is difficult to make any comment regarding the trend of fertility level. However, the total marital fertility rates of table 19 do show a declining trend with exception of 1974 BRSFM rate. The age-specific marital fertility rates do not show any change in timing of childbearing. The rate of 20-24 age group in the peak for all periods. The overall situation of fertility does show a declining trend although it is not as sharp as should be.

Table 18. Mean number of children ever-born per ever married women

Age	Census 1961[a]	DSEP 1961-1962[a]	BRSFM 1974[a]	Census 1974[a]	BFS 1975[a]	CPS 1979[b]	BLDS 1980[a]	CPS 1981[b]	CPS 1983[b]
∠15	–	–	–	–	0.1	0.1	–	0.1	0.0
15-19	0.77	0.88	0.57	0.67	0.8	0.7	0.632	0.7	0.8
20-24	2.24	2.62	1.74	1.91	2.4	2.1	1.842	2.1	2.3
25-29	3.51	4.04	3.52	3.29	4.2	3.6	3.342	3.7	3.8
30-34	4.64	5.34	4.94	4.57	5.7	5.0	4.836	5.4	5.5
35-39	5.27	5.96	5.88	5.46	6.6	6.0	5.382	6.4	6.5
40-44	5.49	6.60	6.21	5.64	7.1	6.5	6.382	7.3	7.3
45-49	5.74	6.33	6.11	5.78	6.7	6.6	6.546	7.6	7.5

Source: [a] 1983-84 Statistical Yearbook of Bangladesh, Dhaka, Bangladesh Bureau of Statistics, table 3.38, p. 94.

[b] Mitra & Associates, *Bangladesh Contraceptive Prevalence Survey-1983,* Final Report, table 4.3, p. 67.

DSEP : Demographic Survey in East Pakistan.
BRSFM : Bangladesh Retrospective Survey of Fertility and Mortality.
BFS : Bangladesh Fertility Survey.
CPS : Contraceptive Prevalence Survey.
BLDS . Bangladesh Longitudinal Demographic Survey.

Table 19. Age-specific marital fertility rates, 1960-1983

Age group	Rates (per 1000 women)						
	1960-1962[a] (DSEP)	1963-1965[a] (PGE)	1966-1968[a] (NIS)	1971-1975[b] (BFS)	1974[b] (BRSFM)	1979[b] (CPS)	1983[b] (CPS)
10-14	112	107	113	18	–	85	26
15-19	335	312	297	155	282	221	239
20-24	347	353	314	302	353	252	267
25-29	348	324	260	294	314	239	229
30-34	288	262	208	251	263	203	187
35-39	180	159	142	186	198	153	108
40-44	116	80	46	108	96	68	49
45-49	–	–	5	35	14	17	6
Total marital fertility rate	8.63	7.99	6.92	6.7	7.5	6.2	5.6

Sources: [a] Sirageldin, I.; Norris, D.; and Ahmed, M.; 'Fertility in Bangladesh: facts and fancies'. *Population Studies,* Vol. 29, No. 1, (March, 1975), pp. 207-215. The rates are based on currently married women.

[b] Mitra and Associates, *Bangladesh Contraceptive Prevalence Survey,* 1983; Final report, table 4.10, p. 75.

DSEP : Demographic Survey in East Pakistan,
PGE : Population Growth Estimation;
NIS : National Impact Survey;
BFS : Bangladesh Fertility Survey;
BRSFM : Bangladesh Retrospective Survey of Fertility and Mortality;
CPS : Contraceptive Prevalence Survey.

II. MORTALITY TRENDS

During last three or four decades, the mortality level of many developing countries has declined. This decline has resulted from wide spread of modern medicine and medical technologies. Still the mortality level of these countries appear to be much higher than those of developed countries. This variation in mortality between developed and developing countries largely depends on the variation of the accessibility of these scientific discovery in medical field. In many countries, it is observed that the mortality level is remaining in stagnant condition. Even sometimes, a slight increasing trend is observed.

In recent years, the mortality levels in Bangladesh is also found to have improved much, although the level is still much higher than many developing as well as developed countries. The recent data indicates a decline of 10-15 per 1,000 in some regions in the country. This may be conceived as an impact of several socio-economic factors such as improved communication system, supply of food in shortage, improvement of public health, treatment of epidemics and availability of health facilities. The empirical findings have proved an evidence of large variation in mortality levels between the regions. People of different regions are not equally exposed to the modern medical facilities and other developmental facilities. Consequently, the variation in mortality appears to be very high eventhough the country is very small.

Reliable assessment of the situation in mortality and morbidity is a difficult task. Not only in Bangladesh but in most developing countries, the adequate system of data collection in mortality and morbidity has not yet been well developed (Ruzicka, 1982). Particularly information on morbidity is rarely available. This limitation creates an impediment for indepth study on the casual relationship of socio-economic development, and mortality and morbidity situation. Consequently, scientists are to some extent confined in studying morbidity under the broad issue of health problems. Still the primary source of mortality data in sample surveys although the vital registration system in Bangladesh started a century ago. This chapter will discuss the trends of mortality levels in Bangladesh.

A. TRENDS OF MORTALITY

(a) Crude Death Rate

The estimates of crude death rate from various sources have been gathered in order to see the trend of mortality level over last few decades. Some of the estimates in early periods suffer from areal variation. The estimates before 1947, year of independence from British Government, was not completely based on the information of today's Bangladesh. Besides, comparision of the estimates of different years are also attached by the variation of sample size and sample design. However, these limitations will probably not affect much the observation of trend.

Table 20 shows an overall trend in crude death rate of Bangladesh for the period 1881-1983. The rates present a declining trend in several phases. The first phase appears to have an increasing trend until 1921, and since then it starts decline until about 1970. During the period 1921-1951, the level of mortality remained about 40 per thousand. The following decade, 1951-1961, reveals a rapid improvement of mortality situation, and the similar pace of improvement is also observed for the period 1961-1970. This improvement may be attributed to the various health programmes undertaken by the government such as programme of eradication of malaria, smallpox, cholera. With assistance of World Health Organization, the Ministry of Health launched a nationwide smallpox eradication programme in 1968. By 1970, the incidence of smallpox was found to be unidentifiable. The higher deaths in the early part of the century were primarily due to plague, cholera, malaria and smallpox in the subcontinent (Elahi and Ruzika, 1981).

Although the mortality level of the table for the early part of 1970s does not show much changes in comparison of previous years, there are several factors which contributed to the high mortality level in early 1970s. In November 1970, there was a big cyclone which caused several thousand deaths in southern part of the country. The liberation war of 1971 was another important incidence caused higher death rate for

Table 20. Levels and trends in crude death rates, 1881-1980

Year	Crude death rates					
	Davis	BBS	PGE	BRSFM	BFS	ICDDR,B
1881-1891	41.3	–	–	–	–	–
1891-1901	44.4	–	–	–	–	–
1901-1911	–	45.6	–	–	–	–
1911-1921	–	46.3	–	–	–	–
1921-1931	–	41.7	–	–	–	–
1931-1941	–	37.8	–	–	–	–
1941-1951	–	40.7	–	–	–	–
1951-1961	–	29.7	–	–	–	–
1961-1965	–	–	18.5	–	–	–
1962-1965	–	–	20.0	–	–	–
1961-1974	–	19.4	–	–	–	–
1966	–	–	–	–	–	15.0
1967	–	–	–	–	–	16.6
1968	–	–	–	–	–	15.0
1969	–	–	–	–	–	14.9
1970	–	–	–	–	–	14.8
1971	–	–	–	–	–	21.8
1972	–	–	–	–	–	16.2
1973	–	–	–	–	–	14.2
1974	–	19.4	–	19.8	–	16.5
1975	–	–	–	–	19.0	20.8
1976	–	–	–	–	–	14.8
1977	–	–	–	–	–	13.6
1978	–	–	–	–	–	13.2
1979	–	–	–	–	–	15.6
1980	–	10.2 (BLDS)	–	–	–	14.8

Table 21. Crude death rates estimated in small studies, 1979-1983

Name of the study	Year of data collection	Sample size (households)	Crude death rate (per 1000)
An Evaluation of CWFP Activities	1983	1 136	8.83
Family Planning through Swanirvar Program	1982	517	14.48
Impact of Development Program on Fertility in Two Villages:	1982		
Nalam		2 226	8.00
Gawail		1 897	12.00
Impact Study of UNICEF Project Villages	1982	5 879	9.59
An Evaluation of the Rural Family and Child Welfare Project through RSS Program	1981	190	10.00
An Evaluation of the FPIA Supported Family Planning Projects through RSS Program	1981	296	9.00
A Case Study FP Activities in Two Villages:	1981		
Nabinagar		260	7.00
Baliadi		266	4.00
Zero Population Growth in Bangladesh, 1981	1981	856	12.00
B R A C			
Ghior	1979	–	11.00
Manikganj	1979	–	15.00

the country. The estimates based on Matlab present a clear reflection of the war on mortality levels. Due to repeated crop failure of 1974, the country was in a disaster of famine. Thousands of people died of starvation in this year and its effect continued through 1975. The estimates based on Matlab data, 20 per thousand which is very high compared to previous and following years, show pungent of the effect. After this incidence, the crude death rate continued to decline, and now it has come to a somewhat stable situation, about 12 per thousand. The rates from other independent small studies in table 21 appears to be less than 10 per thousand. Therefore, it is possible to remark that the mortality situation in the country is gradually improving.

Table 22 presents a short trend of urban-rural differential in crude death rate. The rates for urban areas are almost half of the rural rates. The difference is gradually becoming winder. It may be the impact of higher medical facilities available in urban areas, the differences in age-structure, and socio-economic structure of the urban population. For instance, due to higher rural-to-urban migration, the population size of working age group is proportionately higher in urban areas than rural areas, and similarly proportion of people in higher social classes are likely to be higher in urban areas. Besides there are other conducive facilities which are directly and indirectly responsible for the lower crude death rate in urban areas.

(b) Infant Mortality Rate

Infant mortality rate is considered as an important indicator for explaining the mortality situation as well as development indicator for a country. Table 23 presents trends of infant mortality rate during the period 1911-1983. The table presents a picture of increasing improvement of infant mortality rate over the period, from 205 per thousand in 1911 to 113 in 1983. Several independent studies have documented this improvement, yet compared to the developed countries the present level is still very high. As observed for crude death rate, an impact of natural disasters and political events is also observed in infant mortality rate. This is more prominent with estimates of Matlab (ICDDR,B). During the last decade the infant mortality does not show much change.

Table 22. Crude death rate per 1,000 population by rural-urban residence in Bangladesh, 1980-1983

Residence	Year			
	1980	1981	1982	1983
National	10.18	11.50	12.17	12.32
Urban	6.81	7.21	6.92	7.46
Rural	10.77	12.23	12.78	13.20

Source: Bangladesh Bureau of Statistics, 1983-1984 Statistical Yearbook, table 3.50, p. 102.

Table 24 presents more detailed picture of infant, neonatal and post-neonatal deaths for male and female separately. During the 1974-1982, neonatal mortality rate for both sexes appears to have declined much sharper than that of the post-neonatal rates. The neonatal mortality for male is found to be consistantly higher than female for all years, but a reverse situation is observed for post-neonatal mortality rate. D'Souza and Chen (1980) also provided the evidence of this fact. A similar sex difference is also observed for infant mortality, but the magnitude of difference is very high as compared to post-neonatal mortality. It should be noted that the unusually high rates of 1975 bear the effect of 1974 famine. It affected more female post-neonatal mortality rate than the male rate. Chen and others (1980) observed behavioural antecedents of higher female death after few months of the birth. They claimed it is primarily due to male-based health and nutrition-related activities. Malnutrition is found to be substantially higher among female children than male children. Males always consume more calories and protein than females at all ages even in a situation when female nutrient requirements due to changing of body weight pregnancy and lactation are essentials. Post-neonatal mortality is particularly sensitive to environmental condition. During the infancy, boys are more vulnerable to same birth hazards (pre maturity, malformation, birth injury); to infection possibly as a result of some biological factor; and to injuries (Bucharest Conference, 1974).

(c) Child Death Rate

Table 25 presents trends of child death rate of children ages 1-4 years by sex. The sources of estimates are ICDDR,B and Bangladesh Bureau of Statistics. A declining trend is observed for both male and female during the period. Male rates appear to have declined somewhat faster than the female rates. The differences of rates between sexes are much higher in Matlab data, and the rates for male are always lower. The situation is somewhat different with the rates provided by Bureau of Statistics. The rates for rural area follows the pattern observed in Matlab data but the magnitude of sex difference in rates is much lower. The urban rates present an opposite pattern in the direction of differences

Table 23. Infant mortality rate in Bangladesh, 1911-1983

Year	Estimates of various sources						
	Davis	Census	PGE	ICDDR,B	BFSF	BRSFM	BBS
1911	205						
1922	198						
1931	179						
1951		168					
1961			144				
1966				111			
1967				125			
1968				124			
1969				128			
1970				131			
1971				147			
1969-1970					152[a]		
1970-1972					158[a]		
1972-1973					154[a]		
1972				127			
1973				126			
1974				148		153	
1975				192			
1976				120			
1977				114			108 (BLDS)
1977							102 (VRS)
1979				118[b]			
1980				114[b]			112 (VRS)
1981				115[b]			122 (VRS)
1982				118[b]			118 (VRS)

Source: Rabbani, A.K.M. Ghulam and Hussain, Shahadat. 'Levels of Fertility and Mortality from the National Sample Vital Registration System of the Bangladesh Bureau of Statistics'. Recent Trends in Fertility and Mortality in Bangladesh: Proceeding of a National Seminar. Dhaka: Population and Development Unit, Planning Commission (December, 1984), table 3. p. 88.

Note: [a] Mitra, S.N. "Infant and childhood mortality in Bangladesh: levels and differentials," Australian National University, Canberra (September, 1979).

[b] These estimates are based on the data of comparison area of Matlab.

Table 24. Trends in neonatal, post-neonatal and infant mortality rates in Matlab, 1974-1982

Year	Neonatal mortality			Post-neonatal mortality			Infant mortality		
	Male	Female	All	Male	Female	All	Male	Female	All
1974	87.9	67.8	78.1	54.6	65.1	59.8	143	133	138
1975	81.6	78.1	79.9	98.4	126.3	111.9	180	204	192
1976	72.0	58.1	65.3	33.3	42.1	37.6	105	100	103
1977	73.1	69.4	71.3	40.2	44.8	42.4	113	114	114
1979[a]	81.9	66.9	74.6	42.1	44.6	43.3	124	111	118
1980[a]	70.0	75.6	72.7	32.6	50.8	41.3	103	126	114
1981[a]	68.7	71.4	69.5	37.3	55.2	45.0	106	124	115
1982[a]	74.4	61.2	68.1	49.8	50.7	50.2	124	112	118

Source: Demographic Surveillance System- Matlab. International Centre for Diarrhoeal Disease Research, Bangladesh.

Note: [a] These estimates are based on the information of comparison area of Matlab.

Table 25. Child death rate per 1,000 children of ages 1-4 years by sex, 1966-1983

Year	Source		Death rate		
			Both sexes	Male	Female
1966-1969	ICDDR,B		–	22.3	29.6
1974	ICDDR,B		25.4	18.3	32.9
1975	ICDDR,B		34.9	28.8	41.3
1976	ICCDR,B		29.6	25.5	33.9
1977	ICDDR,B		19.6	14.5	25.2
1979[a]	ICDDR,B		26.2	18.5	34.5
1980[a]	ICDDR,B		25.4	18.5	32.9
1980	VRS, BBS	: National	12.7	12.7	12.7
		Urban	8.0	7.7	8.3
		Rural	13.2	13.2	13.1
1981[a]	ICDDR,B		24.8	20.3	29.6
1981	VRS, BBS	: National	16.5	15.7	18.0
		Urban	9.4	8.5	10.3
		Rural	17.5	16.3	18.8
1982	VRS, BBS	: National	22.2	20.5	23.9
		Urban	9.1	10.7	7.4
		Rural	23.6	21.5	25.6
1982[a]	ICDDR,B		27.4	19.3	36.5
1983	VRS, BBS	: National	23.8	25.5	22.0
		Urban	10.5	12.7	8.3
		Rural	26.2	27.8	24.5

Source: 1983-84 Statistical Yearbook, table 3.51. p. 103 and Demographic Surveillance System – Matlab.

Note: [a] These estimates are based on the data of comparison of Matlab.

for last couple of years. Male mortality rates are somewhat higher than female mortality rates.

The urban rates are much lower than that of rural rates. During last few years, the estimates do not shows much changes. More precisely, the estimates of Bangladesh Bureau of Statistics are observed to be increasing, however, it may be for a short-time.

(d) Age Specific Death Rates

Figures 1 and 2 present a comparative picture of age-specific mortality rates for three time periods for male and female separately. The child death rates for 1974 are found to be higher than 1962-1964 for both sexes. For male the death rates of 1974 continued to be higher until age 55. This was due to the impact of 1974 famine. The deaths for all the age groups of 1981 appears to be lower than those for 1974, and 1962-1964. This shows an improvement of mortality situation for all ages. The significant improvement is found to be for child and older population. During the child-bearing ages female death rates appear to be somewhat higher than that of male. This is primarily due to high pregnancy related mortality.

(e) Expectation of Life at Birth

Expectation of life is a age-standardized summary measure of mortality. The effect of the variation of deaths due to age, as observed in previous section, does not affect the measure of life expectancy. Table 26 presents an increasing trend of life expectancy at birth over the period 1901-1982. The life expectancy has increased from 23.7 years for all in 1901 to 54.0 years in 1982, which is about 128 per cent increased. In 1962-1963, the life expectancy is observed to have declined little. This may be due to malaria, tuberculosis, diarrhoea and typoid. The significant fall of life expectancy in 1974 is caused by the famine. Although life expectancy has shown an overall increasing trend, the estimates of last two years shows evidence of declining.

In most developed countries, life-expectancy of female is observed to be slightly higher than that of the male. In Bangladesh, the situation appears to be reversed. This may be due to higher female child mortality and maternal mortality.

Table 27 presents probability of dying by age, sex, and place of residence. The differences

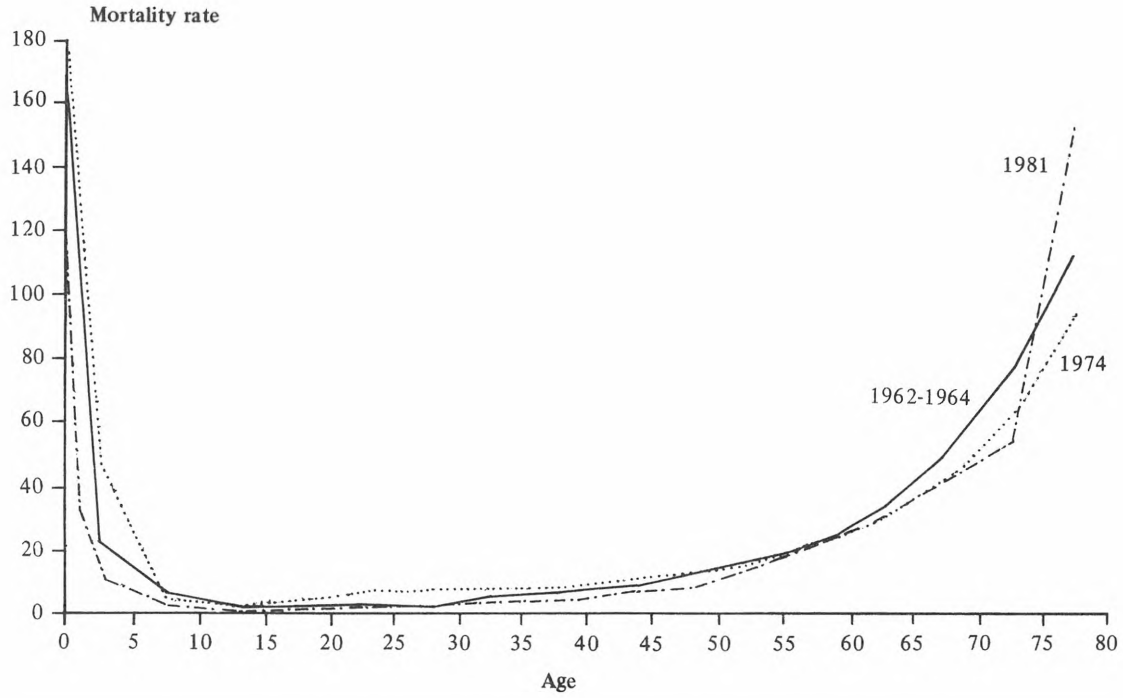


Figure 1. Age-specific mortality rates, males, 1962-1964, 1974 and 1981

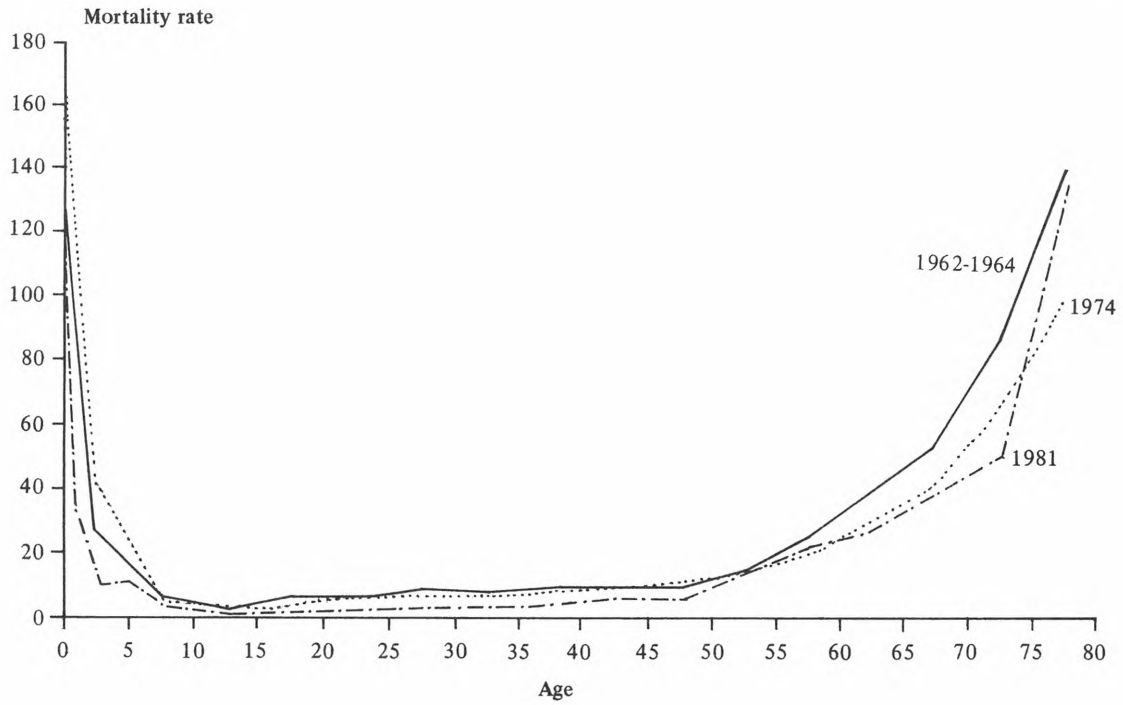


Figure 2. Age-specific mortality rates, females, 1962-1964, 1974 and 1981

between male and female in probability of dying of children under age one are observed to be much higher in urban areas than rural areas. It is even higher for the children of age one. These probabilities for female of age group 20-34 in urban areas and 15-34 in rural areas show higher chances of deaths than their male counterparts. Maternal deaths of these age groups are assumed to be a contributing factor for such differences, and it also explains higher probabilities for rural areas. After reproductive age group, the chances of dying for male appear to be higher than the female, and it increases faster than the females. The differences are much wider in rural areas. Lack of health care facilities, environmental sanitation and favourable socio-economic conditions are contributing to such differences among other factors.

Table 26. Trends in expectation of life at birth by sex, 1901-1982

Year	Expectation of life at birth		
	Total	Male	Female
1901[a]	23.7	23.6	23.9
1911[a]	22.9	22.6	23.3
1921[a]	20.1	19.4	20.9
1931[a]	26.7	26.9	26.6
1941[a]	31.8	32.1	31.4
1962-63[b]	48.1	49.2	46.9
1962-64[c]	47.2	48.4	46.0
1966-69[d]	50.3	51.0	49.5
1974[e]	46.2	45.8	46.6
1973-74[f]	50.7	51.6	49.7
1979[g]	54.5	56.1	52.3
1980[h]	56.9	57.0	57.1
1981[h]	54.8	55.3	54.4
1982[i]	54.0	55.2	52.7

Source: [a] Kingsley Davis, Population of India and Pakistan, Princeton: Princeton University Press, 1951, p. 62.

[b] Lie L. Bean. M.R. Khan and A Razzaque, Rukunnuddin, Population Projection for Pakistan 1968-2000. Monograph No. 17. Karachi: Institute of Development Economics, 1968.

[c] F. Yusuf, "A bridged Life Tables for Pakistan and its provinces 1962-64", Syndicate Conference Proceedings. Liege: IU SSP, 1967.

[d] A.K.M.A. Chowdhury, K.M.A. Aziz and W.H. Mosley, Demographic Study in Rural East Pakistan, 1968-69 Dhaka: Cholera Research Laboratory, 1970.

[e] Bangladesh Retrospective Survey of Fertility and Mortality 1974. Dhaka: Bangladesh Bureau of Statistics, 1977.

[f] National Academy of Sciences, 1973-74.

[g] International Centre for Diarrhoeal Disease Research Bangladesh. Demographic Surveillance System – Matlab Volume 9.

[h] Bangladesh Bureau of Statistics. Bangladesh Demogtaphic Survey and Vital Registration (1980-83).

[i] International Centre for Diarrhoeal Disease Research Bangladesh. Demographic Surveillance System, Volume 12.

Table 27. Probability of dying by place of residence and sex, 1982

Age	Probability of dying (q_x)						
	Urban			Rural			All
	Male	Female	All	Male	Female	All	
0	0.114	0.092	0.103	0.125	0.122	0.123	0.122
1	0.023	0.012	0.018	0.040	0.045	0.043	0.040
2	0.010	0.009	0.009	0.027	0.036	0.032	0.029
3	0.009	0.005	0.007	0.015	0.015	0.015	0.015
4	0.003	0.005	0.004	0.008	0.010	0.009	0.009
1-4	0.042	0.029	0.035	0.082	0.098	0.090	0.085
5-9	0.013	0.012	0.012	0.027	0.020	0.023	0.022
10-14	0.005	0.004	0.004	0.007	0.007	0.007	0.006
15-19	0.009	0.004	0.006	0.009	0.016	0.012	0.012
20-24	0.007	0.005	0.006	0.005	0.022	0.014	0.013
25-29	0.008	0.014	0.011	0.004	0.031	0.017	0.016
30-34	0.007	0.012	0.009	0.014	0.023	0.019	0.017
35-39	0.013	0.014	0.014	0.022	0.009	0.016	0.016
40-44	0.017	0.014	0.016	0.031	0.021	0.026	0.025
45-49	0.038	0.023	0.031	0.053	0.029	0.042	0.041
50-54	0.046	0.016	0.033	0.050	0.028	0.040	0.039
55-59	0.056	0.067	0.060	0.079	0.046	0.064	0.063
60-64	0.124	0.088	0.109	0.118	0.056	0.090	0.091
65-69	0.201	0.132	0.171	0.170	0.133	0.154	0.155
70-74	0.235	0.289	0.260	0.228	0.198	0.215	0.218
75+	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source: Bangladesh Bureau of Statistics; 1983-84 Statistical Yearbook of Bangladesh. Table 3.56-3.58, pp. 105-107. The table is based on the data of Vital Registration System of Bangladesh Bureau of Statistics.

III. DIFFERENTIAL MORTALITY

Socio-economic factors have strong influence on mortality level. Mortality is strongly related with development level of the country. Besides, minimum of public health programme such as mass immunization, better water supplies and improved sanitation can reduce mortality drastically. Although infant and child mortality is not independent of children and mother's demographic characteristics, socio-economic and environmental factors also have strong influence on their mortality. This section delineates the socio-economic and demographic differentials in mortality level of the country. Although the sources of the various tables are not same, this will not affect the purpose of evaluation of the differentials due to various factors.

A. DEMOGRAPHIC FACTORS

In the literature of cross nation studies, four demographic factors are found to be important predictors of child survival. These are sex of the child, age of mother at the time of birth, birth order and multiplicity of birth (UN 1984, p. 153). The predictors are not limited to these only. Many research have documented prior and subsequent birth intervals, and parity substantially stronger predictors for infant and child mortality. Tables 28 and 29, based on Bangladesh Fertility Survey, present mortality differentials of children of different ages by some important demographic characteristics.

(a) Sex:

Tables 28 and 29 present a clear picture of sex differential mortality pattern in Bangladesh. Evidence of high mortality for male during neonatal and post-neonatal period confirms the findings of other developing countries. After this period, the female mortality rate exceeds the male mortality rate through the childbearing period of women. Pakistan once used to be considered as an extreme case where female death rates at ages 1 and 2 to 5 exceeded male rates by a factor by 50 per cent. This difference reflects a "selective neglect" of female children regardless of the sex composition in a family (Alam and Cleland). The empirical evidence of this table appears to be even more selective neglect of children in Bangladesh. The probability of dying: for a female child in four to nine years of age is about 70 per cent higher than that of the male child. It is probably still not known how much this difference is caused by biological factors, but socio-cultural factors do have strong influence.

(b) Mother's Age:

Mother's age at the time of confinement has clear relation with probability of dying for children. For neonatal and post-neonatal period, the probability of dying shows a U-shaped relation with age of mother. The shape changes to J-shaped as the age of children increases. However, it appears that mother's age does not have much influence on mortality for children over one year of age. The probability of dying for children of teen-age mother is comparatively much higher than those in twenties, but the probability for neonatal and post-neonatal again increases for women in subsequent age groups. Teen-age mother does not show much interest of taking risk for having an additional child if her first child survives.

(c) Prior Birth Interval:

Prior birth interval demonstrates a consistent inverse relation with risk of child mortality. The high risk of dying appears to be associated with the children if the duration between the prior birth becomes less than one year. About 40 per cent of these births die within one year of age and about 37 per cent die before 10 years of age. The results also show that the high risk associated with short duration under 2 years persist through all ages – infant as well as childhood. The risks for the children of more than 2 years duration do not show any systematic pattern for drawing any conclusion. Thus, it is justified to draw the conclusion that duration since prior birth, does have significant impact on the risk of child mortality.

(d) Subsequent Birth Interval:

Subsequent birth interval is also observed to have significant role for influencing the risk of infant and childhood mortality. The high risk is observed to be associated with children having less than two years interval until next birth and it persists through the ages until four years of age it appears that there is no added risk for the subsequent interval more than 2 years. No risk of dying was not estimated for neonatal and post-

neonatal period because deaths during first year of life increases chance for getting pregnant again (Edmonston, 1982).

(e) **Parity:**

Birth order is also observed to have important relation with infant and childhood death rate. First-born child appears to have high risk of death than subsequent order of birth. This high risk remains consistent through ages until 10 years. The risks of death for neonatal and for one year old are found to have a U-shaped relation with order of the birth. The pattern was also observed in some other countries such as Nepal and Kenya (United Nations 1984 p. 154). That is, after order seven, risk of death is found to be increasing again. This is probably for the countries with high mortality level. For the low mortality level countries such as Philippines and Jamaica, the first-born children were most likely to have higher mortality risks, and the risks of

Table 28. Probability of dying[a] in selected ages of children by demographic characteristics of mother, for Bangladesh, 1975[b]

Demographic variables	Age of Children					
	Neonatal	Post neonatal	One (1-2)	Two (2-3)	Three (3-4)	Four to nine (4-10)
Sex:						
Female	.0207	.0709	.0435	.0119	.0127	.0480
Male	.0271	.0896	.0303	.0071	.0094	.0285
Mother's Age:						
∠15	.0981	.2032	.0639	.0073	.0362	.0362
15-19	.0449	.0940	.0456	.0107	.0112	.0515
20-24	.0207	.0709	.0435	.0119	.0127	.0480
25-29	.0341	.1001	.0254	.0159	.0123	.0928
30-34	.0595	.1312	.0037	.0162	.0178	.1230
45-49	.2130	.0900	.0170	.0151	.0111	.0456
40+	.0279	.0462	.0000	.0000	.0000	.0000[c]
Prior Birth Interval (in years):						
1	.1071	.2905	.1124	.0240	.0863	.1469
1-2	.0366	.1442	.0577	.0249	.0315	.0516
2-3	.0207	.0709	.0435	.0119	.0127	.0480
3-4	.0226	.0926	.0244	.0075	.0069	.0452
4+	.0323	.0580	.0112	.0114	.0248	.0000[c]
Subsequent Birth Interval (in years):						
1	_[d]	_[d]	.0999	.0501	.0570	.0000
1-2	_[d]	_[d]	.0343	.0166	.0123	.0586
2-3	_[d]	_[d]	_[d]	_[d]	.0075	.0345
3+	_[d]	_[d]	.0435	.0119	.0127	.0480
Parity:						
1	.0333	.1299	.1278	.0411	.0517	.0467
2	.0132	.0706	.0311	.0194	.0133	.0428
3	.0207	.0709	.0435	.0119	.0127	.0480
4	.0168	.0476	.0326	.0270	.0223	.0315
5	.0131	.0441	.0909	.0080	.0301	.0239
6	.0069	.0474	.0648	.0255	.0205	.0172
7	.0102	.0327	.1039	.0240	.0047	.0165

Source: Edmonston, Barry: "Maternal factors affecting infant and child mortality in Bangladesh: A multivariate logistic analysis". *Infant and Child Mortality in Bangladesh.* Institute of Statistical Research and Training, University of Dhaka (January, 1982), table 10. p. 135.

Note: [a] The Probability of dying was calculated using logistic equation model.

[b] Bangladesh Fertility Survey, 1975 is the data source for the estimates. These estimates are based on a sample of 2,150 out of 25,744 children under 10 years of age.

[c] There was no deaths in this category.

[d] Not in the logistic equation mode.

Table 29. Mortality differentials by selected characteristics
(0-9 years before the survey)

Characteristics	Infant ($1q_0$)	Toddler ($1q_1$)	Child ($3q_2$)
Sex:			
Male	143.7	26.0	57.7
Female	121.5	35.4	68.6
Mother's age:			
∠ 20	174.3	29.8	60.2
20-29	113.5	30.9	67.6
30-39	113.0	28.8	59.6
40+	124.0	62.5	39.7
Birth Order:			
1	173.1	28.7	54.6
2 – 3	138.7	25.5	58.5
4 – 6	109.4	32.8	72.2
7+	126.6	36.6	60.9
Birth Interval:			
24 months	184.9 (all) 161.3 (Surv.)	41.9 (all) 44.3 (Surv.)	81.3 (all) 89.6 (Surv.)
24-47 months	89.0	28.4	61.9
48+	58.2	9.8	27.2
Birth:			
Single	127.3	30.4	54.3
Multiple	548.3	68.6	63.1

Source: Rutstein, Shea Oscar: "Infant and child mortality: levels, trends and demographic differentials". *Comparative Studies* No. 24. World Fertility Survey, London (September 1983).

deaths were found to have increased progressively with increase of order. With some exceptions in most of the country, toddler mortality increases with birth order (United Nations, 1983).

Parity and mother's age are not independent demographic variables. Women of higher age groups expected to have higher number of births. But one cannot be a proxy for others. The variation of age at marriage and the variation of conception make these two variables different in their significance. Norman (1974) indicated that infants most at risk tend to be high-birth-order children of very young mothers and low-birth-order (particularly the first born) children of relatively older mothers. Unfortunately there has not been any analysis of deaths in cross-classification of mother's age and birth order, which would give more clear picture of the issue discussed above.

(f) Multiplicity of birth

Multiple births in table 29 have more than 4 times higher infant mortality rate than single birth, but this difference declines sharply as the age of children increases. Bebies of multiple births usually become physically weak when they are born. Breastmilk is normally not sufficient for feeding more than one baby at their early ages. Sometimes parents do not have enough means to buy external food substitute. Besides taking care of more than one baby itself is a big task. The compound effect of several factors results in high mortality of multiple births.

B. SOCIO-ECONOMIC DIFFERENTIALS

Socio-economic condition of people in the community have strong impact on mortality. These factors affect mortality through the level of nutrition, sanitation and pure water supply. The socio-economic condition of the people does create differentials in access of these basic items. The fact which is observed by the experts of international organization is that the high mortality of developing countries is associated with, among other factors, poverty, ignorance, malnutrition, inadequate quality of housing, a lack of personal and environmental hygine and low level of immunity. It is a circular relation that socio-economic development affect the mortality level and in turn mortality level affect socio-economic and demographic structure of

the country. This section will evaluate the differentials in mortality by various socio-economic factors.

(a) Residence

Table 30 presents urban-rural differentials of infant mortality for male and female for the period 1980 to 1983. The urban rates appear to be significantly lower, about 20 per cent, than the rural rates. The rates of table 31 also show similar pattern of differences for neo-natal, post-neonatal, infant and child mortality. The male rates appear to be higher than the female rates for both urban and rural areas, but the magnitude of the differences is much larger in urban areas. This seems to be unusually high differences. Although we know that there is an almost certain tendency of male mortality to be higher during first year of age, the clear explanation needs further investigation. It may be partly due to higher sex selective case in rural areas, which enhance female rate higher than what it would be otherwise.

A group of scientists are still debating on the importance of biological and genetic factors as compared to socio-economic and health factors in mortality differentials by sex (Ruzicka, 1982). Bangladesh, from cultural perspective, is a patriarchial society. Anthropologists have demonstrated that patriarchial societies in general have mortality level favourable for male. Preferences for sons over daughters are found to be stronger. Sons always get better care interms of food, clothings, and medical care than their female counterparts. These differentials remain unchanged throughout their life (D'Souza and Chen, 1982 and Ahmed, 1982). This practice can be viewed in terms of economic rationality. If men are responsible for providing food and shelter for women and other dependents in family, men need better physical and mental fitness for competing with others in the continuous war of resource holdings.

Table 30. Infant mortality rate by sex and residence, 1980-1983

Residence	Sex	Year			
		1980	1981	1982	1983
National	Both sexes	101.4	111.5	121.9	117.5
	Male	102.3	113.4	124.1	118.8
	Female	97.4	109.4	119.4	116.0
Urban	Both sexes	80.7	99.4	103.0	98.8
	Male	84.2	105.2	114.0	106.5
	Female	76.4	93.4	91.6	90.6
Rural	Both sexes	103.5	112.5	123.2	120.8
	Male	105.8	114.0	124.9	121.0
	Female	101.0	110.8	121.5	120.6

Source: Rabbani, A.K.M. Ghulam, and Hussain, Shahadat. 'Levels of fertility and mortality from the national sample. vital registration system of the Bangladesh Bureau of Statistics'. Recent Trends in Fertility and Mortality in Bangladesh: Proceedings of National Seminar. (Dhaka, 29-31 January, 1984). Population and Development Planning Unit, Planning Commission, Dhaka (December, 1984), table 4. p. 89.

For child mortality by age 2 in table 32, the male mortality rates are also found to be higher than the female rates for both urban and rural areas, but the differences in rates between sexes appears to be higher in rural areas which is expected to be usual pattern in rural areas.

(b) Region

The variation in mortality situation among regions exists almost in every country in the World (Ruzicka, 1982). The regional differences occur primarily due to differential exposure of the individuals to the amenities available for prevention and treatment. In Bangladesh a slight regional differences does exist in mortality rates. Table 31 shows regional differences in various mortality rates. Chittagong division appears to have the lowest mortality levels for neonatal, post-neatal, infant and child; Khulna has the highest levels; and on the other hand, the rates of BRSFM in table 32 contradicts the above pattern, but the differences between the rates are very small. For male, Dhaka is found to have the highest child mortality as opposed to the lowest mortality for Rajshahi. For females, Rajshahi is also observed to have the lowest as opposed to the highest for Chittagong, Dhaka has the highest sex differences in mortality.

The divisions are somewhat different in terms of their level of socio-economic development. Chittagong division has somewhat higher level of education, higher proportion of population engaged in non-agricultural occupation, and may have higher average protein intake (such as meat and fish consumption) as opposed to Khulna and Rajshahi division. Besides, cultural differences also account for some of these differences.

(c) Religion

Religious difference in demographic behaviour is an established fact. Apart from economic activity there are some social norms and spiritual values of a religion which distinguishes one religion from another is differential creates somewhat differences in life style and thereby it creates differences in mortality level, although it will be difficult to

Table 31. Mortality rates by socio-economic characteristics of mother

Characteristics	Mortality rates			
	Neonatal[a]	Post-neonatal[a]	Infant[a]	Child[b]
Region:				
Rajshahi	82	67	143	84
Khulna	83	80	162	98
Dhaka	79	64	138	81
Chittagong	60	52	109	105
Place of residence:				
Rural	78	66	139	93
Urban	65	53	115	72
Religion:				
Muslim	74	62	131	88
Hindu	89	83	164	114
Education:				
No School	79	68	141	98
Primary (1-5)	68	56	120	73
Secondary (6+)	83	53	132	35
Husband's occupation:				
Agriculture, land possessed	80	71	145	85
Agriculture, landless	74	71	140	103
Others	70	61	127	99

Source: Al-Kabir, Ahmed; 'Effects of Community Factors on Infant and Child Mortality in Rural Bangladesh'. *Scientific Reports.* Number 56 (July 1984). World Fertility Survey, London, table 6, page 18. Bangladesh Fertility Survey is the Source of Data.

Note: [a] These rates are based on births occuring 12-71 months before the survey.

[b] The child rates are based on births occuring 60-119 months before the survey. The rates are expressed as deaths per 1000 exposures.

Table 32. Child mortality estimates for Bangladesh, 1974

Area/subgroup	Probability of dying by age 2, (q_2)	
	Males	Females
Bangladesh	.199	.183
Residence:		
Urban	.175	.152
Rural	.203	.186
Religion:		
Muslims	.200	.181
Hindus	.219	.215
Region:		
Chittagong	.201	.188
Dhaka	.206	.184
Khulna	.202	.186
Rajshahi	.194	.181

Source: Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality, table 4.5. p. 84.

identify the contributing factors and their significance to the differences. For instance, Simmons and Bernstein (1982) observed highest infant mortality due to tetanus among Hindu families in North India. Hindus quite often use cow dung for the cleanliness and purification of houses. People suspect that these might be causes for higher tetanus among the Hindus.

Tables 31 and 32 present neonatal, post-neonatal, infant and child mortality for Muslim and Hindu for both male and female separately. Hindus have higher mortality rates than Muslims for both sexes. The religious differences is much higher for females than males. But the infant mortality levels in table 33 delineate a different picture in religious differentials. Except for Muslim male in 1981, where the rates are almost the same for urban and rural areas, the mortality levels are much higher in rural areas than those of urban areas. In rural areas, the differences due to religion appear to be less significant as opposed to urban areas. In urban areas, the mortality levels for Hindus

are much lower than Muslims. The estimates of 1980 and 1981 show different pattern so it is difficult to provide substantive reasonings. In general, the average literacy rate for Hindus is higher than Muslim. It is more true in urban areas than rural areas. This might be a contributing factor for such differences.

Table 34 also confirms the pattern of differentials as observed in table 32. Proportion of children dead is found to be somewhat higher for Hindus than Muslims. But the difference between Muslims and Caste Hindus is almost zero. Hindu mortality is inflated by the higher mortality level for schedule castes. The difference between religion is also found to be slim due to the age of mother. Hindu mothers until age 40, experience higher proportion of children dead but Muslim mothers older than age 40 appear to have higher proportion of children dead. It is difficult to provide an explanation of such differentials. In sum, the differences by religion (not by caste) are comparatively small and most probably due to differences in socio-economic and other conditions.

(d) Education

Among the socio-economic factors, education is observed as the most influential factor in differentiating people's social and demographic bahaviour. Social scientists very often use level of education as an index for socio-economic status (Kitagawa and Hauser, 1973; and Bucharest Conference 1974). Table 31 describes the differentials in neonatal and post-neonatal infant and child mortality due to mother's level of education. Post-neonatal and child mortality show inverse relation with mother's level of education; however, neonatal mortality is observed to be the highest for the mothers of secondary education category (6 years and over), which is very unusual. It is difficult to make any substantive interpretation of this situation without further investigation. Table 35 presents differentials in child mortality for education of

Table 33. Infant mortality rate per thousand live births by religion, residence and sex

Residence	Sex	1980		1981	
		Muslim	Hindu	Muslim	Hindu
Urban	Both sexes	85.73	46.39	105.01	62.15
	Male	95.05	17.54	110.42	68.97
	Female	75.95	87.50	99.35	55.56
Rural	Both sexes	103.12	94.18	110.79	119.24
	Male	104.13	101.69	110.64	132.60
	Female	102.01	86.96	110.94	106.38

Source: Rabbani and Hossaon (1984), table 5. p. 90.

Table 34. Proportion of children dead by age of mother and religion, 1974

Age	Religion			
			Hindu	
	Muslim	All	Caste Hindu	Schedulecaste
15-19	0.1852	0.1946	0.2030	0.1863
20-24	0.2020	0.2253	0.2221	0.2279
25-29	0.2117	0.2340	0.2455	0.2220
30-34	0.2257	0.2548	0.2491	0.2600
35-39	0.2382	0.2592	0.2600	0.2583
40-44	0.2693	0.2388	0.2276	0.2502
45-49	0.2866	0.2791	0.2657	0.2943
All ages	0.2706	0.2754	0.2709	0.2798

Source: BRSFM report, tables 5.7 and 5.8. pp. 110-111.

mother, household head and highest education level achieved by any family member. Mother's education appears to be the most influential factor among these three factors for variation in child mortality. The same is also observed in table 36, which is based on the national sample survey. Several studies have observed mother's education as more influential factor than father's education. As the highest percentage of household heads are expected to be the husbands of the respondents (reporting mother), the results of the table also provides such evidence of differentials influence between parent's education level.

Head of the household may be uneducated or have low level of education, but other members might have more education than the household head. Therefore, the highest education level of any family member appears to be more strong in the variation of mortality level as the ratio between levels 1 and 3 is, 7.26, higher for the highest level of education by any family member than the household head, 1.68.

(e) Occupation :

Table 37 explains the differential pattern in mortality due to occupation of household head, area of dwelling, number of cows owned and use of fixed latrine. Matlab is considered as a rural area. There are not many people with occupation other than agriculture oriented. The present classification of occupation of household heads can be considered as an economic indicator. In general, the occupation shows a considerable influence in the variation of mortality level. For child mortality the influence appears to be rather strong. The land owners have lower mortality rates, 8.8 per thousand, than the occupation category of land owner-cum-worker, 21.2, which is also lower than agricultural labour, 31.3. The old age mortality after age 45, does not have any

Table 35. Mortality rates (per thousand) of age 1-4 for both sexes by level of education of mother, household head and any family member achieved highest education

Level of Education	Mother (1980)	Household head (1977)	Highest education level achieved by any family member (1977)
1. 0 (No schooling)[a]	24.6	26.0	41.9
2. 1-6 years school	13.2	19.0	28.9
3. 7+ years school	–	15.4	18.5
1 1 : 3	24.60	1.68	2.26
All	21.0	22.2	29.4

Source: D'Souza, Stan and Abbas Bhuiya. Mortality Differentials in Rural Bangladesh. Population and Development Review, volume 8(2) (December, 1982): 753-770.

Note: [a] Matlab education has been included in no schooling category. However, the number with madrasa education was negligible.

Table 36. Proportion of children dead by age and father's and mother's educational level, 1974

Age	Mother's educational level			Father's educational level		
	Illiterate	1-5 grade	6-10 grade	Illiterate	1-5 grade	6-10 grade
15 – 19	0.1959	0.1653	0.1207	0.1978	0.1780	0.1510
20 – 24	0.2163	0.1719	0.1067	0.2136	0.2106	0.1598
25 – 29	0.2207	0.1896	0.1402	0.2223	0.2140	0.1717
30 – 34	0.2376	0.1781	0.1431	0.2373	0.2261	0.1741
35 – 39	0.2452	0.2060	0.1993	0.2418	0.2370	0.2005
40 – 44	0.2711	0.2155	0.1447	0.2653	0.2617	0.2058
45 – 49	0.2901	0.2266	0.2099	0.2800	0.2765	0.2442
All ages	0.2767	0.2172	0.1653	0.2672	0.2649	0.2141

Source: BRSFM, tables 5.5 and 5.6 pp. 107-108.

pattern of relation with occupation. Mortality rates with husbands' occupational classification in table 31 do not show any meaningful pattern for interpretation.

(f) Area of Dwellings:

Area of dwellings is found to have an inverse relation with mortality in general except for old age mortality. This is also an economic indicator. The higher social class people are more likely to have larger dwelling areas, and people in higher social class have more ability to take curative as well as preventing measures of health. There might be some other environmental aspects underneath this relation. The people having 169 square feet area for their dwellings have higher child mortality rate, 30.5, than the rates for the people having 170-242 square feet area of dwelling house, which is again lower than the rates of people having 243 square feet and over for the dwellings. A similar pattern also holds for the mortality of higher age groups, but the differences are not very sharp. Comparing the influence of dwelling areas with that of the occupation, occupation appears to be a stronger factor for the variation of mortality level.

(g) Number of Cows Owned:

In rural areas, cows are usually used for pulling plough. By and large, households with larger amount of cultivable land and the cultivation done by own management, are likely to have larger number of cows. Consequently, this also indicates the economic condition of the household. Aside from the nutritional variation for having cows at home, the number of cows in households shows an inverse relation with the mortality level for all age group. Comparing influence of the above two factors with this factor, the variation of possession of cows is not as strong a factor as the above factors. As observed with previous factors, the number of cows owned do not have strong influence in old age mortality, but maintained an inverse relationship.

(h) Use of Fixed Latrine:

Use of fixed latrine is supposed to be health related practice, and expected to have important effect on mortality. This is one component of primary health care practice, which can easily be achieved without any financial involvement. People who use fixed latrine

Table 37. Mortality rates per thousand for both sexes in Matlab by occupation of household head, area of dwellings, cows owned, and use of fixed latrine, 1977

Characteristics	Age group			
	1-4	5-14	15-44	45+
Occupation of household head:				
1. Agricultural labour	31.3	3.6	2.4	33.4
2. Owner/worker	21.2	1.9	2.1	21.7
3. Land owner	8.8	1.5	1.7	26.8
1 : 3	3.56	2.40	1.41	0.87
Area of dwellings (in sq. ft.):				
1. 169	30.5	2.5	2.7	23.6
2. 170-242	26.7	2.3	2.1	21.0
3. 243+	15.7	1.7	1.7	23.6
1 : 3	1.91	1.60	1.59	1.00
Cows owned:				
1. None	25.2	2.6	2.2	26.1
2. 1-2	22.8	1.9	2.2	22.6
3. 3+	14.8	1.5	1.5	19.9
1 : 3	1.70	1.70	1.47	1.31
Use of fixed latrine:				
1. No	23.1	2.9	2.6	24.3
2. Yes	22.0	2.1	2.0	23.5
1 : 2	1.05	1.40	1.30	1.03

Source: D'Souza, Stan and Bhuiya, Abbas. "Mortality differentials in rural Bangladesh". *Population and Development Review.* Vol. 8(2) (December 1984): 753-70.

Table 38. Mortality rate per thousand for children of both sexes aged 1-4 years in Matlab by socio-economic characteristics and education of household head, 1974-1977

Characteristics	Education of household head			
	No schooling + Matlab	1-6 grade	7+ grade	All
Occupation of Household head:				
1. Agricultural labour	32.8	26.9	9.5	31.2
2. Owner/worker	23.0	18.5	13.5	19.9
3. Land owner	20.4	8.9	10.4	13.5
All	25.2	19.1	13.1	21.7
Area of dwellings (in sq ft.):				
1. 169	31.4	24.8	17.0	28.9
2. 170-242	26.7	19.6	19.6	23.5
3. 243+	18.3	16.2	11.5	16.2
All	25.3	18.8	12.9	21.5
Number of cows owned:				
1. None	29.2	22.0	14.3	25.3
2. 1-2	22.6	17.6	13.1	19.6
3. 3+	16.9	14.0	10.3	14.8
All	25.3	18.9	13.0	21.5
Use of fixed latrine:				
1. Yes	24.3	18.7	12.6	20.6
2. No	28.7	19.6	16.0	26.0
All	25.3	18.8	12.9	21.5

Source: D'Souza, Stan and Bhuiya, Abbas. "Mortality differentials in rural Bangladesh". Population and Development Reivew vol. 8(2) (December): 753-70.

have lower mortality for all the age groups than people who do not use. Rahman and others (1985) also observed the same pattern of relationship with this variable.

The above four factors in table 37 have shown strong relationship with mortality. These factors are not independent of economic condition of Bangladeshi people, and thus not independent of the effect of education. Table 38 shows increasing results where the effect of education is controlled. These factors do show stronger relation with mortality for the people who have less or no education, but for the higher level of education of household head, the factors appears to have no effect on the variation of mortality. Thus, in absence of education, these factors may be considered as an economic indicator in rural areas, and the variation in economic condition usually spouses with the variation in nutrition level which affects mortality level.

(i) Type of House:

Similarly type of house in table 39 does show influence on the variation of mortality

Table 39. Proportion of children dead by age of mother and types of house, 1974

Age	Type of house			
	1	2	3	4
15-19	0.1459	0.1288	0.1662	0.2013
20-24	0.1524	0.1581	0.1858	0.2176
25-29	0.1411	0.1666	0.2025	0.2242
30-34	0.1837	0.1656	0.2192	0.2379
35-39	0.1824	0.1829	0.2369	0.2466
40-44	0.1936	0.2046	0.2546	0.2747
45-49	0.2245	0.2294	0.2776	0.2931
All ages	0.2089	0.2148	0.2608	0.2799

Source: BRSFM report, table 5.10. p. 113.

Note: House type 1 Characterizes houses with walls of burnt bricks, Concrete or stone, and roof of tiles and cement.

House type 2 Charaterizes houses with walls of burnt bricks, Concrete or stone and roofs of corrugated iron.

House type 3 Characterizes houses with walls of mud, unburnt bricks or corrugated iron and roofs of corrugated iron.

House type 4 Characterizes houses with walls of mud or unburnt bricks and roofs of thatch or reeds.

level. People who have houses characterised with walls of burnt bricks, concrete or stone, and roof of tiles and cement, have lower mortality level as opposed to the people who have houses characterised with walls of mud, unburnt bricks and roofs of thatch or reeds. That is, the house type 4 appears to have 34 per cent higher mortality level than the house type 1. The age specific mortality pattern also varies in similar manner. In sum, the better the housing condition, the lower the mortality level.

(j) Marital Status of Mother:

Table 40 presents an interesting relationship between proportion of children dead and marital status of mother. With current marital status, proportion of children dead for married women is found to be 37 per cent lower than the divorced women, and 15 per cent for widow. Proportion of children dead with women currently married and married once only is found to be the lowest compared to other categories, and the highest proportion of children dead is observed to be with women currently divorced and married more than once, which is almost 68 per cent higher than the lowest. Comparing the proportion of children dead of widow married once with that of the widow married more than one, the latter shows 19 per cent higher mortality level. Similarly women divorced and married more than once have 30 per cent higher proportion of children dead than women divorced and married once. In sum, multiple marriage has positive relation with mortality of children. The higher mortality is associated with divorce may be due to the conflict of divorced parents in bearing the child care expenses and children's shelter, but this conflict does not arise with widow. Widow mother faces the problem of economic support rather than the conflict.

(k) Community Characteristics

Table 41 shows mortality rates of several community characteristics. The mortality rates of neonatal, post-neonatal, infant and child have shown direct relation with the distances of upazila headquarter, family planning clinic, government dispensary, hospital, primary school, and qualified and other doctors. The rates increase as the distance of these places increase from the respondents' places. Other than primary school, all these places are the sources of medical help. Although nearness of primary school does not increase medical help to the needy people, it has some indirect influence in the community through education such as increase of the knowledge of preventive measures. Other factors such as dai (traditional birth attendants), number of visits by fieldworker, occurance of natural disaster, and epidemics do not show any systematic pattern with mortality rates. It should be noted here that when the survey was conducted the family planning workers and dais did not have any formal or informal training in primary health care or preventive measures for diseases; therefore, availability of them did not make any effect on health related problems. This is part of the reasons for not showing any systematic relation with mortality rates. Thus the community characteristics have sufficient influence on the mortality levels of the community.

C. ADULT MORTALITY

The discussion of the previous section has already encompassed the issue of adult mortality. Table 42 presents the probabilities of survival estimates on the information on orphanhood of all female respondents. The age specific paternal survivals are fairly lower than their corresponding maternal survivals. These differences increase with the increase of age. Two causes other than the health related causes may be concieved here. In general, male mortality risk after age 40 is found higher in most of the societies. particularly in developing countries where men is bread-winter. They are expected to strive for the existence in the market place in all sorts of odds, which increase the risk of their death. Second, the age-differences between spouses is also an important factor for enhancing the difference in paternal and maternal survivals. A similar pattern of paternal and maternal mortality differentials is observed from the information based on orphanhood of eldest surviving children in table 43.

Table 44 also presents somewhat similar pattern of mortality relationship between the sexes from the information based on widowhood. The age specific proportion of survival men with first wife alive is consistently higher than the proportion of women with first husband alive. The differences between these proportions rapidly increase with the increase of age. The proportion of women with husband alive for the last age group appears to be almost half of the proportion of men with wife alive, which is attributed to the sex differential mortality.

In developing countries, researchers and policy makers are more concerned about child and maternal mortality than adult mortality, but in developed countries adult mortality has also got substantial importance. For instance, mortality due to the accident, cardio-vascular diseases, homocide, suicide and alcoholism are deeply rooted in social condition. Social scien-

Table 40. Proportion of children dead by age, and current and transition of marital status of ever married women, 1974

Age	Current marital status			Transition of marital status					
	Married	Widowed	Divorced	Married and married once only	Married and married more than one	Widowed and married once only	Widowed and married more than one	Divorced and married once only	Diviorced and married more than one
15-19	0.1838	0.2385	0.2567	0.1821	0.2283	0.2105	0.6006	0.2336	0.3851
20-24	0.2018	0.2438	0.3225	0.1995	0.2464	0.2339	0.3337	0.2911	0.4416
25-29	0.2127	0.2343	0.2561	0.2094	0.2618	0.2303	0.2727	0.2196	0.3890
30-34	0.2266	0.2624	0.2512	0.2233	0.2652	0.2605	0.2804	0.2111	0.3687
35-39	0.2367	0.2779	0.3065	0.2324	0.2836	0.2775	0.2810	0.3066	0.3064
40-44	0.2572	0.3000	0.4361	0.2523	0.2977	0.2958	0.3346	0.3927	0.5392
45-49	0.2769	0.3096	0.3368	0.2703	0.3395	0.3024	0.3649	0.3192	0.3883
All ages	0.2605	0.2994	0.3563	0.2560	0.3114	0.2938	0.3499	0.3328	0.4326

Source: BRSFM Report. Tables 5.2 and 5.3, pp. 103-104.

Table 41. Mortality rates by community characteristics: rural women

Characteristics	Mortality rates[a]			
	Neonatal[b]	Post-neonatal[b]	Infant[b]	Child[c]
Distance to Upazila HQ:				
∠ 4 miles	71	67	134	80
5-9 miles	78	63	136	94
10+ miles	91	68	152	102
Distance to FP Clinic:				
∠ 3 miles	73	66	134	63
3-9 miles	75	64	134	99
10+ miles	94	64	152	98
Distance to govt. dispensary:				
∠ 3 miles	78	63	136	84
3-9 miles	82	65	142	95
10+ miles	76	79	149	107
Distance to hospital:				
∠ 3 miles	72	57	124	73
3-9 miles	80	64	139	95
10+ miles	85	71	150	101
Distance to qualified doctor:				
In village	68	69	132	62
1-4 miles	77	61	133	93
5+ miles	86	70	149	100
Distance to other doctor:				
In village	75	64	134	96
1-2 miles	82	59	136	96
3 miles	88	69	151	70
Distance to Dai (IBA):				
In village	79	62	136	92
1-2 miles	72	57	126	82
3 miles	85	76	155	102
Distance to primary school:				
In village	77	60	133	95
1 mile	82	84	159	85
2+ miles	105	91	187	74
Number of visits by fieldworker:				
No visits	56	43	97	129
1-12 visits	90	53	138	91
13-24 visits	83	71	148	78
25+ visits	76	70	140	102
Natural disaster:				
Did not occur	90	69	153	91
Occured, no deaths	77	66	138	85
Occured, some deaths	72	58	126	107
Epidemic:				
Did not occur	81	73	147	94
Occured, no deaths	69	42	108	76
Occured, some deaths	81	62	138	95

Source: Al-Kabir, Ahmed; 'Effects of community factors on infant and child mortality in rural Bangladesh'. *Scientific Reports*, Number 56 (July 1984). World Fertility Survey, London. Table 9. Bangladesh Fertility Survey is the source of data.

Note: [a] Death per 1,000 exposires.

[b] Calculated for births occuring 12-71 months before survey date.

[c] Calculated for births occuring 60-119 months before survey date.

tists consider modernization, such as urbanization and industrialization, has some relation with the incidence of death due to these causes. In a society of rapid transition, incidence of these deaths is very high. Although Bangladesh is not a rapidly changing society, incidence of these deaths is gradually increasing.

D. MATERNAL MORTALITY

Level and pattern of maternal mortality indicate the situation of maternal health in the country as status of health of mothers is normally assessed through measurement of mortality and morbidity level of mothers. This is an important information in formulating policy for maternal and child health programme. There has not been much study done in this area on a regular basis. Table 45 presents maternal mortality rate from various studies for different periods. Discussion on the trend become difficult because this estimate has strong tendency to fluctuate with some under-enumeration and overenumeration of live births and maternal deaths due to pregnancy related and child birth causes. However, it definitely throws some light about the level and pattern of changes over the time. Based on the information from hospital, Islam (1971) estimated a maternal mortality 20 per 1,000 live births for 1950s, which appears to be a very high estimate. Department of health in 1958, provided an estimate of 6.6, considerably very low. Another study at Dhaka Medical College Hospital reported a very high maternal mortality rate, 34 per 1,000 (Robinson, 1967). Robinson

Table 42. Probabilities of survival from orphanhood of all female respondents, 1974

Age group of respondents	Age N	Paternal mortality			Maternal mortality		
		Proportion with father alive	35+N	$\frac{1(35+N)}{1(32\text{-}½)}$	Proportion with mother alive	25+N	$\frac{1\ (35+N)}{1(25)}$
15-19		0.816		0.813	0.898		0.888
	20		55			45	
20-24		0.717		0.718	0.839		0.832
	25		60			50	
25-29		0.589		0.579	0.751		0.748
	30		65			55	
30-34		0.439		0.411	0.636		0.636
	35		70			60	
35-39		0.309		0.253	0.513		0.509
	40		75			65	
40-44		0.202			0.387		

Source: Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality. Table 4.7. p. 85.

Table 43. Probabilities of survival from orphanhood of eldest surviving children (females only), 1974

Age group of respondents	Age N	Paternal mortality			Maternal mortality		
		Proportion with father alive	30+N	$\frac{1(30+N)}{1(30)}$	Proportion with mother alive	25+N	$\frac{1(25+N)}{1(25)}$
15-19		0.861			0.908		
	20		50	0.848		45	0.865
20-24		0.764			0.844		
	25		55	0.756		50	0.800
25-29		0.661			0.783		
	30		60	0.659		55	0.703
30-34		0.516			0.677		
	35		65	0.519		60	0.588
35-39		0.372			0.560		
	40		70	0.380		65	0.459
40-44		0.264			0.428		

Source: BRSFM Report. Table 4.7. p. 86.

(1967) informed 13 as the minimum rate in the final report of the Population Growth Estimation Experiment, and it might be as high as 40. The Public Health Association of Pakistan announced maternal mortality rate as 25.4 per 1,000 live births for 1968. In First Five Year Plan, Planning Commission used 30 as the level of maternal mortality rate. On the other hand, the recent estimates of ICDDR, B Alauddin Khan and BAMANEH appear to be fairly low as compared to the above estimates and more consistent. These estimates show a declining trend in maternal mortality rate; however, these are still very high rates com-

Table 44. Probabilities of survival from widowhood

Age group of respondents	Age N	Male respondent: Proportion with first wife alive	N-5	1(N-5) / 1(17½)	Female respondent: Proportion with first husband alive	N+5	1(N+5) / 1(22½)
25-29		0.953			0.941		
	30		25	0.931		35	0.932
30-34		0.932			0.875		
	35		30	0.914		40	0.888
35-39		0.915			0.839		
	40		35	0.875		45	0.834
40-44		0.876			0.751		
	45		40	0.841		50	0.751
45-49		0.841			0.677		
	50		45	0.792		55	0.680
50-54		0.792			0.545		
	55		50	0.759		60	0.550
55-59		0.759			0.439		
	60		55	0.716		65	0.440
60-64		0.715			0.306		

Source: BRSFM report, Table 4.9, p. 86.

Table 45. Maternal mortality rates (per 1,000 live births) found in studies of various organizations in Bangladesh

Organization	Study area	Study time	Maternal mortality rate
Islam[a]	Hospital-based estimate	1950s	20.0
Department of Health[b]	Nation	1958	6.6
PGE[c]	–	1962-65	13.0
ICDDR,B[d]	Matlab	1967-68	7.7
ICDDR,B[d]	Matlab	1968-70	5.7
Khan and others[f]	Islampur in Jamalpur	1982-83	6.2
Alauddin[g]	Gopalpur and Bhuapur	1982-83	5.7
BAMANEH[e]	Chandina, Gabtali and Tongi	1982-83	4.8

Source: [a] Islam, A.F.M. Nurul, "Maternal Mortality in East Pakistan". *East Pakistan Medical Journal* 1971, vol. 5(3).

[b] Report of the Directorate of Health Services in East Pakistan, 1958. Vital Statistics. Government of East Pakistan.

[c] Final report of the population growth estimate experiment (1962-1965), 1971, Dhaka: Pakistan Institute of Development Economics.

[d] Ohen, Lincohn C and others "Maternal Mortality in Rural Bangladesh". *Studies in Family Planning.* November 1974, 5(1), pp. 334-341.

[e] National Strategy for A Comprehensive Maternal and Child Health Programme (Report of MCH Task (Four) Ministry of Health and Population Control Wing, Dhaka, January 1985.

[f] Khan, A.R. Akhter, J.F.; Begum, S.F. "Maternal mortality in rural Bangladesh: The Jamalpur district". *Studies in Family Planning,* January, 1986, vol. 17(1), pp. 7-12.

[g] Alauddin, M.; "Maternal mortality in rural Bangladesh: The Tangail Districts". *Studies in Family Planning.* January, 1986, vol. 17(1), pp. 13-21.

BAMANEH : Bangladesh Association for Maternal and Neonatal Health.

pared to other developing and developed countries, such as Japan has only 0.41 per 1,000 live births, 2.22 in Thailand, 2.21 in Sri Lanka.

(a) Maternal Age:

Table 46 shows the relationship between maternal age and maternal mortality for 1968-1970 and 1982-1983. The distribution of age-specific maternal mortality rate has a U-shaped pattern for both the period. For the period 1968-1970, the high risk of maternal mortality was found to be with mother under age 15. Since then the risks started declining sharply, and reached the lowest level at ages 20-24. After age 25, the risk started increasing again. For the period 1982-1983, two sets of age specific maternal mortality rates has been presented: one with abortion related death and other without abortion related death. Comparing these two sets of rates, abortion related maternal mortality rates appear to be much higher for teen-age mothers and again it increases after age 25. About 20 per cent of maternal deaths is accounted for abortion related deaths. For both the periods the distribution pattern of the rates appear to be the same. But the rates of ages 35-39 is observed to be consistently lower for both the periods than the preceeding and following age groups. It is difficult to provide any substantive explanation for the fact without further inquiry.

(b) Parity:

Parity specific maternal mortality rate is exhibited in table 47. Parity in this table refers to the number of completed live births experienced by the mother prior to the pregnancy. Parity shows a positive relation with maternal mortality during 1968-1970, but the distribution has somewhat U-shaped pattern in 1982-1983. For 1968-1970, parity zero shows the highest risk of mortality, 9.9 per 1,000 live births. After the risks declines very sharply and reaches the lowest at parity two, 2.3 per 1,000 live births. Again the risks increase as the parity increases. During the period 1982-1983, the lowest rate is found to be at parity four, which was at parity two for 1968-1970. After parity four, mortality again increases. Abortion related mortality is not same for all the parity. The higher mortality appears to be with parity zero, three, five and six, 1.06, 1.92, 1.85 and 4.97 per 1,000 live births respectively. Since the conception due to premarital and extra marital sexual relation is very rare in the society, these abortion related mortality may be related to the fact of unwanted pregnancy. If the women had clear idea about the reliable contraception, these mortality would not possibly occur.

(c) Gravidity:

Table 48 presents maternal mortality by gravidity. Gravidity in this table refers to the number of pregnancies experienced by a woman prior to the birth or death event examined in the study. During 1968-1970 mortality for gravida zero appears to be unusually very high. After this, the rates fall sharply and stay about 2.4 for gravida 1 to 3, and the mortality climbs with multigravida women, and sustained the rate at about 6 per 1,000 live births for five or more gravidity. For the 1982-1983, the mortality for gravidity zero is

Table 46. Maternal mortality rates per thousand live births by maternal ages

Maternal ages	Maternal mortality rate				
	1968-1970[a]		1982-1983[b]		
	Rate	Number of live birth	With abortion related death	Without abortion related death	Number of live birth
10-14	17.7	509	–	–	–
15-19	7.4	3 907	8.6	6.5	930
20-24	3.8	5 544	2.5	2.5	2 811
25-29	5.2	5 742	5.4	4.0	2 230
30-34	6.2	3 206	9.0	7.4	1 225
35-39	4.8	1 461	6.5	6.5	767
40-44	8.1	368	9.6	7.7	522
45-49	0.0	79	–	–	–
All ages	5.7	20 816	5.7	4.7	8 485

Source: [a] L.C. Chen and others "Maternal mortality in rural of Bangladesh". Ford Foundation, Dhaka. (October, 1974).

[b] Alauddin, M. "Maternal mortality: A study of two upazilas in Bangladesh". *Contraceptive Practice in Bangladesh: Safety Issues.* Dhaka: PIACT/PATH (December 1984): 83-119. Table 2.

less than half of the earlier period. The lowest rates 3.7, is observed at gravidity 2 for the rates including abortion, and at gravidity 3 for the rates excluding abortion; and the highest rate is at gravidity 6. Comparing the rates of two panels, a very high level abortion related mortality is observed at gravidity 3 and 6. This may be an implication that women had intention for controlling births of higher order, but the reliable family planning methods were not available otherwise there would not be abortion related deaths.

(d) Economic Solvency:

Table 49 presents the relationship between maternal mortality and socio-economic factors: economic solvency, land ownership and educational attainment of women. In the scale point of economic solvency, the highest maternal mortality is observed for economically surplus group of people, who have also very high abortion related mortality rate. The relationship was expected to be reversed; however, the cost involved in abortion is probably the underlying

Table 47. Maternal mortality rate per thousand live births by parity

Parity	Maternal mortality rate				
	1968-1970[a]		1982-1983[b]		
	Rate	Number of live birth	With abortion[c] related death	Without abortion[c] related death	Number of live birth
0	9.9	4 132	3.8	2.74	1 826
1	2.8	2 471	3.7	3.19	1 878
2	2.3	2 653	4.2	4.18	1 435
3	4.8	2 518	5.7	3.78	1 057
4	4.3	2 339	2.8	2.75	727
5	5.9	2 021	9.1	7.25	552
6	5.2	1 726	14.9	9.93	403
7+	7.4	2 956	14.9	14.91	607
All	5.7	20 816	5.7	4.71	8 485

Source: [a] Chen, L.C. and others "Maternal mortality in rural Bangadesh". *Studies in Family Planning* (1974) 5(ii): 334-341.

[b] Alauddin, M. "Maternal mortality: A study of two upazilas in Bangladesh". *Contraceptive Practice in Bangladesh: Safety Issues.* Dhaka: PIACT/FATH (December 1984): 83-119.

[c] The denomenators are the same for these two categories.

Table 48. Maternal mortality rate per thousand live births by maternal gravidity, 1968-1970 to 1982-1983

Gravidity	1968-1970[a]		1982-1983[b]		
	Rate	Number of live birth	With abortion[c] related death	Without abortion[c] related death	Number of live birth
0	12.7	3 139	5.53	4.42	1 809
1	2.4	2 930	4.31	3.77	1 855
2	2.6	2 693	3.42	3.42	1 460
3	2.4	2 477	3.82	1.91	1 045
4	4.7	2 319	8.01	8.01	749
5	6.0	2 001	7.23	7.23	553
6	6.8	1 762	12.59	5.04	397
7+	6.9	3 495	9.72	9.72	617
All	5.7	20 816	5.66	4.71	8 485

Source: [a] L.C. Chen and Others (1974).

[b] Alauddin, M. (1984).

[c] The denomenators are the same for these two categories.

Table 49. Maternal mortality rate per thousand live births by selected socio-economic factors

Socio-economic factors	Maternal mortality rates		Number of live birth
	With abortion related death	Without abortion related death	
Solvency Status:			
Economic hardship	3.13	2.35	1 279
Deficit	5.65	5.02	4 780
Solvent	6.21	5.65	1 770
Surplus	9.15	6.10	656
Landsize in acre:			
0- .50	5.30	4.70	3 401
.51-1.00	4.59	3.82	1 388
1.01-2.00	4.80	3.43	1 458
2.01-3.00	10.29	9.26	972
3.01+	5.84	4.20	1 199
Maternal Education:			
No education	3.23	2.85	5 258
Literate	8.22	6.29	2 068
Primary	14.31	11.44	699
Secondary	8.70	8.70	460
All	5.66	4.71	8 485

Source: Alauddin, M. "Maternal mortality: A study of two upazilas in Bangladesh". *Contraceptive Practice in Bangladesh: Safety Issues.* Dhaka: PIACT/PATH (December, 1984): 83-119.

reason for such relation. Poor people cannot afford to bear the cost of abortion, although they have strong desire for controlling family size. In rural areas, local untrained dais perform most of the abortions in a very crude and traditional manner.

(e) Land Ownership:

Land ownership of families also show certain pattern of relationship with maternal mortality. Families with less than 50 acres of land have 5.30 maternal deaths per 1,000 live births, which is higher than the families having land 51 to 200 acres. Families having 201 to 300 acres of land have the highest death rate, but families having more than 300 acres of land have much lower mortality rate. Abortion related mortality appears to be higher for larger land holders.

(f) Maternal Education

Maternal education shows somewhat positive relationship with maternal mortality, which is an unexpected relationship. Maternal education is expected to have negative relation with maternal mortality through knowledge of health care system and nutritional status. The highest mortality, 14.31 per 1,000 is observed to be associated with women having primary education, and the lowest rate, 3.23, is with women having no education. Abortion related death is found to be very high for women with primary education.

In sum, the above factors present an unexpected result with maternal mortality. The underlying reasons are yet to be evaluated, however, some plausible explanation may be made. The above situation indicates that middle class people are more concerned about limiting their family size. They even consider abortion for unwanted pregnancy. Not many places are available in rural areas where menstrual regulation (MR) are done, so they go to local untrained people for abortion; therefore, this results in high proportion of maternal deaths due to septic abortion.

E. SEASONALITY IN MORTALITY

Like other aspects of demographic parameters, mortality in Bangladesh also show some seasonal pattern. Becker and Sarder (1978) observed some sort of relation in seasonalities of infant deaths, neonatal deaths and births. The peaks of births are found to be followed by the peaks of neonatal deaths and it is about one month after the peak of birth. For post-neonatal deaths, they observed a slight peak in March-May. Effort was made to link the variation of socio-economic status with the seasonality. No significant relation was found in neonatal mortality; however, in families where the household head with no formal education, did show slight seasonality in post-neonatal mortality. In general, post-neonatal mortality of lower socio-economic class is more responsive to seasonality than that of upper socio-economic class.

Figure 3 presents seasonality of child mortality of age 1 to 4 years for 1976 to 1979. In contrast to the observation of Becker and Sarder, the figure shows one peak in March-April 1976 and another in September-November 1977. However, the seasonal fluctuation is not too well pronounced. This fluctuation is not independent of the economic condition of the rural people during these months. Both the periods of peaks are just before the harvesting periods. Farmers having shortage in yearly food stock face economic problem for purchasing food from market. This has direct impact on health condition of the people. Besides employment opportunities in rural areas also become poor during this period. This might be an underlying link of seasonality in mortality with the seasonality of economic solvency.

To summarize, differentials are observed due to various socio-economic and demographic factors. High mortality is associated with rural, illiterate, poor and low caste Hindu people.

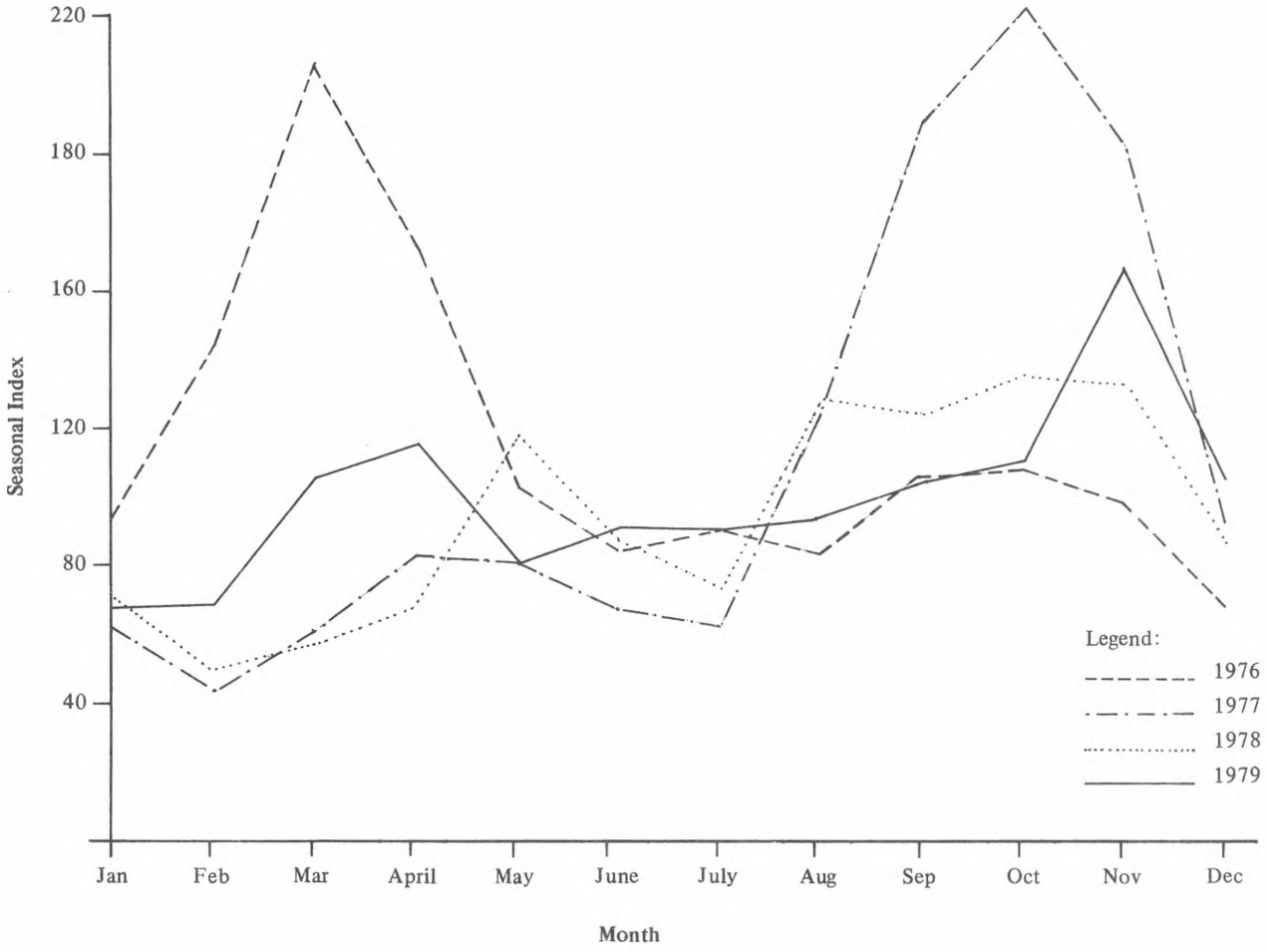


Figure 3. Seasonal variation of child mortality of age 1-4 years, Matlab

During the first year of age, male mortality is higher than female mortality, and later on female mortality stays higher than male mortality. Land owners have lower risks of mortality than the agricultural labour. The influence of mother's education is observed to be stronger than the effect of the education level of household head and any other member of the family. Use of latrine, area of dwelling house and possession of number of cows have shown negative relation with child mortality. Besides, parity has shown somewhat positive relation with infant mortality level.

With maternal mortality, age of mother at the pregnancy termination, parity and gravidity have somewhat U-shaped pattern of the distribution of risks of mortality. The risk of abortion related deaths has the same pattern of distribution of deaths.

Socioeconomic factors also play important role in the variation of maternal deaths. Unexpectedly women's education, economic solvency and possession of land have positive relation with the risks of maternal mortality. The proportion of abortion related deaths follows the same pattern of risks with these factors.

A seasonality is observed with infant mortality. There are two periods – March-April and September-November – of high mortality in the year. These periods are just prior to the harvesting periods of crops, and relate to the scarcity of pure drinking water.

IV. CAUSES OF DEATH AND MAJOR HEALTH PROBLEMS

A. MORTALITY DYNAMICS

Thus far the discussion was mainly focussed on the trends and differentials of mortality. This section concentrates on the dynamics of mortality. The proper study of the mortality dynamics and morbidity is limited by identification of causes and completeness of the information about the causes of deaths. With the changes of time, risk of deaths due to certain diseases changes as curative measures become available to people. Even in course of time some diseases become undetectable such as smallpox. Similarly, some new diseases also become visible as the scientific development takes place. This section attempts to demonstrate an overall situation of severity of deaths by various causes in the country.

Table 50 presents a trend of mortality level by various causes. In trend analysis, a rapid decline in mortality observed since after the World War Two, and particularly the decline was very sharp during the period 1951-1961. This is considered to be the result of continuation and expansion of limited health programme for communicable diseases. Among other diseases, malaria and tuberculosis were considered as major causes of deaths. During the period 1901-1911, malaria caused about 72.3 per cent of deaths among other causes. Until 1951, at least 150,000 used to die every year due to malaria. Compared to other Asian and African countries, Bangladesh was less affected by malaria.

In early 1960s the government undertook a programme of better health care for people. Malaria had been controlled, and target of malaria eradication were achieved in 1975. By 1977, the programme of malaria eradication was almost complete and full control of malaria was achieved. However, incidence of malaria still prevails in northern and southern part of the country.

Smallpox is now declared as an undetectable disease. Until mid 1950, smallpox was also considered as one of the diseases contributing to the high death rate. The incidence of smallpox was at the peak during 1950-1960. In 1958, the government undertook smallpox eradication programme. The goal was achieved in 1970. But there was some incidence of smallpox after the war of independence, and it happened primary in the refugee camps. However, by 1976 it was again found completely eradicated.

Cholera was also one of the deseases responsible for high death rate. In the rural areas, people used to be very afraid of cholera. This is a highly seasonal disease : one peak was in March-April and another peak was September-November. The germs are usually spread by drinking water or food-water contaminated with fecal matter from infected individuals. During these periods of the year people face scarcity of pure water for drinking as well as washing. Every year in the past, about 25,000 people used to die of cholera, and it was about 10,000 in 1958 (Cockburn, 1960). During 1972-1973, the cholera cause 1.4 death per 1,000 population. Cholera still frequently occurs in rural areas although the table does not show such evidence. It is because ICDDR,B has a programme of eradicating diarrhoeal disease from Matlab and the table represents a picture of Matlab not the whole country. Until 1976 diarrhea and dysentery were one of the major causes of deaths. Even now the situation has not improved much.

Incidence of diarrhoeal and dysentery diseases is deeply connected with economic condition of the people. In rural areas, people face scarcity of fuel for cooking particularly in pre-harvesting periods. About 60 per cent of the fuel comes from crop residues *(nara, kher,* husks, jute sticks). Poor people mostly depend on crop residues, cow dung and other dried plants. Their stock of fuel sometimes are not sufficient for their yearly need. Consequently limited fuel make them unable to cook several times a day in order to feed young children adequately and purify drinking water. Bacterial contamination always stays in weaning food. Black and others (1982) observed 41 per cent E. coli and 100 per cent other bacteria in a 500 food sample.

Besides, practice of storing cooked food without refrigeration. Food cooked in the morning are saved for afternoon meal in order to save fuel as well as cooking time. Rural mothers are involved with many activities of the household. While rearing children, they get very little time to spend for taking care of their children. Therefore, these problems should be highlighted in policy making.

Table 50. Percentage distribution of deaths by specific cause for selected years

Causes	Death rates per 1000 population 1950-1960	Percentages						
		1901-1911	1950-1960	1976	1979	1980	1981	1982
Small pox	0.2	7.4	2.5	–	–	–	–	–
Measles	–	–	–	–	4.1	3.2	3.7	1.5
Tetanus	–	–	–	–	14.8	19.8	15.4	15.3
Drowning	–	–	–	–	3.1	2.8	3.0	1.8
Murder	–	–	–	–	0.2	0.3	0.1	0.3
Suicide	–	–	–	–	0.2	0.3	0.1	0.3
Diarrhoea	3.0	2.5	14.9	15.5	3.4	4.0	3.2	5.6
Dysentery					10.6	9.4	7.7	10.6
Jaundice	–	–	–	–	0.8	0.9	1.5	1.5
Diseases of G.I.	–	–	–	–	0.9	3.2	2.8	3.6
Respiratory	1.0	0.5	4.9	20.9	11.3	8.8	12.6	16.0
Heart disease	–	–	–	–	1.0	1.6	0.8	1.3
Liver disease	–	–	–	11.4	2.0	0.4	1.8	1.5
Veneral disease	–	–	–	–	–	0.1	0.1	–
Skin disease	–	–	–	–	0.7	0.8	0.4	0.7
ENT disease	–	–	–	–	0.2	0.6	0.7	0.6
Cholera	0.5	7.4	2.5	–	–	0.1	–	–
Dropsy	–	–	–	–	7.1	8.6	8.0	6.0
Rheumatism	–	–	–	–	3.6	4.1	4.3	4.4
Accident	–	–	–	–	0.2	0.5	0.3	1.4
Old age	–	–	–	–	3.7	4.0	3.2	2.3
Fever	–	–	–	4.5	6.1	9.3	5.8	7.5
Malaria	3.0	72.3	14.8	0.1	–	–	–	–
Typhoid	3.0	–	14.9	0.6	–	–	–	–
Tuberculosis	2.5	–	12.4	4.8	–	–	–	–
Cancer	–	–	–	19.8	–	–	–	–
Diabetes	–	–	–	3.6	–	–	–	–
Blood deficiency	–	–	–	2.8	–	–	–	–
Childbirth	2.0	–	9.9	4.4	1.2	0.6	0.7	0.3
Other	5.0	17.3	24.7	5.7	24.7	16.7	23.6	17.5
Total	20.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: W.C. Robinson, ed., Studies of Demography in Pakistan (Karachi, Pakistan Institute of Development Economics, 1967); C.A. Gourlay, "Observation on the collection of vital statistics in the Province of East Bengal and Assam". Unpublished M.D. Thesis, Glasgow University, United Kingdom, 1912; Death Statistics at the Dhaka Medical College, Dhaka during 1976; Demographic Surveillance in Matlab, ICDDR,B, for 1979-1982.

During 1950-1960, tuberculosis and typhoid were equally important causes for deaths. About 1,000,000 people used to die every year due to tuberculosis although the reported death was far below than actual (Cockburn, 1960). To protect lives from death due to tuberculosis, the government has undertaken an immunization programme, BCG. From the table it appears that typhoid and tuberculosis have completely been controlled.

A significant portion of deaths remained undetected. This limits the scope of mortality and morbidity study. This fact is also observed in developed countries.

Figure 4 delineates the trends of child mortality over the period 1971 to 1982 in Matlab for dysentery, diarrhoea, respiratory diseases, measles, fever and tetanus. Dysentery, tetanus and measles have somewhat different trend than the others. In 1974, dysentery was the major cause for child mortality, and since then it shows gradually declining trend until 1977. Again deaths due to dysentery show an increasing trend. It is not clearly known why dysentery became so insignificant in 1977 but in the same year about 25 per cent of child death was caused by tetanus. No other causes were so priminent in that year. In 1976, dysentery and measles were two important causes of child death. The general observation is that the death pattern due to the above causes did not show any significant pattern before 1977 as after

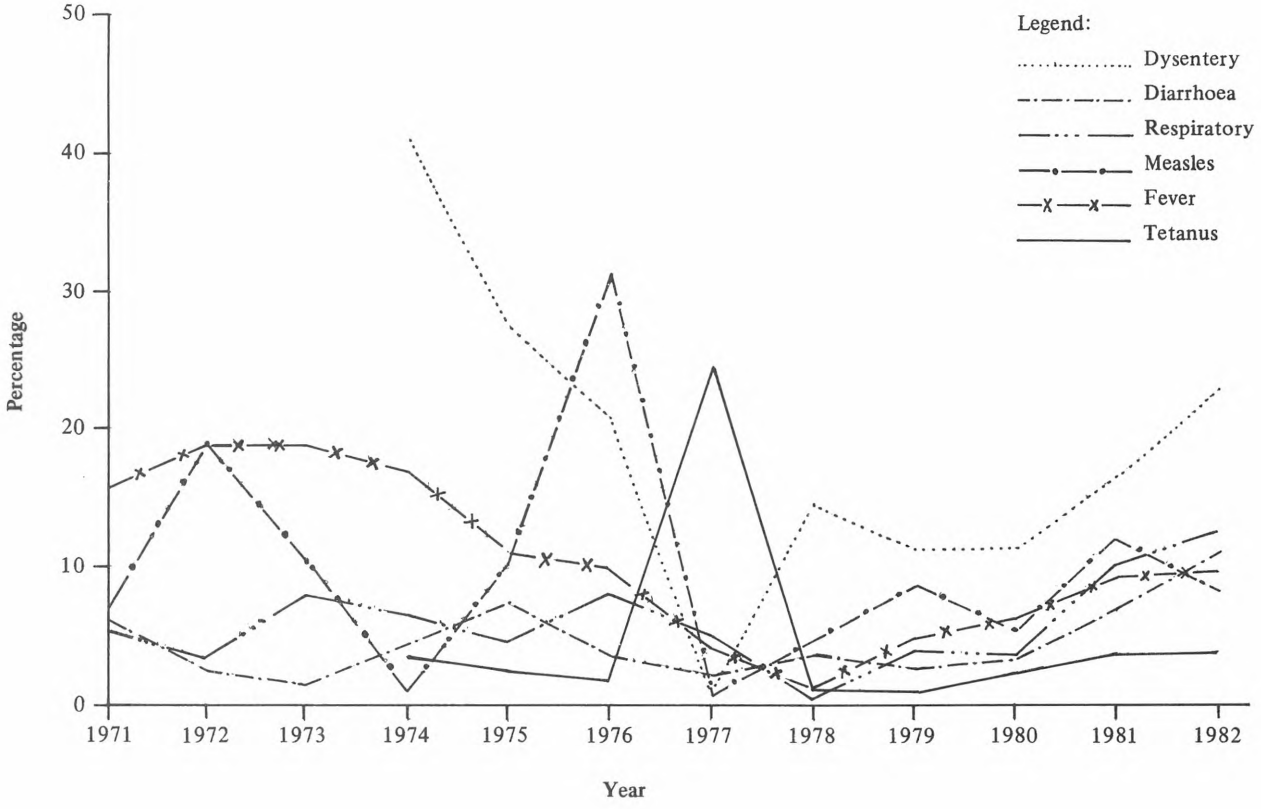


Figure 4. Trends of child mortality of age 1-4 years for six different diseases, Matlab

1977. It is generally expected that mortality situation will gradually be improving as the various developmental programmes are implemented, which was observed in many countries in the past. However, the trends of the above diseases show somewhat consistent pattern after 1977. Death rates due to these causes are found to have increased. This may be the effect of economic condition via nutrition. However, without proper investigation it is difficult to comprehenced the fact correctly. It should be noted here that the identification of causes of death has done on the basis of information provided by the field staffs, who did not have paramedic training. The field staffs usually collect this information from the family numbers of the deceased. Therefore, the question about full reliability cannot be assured. However, this information does provide some basis to observes the dynamics of mortality in general.

Table 51 presents short trends of infant deaths due to various causes. Tetenus causes about 45 per cent of infant deaths. The second important disease is respiratory disease. which causes about 15 per cent of infant deaths. Although diarrhoea and dysentery are not as strong a cause as the above two, they also count about 9 per cent of deaths. A very high proportion of decease remains undetected

Table 51. Percentage distribution of infant deaths by specific cause for selected years

Cause	Percentage of total deaths			
	1979	1980	1981	1982
Small pox	–	–	–	–
Measles	1.4	2.0	1.8	1.3
Tetanus	39.5	55.8	43.1	44.9
Drowning	0.6	0.7	0.4	0.5
Diarrhoea	2.4	2.6	2.5	5.9
Dysentery	1.8	1.4	1.5	3.1
Jaundice	0.1	0.3	0.3	0.4
Disease of G.I.	–	0.3	–	0.4
Respiratory	10.6	6.8	13.2	14.7
Liver disease	0.1	–	0.6	0.4
Skin diseas	0.9	0.9	0.5	0.8
ENT disease	–	0.1	0.1	0.3
Cholera	–	–	–	–
Dropsy	0.5	0.8	0.6	0.7
Rheumatism	1.2	0.8	1.8	0.7
Accident	–	–	–	0.5
Fever	3.5	6.4	2.4	5.6
Other	37.4	21.1	31.2	19.8
Total	100.0	100.0	100.0	100.0

Source: International Centre for Diarrhoeal Disease Research, Bangladesh. *Demographic Surveillance System – Matlab*, Volume 9, 10, 11 and 12.

about their causes of deaths, which creates complexity in mortality and morbidity research, and it is due to lack of availability of proper medical facilities in rural areas.

Table 52 explains whether people of a sex group are more prone to be attacted by a particular disease, and whether this happens for a particular age group. The risk of female death due to measles is somewhat higher than male. About 10.3 per cent of female of ages 1 to 4 die due to measles as opposed to 5.7 per cent for male. Tetanus seems to be the strongest cause for infant deaths. The risk of infant death due to tetanus appears to be little higher for female than male. However, the percentages for all ages are higher for male, which is because of higher male deaths after age one.

The percentage of deaths due to dysentery for female children of ages 1 to 4, 26.2 per cent, is much higher than the male, 17.3. The difference is unusually very high. It is difficult to apprehend any causes for this; however, sex differential child care may also be a fact for such differences, but the difference for infants is only 2 per cent. Although diarrhoeal deaths follow similar directions of sex difference, the differences are found to be minimal. A somewhat similar pattern of difference of risk of death is observed for dropsy.

Respiratory disease has shown the reverse pattern of sex differences as observed with dysentery and diarrhoea. Surprisingly a very high percentage, 18.2 per cent, of male children of ages 1 to 4 die because of respiratory diseases as opposed to 9.4 per cent for female.

Deaths due to fever is much higher for male children of ages 1 to 4 than the female, but the risk of death for all ages is somewhat higher for female than male. The risk of male death due to unidentified causes appear to be fairly higher than female.

The observations discussed in above is completely based on the information of Matlab. These results may not truely represent the country because of areal variation of socio-cultural factors as well as differences in health programme. Several studies pointed that although Bangladesh

Table 52. Percentage distribution of deaths by age and sex, 1982

Causes	Male			Female		
	All ages	Under 1	1-4	All ages	Under 1	1-4
Small pox	–	–	–	–	–	–
Measles	1.4	0.9	5.7	3.4	1.7	10.3
Tetanus	16.3	43.4	4.2	15.5	46.4	3.7
Drowning	1.9	0.4	8.3	2.4	0.5	6.6
Murder	0.2	–	–	0.2	–	–
Suicide	0.2	–	–	0.4	–	–
Diarrhoea	5.2	6.8	9.9	6.8	4.8	11.7
Dysentery	8.9	2.0	17.3	15.4	4.3	26.2
Childbirth	–	–	–	1.1	–	–
Jaundice	1.4	0.7	1.0	1.3	–	0.6
Disease of G.I.	4.2	0.4	0.5	2.3	0.2	0.6
Respiratory	17.4	15.1	18.2	10.4	14.3	9.4
Heart disease	1.6	–	–	0.5	0.5	–
Liver disease	1.7	0.4	0.5	1.1	0.2	1.1
Veneral disease	–	–	–	–	–	–
Skin disease	0.7	0.9	2.1	0.6	0.7	1.1
E.N.T. disease	0.7	0.7	2.1	0.4	–	0.6
Cholera	–	–	–	–	–	–
Dropsy	5.6	1.1	3.6	7.4	0.2	6.6
Rheumatism	4.5	0.4	1.0	4.2	1.2	1.7
Accident	1.5	0.7	1.0	1.0	0.5	0.8
Old age	2.0	–	–	2.2	–	–
Fever	7.2	4.5	12.0	7.7	6.7	8.3
Others	17.4	21.6	12.6	15.7	17.8	10.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Demographic Surveillance System – Matlab, 1982, Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh. Volume 12.

is a small country, there is significant variation in cultural settings between the regions which in turn affect the demographic behaviour of the people. However, in absence of information at national level, these results certainly provide some meaningful light of mortality and morbidity pattern in Bangladesh.

In sum, diarrhoea, tetanus and dysentery are the important causes of deaths in rural area of Bangladesh. Tetanus is the important cause for infant deaths. Female children are observed to have higher risk of mortality due to tetanus, dysentery, measles and diarrhoea than male children, but the situation is reverse with respiratory disease.

B. CAUSES OF MATERNAL DEATH

Table 53 presents the influence of various factors for maternal deaths. From the table, it appears that about 86.2 per cent of maternal death is attributed to direct obstetric causes. Among the various causes of direct obstetric, infection causes 37.9 per cent deaths within which septic abortion counts about 20.7 as opposed to 10.3 per cent for postpartum sepsis. Tetanus causes only 6.9 per cent deaths. Toxaemia is found to be the second important causes, 20.7 per cent for maternal deaths. Antepartum and postpartum eclampsia are equally fatal in toxaemia. Difficult labour cases 17.2 per cent deaths of which 10.3 per cent is due to obstructed labour. Haemorrhage causes 10.3 per cent deaths, and both antepartum and postpartum haemorrhage are observed to be equally fatal.

In sum, septic abortion is the primary factor for maternal deaths, and other important causes are toxaemia, and difficult labour. It is possible to reduce maternal deaths rapidly if the system of menstrual regulation and reliable family planning methods can be made available to the rural people. This will not only reduce the maternal deaths but also will reduce the fertility level of the country.

C. NATURAL DISASTERS

Bangladesh is already known to the World as a place where natural disasters occur almost on a regular basis. Cyclone and flood are common phenomena in the country. Table 54 presents a chart of natural disasters in Bangladesh. Flood in some years are more severe than other years. The floods of 1769, 1770, 1784, 1787, 1954, 1969 and 1974 affected inhabitants most severely. Flood of 1974 affected about 50 per cent of the people.

Table 53. Maternal deaths by causes of death

Cause of death	Number[a]	Per cent
Direct Obstetric Infection:	50	86.2
Septic abortion	12	20.7
Postpatum sepsis	6	10.3
Tetanus	4	6.9
Total	22	37.9
Toxaemia:		
Antepartum eclampsia	6	10.3
Postpartum eclampsia	6	10.3
Total	12	20.7
Haemorrhage:		
Antepartum haemorrhage	3	5.2
Postpartum haemorrhage	3	5.2
Total	6	10.3
Difficult labour:		
Obstructed labour	6	10.3
Retained placenta	4	6.9
Total	10	17.2
Indirect Obstetric:		
Cardio-vascular failure	5	8.6
Not diagnosed	3	5.2
Total	8	13.8

Source: Jahan, F.A. and others "Use of traditional birth attendants for monitoring maternal and neonatal mortality" *Contraceptive Practice in Bangladesh:* Safety issues Dhaka: PAICT/PATH (December, 1984). Table 5. p. 142.

Note: [a] The total number of live birth was 9,317, and the number of maternal death was 58.

Similarly, cyclone of November 1970 is still remembered by the people because of its severity, and the cyclone was accompanied by massive tidal bore. About 17 per cent people of the affected mid coastal areas were lost. In May 1985, there was another cyclone accompanied by tidal bore which affected the Urir Char, and Southern part of Naokhali district. It killed thousands of people and damaged a large per cent of houses and buildings.

Flood and cyclone are usually followed by famine and epidemics of cholera, diarrhoea, dysentery and other communicable diseases, which increase mortality and morbidity levels of the affected area for that time.

These natural phenomena affect economic structure of the country. Their effect goes deeper to the socio-demographic structure. However, there is no way the country can have control over it.

Table 54. Major disasters in Bangladesh in the last 216 years

Year	Event	Casualties
1769-1776	Great Bengal famine	Eliminating almost a third of Bengal's population. The impact was less severe in East Bengal
1784-1788	Floods and famines; radical shift in course of Brahmaputra (1787)	Unknown
1873-1874	Famine	Unknown
1876	Bakerganj (Barisal) cyclone and tidal wave	Approximately 400,000 deaths
1884-1885	Famine	Unknown
1897	Chittagong cyclone	Approximately 175,000 deaths
1918-1919	Influenza epidemic	Approximately 400,000 deaths
1943	Bengal famine	2-2.5 million deaths
1947	Partition of India	Unknown: total deaths in partition about one million, but most were in the west
1970	Cyclone and tidal wave	200,000-500,000 deaths
1971	War of independence	Approximately 500,000 deaths
1974	Flood and famine	Officially approximately 30,000 deaths. Some estimates are much higher eg. about 500,000 (80,000 in Rangpur district alone)
1985*	Cyclone and tidal wave	Officially approximately 2000; Some estimates are much higher eg. about 100,000 deaths

Source: W. Brain Arthur, and Geoffrey McNicoll, "An analytical Survey of Population and Development in Bangladesh". *Population and Development Riview,* vol. 4 No. 1 (March 1978).

* The Daily News Paper, *The Daily Bangladesh Observer, (May, 1985).*

V. NUTRITION AND HEALTH

Population growth, food supply, mortality and nutrition are not isolated factors rather they are closely related with each other. Population growth increases demand for basic needs of food and shelter. If the demand is met there may not be any effect on people's health and nutrition; otherwise it will affect health, nutrition and mortality level of the country. Food supply depends on domestic production of foodgrains and import capacity and policy which needs foreign exchange. If there is no natural calamity, food production depends on land available for cultivation, and capital available to the farmers. Rapid increase in population, thereby decrease in total size of arable land, and cumulative effect of deterioration of economic condition of farmers pose a serious question whether the country will be able to maintain its huge population with its limited resources. Shortages of foodgrain in the country is almost a regular phenomenon. This section evaluates food situation in the country and nutritional status of the people.

A. FOOD SITUATION IN THE COUNTRY

Table 55 presents trends of gross domestic production of some essential foodgrains in Bangladesh. Rice is the most dominant foodgrain in the food habit of the people. In terms of nutrition, rice, wheat, fish, pulses, fruits, potatoes and vegetables contribute to 90 per cent of total calories and protein consumed by the population. Their production and availability are important determinants for nutrition level of the people. The production of rice, wheat and potatoes show somewhat increasing trend in recent years. This is certainly due to the intervention of the government programmes for agricultural development.

Production of pulses which play important role in the food habit of the people, has declined over the period. It is partly due to the shortage of land for pulse cultivation. Land which used to be utilized for pulses or winter crops is gradually being used to produce rice with irrigation. As a result pulse production has been declining. Similarly, fish production also shows a somewhat declining trend, excepting last few years. More than 90 per cent of total fish supply comes from sweet water. Use of surface water for irrigation has dried out many fish production sources. This is part of the reason for such decline in fish production. Until recent past, there was no organized efforts for improving fish production in the country. However, the government has become concerned about the improvement of fish production and taking necessary effort for this.

Production of oilseeds and fruits has not been changed over the period. A considerable

Table 55. Gross domestic production of major food groups

Year	Rice	Wheat	Other	Fish	Pulses	Oil seeds	Fruits	Potato	Vegetables
				(in thousand tons)					
1970-1971	10 968	110	91	814	296	274		849	613
1971-1972	9 775	113	74	824	281	240		741	486
1972-1973	9 930	90	67	818	223	225		747	689
1973-1974	11 721	109	66	820	208	215		719	701
1974-1975	11 109	115	65	822	223	168	1 328	866	738
1975-1976	12 561	215	43	640	220	238	1 344	889	748
1976-1977	11 567	255	59	641	230	235	1 362	724	705
1977-1978	12 756	343	59	643	236	264	1 349	849	700
1978-1979	12 646	486	53	645	225	264	1 297	895	717
1979-1980	12 539	816	50	464	214	246	1 342	903	723
1980-1981	13 662	1 075	51	650	208	247	1 382	983	741
1981-1982	13 415	952	50	686	202	251	1 405	1 078	780
1982-1983	13 991	1 078	45	724	210	249	1 470	1 131	801
1983-1984	14 279	1 192	39	751	196	263	1 382	1 148	825

Source: Bangladesh Bureau of Statistics. *Statistical Yearbook, 1983-1984.*

proportion of edible oil such as soyabean and palm oil is imported to meet the demand. There is still enough scope to improve the production of oilseeds and fruits in the country. Effective efforts to increase production of oilseeds should be made so as to meet the domestic consumption.

Table 56 presents trends and patterns of net availability and per capita consumption of some food items of carbohydrate, protein and fat groups. Both the production and per capita consumption of cereal and potato have increased over the period. In protein group, the total availability of pulses, fish and milk for consumption has increased but their per capita consumption show somewhat declining trend. On the other hand, the net availability of meat and its per capita consumption have increased markedly after 1980. The urban people generally consume major share of the available meat. However, it is difficult to say that the production of meat has increased in the country. It may be partly due to substitution effect of availability of fish or meat. Per capita milk consumption also shows rapid fall after 1980 as compared to the consumption rate before 1980. Gradual shortage of food for milk cow or cattle in general is to some extent contributing to the declining milk production in the country. Large proportion of urban people depend on imported powder milk for their need. The per capita consumption of fruit is also observed to have declined over the period, and vegetable consumption remained almost unchanged. The overall picture of the table delineate, that the carbohydrate consumption has slightly increased; on the other hand, the protein consumption has decreased considerably.

B. EXPENDITURE AND SUBSIDIES IN FOOD

Table 57 presents allocation of money on food by monthly income of the households in rural areas. Households having monthly income less than Tk.450 can hardly meet their nutritional requirement although they spend all income on food. Percentage of expenditure on food decreases as the family income increases. The information of the table implies that large proportion of the people live below the poverty line.

Turning to the food production side, food grain production has consistently increased over the past few years, and according to a World Bank estimates it has increased at an annual rate of 3.5 per cent since mid 1970s in contrast to the declining population growth rate which is 2.23 per cent in 1981. The current production should have enable our population to fulfil their calories need, but this could not happen primarily because of the lack of the effective demand. Again the fluctuations between seasons affected the consumption significantly. According to a recent World Bank estimate the instability index of the coarse rice in different seasons varied from a low 4.7 per cent to a high of about 15 per cent between 1979-1980 to 1982-1983 (table 58). This resulted in a considerable variation in intakes and nutrition of our population.

In Bangladesh, the government provides price support to consumers through the public foodgrain distribution system to ensure better consumption. The price support takes place under six broad heads e.g. statutory rationing, distribution to priority categories, modified rationing, open market sales, food for work programme, vulnerable group feeding programme and gratuitous relief. The main objective of these price support policies so far, however, have been to supply subsidized food to city workers, government employees, defence personnel and other urban consumers through a rationing system (table 59). There is a regular rationing system in the major cities of Dhaka, Chittagong, Khulna, Rajshahi, Narayongonj and Rangamati. An irregular system known as modified rationing is also in practice; through this system the rural people have been provided occasionally with subsidized foodgrains. In recent years government has undertaken a programme of open market sales of foodgrains in order to stabilize prices in the market specially during the pre-harvest lean seasons. But until 1982-1983 the government's performance in open market sales did not prove to be very successful. The food for work programme started in 1975, aimed at providing employment and payment in the form of foodgrain to landless rural labourers in non-agricultural seasons. Till now this is proved to be a successful programme. The vulnerable group feeding and relief programmes clearly are not financially feasible to encompass all eligible children and distressed households of the country. Although the programmes of open market sales, food for work and vulnerable group/relief feeding reduce to some extent the disparities in benefits received by the low and high income groups from public foodgrain distribution systems, the imbalance is still heavily weighted in favour of the higher income urban group.

C. NUTRITION SITUATION

In Bangladesh three nutrition surveys so far have been conducted each in 1962-1964, 1975-1976 and 1982-1983 respectively. The results reveal serious deterioration in the food and nutrient

Table 56. Net availability and per capita consumption of selected food items

Year	Population (million)	Cereal		Potato		Pulses		Meat		Fish	
		Net availability ('000' tons)	Per Capita (lbs)	Net availability ('000' tons)	Per Capita (lbs)	Net availability ('000' tons)	Per Capita (lbs)	Net availability ('000' tons)	Per Capita	Net availability ('000' tons)	Per Capita (lbs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1974-1975	78.0	11 794	338.7	866	24.8	206	5.9	167	4.79	818.1	23.13
1975-1976	79.9	12 877	361.0	889	24.9	203	5.7	171	4.79	634.7	17.52
1976-1977	81.8	11 925	326.5	724	19.8	213	5.6	175	4.80	635.5	17.13
1977-1978	83.7	13 277	355.3	849	22.7	224	6.0	180	4.81	637.0	16.78
1978-1979	85.6	13 300	348.0	895	23.4	213	5.6	184	4.82	637.7	16.43
1979-1980	87.7	14 201	362.7	903	23.1	201	5.1	189	4.83	636.5	16.00
1980-1981	89.9	13 812	344.1	983	24.5	197	4.9	313	7.80	633.9	15.79
1981-1982	91.6	14 720	360.0	1 008	24.7	196	4.8	334	8.17	669.8	16.38
1982-1983	93.6	15 323	366.7	1 057	25.3	202	4.8	349	8.35	709.8	16.99
1983-1984	95.7	15 704	367.5	1 074	25.1	188	4.4	378	8.85	519.6	12.16

Year	Milk		Fruit		Vegetable		Oils	
	Net availability ('000' tons)	Per Capita (1 lb)	Net availability ('000' tons)	Per Capita (1 lb)	Net availability ('000' tons)	Per Capita (1 lb)	Net availability ('000' tons)	Per Capita (1 lb)
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1974-1975	735.7	21.1	1 346.6	38.7	318.4	9.2	141.1	2.8
1975-1976	750.4	21.0	1 363.1	38.2	321.2	8.9	173.8	3.5
1976-1977	758.1	20.8	1 370.7	37.6	300.1	8.2	182.7	3.5
1977-1978	786.0	21.0	1 369.2	33.9	355.6	8.5	194.7	3.6
1978-1979	778.1	20.4	1 318.0	34.5	321.4	8.4	186.7	3.6
1979-1980	795.0	20.3	1 342.2	34.3	328.5	8.3	192.1	3.5
1980-1981	661.0	16.5	1 306.7	32.4	319.2	7.9	234.6	3.3
1981-1982	627.1	15.3	1 322.7	32.4	337.0	8.2	248.0	3.1
1982-1983	707.74	16.9	1 378.8	33.0	340.7	8.2	239.5	4.0
1983-1984	739.8	17.4	1 295.9	30.3	345.1	8.1	240.5	3.8

Source: Bangladesh Bureau of Statistics; *Statistical Pocket Book of Bangladesh 1984-1985.*

intake of our population (tables 60, 61 and 62). Total per capita food consumption declined from 886 gm. in 1962-1964 to 807 gm. in 1975-1976 and further to 765 gm. per person per day in 1981-1982. This means a drop in per capita food intake by about 5 per cent since 1975-1976 and 14 per cent since 1962-1964. As regards the sources of food, intakes of grains and food grouped under vegetables and other plants have sharply declined in 1981-1982. Animal food consumption in 1981-1982 remained the same as in 1975-1976 but it dropped by about 22 per cent compared to 1962-1964 figure.

Table 61 shows changes in per capita daily food intake by various food groups. Rice consumption has declined 11 per cent from 546 gm/person/day in 1962-1964 to 488 in 1981-1982; on the other hand, wheat consumption is very low, so increase in consumption has not been able to compensate the decline in rice consumption to protect the overall decline in cereal consumption. Vegetable consumption has dropped noticeably during 1962-1964 to 1981-1982. In 1962-1964 the per capita daily consumption was 142 gm as against 120 gm in 1981-1982 which is about 18 per cent as compared to 3.2 per cent decline between 1962-1964 and 1975-1976. Consumption of leafy vegetables and white potato are observed to have increased in last two periods, but the level of consumption is very low. About 71 per cent decline in per capita daily pulses consumption is observed between 1962-1964, 28 gm to 1981-1982 and about 67 per cent decline from 24 gm of 1975-1976 to 8 gm of 1981-1982. In general cereals particularly rice and vegctables constitute large portion of common people's diet.

Table 57. Percentage of income spent on food, clothing and education, 1981-1982

Monthly family income	No. of households	Food	Cloth	Education
Below 300	52	101.9	8.9	0.4
300 – 449	149	100.1	8.0	0.3
450 – 499	101	93.5	6.9	0.7
500 – 749	86	86.5	6.6	0.6
750 – 899	48	83.4	6.8	0.9
900 – 1049	36	78.7	6.5	1.0
1050 – 1199	33	78.1	5.8	1.2
1200 and above	92	64.3	5.8	2.0

Source: K. Ahmad and N. Hassan (eds). *Nutrition Survey of Rural Bangladesh 1981-1982,* INFS, 1983.

INFS = Institute of Nutrition & Food Science, University of Dhaka.

Food intake by nutrients in table 62 presents a depressing picture of nutrition situation of the people. It shows severe defficiencies in calories intake and some micronutrients such as Vitamin A, riboflavin and Vitamin C. Per capita daily calories intake has noticeably deteriorated during last two decades. In 1962-1964, average daily per capita calories intake was reported as 2,301; in 1975-1976 it fell to 2,094 calories; and by 1981-1982 it was a precarious low of 1943 calories which is 150 per cent below the requirement level. Protein intake dropped from 58 gm of 1962-1964 to 48 gm of 1981-1982 demonstrate a reduction of intake by 17 per cent during the period, but the intake level is somewhat above the daily requirement level. Vitamin A intake has shown a serious deterioration in last two decades. The intakes of 1962-1964, 1975-1976 and 1981-1982 were as 1,870, 730 and 763 respectively. Although Vitamin A and C intake have shown some increase in 1981-1982 over the levels of 1975-1976, the intake levels of these in 1981-1982 over 62 and 57 per cent below their required levels. Only protein, iron and thiamine intake levels are somewhat above the requirement levels. Cereal constitute the bulk of our diet accounting for 87 per cent of calories, 78 per cent of protein, 82 per cent of iron, 84 per cent of thiamine, 70 per cent of riboflavin and 82 per cent of niacin intake (table 63). Other plant sources occupied the next position in terms of providing micronutrients to our diet. The contribution of animal food to nutrient supply however was found to be very insignificant.

Table 58. Index of minimum market price for coarse rice 1979-1980 to 1982-1983 (in 1980-1981 prices)

Year	Average	July-Oct	Nov-Jan	Feb-April	May-June	Instability[a] Index per cent
1979-1980	136.7	154.1	131.7	138.2	122.8	9.8
1980-1981	100.0	101.6	95.4	101.3	101.6	4.7
1981-1982	111.5	95.4	104.6	135.0	111.4	14.9
1982-1983	108.1	111.9	107.8	101.1	102.4	5.0

Source: World Food Program, Dhaka, Ministry of Food, World Bank Estimates.

Note: [a] Coefficient of variation of monthly minimum market prices.

Table 59. Public foodgrain distritution system 1972/73-1982/83 (,000 long tons)

	Statutory Rationing		Priority groups		Modified rationing		Relief and VGFP		Food for work and canal digging		Market operations		Open market sales		Total	
	Amount	Per cent	Amount	Per cent	Amount	Per cent	Amount	Per cent	Amount	Per cent	Amount	Per cent	Amount	Per cent	Amount	Per cent
1972-1973	465	17.8	350	13.4	1 592	60.8	207	7.9	–	–	4	0.2	–	–	2 618	100.0
1973-1974	502	29.1	396	22.9	777	45.0	52	3.0	–	–	–	–	–	–	1 728	100.0
1974-1975	471	26.1	554	31.4	578	32.8	161	9.1	–	–	–	–	–	–	1 764	100.0
1975-1976	359	21.4	584	34.8	496	29.6	110	6.6	116	6.9	11	0.7	–	–	1 677	100.0
1976-1977	337	25.6	551	37.4	288	19.6	33	2.2	166	11.3	58	3.9	–	–	1 473	100.0
1977-1978	451	24.4	753	40.8	353	19.1	30	1.6	255	13.8	6	0.3	–	–	1 847	100.0
1978-1979	417	23.2	754	42.0	312	17.4	45	2.5	216	12.0	9	0.5	43	2.4	1 796	100.0
1979-1980	492	20.5	907	37.8	385	16.0	57	2.4	440	18.3	10	0.4	111	4.6	2 402	100.0
1980-1981	343	22.5	601	39.5	179	11.8	50	3.3	349	22.9	–	–	–	–	1 522	100.0
1981-1982	307	15.1	656	32.2	483	23.7	70	3.4	365	17.9	104	5.1	50	2.5	2 036	100.0
1982-1983 (Projected)	308	15.9	647	32.9	368	18.5	85	4.4	410	21.2	70	3.6	48	2.5	1935	100.0

Source: IBRD Report 4277-BD, Bangladesh: Recent Economic Trends and Medium Term Development Issues, 1983.

National average infact concealed the state of consumption of various nutrients at disaggregated family levels. Further breakdown indicated that 24 per cent of the study households in 1981-1982 had adequated calories intake and 76 per cent could hardly meet the required level (figure 5). Fifty three per cent families run short of protein and 93 per cent of the families have calcium deficiency. Very few families have deficiency in iron and thiamine. Intake of Vitamin A is implying a deficit in 88 per cent of the households. This deficiency is causing blindness of about 30,000 children every year. This is an alarming situation for the country. Ninety three per cent of the households had deficient Vitamin C consumption.

D. FOOD ALLOCATION WITHIN FAMILY

With regards to the patterns of food allocation within the family, the 1981-1982 study reveals sharp age-sex differences. Table 64 shows food intake pattern for different age and sex groups. The table has limited the scope of observation of children's food intake pattern by sex as many scientists have pointed that male children get better care than female children. From the table it appears that cereals, vegetables and roots constitute major portion of children's diet. Intakes of milk, fish and meat are fairly low.

For adolescents, intake of most food items is higher for males than females; the differences

Table 60. Food intake by their sources in 1962-1964, 1975-1976 and 1981-1982 (gm/person/day)

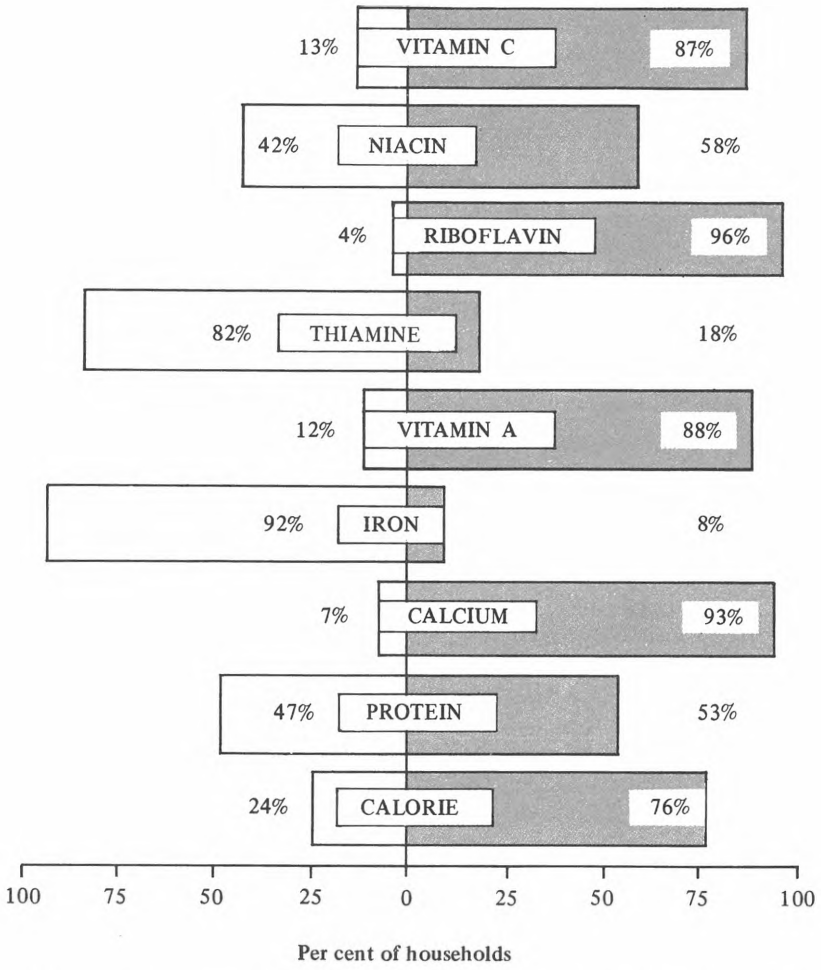
Sources	1981-1982	1975-1976	1962-1964	Change in 1981-1982 compared to	
				1975-1976	1962-1964
Cereals	488	523	546	–6.7	–10.6
Animal	44	44	56	0.0	–22.1
Other plants & Vegetables	233	240	284	–3.2	–18.0
Total	765	807	886	–5.3	–13.7

Source: K. Ahmad and N. Hassan (eds.). *Nutrition Survey of Rural Bangladesh 1981-1982,* INFS, 1983.
INFS = Institute of Nutrition & Food Science, University of Dhaka.

Table 61. Food intake by food groups (gm/person/day)

Food groups	1981-1982	1975-1976	1962-1964	Percentage change in 1981-1982 compared to	
				1975-1976	1962-1964
Cereals:	488	523	546	–7	–11
Rice	451	493	512	–9	–12
Wheat	31	29	16	+7	+94
Roots and tubers:	63	52	81	+21	–22
White potato	45	17	77	+165	–42
Sweet potato	9	19		–53	
Pulses	8	24	28	–67	–80
Vegetables:	120	126	142	–5	–16
Leafy	20	20	14	0	+43
Others	100	106	128	6	17
Fish	23	22	28	+5	–18
Milk	15	17	22	–12	–32
Fruits	17	21	15	–19	+13
Fats and oils	3	3	6	0	–50
Others	23	15	13	+53	+77
Total	765	807	886	–5	–14

Source: K. Ahmad and N. Hassan (eds.). *Nutrition Survey of Rural Bangladesh 1981-1982;* Institute of Nutrition and Food Science (INFS), University of Dhaka, 1983.



Source: K. Ahmad and N. Hassan (eds.). *Nutrition Survey of Rural Bangladesh, 1981-1982.* INFS. 1983.

Figure 5. Per cent of households meeting and not meeting different nutritional requirement

Table 62. Food intake by nutrients as per 1962-1964, 1975-1976 and 1981-1982 survey (person/day)

Nutrients	1981-1982	1975-1976	1962-1964	Requirement
Calorie (kcal)	1 943	2 094	2 301	2 273
Protein (gm)	48.4	58.5	57.9	45.3
Fat (gm)	9.8	12.2	15.8	–
Carbohydrate (gm)	412	439	482	–
Calcium (mg)	260	305	273	450
Iron (mg)	23.4	22.2	10.3	7.6
Vitamin A (I.U.)	763	730	1 870	2 013
Thiamine (mg)	1.38	1.65	1.50	0.90
Reboflavin (mg)*	0.68	0.87	0.50	1.35
Niacin (mg)	13.15	22.21	23.20	14.84
Vitamin C	13.26	9.51	48.0*	26.0

Source: K. Ahmad and N. Hassan (eds.). *Nutrition Survey of Rural Bangladesh 1981-1982,* INFS, 1983.

* Did not account for less due to cooking which is approximately 50 per cent in case of riboflavin and 70 per cent in case of vitamin C.

Table 63. Nutrient intake (per person per day) by their sources in 1981-1982

Nutrients	Sources			Total	Intake = per cent of requirement
	Cereal	Other plants and vegetables	Animal		
Calorie (kcal)	1 691	208	44	1 943	86
Protein (gm)	37.5	6.5	4.4	48.4	107
Fat (gm)	2.9	4.6	2.3	9.8	–
Carbohydrate (gm)	378	33	1	412	–
Calcium (gm)	60	122	78	260	58
Iron (gm)	19	4.0	0.4	23.4	308
Vitamin A (I.U.)	15	680	68	763	38
Carotene* (mg)	27	1 209	7	1 243	
Thiamine (mg)	1.16	0.20	0.02	1.38	153
Riboflavin (mg)	0.48	0.15	0.05	0.68	50
Niacin (mg)	10.8	1.65	0.70	13.15	87
Vitamin C (mg)	0.0	12.67	0.59	13.26	51

Source: K. Ahmad and N. Hassan (eds.). Nutrition Survey of Rural Bangladesh 1981-82, INFS, 1983.

* Carotene are also included in vitamin A.

Conversion factor: Mg carotene X 0.56 = I.U. vitamin A (13).

become wider as the age increases. Only fruits and roots intake of females are somewhat higher in their early ages. The intakes of all food items for both male and female increases as the age increases. For adults the food intake pattern is somewhat different. Sex difference in food intake in almost all food items become more wider as the age increases. An exception is observed with pulses; women have higher consumption than men. Women in economically disadvantaged classes, mostly finish their meals (lunch and supper) with rice and dhal (lentils), made of pulses, leaving curry of meats, fish, and vegetables, and milk or milk products for their male counterparts or male members in the family. Lactating mothers have higher intake of cereals, roots and fruits than pregnant and lactating pregnant women. Pregnant but not lactating women intake more meat, fish and milk than their other female counterparts. However, pregnant and lactating women do get much privilege for additional food to their nutritional deficiency.

Table 65 presents nutrient intake by age and sex. It also shows similar pattern of differences for all the nutrients except Vitamin A, where females of age group 13-40 have higher intake of Vitamin A than the males of same age group. The difference in energy and calcium intake is much higher than other nutrients. In table 66 nutrient intakes are expressed as per cent of requirements. Children of age group 1-3 face severe deficiency in most of the nutrient intake. They meet only 48 per cent of energy, 60 per cent of protein, 31 per cent of calcium, 38 per cent of Vitamin A, and 25 per cent of Vitamin C. Although energy intake of younger children is less than half of that required, these figures may not have included intake of breastmilk. Besides, rural mothers are not careful about introducing supplemental food. The situation improves as the children grow older. Adolescents, both male and female, have more than required protein, iron and thiamine intakes. They severely suffer from calcium, Vitamin A and C deficiency. Adults, both male and female, appear to have required protein, iron, thiamine and niacin intakes, but males suffer from energy deficiency and female suffer from calcium deficiency.

In general, average intake of almost all food is found to be higher for males than females. With regards to intrafamily food distribution, children and mothers are discriminated against adults males. Children and mothers are nutritionally vulnerable, and policies and programmes should be adopted for their nutritional improvement.

E. SEASONALITY IN NUTRITION

Bangladesh is a country with marked seasonal changes. In October-November (before Amon harvest) which is the leanest season, the food intake (except fish and vegetables) is about the lowest (tables 67 and 68). The months of May and June (before Aus) are also a lean period but in triple cropped areas this seasonality is more or less gone as can be seen from the intake figures of Mymensingh village in the table. Modernization of agriculture in Bangladesh amounted to increased production of rice by

Table 64. Food intakes by food groups by different age and sex groups (gm/person/day)

Age in years	Cereals		Roots		Sweets		Pulses		Vegetables		Fruits		Meats		Fish		Milk		Fats		Total	
Children (both sexes)																						
1 – 3	150		22		8		2		33		12		4		7		30		2		277	
4 – 6	299		42		9		6		89		19		6		12		16		3		510	
7 – 9	390		48		10		6		120		21		6		16		15		3		645	
Adolescents	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
10 – 12	470	444	55	66	10	5	9	8	172	93	40	14	5	3	27	18	17	11	3	3	823	676
13 – 15	587	489	73	83	16	6	12	9	148	127	6	20	6	10	23	18	20	22	3	4	907	807
16 – 19	716	557	97	62	12	9	14	9	161	103	12	18	8	8	35	28	27	10	4	4	1 098	825
Adult																						
20 – 39	791	570	104	70	10	7	18	9	193	149	20	18	14	8	40	24	22	10	4	3	1 236	883
40 – 49	743	542	78	59	17	4	11	6	241	143	34	19	12	3	40	23	29	17	4	3	1 236	883
50 – 59	692	517	78	69	19	16	8	15	206	122	22	12	9	6	41	27	45	23	4	4	1 139	825
60 – 69	719	527	86	95	10	8	9	13	206	119	10	16	11	4	48	32	36	10	4	4	1 156	849
70 +	693	452	80	54	7	6	18	13	187	129	42	33	4	0	25	31	33	11	3	4	1 115	745
Pregnant (P)		523		27		4		8		149		18		14		25		17		4		800
Lactating (L)		588		68		5		8		145		25		9		21		11		3		898
P + L		540		9		7		0		162		11		0		31		11		2		780
Average (All age and sex)		493		63		9		9		130		18		7		24		19		3		788

Source: K. Ahmad and N. Hassan (eds). *Nutrition Survey of Rural Bangladesh 1981-1982,* INFS, 1983.

Note: All food groups are not included.

Table 65. Nutrient intake (person/day) by different age and sex group as per 1981-1982 survey

Age in years	Energy (kcal)		Protein (gm)		Calcium (mg)		Iron (mg)		Vitamin A (I.U.)		Thiamine (mg)		Riboflavin (mg)		Niacin (mg)		Vitamin C (mg)	
Children (both sexes)																		
1 – 3	659		16		122		8		314		0.46		0.28		4.0		5.0	
4 – 6	1 245		31		184		16		780		0.90		0.46		8.86		10.0	
7 – 9	1 575		40		233		20		910		1.34		0.58		11.17		11.38	
Adolescents	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
10 – 12	1 912	1 745	47.7	42.5	291.5	245.6	24.2	21.4	1 084.5	454.6	1.37	1.22	0.71	0.58	13.02	10.59	15.43	10.09
13 – 15	2 327	1 973	58.1	49.0	300.6	307.2	29.2	23.8	613.5	1 395.2	1.69	1.32	0.82	0.67	16.50	13.65	11.84	13.82
16 – 19	2 888	2 199	69.7	55.0	373.4	279.5	32.9	24.7	899.7	1 497.6	2.04	1.51	0.92	0.78	17.87	16.74	15.02	12.17
Adult																		
20 – 39	3 154	2 254	79.2	55.0	390.2	294.8	35.9	27.0	803.1	1 047.5	2.19	1.55	1.02	0.74	20.94	14.30	18.39	16.02
40 – 49	2 955	2 115	74.5	53.2	437.3	264.9	38.4	25.2	1 363.0	1 171.9	2.15	1.55	1.08	0.78	19.24	15.64	22.2	11.42
50 – 59	2 791	2 114	71.9	52.3	427.9	308.4	35.1	24.3	1 434.0	679.6	1.99	1.41	1.10	0.67	22.24	13.55	17.55	11.53
60 – 69	2 840	2 134	69.4	52.2	401.1	328.0	34.2	24.5	859.0	644.2	1.82	1.43	0.90	0.71	16.63	14.05	14.27	16.90
70 +	2 776	1 830	70.6	45.4	368.6	282.7	32.0	22.7	1 025.0	680.7	2.05	1.18	1.07	0.59	23.34	12.16	18.39	13.76
Pregnant (P)		2 068		51.0		338.5		25.3		2 031.3		1.38		0.73		11.38		19.01
Lactating (L)		2 305		56.9		288.9		28.1		1 107.5		1.64		0.78		15.26		15.75
(P + L)		2 083		52.3		227.2		20.7		750.6		1.34		0.77		20.29		12.65
Average (All age and sex)	1 975		49.2		272.9		23.8		808.4		1.39		0.69		13.35		12.82	

Source: K. Ahmad and N. Hassan (eds). *Nutrition Survey of Rural Bangladesh 1981-1982,* INFS, 1983.

Table 66. Nutrient intake (per capita per day) expressed as the per cent of requirement for different age and sex groups

Age in years	Energy (kcal)		Protein (gm)		Calcium (mg)		Iron (mg)		Vitamine A (I.U.)		Thiamine (mg)		Riboflavin (mg)		Niacin (mg)		Vitamin C (mg)	
Children (both sexes)																		
1 – 3	48		60		31		107		38		85		34		45		25	
4 – 6	68		91		46		213		78		125		42		73		50	
7 – 9	72		77		58		267		68		152		44		77		57	
Adolescents	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
10 – 12	76	78	96	88	49	41	323	285	57	24	132	130	46	41	76	68	77	51
13 – 15	81	90	133	122	50	51	216	132	25	58	154	148	50	50	91	93	40	46
16 – 19	92	98	132	127	75	56	471	118	36	20	167	182	51	63	89	123	50	41
Adult																		
20 – 39	101	96	135	130	98	74	511	129	32	42	175	194	55	62	102	109	61	53
40 – 49	98	105	127	125	109	66	549	120	55	47	190	207	64	70	103	127	74	38
50 – 59	99	118	123	123	107	77	502	115	57	27	195	199	72	63	132	116	59	38
60 – 69	118	134	118	122	100	82	489	117	34	26	200	227	66	76	111	135	48	56
70 +	140	144	121	107	92	71	457	108	41	27	259	215	90	71	178	134	61	46
Pregnant (P)		90		99		34		112		81		153		54		76		63
Lactating (L)		90		71		29		134		28		164		51		91		53
(P + L)		71		65		14		92		19		122		46		108		42
Average (All age and sex)	87		109		61		182		40		154		51		70		49	

Source: K. Ahmad and N. Hassan (eds.). *Nutrition Survey of Rural Bangladesh 1981-1982,* INFS, 1983.

shifting land from non-rice crops to rice crop. This led to higher rice and lower vegetable consumption in agriculturally advanced areas resulting in servere deficiency of Vitamin A and other essential micronutrients. The drop in intake is also reflected in anthropometry. There are more children with moderate and severe malnutrition in May-June (before Aus) than in other season (table 69). It appears that during wet season of May-June the environmental factor play an aggravating role on the malnourished children. This implies that even though food intake is the principal determinant of nutritional status, there are ecological situations which affect adversely the environment that aggravate the degree of malnourishment.

F. MALNUTRITION

Variations in nutrient intake, environmental hygiene and life style cause variation in degree of malnutrition. Tables 70 and 71 present

Table 67. Food intake (gm/person/day) by food groups by season

Food groups	First round (August) (after aus)		Second round (Oct-Nov) (before aman)		Third round (Dec-Jan) (after aman)		Fourth round (May-June) (before aus)	
	Dhaka	Mymen-singh	Dhaka	Mymen-singh	Dhaka	Mymen-singh	Dhaka	Mymen-singh
Cereal	456	559	461	463	491	546	429	526
Rice	404	551	430	426	465	518	325	511
Wheat	44	1	27	34	18	21	88	13
Roots and tubers	20	24	14	48	42	21	89	26
Pulses	11	17	7	6	5	5	21	14
Vegetables	212	164	189	86	146	119	91	114
Green Leafy	27	3	9	49	43	17	22	21
Fruits	3	10	–	2	1	7	191	52
Meat	0	3	2	5	–	6	1	6
Fish	10	17	36	25	16	17	10	10
Milk and milk product	5	9	3	10	2	5	16	11
Fats and Oils	2	2	2	2	2	2	2	2
Others	7	11	5	7	49	11	29	16
Total	726	816	719	654	754	739	879	777

Source: Hassan and others "Seasonal patterns of food intake in rural Bangladesh: its impact on nutritional status." *Ecology of Food and Nutrition* – An international journal (in press).

Table 68. Nutrient intake (person/day) by season

Nutrients	First round (August) after aus)		Second round (Oct-Nov) (before aman)		Third round (Dec-Jan) (after aman)		Fourth round (May-June) (before aus)	
	Dhaka	Mymensingh	Dhaka	Mymensingh	Dhaka	Mymensingh	Dhaka	Mymensingh
Calorie (kcal)	1 744	2 138	1 749	1 813	1 975	2 060	1 806	2 016
Protein (gm)	39.6	54.8	43.1	46.1	45.0	52.2	48.6	52.0
Fat (gm)	8.0	8.4	7.7	8.6	6.6	8.2	11.4	8.2
Carbohydrate (gm)	376	459	375	380	399	444	376	432
Calcium (mg)	226	199	253	316	244	221	300	293
Iron (mg)	24.8	21.4	22.3	22.7	24.9	21.4	28.7	21.4
Vitamin A (I.U.)	1 070	212	396	1 590	1 087	558	1 001	623
Thiamine (mg)	1.29	1.62	1.27	1.33	1.40	1.57	1.57	1.53
Riboflavin (mg)	0.53	0.74	0.50	0.73	0.66	0.83	0.83	0.85
Niacin (mg)	5.33	19.35	7.34	11.16	12.30	19.50	9.05	17.83
Vitamin C (mg)	8.58	4.39	6.23	12.50	13.40	10.56	52.29	10.72

Source: Hassan and others "Seasonal patterns of food intake in rural Bangladesh: its impact on nutritional status." *Ecology of Food and Nutrition* – An international journal (in press).

Gomez classification of degree of malnutrition for children of under age 5 and 5-11 years respectively. Among the children under age 5, 29 per cent suffer from first, 46 per cent from second and 15 per cent from third degree of malnutrition. Percentages in normal and first degree of all ages imply somewhat better nutritional status of male children than female children. Very small percentage of female children have required nutritional level. Proportion of children suffering from third degree malnutrition appears to be much higher than many developing countries. Table 71 shows even a more precarious nutritional situation of children age 5-11 years. Among these children only 2.0 per cent children meet their required nutritional level. Twelve per cent suffer from first degree, 57 per cent from second degree and 29 per cent from third degree malnutrition. Proportions of children having second and third degree are surprisingly very high for all ages. This gives a very alarming picture about the nutrition situation of the children.

Waterlow classification of degree of malnutrition is presented in table 73. Among the children under age 5 years, 7 per cent are suffering from acute undernutrition (wasting: do not have expected weight for height). For children of age 1-2 years, this percentage is 17 which is very high as compared to other ages, and about 7 per cent children of age under 1 year suffer from the same type of undernutrition. The proportions of undernutrition are observed to be fairly low for other ages except the children of age 6 and 7 years where 7 and 8 per cent children are suffering from acute undernutrition.

More than half of the children (54 per cent) under age 11 years suffer from chronic undernutrition (stunting: do not have weight for age).

Table 69. Percentage of second and third degree malnutrition by season

Age in years	First round (August) (after aus)		Second round (Sept-Nov) (before aman)		Third round (Dec-Jan) (after aman)		Fourth round (May-June) (before aus)	
	Dhaka	Mymensingh	Dhaka	Mymensingh	Dhaka	Mymensingh	Dhaka	Mymensingh
0 – 5	55	64	78	68	65	74	75	83
5 – 11	89	92	97	100	97	98	97	100
0 – 11	70	80	88	84	79	86	86	93

Source: Hassan and others "Seasonal patterns of food intake in rural Bangladesh: its impact on nutritional status." *Ecology of Food and Nutrition* 9(USA), vol. 17, No. 2, pp. 175-186.

Table 70. Age and sexwise distribution of children below 5 years of age according to Gomez classifications for weight-for-age in 1981-1982

Age in months	Sex	Normal	1st degree	2nd degree	3rd degree	Sample size
0-11	Male	25.00	31.67	35.00	8.33	60
	Female	15.87	36.51	30.16	17.46	63
	All	20.33	34.15	32.52	13.01	123
12-23	Male	4.69	32.81	15.56	10.94	64
	Female	1.75	19.30	52.63	26.32	57
	All	3.31	26.45	52.07	18.18	121
24-35	Male	23.91	34.78	36.96	4.35	46
	Female	0.00	22.73	54.55	22.73	44
	All	12.22	28.89	45.56	13.33	90
36-47	Male	8.51	36.17	51.06	4.26	47
	Female	5.88	14.71	58.82	20.59	34
	All	7.41	27.16	54.32	11.11	81
48-59	Male	8.89	22.44	55.56	11.11	45
	Female	2.00	28.00	44.00	26.00	50
	All	5.26	26.32	49.46	18.95	95
0-59	Male	14.12	32.06	45.80	8.02	262
	Female	5.65	25.40	46.37	22.58	248
	All	10.00	28.82	46.08	15.10	510

Source: K. Ahmad and N. Hassan (eds.). *Nutrition Survey of Rural Bangladesh 1981-1982*, INFS, 1983.

Forty four per cent of children under age 5 and 54 per cent of age 5-11 years are facing this problem. The proportion of stunted children increases with upto age 5, but for children of age 5-11 years it does not show any systematic increase with age. Seventy five per cent of children at age 5 are stunted; it is much higher than other ages.

Thirteen per cent children under age 5, and 8 per cent of age 5-11 years are suffering from concurrent effects of acute and chronic undernutrition (combination of both wasting and stunting). This problem is more severe among the children of age 1-2 and 2-3 years, where 20 and 18 per cent children respectively are having this problem. Surprisingly in 2 per cent children of age 5 have combined undernutrition. Further investigation may be required to detect impact of imbalance intake of micronutrients on nutrition situation which may provide underlying reasons for this.

G. BREASTFEEDING PRACTICE

Breastmilk offers the best source of nourishment to an infant. A nourished mother can support her baby for about three months without using any supplemental food. Initiation to breastfeed is universal in Bangladeshi mothers eventhough the majority of them suffer from malnourishment. Breastmilk contributes substantially to infant's and preschool children's diet. However, the practice has a considerable variation between rich and poor, urban and rural, educated and non-educated mothers. From the results of a study conducted by Institute of Nutrition and Food Science (INFS) in selected areas of Dhaka and Khulna, it appears that about 99 per cent of the rural mothers

Table 71. Age and sexwise distribution of children above 5 years of age according to Gomez classification for weight-for-age in 1981-1982

Age group	Sex	Normal	1st degree	2nd degree	3rd degree	Sample size
Incomplete years						
5	Male	0.00	15.69	70.59	13.73	51
	Female	7.55	15.09	47.17	30.19	53
	All	3.85	15.38	58.65	22.12	104
6	Male	0.00	16.00	54.00	30.00	50
	Female	0.00	7.32	80.00	12.20	41
	All	0.00	12.09	65.93	21.98	91
7	Male	0.00	8.89	60.00	31.11	45
	Female	4.35	10.87	47.83	36.96	46
	All	2.20	19.89	53.85	34.07	91
8	Male	0.00	2.22	60.00	37.78	45
	Female	2.78	16.67	55.56	25.00	36
	All	1.23	8.89	58.02	32.10	81
9	Male	0.00	15.38	51.28	33.33	39
	Female	5.13	10.26	56.41	28.21	39
	All	2.56	12.82	53.85	30.77	78
10	Male	2.27	20.45	43.18	34.09	44
	Female	1.79	5.36	60.71	32.14	56
	All	2.00	12.00	53.00	33.00	100
11	Male	0.00	11.43	62.86	25.71	35
	Female	0.00	12.82	46.15	41.03	39
	All	0.00	12.16	54.05	33.78	74
5-11	Male	0.32	12.94	57.61	29.13	309
	Female	3.23	10.97	56.13	29.68	310
	All	1.78	11.95	56.87	29.40	619
0-11	Male	6.65	21.72	52.19	19.44	571
	Female	4.30	17.38	51.79	26.52	558
	All	5.49	19.57	51.99	22.94	1 129

Source: K. Ahmad and N. Hassan. *Nutrition Survey of Rural Bangladesh 1981-1982,* INFS, 1983.

usually breastfeed their children, but in urban and periurban areas considerable number of mothers are found to be reluctant to breastfeed their babies (table 73). In urban areas of Dhaka and Khulna and peri-urban areas of Dhaka, the percentages of non-breastfeeding mothers are observed to be 15, 12 and 8 respectively.

Table 74 shows opinion of 168 women of Dhaka city regarding the duration of breastfeeding. About 66 per cent of women favour breastfeeding for more than a year, and only 18 per cent women supported for 6-12 months. This provides only an idea about their attitude. Generalization cannot be made from this because the sample was not a representative one.

Mean lengths of breastfeeding in table 75 are observed to have some relation with age at marriage and current age. The mean length for women of age 20 or less is found to be 16.6 months, and it increases upto 23.5 months of age group 45-49. This implies that older women have tendency to breastfeed their babies for longer duration and this relationship does not depend on age at marriage. Age at marriage of mothers also appears to have somewhat positive relation with duration of breastfeeding. Women

Table 72. Age specific percentage distribution by classification of stunting and wasting for the survey population in 1981-1982

Age group in months	Normal	Wasting	Stunting	Stunting & wasting	Sample size
0-11	69.11	7.32	18.70	4.88	123
12-23	28.10	16.53	35.54	19.83	121
24-35	30.00	2.22	50.00	17.78	90
36-47	23.46	2.47	65.43	8.64	81
48-59	20.00	3.16	63.16	13.68	95
0-59	36.08	7.06	43.92	12.94	510
Incomplete years					
5	20.19	2.88	75.00	1.98	104
6	29.67	6.59	56.04	7.69	91
7	21.98	7.69	59.34	10.99	91
8	19.75	3.70	64.20	12.35	81
9	32.05	2.56	53.85	11.54	78
10	21.00	3.00	66.00	10.00	100
11	31.08	2.70	62.16	4.05	74
5-11	24.72	4.20	62.84	8.24	619
0-11	29.85	5.49	54.30	10.36	1 129

Source: K. Ahmad and N. Hassan. *Nutrition Survey of Rural Bangladesh 1981-1982,* INFS, 1983.

Table 73. Percentage of the practice[a] of breastfeeding mothers in Dhaka and Khulna districts, 1980

Practice of breastfeeding	Urban		Peri-Urban		Rural	
	Dhaka	Khulna	Dhaka	Khulna	Dhaka	Khulna
Breastfeeding	84.7 (597)	88.1 (317)	91.6 (653)	98.4 (444)	98.8 (673)	99.1 (347)
Non-breastfeeding	15.3 (108)	11.9 (43)	8.4 (60)	1.6 (7)	1.2 (8)	0.9 (3)

Source: INFS, Studies of Practice & Attitude Towards Breastfeeding in Bangladesh (Dhaka & Khulna districts) 1980.

Note: Figures in the parentheses represent number of mother.

[a] This indicates current practice.

married at younger ages do not feed their babies as long as women married at later ages.

It is recommended that the children be given supplementary food along with breast milk from 3 to 6 months of age. In Bangladesh most of the mothers wean their babies within six months of their birth. Milk other than breast milk (cow's milk, goat's milk or powdered milk) is the first supplemented food usually given to the babies (83 per cent) within the first six months of their life (table 76). About 67 per cent of the babies of the same age group received diluted powdered rice paste, and about 25 per cent received biscuit as the first supplementing food. One fourth of them received biscuit within that age. Rice, bread, egg, meat, fish, banana, vegetables, potato, etc. were rarely given within the first six months of the babies. Before crossing the first birthday most of the children are supplemented by other milk (98 per cent), biscuit (95 per cent), powdered rice (96 per cent) and banana (89 per cent). And about the same diet is served to most of the children after their second birthday.

H. MATERNAL NUTRITION

The majority of the mothers in rural Bangladesh usually select and consume some special food during pregnancy and lactation. In a nationwide survey in 1975-1976 it has been found that 41 per cent of mothers do not take any usual maternal diet during pregnancy but 59 per cent did (table 77). Some citrus fruits are commonly consumed by 32 per cent of mothers followed by an especially prepared roasted clay (11 per cent) and uncooked rice (8 per cent). As regards the usual food 48 per cent of mothers prefer fish during pregnancy, 43 per cent prefer meat, 39 per cent prefer milk, 10 per cent prefer

Table 74. Opinion of the respondents as regard the duration of breastfeeding, 1977

Period	No. of respondents	Per cent
As long as there is milk in the breast	26	15.48
Less than 6 months	1	0.60
6 – 12 months	30	17.86
1 year – 2 years	53	31.55
2 years – 4 years	58	34.51

Source: Sayeda Ghaffar. Studies on attitude towards breastfeeding among the women of urban areas in Bangladesh (Dhaka city), INFS, D.U. June 1977.

Table 75. Mean length (in months) of breastfeeding in last closed interval by age at marriage and current age

Current age	Age at marriage[a]			All	All[b] (1981)
	12	12-14	15+		
20	*	*	*	16.7	16.6
20-24	17.1	17.5	18.5	17.5	18.1
25-29	16.6	17.2	18.8	17.2	19.5
30-34					20.6
35-39	17.0	17.0	14.9	16.6	21.0
40-44					21.9
45-49	17.5	18.5	*	17.3	23.5
All	16.8	17.3	17.3	17.1	19.9

Source: [a] Bangladesh Fertility Survey, 1975, First Report. Table 7.8, p. 85.

[b] The Study on the Situation of Children in Bangladesh, Dhaka: The Foundation for Research in Educational Planning & Development (FREPD) (July, 1981).

* Number of cases less than 20.

Table 76. Age at weaning and distribution of children by age of starting some common weaning food, 1980

Food items		Age (months) at which feeding started			
		0-6	7-12	13+	Total
Other milk	No.	1 351	241	41	1 633
	Per cent	83	15	2	
	C%	83	98	100	
Biscuit	No.	398	1 111	78	1 587
	Per cent	25	70	5	
	C%	25	95	100	
Rice	No.	61	1 071	366	1 498
	Per cent	4	72	24	
	C%	4	76	100	
Bread	No.	39	769	191	999
	Per cent	4	77	19	
	C%	4	81	100	
Powdered Rice	No.	428	190	24	642
	Per cent	67	29	4	
	C%	67	96	100	
Egg	No.	100	273	151	524
	Per cent	19	52	29	
	C%	19	71	100	
Meat/Fish	No.	14	209	98	321
	Per cent	4	65	31	
	C%	4	69	100	
Banana	No.	166	721	144	1 001
	Per cent	17	72	11	
	C%	17	89	100	
Leafy vegetables	No.	40	237	108	385
	Per cent	10	62	28	
	C%	10	72	100	
Vegetables	No.	63	261	118	442
	Per cent	14	59	27	
	C%	14	73	100	
Potato	No.	82	608	166	856
	Per cent	10	71	19	
	C%	10	81	100	

Source: INFS, D.U. Studies on practice & attitude towards breastfeeding in Bangladesh, Dhaka & Khulna, 1980.

Note: C% = Cumulative Percentage.

egg and 9 per cent prefer fruits (table 78). Among lactating mothers 50 per cent prefer fish, 33 per cent prefer milk, 8 per cent prefer vegetables and 7 per cent prefer meat and rice.

Besides, rural mothers are observed to have believes in various superstitions and misconceptions regarding food. Pregnant mothers usually do not take nutritious fruits in the fear that this will abnormally increase the size of the baby to be born. They do not take egg and papaya in the fear that this destroy the fetus. They believe that eating ducks during pregnancy will cause asthma to their babies. In the fear of edema pregnant mothers do not take vegetables. They do not take meat because they fear that if they take meat of any animal origin, the child will be born with characteristics of that animal. Lactating mothers are not allowed to take vegetables in the fear that the baby will suffer from stomach trouble. Some mothers believe that eating meat during lactation may make their breast milk poisonous. So they avoid eating meat. Similarly they do not take bringal and maize in the fear of paralysis. Many mothers even do not take orange or pineapple after drinking milk in the fear that it will hamper digestion. Some mothers also believe that cheese creates constipation and as such they do not take cheese.

These believes are being nursed among the illiterate and semi-literate women in the society. They do not have ability to look for scientific basis of these believes. High infant mortality, still birth, malnutrition of children at their early ages and malnutrition of pregnant and lactating mothers are the consequences of these believes. Education and dissemination of scientific knowledge can only bring changes of these believes.

In conclusion, the foregoing discussion on socio-economic background, mortality, health and nutrition, enriched our knowledge regarding various aspects of life of the people in Bangladesh. Although a single factor is not contributing to this complicated situation, the mass poverty resulted from high population growth rate and mass illiteracy may be attributed to this deleterious condition of people in Bangladesh. Improvement of this condition needs a multisectoral approach which ensure curbing growth rate, increase production, and remove mass illiteracy. Although we have gathered knowledge about various issues from the results of various research, there is still much to know about the underlying factors of this complex situation. Much research needs to be done to probe salient dimensions of problems and order them in priority.

Table 77. Distribution of respondent by special food taken during pregnancy, 1979

Food/materials	Per cent
Citrus fruit	32
Specially prepared roasted clay	11
Uncooked rice	8
Others	8

Source: Khaleda Edib. Habits, Attitude & Misconceptions on Food in Bangladesh. Proceedings of the Third Bangladesh Nutrition Seminar, INFS, D.U., 1979.

Table 78. Respondents' opinion about the foods that should be taken during lactation and pregnancy, 1979

Food	Lactation		Pregnancy	
	Number of respondents	Per cent*	Number of respondents	Per cent*
Fish	228	58	181	48
Meat	29	7	163	43
Egg	8	1	38	10
Milk	125	33	149	39
Vegetables	32	8	5	1
Pulses	11	3	3	1
Black cumin	13	5	0	0
Rice	28	7	–	–
Fruit	6	2	33	9

Source: Khaleda Edib. Habits, Attitude & Misconception on food in Bangladesh. Proceedings of the third Bangladesh National Seminar, 1979.

* Percentage total may be greater than 100 as multiple responses given by the same respondent.

VI. HEALTH SERVICES

In previous chapters, our main focus was on mortality levels and trends, and on its socio-economic-demographic differentials. This chapter describes the health facilities that are available for the people in the country. 'Health for all by the year 2000' is the target set by the government in its policy. The government has spelled this policy in five objectives. First, the policy aims to bridge rural-urban gap and to improve quality and coverage of the health care service with a view to providing minimum medical care to all. Second, the policy attempts for effective control of major communicable diseases and expand preventive measures. Third, it aims to improve health and family planning services in a package to all with a view to increasing family welfare and ensuring population control. Fourth, it aims to ensure availability and quality of drugs. Lastly, it strongly emphasize on developing and integrating indigenous and homoeopathic systems of medicines with the overall health care services. The government is also determined to do everything possible for child health care. The achievement of this goal again depends on the facilities available or resources available for this target.

Keeping this in view, the policy has been translated in various demographic components. Table 79 presents comprehensive figures of short-term and long-term targets of various demographic parameters. The policy attempts to reduce infant mortality rate (IMR) to 50 per 1,000 by the year 2000; child mortality to 5 per 1,000; maternal mortality rate to 5 per 1,000; neo-natal mortality to 30 per1,000; crude death rate to 10.70 per 1,000; and to increase life expectancy from 54.0 as of 1981 to 65 years. Similarly the policy also considers a rapid reduction of fertility by 2000, such as crude birth rate to 10.70 and total fertility rate to 2.34 by 2000. These are the targets for population division.

The following sections of this chapter provides descriptions of organizational set up of health services, manpower for health services, existing medical facilities and expenditures on health services.

A. ORGANIZATION OF HEALTH SERVICES

There has been a number of changes in the organizational structure of health services after the independence of the country. The government of Bangladesh has been giving strong emphasis in its policy to reduce mortality through improving general health condition of the people and to improve the overall morbidity situation since the implementation of the first five year plan. In the first five year plan (1973-1978), one of the main objectives was to create an infra-structure for providing an integrated and comprehensive health services to the rural people through Upazila Health Complex (UHC) and Union subcentres (Hossain, 1981: 185). For implementing this objective, the organization structure has been changed several times. A description of the present organizational structure of health services is presented below.

Table 79. Short-term and long-term target of demographic parameters

Parameter	Present	Short-term target 1985	Long-term target 2000
Infant Mortality Rate (IMR)	122.0 (1982)[a]	100.00	50.00
Child Mortality Rate (1-5)	16.5 (1982)[a]	15.00	5.00
Maternal Mortality Rate	30.0 (1974)	15.00	5.00
Neo-natal Mortality Rate		65.00	30.00
Crude Birth Rate (CDR)	41.7 (1981)[b]	31.56	20.70
Crude Death Rate (CDR)	16.0 (1980)[b]	13.75	10.70
Life Expectancy	54.0 (1981)[b]	–	65.00
Total Fertility Rate	6.23(1981)[b]	4.10	2.34

Sources: [a] Vital Registration System, Bangladesh Bureau of Statistics.

[b] Bangladesh Population Census, 1981.

[c] *Statistical Yearbook 1982,* Dhaka: Bangladesh Bureau of Statistics, 1982. P-676.

(1) Health Division

Figure 6 presents current organizational set up of the Ministry of Health and Population Control. The Ministry has two main divisions: Health Division and Population Division. As our main interest is in health services, the organizational structure of Population Division will not be discussed here. The Health Division is headed by a Secretary and is responsible for determining policies and objectives, planning, financing, supervising of programmes, and co-ordinating health services with other governmental and non-governmental organizations. Under the Ministry, Health Division has two Directorates: Directorate of Health Services, and Directorate of Nursing. Although the Director of Nursing has full autonomy, the Director is in some aspects under the control of the Director General of Health Services. The Director of Nursing is somewhat lower in rank and status than the Directors in Health Directorate.

During the first five year plan (1973-1978), the Directorate of Health Services was separated into two separate Directorates viz. Directorate of Preventive Health Services and Directorate Curative Health Services. The programmes of both curative and preventive health services are now operated through one Directorate.

(2) Directorate

The Directorate is headed by the Director General, and is responsible for supervising the functionings of field level staff, implementation of programmes (both curative and preventive), storage and supplies, man-power development, and coordinating with other governmental and voluntary organizations. The Directorate has seven sections. Five sections – Drug Administration, Administration and Finance, Stores and Supplies, Medical Manpower Development, and Diseases Control – are headed by five Directors, and two sections – Health Information Unit and Bureau of Health Education – are headed by two Chiefs. Each of these Directors and Chiefs has more than one Deputy Director and Deputy Chief respectively. Figure 6 shows only the sections headed by Deputy Directors for two important departments viz. MPD (Manpower Development) and hospitals, and disease control. The Directorate has field functionaries at districts, upazilas, unions and ward levels.

A Deputy Director of Health under the Director of finance and administration, is incharge of a Division. There are four such Administrative Divisions in the country. All the health programs are chanelled to the Districts under a Division through this Deputy Director. He is someway under all the Directors of the headquarters.

(3) District level

At the district level, a civil surgeon is responsible for implementing programmes and monitoring the overall functionings at lower levels. The district level health office has all the technical and medical personnel of the above departments. The district is responsible for channelling the programmes to upazila (sub-district) level health offices, and coordinating with other government and non-governmental organizations at district level.

It should be mentioned here that there are 96 Maternal and Child Welfare Centres in the country. Most of them are located at district cities and subdivision towns. They provide specialized health services to mothers and children, and some family planning services. Some of these centres are being used as Upazila Health Complex. These are under the administration of Population Control Division.

(4) Upazila/Thana

The Upazila Health Complex (UHC) and Upazila health programme is headed by Upazila Health and Family Planning Officer (UHFPO), a medical doctor (MBBS). The UHFPO is responsible for implementing the health programmes at field levels, and monitoring programme activities. In addition, he is in-charge of UHC. The UHC is staffed with one surgical specialist, one medical specialist, one gynaecologist, one dental surgeon, one medical officer in charge of Mother and Child Health (MCH), three medical officers, two medical assistants, one pharmacist, one EPI technician and radiographer. The UHC is supposed to provide a wide range of promotive, preventive and curative services. In addition, special programmes on health are also administered through UHCs.

The UHC basically provides three types of services:

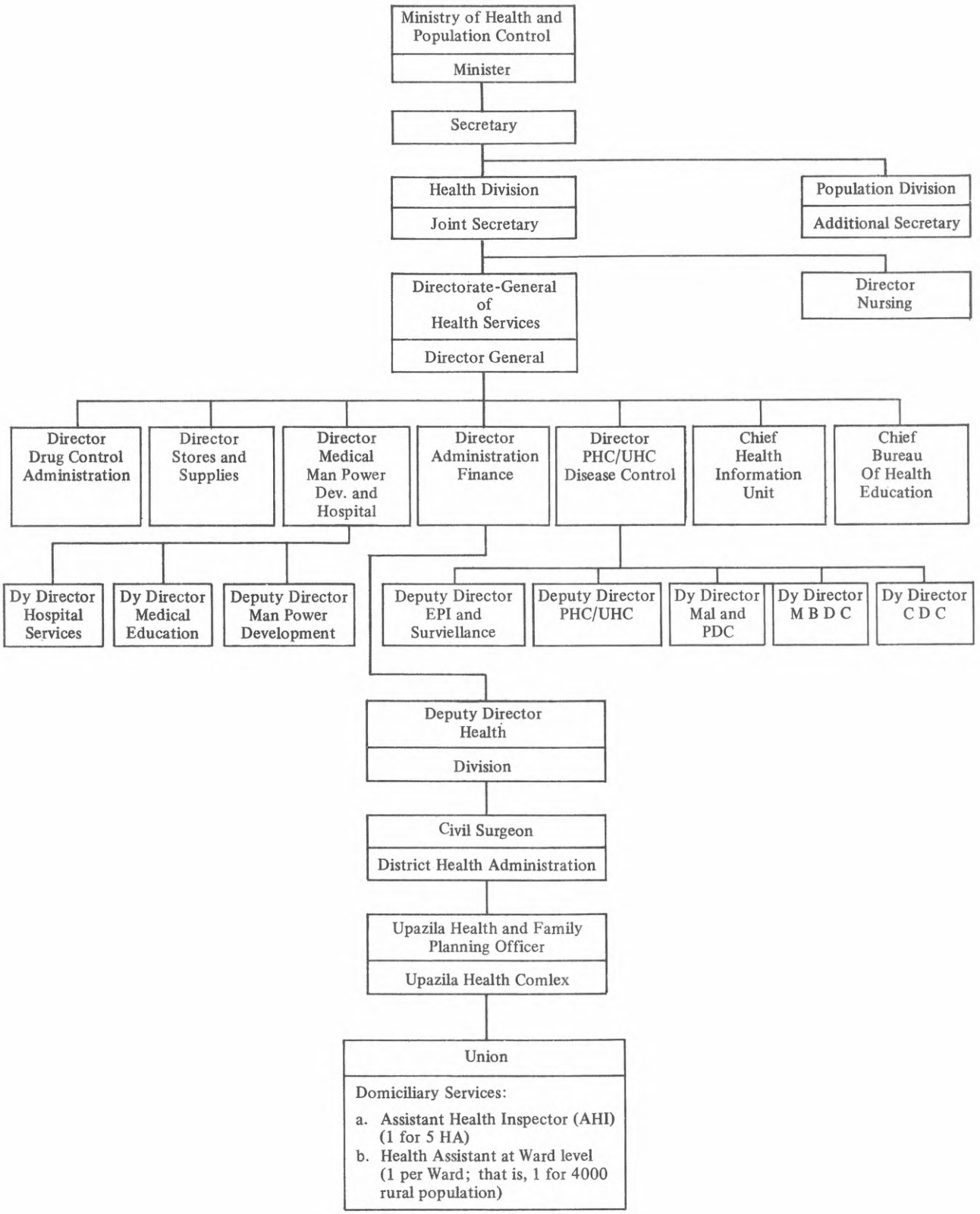
1) A 31-bed patient facility of which six beds are reserved for maternal and family planning services.

2) Out-patient general health services as well as MCH and Family Planning Services.

3) Provide functional support to Family Welfare Centres (FWC).

(5) Union Level

Health division provides domiciliary health services at union, through Assistant Health Inspector (AHI) and Health Assistant (HA).



CDC = Communicable Disease Control
MBDC = Micro Bacterial Disease Control
PDC = Parasetic Disease Control
PHC = Primary Health Care
EPI = Expended Program on Immunization
UHC = Upazila Health Complex

Source: Office of the Directorate General of Health Services, Dhaka

Figure 6. Organization of Ministry of Health Services, 1985

For every 4,000 people in rural area there is a health assistant, who is responsible for providing domiciliary health services to these people. Generally five health assistants work under an AHI. At present these workers usually carry out the immunization programme.

Besides, there is a provision for a Union Health and Family Welfare Centre (UHFWC) for each union. As of 1985, 1,351 UHFWCs have been established. These centres are under the control of Population Division. However, the centres also provide static health services with emphasis on mother and child health to the rural people. In addition, the centres provide clinical contraceptive services to women. Each centre is staffed with a Medical Assistant (MA), one Family Welfare Visitor (FWV) and one Pharmacist (medical officer in some places). Both MA and FWA are paramedics. MAs have undergone three years special training in paramedics after tenth grade of their education, and FWVs have undergone two years training in maternal and child health and family planning. The domiciliary health and family planning services are provided through house-to-house visits by grass-root health and family planning workers. These visitors comprise of one Family Welfare Assistant (FWA) and one Health Assistant (HA) for each ward.

B. MANPOWER IN HEALTH SERVICES

Manpower statistics of health services in Bangladesh is highly deficient. It is not possible to know exactly how many medical personnels are existing in the country, and how many are working in rural areas. The WHO report of 1977 on Country Health Programming provides some information to bridge the gap of our knowledge partially.

Table 80 shows the trends of increase of manpower in various categories. The registered post-graduate doctors rose from 291 in 1978 to 690 in 1983. By 1984, only 13,000 doctors (both MBBS and LMF) were in the country. Only 327 dentists as of 1983 were found in the country. For this large size of population, the number of dentists is very small. A significant number of qualified doctors migrate to the Middle-East for better employment. This creates a gap between the existing doctors and yearly out-turns of doctors. Table 81 presents out-turn pattern of various medical personnels of 1982. On an average, 1,400 MBBS doctors qualify from the medical colleges in the country, and 653 nurses qualify from nursing institutions. Although there is a notable increase in number of registered nurses and midwives, 5,800 and 3,850 respectively as of 1984, they are still small in number for the present population.

The population per physician or doctor is declining. It declined from 12,033 in 1978 to 7,438 in 1984. This indicates that more doctors are becoming available in the country. However, the population/doctor ratio is misleading because most of the qualified doctors are practicing and residing in the urban areas. The major part of the rural health services is carried by unqualified healer such as unqualified allopaths, homoeopaths, *kabiraj* – who practices

Table 80. Registered medical manpower in health services

Category	1971	1978	1982	1983	1984
Post-graduate	–	291	–	690	
Physicians (MBBS & LMF; Govt. & Non Govt.)	7 482	7 035	10 513	–	13 000
Dentists	–	129	327	327	–
Nurses	821	2 012	4 500	–	5 800
Midwives	1 092	1 041	2 934	–	3 850
Health Visitors	274	413	743	–	475
National pass	–	1 237	2 101	2 121	–
Palli Chikitshak				25 350	
Population per physicain		12 033	8 810		7 438
Assistant Health Inspector		–	–	–	2 800
Health Assistant		–	–	–	17 000
Medical Assistant		–	–	–	1 180*
Family Welfare Visitor		–	–	–	4 009*
Family Planning Assistant		–	–	–	4 500*
Family Welfare Assistant		–	–	–	13 500*

Source: 1983-84 Statistical Yearbook; Health Information Unit; Office of Information, Education and Motivation (IEM), Directorate of Population Control.

* These are the figures of 1985.

Ayurvedic system of medicine, *Hakim* – who practices Unani system of medicine, spiritual healers and traditional midwives.

Unqualified healers such as national pass, Palli Chikitshak and Gram doctors, account for more than 50 per cent of the total healers. Among them national practitioners were institutionally trained. They went through four years formal training in medical science after passing tenth grade (secondary school certificate). This programme did not continue for a long period, and it does not exist anywhere in the country.

Based on the concept of bare-foot doctor of China, the government in 1979 launched a programme for training existing unqualified healers and new people to meet need of doctors in rural areas and improve general health status of the people. These trained healers are known as Palli Chikitshak. The programme was developed to train these people with the knowledge of mother and child health, family planning, treatment of common diseases and minor ailment. It was a programme of one year duration – 9 months for theoretical and 3 months for practical training. The trainees were of wide variation in their background; those who did not have any experience of practice were required to have minimum tenth grade (secondary school certificate) pass, and those who had several years of experience in practice were required to have the ability of reading and writing. About 60 upazila health complexes started this programme. By 1985 about 27,000 Palli Chikitshaks were produced through this programme. The programme was stopped on account of the possibility of treatment hazards as raised by the qualified doctors.

All other healers are known as Gram doctors. Some of them received one week training locally arranged by qualified doctors, and others did not have any kind of training. Very few of them have few years of school education, and most of them are illiterate. Turning to healers of other system of medicines, homoeopath healers rank second in number, and spritual healers rank third in their numbers. Ayurvedic healers comprise of about 10 per cent of the total healers.

Table 82 shows the numbers of institutionally qualified and unqualified Homoeopathic, Ayurvedic and Unani practitioners. Homoepathy practitioners are 18,504 in number as against 2,332 and 3,131 practitioners for Ayurvedic and Unani respectively. Ayurvedic and Unani are known as traditional or indigenous system of medicine in the country. Unani practitioners are known as *Hakim* and this is practiced by Muslims. It is based on Arab tradition. Ayurvedic practitioners are known as *Kabiraj* and used to be practiced by Hindus. Now a high percentage of Ayurvedic practitioners are Muslims. Both the systems largely use herbal medicine. The Unani and Ayurvedic practitioners are primarily based in three districts namely Chittagong, Dhaka and Sylhet.

Table 83 presents number of institutions, teachers and students, as of 1984, available for developing manpower in health services of different systems of medicine. Homoeopathy appears to rank second in terms of manpower development. This system of medicine is also

Table 81. Out turn of doctors, medical assistants, nurses, midwives and lady health visitors, 1982

Category	Number
Post graduate doctors	132
M.B.B.S. doctors	1 400
B.D.S. dentists	28
Medical assistant	350
Post graduate nurses	57
Nurses	653
Midwives	522
Lady health visitors	403

Source: 1983-84 Statistical Yearbook, table 14.3, p. 656.

Table 82. Distribution of non-allopathic medical practitioners, 1985

Category	Institutionally Qualified		Not Institutionally Qualified		Total		Grand Total
	Registered	Under-Process	Registered	Under-Process	Registered	Under-Process	
Homoeopathy[a]	6 361	2 000	1 143	2 857	7 504	11 000*	18 504
Ayurvedic[b]	243	249	796	1 044	1 039	2 393	3 432
Unani[b]	99	28	1 254	1 750	1 353	1 778	3 131

Source: [a] Bangladesh Homoeopathic Board, Dhaka.
[b] Board of Ayurvedic and Unani System of Medicine.
* 8000 not institutionally qulalified practitioners submitted their application for pregisteration.

widely accepted by the people. Although Ayurvedic and Unani have been practiced by the people for a long time, these systems have not got much support from the government for their development as Western system of medicine (Allopathic). Consequently, their institutional development remained in the hands of practitioners.

C. HOSPITAL FACILITIES

The existing medical facilities is insufficient for this large population. Table 84 presents figures of existing medical facilities in the country. There are only 760 hospitals of which 596 hospitals are managed by the government. This includes Thana/Upazila health complex, police hospitals, railway hospitals and hospitals in jails. In addition, there are 1,559 as of 1984 government dispensaries in the country. These dispensaries have also provision for few hospital beds, and most of them remain unoccupied and unused because of lack of drugs and medicines and medical personnels in the dispensaries.

Table 83. Number of institutions, teachers and students of different systems of medicine, 1984

System of Medicine	Number of institutions	Number of teachers	Number of students
Medical College	10	753	8 299
Homoeopathy	18	238	6 551
Unani	4	25	141
Ayurvedic	4	18	164
Nursing Institute (1985)[a]	42*	128	3 216

Source: 1983-1984 Statistical Yearbook, table 13.41-45, pp. 640-641.

Note: [a] These were collected from the office of the Nursing Director.

* The figure also include 4 private nursing colleges.

Table 84. Medical facilities existing in the country

Idicators	1978	1982	1984
Hospitals:	424	709	760
Government	134	545	596
Non-Government	36	164	164
Govt. Dispensaries	1 752	1 468	1 559
Hospital Beds	19 538	23 907	25 371
Govt. Hospital Beds	16 853	19 136	21 370
Non-Govt. Hospital Beds	2685	4 771	4 771
Population per bed	4 333	3 765	3 334
TB Clinics	44	44	44
Maternity & Child Welfare Centre	91	93	96
Pharmacotical Industries (Alopathic)	149	163	163
Homoeopathic Producing Firms	16	27	–

Source: Health Information Unit, Directorate of Health Services.

This was a notable increase in hospital beds from 1982 to 1984. The total number of hospital beds was 25,371 as of 1984, including the beds in rural dispensaries. Out of this total beds, 21,370 beds are in government hospitals of which 8,813 beds are located in Upazila/ Thana health complex and 4,993 beds are located in medical college hospitals (see table 85). As mentioned above, a significant number of beds are also located in rural dispensaries, which are very seldom used. On the other hand, the occupancy of urban hospital beds varies from 99.8 to 120 per cent.

Table 84 presents details about the number of hospitals, beds, indoor and outdoor patients. In rural areas, we have information on indoor and outdoor patient of Thana health complex, union subcentres, and rural dispensaries, but there is a large number of patients who are treated by unqualified healers. No correct information is available on them. Other specialized hospitals are also found to have large number of hospital beds.

Besides these governmental facilities there are number of valuntary organizations providing health services to the people. For instance, among other organizations, Bangladesh Rural Advancement Committee (BRAC), Gono Shastha Kendra, CARITAS, International Centre for Diahrrheoal Disease Research (ICDDR,B), International Union for Child Welfare (IUCW) are providing health services to large portion of population in various part of the country.

Generally speaking, the existing facilities in government hospitals in terms of the availability of drugs and medicines and necessary equipments are very poor. Most of the patients in the hospitals face the problems of shortage of essential medicines and drugs and other necessary facilities. It is even worse in rural areas.

To improve situation of the availability of medicine government has adopted a drug policy which is an integral part of the national health policy. The policy aims to ensure production, sales and distribution of essential and quality drugs and medicines at reasonable prices. About 250 drugs and medicines are declared as essential of which 12 are at village level, 33 Upazila level, 105 are upto district level, and 100 are specialized drugs. The prices of drugs and medicines produced locally or imported should be within the purchasing capacity of common people. The indigenous firms producing drugs and medicines will be responsible for ensuring the quality of medicine, and multinational firms are responsible for producing essential drugs and medicines. So far

Table 85. Medical institutes, hospital bed, indoor and outdoor patient 1983-1984

Institute	1984			
	Number	Number of Bed	Indoor Patient (000)	Outdoor Patient (000)
Rural Area (THC/UHC)	345	8 813	150	15 000
IPGMR Hospital	1	250	10	154
IDCH (Institute of Disease of the Chest & Hospitals)	1	500	5	–
ICVD (Institute of Cardiovascular Disease)	1	100	6	16
RIHD (Rehabitation Institute & Hospital for the Disables)	1	430	6	32
Institute of Opthalmology	1	70	1	55
Medical College Hospital	8	4 993	180	2 688
District Hospitals & Subdivisional Hospitals	59	350	200	3 700
Other general Hospitals	1	70	4	150
TB Hospitals	12	566	6	–
TB Clinics	44	–	–	450
Leprosy Hospitals	5	130	1	19
ID Hospital (Infectious Diseases)	5	180	13	–
Mental Hospitals	1	400	3	9
School Health Clinics	23	–	–	103
Urban Clinics/Dispensaries	44	–	–	995
Union Subcentre (HFWC)	1 351	–	–	15 000
Rural Dispensaries	1 275	–	–	

Source: Health Information Unit, Ministry of Health and Population Control.

there are 163 firms producing alopathic drugs and medicines, and 27 firms producing homoeopathic medicines

D. PRIMARY HEALTH CARE AND MCH-FP

In the health service programme the government has emphasized on primary health care programme. This is major part of preventive side of the health services in the country. All eight components of primary health care are equally emphasized in the programme for improving level of basic health in the community. Maternal and child health and family planning component of primary health care programme is mainly carried out by the population division, and other components are in the stream of health services programme. The following section provides some information on immunization and family planning.

(1) Immunization

The government has undertaken an expanded programme on immunization (EPI) since 1979. The programme targets for completing immunization of all the children by 1988. It has already expanded to all the upazilas where electricity is available because without chain cold storage, storage of vaccines is not possible. The upazilas which has EPI programme, has a EPI-technician. Health Inspector along with other medical personnel carry out the programme.

Table 86 presents performance of EPI programme for 1979-1984. A significant increase in performance is observed for all the vaccines. DPT, Polio and DT are usually for the children. The performances for Polio, TT (Tetanus Toxoid) of pregnant women, and non-pregnant women with others for 1985 are notably higher than other years. Very high dropout rates are observed for DPT, Polio and DT particularly after first dose of vaccine. During 1984-1985, immunization against tuberculosis (BCG), diptheria, whooping cough and tetanus (DPT), poliomyelitis (Polio) and measles has covered 60 per cent of the target group of that year for 15 years children, 2 per cent of children under age 2 years and 0.8 per cent of children of the same age respectively. The recent policy of immunization considers children under age 1 as target group for immunization. Children older than age 2 will not be immunized under this policy.

To achieve the target, of immunization

Table 86. Performance of immunization programme for 1979-1984

Name of Vaccines Doses		Year						
		1979	1980	1981	1982	1983	1984	1985
DPT:	I	2 425	32 395	68 808	115 422	122 573	161 152	249 518
	II	1 822	19 542	45 559	83 257	88 891	125 642	182 059
	III	1 383	13 504	32 658	63 265	68 056	96 892	146 914
	Total	5 630	65 441	147 025	261 944	279 520	381 686	579 491
POLIO:	I	2 510	19 078	52 839	95 863	104 381	127 016	206 447
	II	1 871	11 574	37 610	67 112	78 054	94 279	159 276
	III	1 392	8 419	34 550	53 997	60 182	72 477	124 951
	Total	5 773	39 071	124 999	216 972	242 617	295 672	490 677
D.T.:	I	–	7 747	90 215	341 493	201 990	276 913	505 644
	II	–	3 096	53 865	188 070	139 139	149 998	334 963
	Total	–	10 843	144 080	529 563	341 129	426 911	840 547
T.T.:	I	–	7 871	29 900	5 357	40 380	64 287	194 207
(Pregnant women)	II	–	5 617	21 486	43 100	32 102	41 885	680 229
	Total	–	13 488	51 386	94 257	72 482	106 172	211 239
T.T.:	I	2 437	162 156	120 499	276 919	244 107	374 143	523 039
(Women & Others)	II	1 399	62 427	69 524	155 563	167 257	146 405	368 478
	Total	3 836	224 583	190 023	432 482	411 364	521 548	891 467
Measles:		47	3 125	19 650	62 734	50 066	61 870	114 039
BCG:		3 391	47 876	98 366	225 083	239 139	231 374	493 209

Source: Expanded Programme on Immunization, Bangladesh.

Note: DPT = Diptheria, Partussis and Tetanus.
DT = Diptheria and Tetanus.
TT = Tetanus Toxoid.
BCG = for Tuberculosis.
POLOP = Poliomyelitis.

by 1990, the programme has to be geared in full speed. Success of this target will make rapid decline in infant, child and maternal mortality in country.

As observer in chaper III, tetanus is a major cause for maternal and child mortality, and it mostly occurs to woman during the period of pregnancy termination. In rural areas, most of the births are attended by traditional birth attendants (TBA) who usually do not have any formal training in this. They usually do not follow any system of cleanliness, sanitation and formal medication, which causes deaths to many mother and children. No statistics are available on how many births are attended by unqualified birth attendants. In order to prevent such deaths, the government has adopted a policy of training these TBAs. At the end of the programme, there will be 68,000 TBAs, one in each village, in the country.

(2) Contraceptive Prevalence

The family planning programme has been working, in one way or otherway, in the country since 1953. It has gone through a series of programatic changes over this period. It has been integrated as well as disintegrated with health services few times. Since 1980, it is an integrated programme with health services. There has been a significant increase in allocation of man and resources for this programme. However, the current contraceptive prevalence rate in the country does not show any significant achievement.

Table 87 presents trends of acceptors of various modern family planning methods. Among the temporary methods, condom appears to be the most popular method, and oral pills and foam tablets are observed to be second and third respectively with respect to use rate. However, these figures might be somewhat inflated than actual users. For instance, condom was found to be used other than contraception purpose such as balloon – toy of children. Among the permanent methods, tubectomy acceptors outnumbers vasectomy acceptors by a large number. Again, there is a chance of misreporting, which possibly inflacted the figure of actual performance, because there is an incentive system attached with sterilization programme. There is a provision of incentive for

Table 87. Performance of different contraceptives by years and methods

Financial year	Vesectomy	Tubectomy	Injection	M.R.	I.U.D.	Condom (in pieces)	Oral pil (in cycle)	Emko (in vials)	Foam tablets
1974-1975	14 469	4 707	58	686	50 391	9 282 576	1 288 472	99 091	–
1975-1976	37 839	11 076	1 908	4 408	77 840	54 744 540	5 943 055	124 784	
1976-1977	75 066	41 246	2 548	6 687	59 421	35 257 560	4 638 597	59 479	
1977-1978	32 643	44 722	4 527	6 135	40 564	65 366 388	7 487 316	32 224	–
1978-1979	24 705	81 719	11 028	4 412	22 631	57 541 476	7 120 550	39 051	–
1979-1980	27 534	171 248	26 026	10 479	21 801	58 380 612	6 227 651	39 127	–
1980-1981	26 296	232 497	112 010	28 044	41 601	87 111 780	8 137 744	60 786	5 011 074
1981-1982	67 824	235 084	81 065	43 444	83 668	93 230 412	7 751 352	63 549	4 125 979
1982-1983	88 315	274 842	72 697	58 579	117 743	116 821 488	8 257 995	69 634	5 404 417
1983-1984	215 665	336 502	122 457	56 728	303 338	131 096 483	9 725 677	64 249	4 384 707
					Yearly Growth Rate (per 100)				
1975-1976	161.5	135.3	3 189.6	542.5	54.4	489.7	361.2	25.9	
1976-1977	98.3	272.4	33.5	51.7	–23.6	–35.6	–21.9	–52.3	
1977-1978	–56.5	8.4	77.6	–8.2	–31.7	85.3	61.4	–45.8	
1978-1979	–24.3	82.7	2 352.5	–28.1	–44.2	–81.4	–4.8	21.2	
1979-1980	11.4	109.5	135.9	137.5	3.6	11.9	–12.5	194.6	
1980-1981	–4.4	35.4	330.3	167.6	90.8	1.4	30.6	55.3	
1981-1982	157.9	1.1	–27.6	54.9	101.1	49.2	–4.7	4.5	–17.6
1982-1983	30.2	16.9	–10.3	34.8	40.7	–87.4	6.5	9.5	30.9
1983-1984	144.2	22.4	68.4	–3.1	157.6	12.2	17.7	–7.7	–18.8

Source: Management Information System Unit, Population Control and Family Planning Division, Dhaka.

doctors, referrals as well as clients. However, we do see a positive sign from the yearly growth rate of reliable methods namely vesectomy, tubectomy and IUD.

Abortion is illegal in the country, and it is permitted only when pregnancy becomes a threat to mother's life. Therefore, no national data are available for abortion. This does not mean that abortion does not occur in the society. As mentioned in chapter III, a high percentage of maternal deaths occur due to septic abortion. Menstrual Regulation (MR) is perceived as a kind of abortion in the society. Therefore, the performance of MR is found to be the lowest among the methods.

Table 88 shows estimates of use rates of various methods from different national surveys. The Contraceptive Prevalence Survey of 1983 shows 19.1 per cent of currently married women under age 50 using contraception. Of all the modern methods, oral pill among the temporary methods and tubectomy among the permanent methods are significantly used by the acceptors. The tubectomy acceptor rate has increased rapidly during the period 1981-1983.

The use rates of traditional methods – abstinence, safe-period and withdrawal – seem to be declining. This might be the effect of increasing knowledge and availability of modern methods to the eligible couples. More than 90 per cent of women in reproductive age group have knowledge about family planning methods as observed from Contraceptive Prevalence Surveys. The difference between knowledge rate and use rate is very high. This may be regarded as the effect of socio-cultural factors of the society.

Table 89 presents age-specific contraception use rate of currently married women under age 50. The women after age 25 are more likely to use contraception for either creating larger space between births or stopping unwanted births. The age-specific rates of 1983 are somewhat higher than the corresponding rates of other years. The higher rates of later age group clearly indicate a preference of limiting family size.

E. EXPENDITURE ON HEALTH

The proportion of expenditure on health has not changed much. However, the amount of total expenditure has increased noticeably. In second five year plan, 1980-1985, the total allocation for health sector was 595 crore taka (one US dollar is about 28 taka) of which 206.42 crore taka, 34.69 per cent of the total, was allocated for Upazila Health Centre (UHC), and 182.76 crore taka, 30.71 per cent, was allocated for manpower development in which a considerable emphasis was given on development of nursing, medical assistant and palli Chikitshak. The plan has also given importance in development of homoeopathy and indigenous systems of medicines (see table 90).

The government expenditures for health are made up of two components: one from the revenue budget and other from development

Table 88. Percentage of currently married women under age 50 using contraception by method, for 1975-1983

Method	BFS[a] 1975	CPS[b] 1979	CPS[b] 1981	CPS[b] 1983
Oral Pills	2.7	3.6	3.5	3.3
Codom	0.7	1.5	1.6	1.5
IUD	0.5	0.2	0.4	1.0
Tubectomy	0.3	2.4	4.0	6.2
Vesectomy	0.5	0.9	0.8	1.2
Injection	–	0.2	0.4	0.2
Vaginal method	–	0.1	0.3	0.3
Abstinence	1.1	0.8	1.2	0.4
Safe Period	1.0	2.1	3.9	2.4
With drawal	0.6	0.2	1.8	1.3
Other	0.3	0.6	0.7	1.4
Total use rate	7.7	12.7	18.6	19.1

Source: [a] Bangladesh Fertility Survey (1975). Tables 2.4.5 and 4.4.1.

[b] Bangladesh Contraceptive Prevalence Survey, 1983-Final Report. Table 7.4, p. 166.

Table 89. Percentage of currently married women under age 50 using contraception by age group, 1975-1983

Age Group	BFS 1975	CPS 1979	CPS 1981
∠15		2.6	2.9
	4.5		
15-19		5.2	9.5
20-24	9.3	11.1	17.6
25-29		13.8	23.8
	11.5		
30-34		17.0	25.3
35-39		17.1	23.2
	14.3		
40-44		15.9	23.4
	7.9		
45-49		9.2	12.5
	9.6		
All	7.7	12.7	18.6

Source: Bangladesh Contraceptive Prevalence Survey, 1983-Final Report. Table 7.5, p. 170.

Table 90. Allocation for health sector in second five year plan, 1980-1985

Sectors	Allocation in SFEP			
	On going	New	Total	Percentage
		(in crores taka)		
Hospital and clinics	77.18	16.87	94.05	15.80
General	71.91	5.97	77.88	13.08
Specialized	5.27	10.90	16.17	2.72
Thana Health Centre (THC, Family Welfare and other services)	206.42	–	206.42	34.69
Manpower Development	90.33	92.43	182.76	30.71
Medical	38.94	17.15	56.09	9.42
Para-medical	–	4.50	4.50	0.76
Nursing	7.23	27.28	34.51	5.80
Medical Assistant	15.36	24.00	39.36	6.61
Palli Chikitsak	28.80	–	28.80	4.84
Training and orientation	–	19.50	19.50	3.28
Production, Storage and Distribution of Drugs, Biological and other Logistics	3.68	26.22	29.90	5.02
Public Health Services	4.53	53.50	58.03	9.76
Development of Homeopathic and Indigenous Systems of Medicines	20.80	–	20.80	3.50
Research and Development	–	1.00	1.00	0.17
Miscellaneous	1.04	1.00	2.04	0.34
Total	403.98	191.02	595.00	100.00
Family Planning and Population Control	–	–	615.00	–
Grand Total for Health Sector in SFEP (1980-85)	–	–	1 210.00	–

Source: 1983-1984 Statistical Yearbook, table 14.18 p. 670.

budget. In 1982-1983, the revenue budget was 1,051,516 thousand taka, and the development budget was 808,341 thousand taka. The total budget was 1,859,857 thousand taka. Tables 91 and 92 present details of the expenditure of revenue budget as well as development budget.

Health centre received the highest proportion, 30.6 per cent, of the total revenue expenditure. Two other sectors namely health organization, and hospital and dispensaries also received fairly high proportion of 24.2 and 21.6 per cent respectively, total revenue expenditure. It should be mentioned here that the revenue expenditure on health organization, and hospital and dispensaries are mostly spent in urban areas since most of the hospitals are located in urban areas.

From the development expenditure budget (see table 92), it appears that rural health centre received 53.7 per cent of the development expenditure, and hospital and clinic sector received about 17.0 per cent of the total expenditure. Expenditure on public health service and paramedical sectors were also fairly high.

Considering both the expenditures together, the per capita expenditure on health is about 20.31 taka which is about 0.73 US dollars, and the total expenditure is about 0.79 per cent of gross domestic product. These estimates do not include expenditure on public health engineering (such as water supply). Including this expenditure, the percentage of gross domestic product spent on health becomes 1.10 as compared to about 4.6 per cent for developed countries. Of the total national budget, health receives only about 6 per cent. Private expenditure on health is not known, so this may increase per capita expenditure by few takas. Compared to developed countries, the per capita expenditure and the total expenditure on health are significantly low.

Table 91. Public expenditures on health and related activities, 1982-1983

Name of the sector	Expenditure (in thousand Taka)	Per cent
Health organisation	227 095	21.6
Hospital and Dispensaries	254 837	24.2
College and School	59 526	5.7
Mental Hospital	6 011	0.6
Epidemic Control	27 244	2.6
Health Research	7 699	0.7
Health Centre	321 961	30.6
Pastorised Institute[a]	4 085	0.4
Population Control and Family Planning	124 466	11.8
Grant for Health Purpose	14 693	1.4
Public Health Organisation	–	
Drug and Drug Court Admn	2 727	0.3
Work and Reforms Activities	1 172	0.1
Total revenue expenditure	1 051 516	100.00
Total ADP[b] allocation	808 341	43.5
Grand total	1 859 857	
Total expenditure as a per cent of GDP	0.79	
Percapita expenditure (in current prices)	20.31	

Source: 1983-1984 Statistical Yearbook, table 14.15 p. 665.

Note: [a] The budget is spent for the Institute of Public Health. It usually spent for vaccine production such as antirabis vaccine.
[b] ADP = Annual Development Program.

Table 92. Annual development expenditures on health by broad components

Name of the Sector	1982 – 1983	
	Total cost	ADP allocation (in lac taka)
Rural Health (THC)	36 039.47	4 338.43
Medical Education Training	517.61	109.73
Nursing Education and Training	1 999.07	317.10
Hospital and Clinics	9 979.21	1 377.66
Para Medical Education and Training	4 622.78	657.00
Production Storage and Distribution of Drugs and supplies	601.86	233.05
Public Health Service	4 702.90	940.44
Dev. of Homoeopathic & Indigenous system of Medicine	1 465.97	20.00
New Projects:		
Medical Education & Training	34.28	4.00
Hospital & Clinics	90.00	10.00
Production storage and distribution of drugs and supplies	385.10	40.00
Public Health Services	33.56	12.00
Miscellaneous	171.70	24.00
Grand total	60 643.51	8 083.41

Source: 1983-1984 Statistical Yearbook, table 14.16. p. 667.
ADP = Annual Development Program.

VII. HEALTH AND MORTALITY PROSPECTS

Mortality transition has been observed in many, with some variations, developed as well as developing countries since about 1950s after the Second World War. Without corresponding decline in fertility, this decline of mortality has given a phenomenal rise in population growth rate in many countries. This mortality decline has resulted from composite effect of several factors such as development and spread of modern medicine, socio-economic development and introduction of several new time-to-time health programme interventions. This study has made an attempt to analyse the mortality trends and patterns in Bangladesh, and the underlying factors affecting mortality over last three decades.

A. SOCIO-ECONOMIC BACKGROUND

Bangladesh is a densely populated country. In 1981, 89.9 million people were recorded to live in an area of 55,598 sq.miles; that is 1,567 persons live per square mile. During the first half of this century, population growth rate was quite low as compared to the growth rate after 1950s. This resulted from decline of mortality without changing fertility level. In last census, the growth rate was observed to be 2.23, somewhat lower than the rate observed in 1974.

Population density has a considerable variation between the regions. Dhaka district, having the capital city, has the highest population density, while Comilla has the second highest and Bandarban has the lowest.

Urbanization has also increased considerably during last three decades. About 15.18 per cent of the total population live in urban areas; it was only 5.19 per cent in 1961 and 8.78 per cent in 1974. A notable increase in urbanization during last intercensal period was partly due to change of definition of urban area in 1981 census, and partly due to expansion of urban areas and high unemployment problem in rural areas.

With regards to religion, about 87 per cent of the population are Muslims, 12 per cent Hindus, 0.6 per cent Buddhists and 0.3 per cent Christian. During last few decades, proportion of Hindu population has declined considerably because of their emigration to India. Hindu population is considerably higher in Khulna, Jessore, Faridpur, Dinajpur and Sylhet. Buddhists are mainly concentrated in Chittagong Hill Tracts and Bandarban.

Land utilization bears the reflection of population pressure on land. Sizes of forest and fallow land are declining. Land use in non-cultivable purposes such as housing and establishment, about 4.6 per cent in last ten years, has increased considerably. More land is being used for multiple cropping.

Age-sex distribution of population does not show much changes over last two decades. About 47 per cent of the total population are below age 15, and only 3 per cent people are above age 65. There is a small decrease in the size of population of age groups 0-4 and 5-9, and increase in population of age groups 10-14 and 15-19.

Literacy rate is fairly low compared with other countries in this region. It has not shown much increase over the last two decades; however, it is partly due to change of definition, which gradually became strict. In 1981 census, 19.7 per cent of the population were found literate against 20.2 per cent in 1974. Male literacy rate, 25.8, is almost twice as high as female literacy rate, 13.2. Unlike female literacy rates, male rates have shown somewhat declining trend. The urban literacy rate is observed to be 34.8 per cent as against 17.0 per cent in rural areas. Sex differences in literacy is much wider in rural areas than urban areas, and the difference is gradually closing.

A notable decline is observed in school attendance population of age 10-14 years. The decline is much prominent for males of age groups 15-19 and 20-24 in urban areas. While male school going population is decreasing, female school going population has maintained an increasing pace.

Of the literates 88 per cent have less than secondary level of education; 76.8 per cent in urban areas and 91.7 per cent in rural areas, and about 84.7 per cent of male and 94.8 per cent of female have less than secondary level of education. Seventy five per cent of female finished their education at primary school. Another large drop-out occurs after tenth grade.

With regards to labour force, the refined activity rates show a declining trend. In 1981, it

was found to be 43.1 per cent as against 48.6 per cent in 1961. It is partly due to change of definition of economically active population. In recent definition, females engaged in household work were excluded from labour force. A noticeable increase in growth rate of female labour force is observed in both urban and rural areas. Urban-rural differences of this growth rate are not very sharp. Compared with other developing as well as developed countries, female labour force participation is still very low.

Employment in agriculture sector has declined considerably. In rural areas, agriculture is the main sector for male employment, and in urban areas production, sale and service sector. Female employment in service sector has increased noticeably, but a simultaneous decline is also observed in agriculture sector.

Bangladesh economy is primarily based on agriculture. Agricultural sector contributes 46 per cent of gross domestic product, while industrial sector contributes only 9.7 per cent. Unlike agricultural sector, industrial sector is gradually increasing its contribution to GDP. Transport and trade and services also make notable contribution to GDP.

Marriage is universal in Bangladesh. Tradition of early marriage is still prevailing in the country. Mean ages of marriage for men and women are 25.6 and 17.7 years respectively as observed in 1983. The difference of mean ages is about 8 years. Marriage is also observed to have small regional variation.

Despite strong programmatic efforts, high fertility pattern is still prevailing in the country. During last two decades, there has not been much achievement in fertility reduction as the total fertility rate is observed to be 5.6 per woman in 1983 Contraceptive Prevalence Survey. However, a modest declining trend is observed with the rates from various sources.

B. MORTALITY TRENDS

Like many other countries, mortality transition has also taken place in Bangladesh since 1950s. In recent years, the mortality levels in Bangladesh has shown some improvement although the level is still much higher than many developing as well as developed countries. The estimates of crude death rate from various sources present an overall trend of mortality although these measures suffer from different types of accuracy problems. During the period 1921-1951, the mortality level remained about 40 per thousand, which used to be highly influenced by the natural calamities and environmental condition. The decade after this showed a rapid improvement of mortality situation and the similar pace of decline also prevailed during 1961-1971. This improvement may be attributed to the various health programme undertaken by the government suh as programme of eradication of malaria, small pox, tuberculosis, typhoid and cholera. That is, about 50 per cent of the decline resulted from the control of communicable diseases. Malaria and tuberculosis were among the important causes, and dysentery, diarrhoea and gastroenteric diseases (including cholera and typhoid) accounted for about 0.2 to 0.3 million deaths per year in the country during the late 1950s. Since early 1960s, the Pakistan Government had undertaken a policy to make available the improved medical facilities and other public health utilities throughout the country, and these had made rapid improvement in mortality situation.

In 1962, the government introduced the malaria eradication programme, and full control of malaria was achieved by 1977. However, incidence of malaria still prevails in northern and southern part of the country.

After the decade of 1960-1970, the mortality rates, crude death rates, was very stable ranging from 12 to 17. The rates of 1971 was influenced by the deaths due to liberation war, and the rates of 1974 and 1975 were affected by the famine of 1974. The rates from small studies also show a wide range of variation from 4 to 15 per 1,000.

Infant mortality rates of the period 1911-1983 indicates an overall improvement in mortality situation from 205 per thousandin 1911 to 113 in 1983. Infant mortality rates also show similar pattern of changes like crude death rates. The rates of the recent years appear to vary between 115 to 125, but show some increase for 1981 and 1982. It may be due to improvement of reporting system rather actual increase of incidence of death. Separating the neo-natals from post-natals, neo-natal mortality rates show faster decline than post-natal mortality rates. Male neo-natal mortality rates are found to be consistently higher than the female for all the years, but a reverse situations is observed for post-neonatal mortality rate. It is primarily due to male-based health and nutrition-related activities at family level. Malnutrition is found to be substantially higher among female than male children. Males alway consume more calories and protein than females at all ages even in a situation when female nutrient requirements due to changing of body weight for pregnancy and lactation are essentials. Post-neonatal mortality is particularly sensitive to environmental condition.

Child mortality also show a similar declining trend. Male mortality rates declined faster than the female rates. The rates of last few years are observed to be higher than the previous years, which indicates slight deterioration of mortality situation. Measures of life expectancies, which are 48.1 in 1962-1963, 56.9 in 1980 and 54.0 in 1982, show a similar trend.

Comparing the mortality of various age groups, it appears that mortality situation has improved for all ages; particularly it has improved significantly for children and older people. Female mortality rates during reproductive age groups are higher than their male counterparts. Maternal deaths contribute to such difference. After this period, chances of dying for male become higher and it increases faster than the females.

C. DIFFERENTIAL MORTALITY

Mortality has close association with the developmental level of the country. It is strongly related with socio-economic characteristics of the people as well as characteristics of the community. Various studies also unvailed the significance of the relationship of mortality with demographic characteristics of mothers and children such as sex, age, parity, birth intervals. This section has demonstrated infant, child and maternal mortality with a series of socio-economic and demographic characteristics, and major dynamics of mortality.

Mortality differentials due to sex of children are noticeably very high. Female children of ages older than one have higher risk of mortality than their male counterparts, but for neonatal deaths, situation is reverse. It implies a selective neglect of children unless there is a biological factor causing this differences. Cultural factors such as role of man in the society creates biasness towards male children.

Mother's age of confinement has a clear relation with the probability of dying of children. For neonatal and post-neonatal, higher chances of mortality are associated with mothers of younger ages and ages older than 30. Lack of knowledge about child rearing activities of younger mothers and preoccupation with household work of older mother probably explain this phenomenon. Mortality of children of one year old shows gradual decline as age of mother increases. Therefore, increase in age at marriage of women would reduce child mortality substantially.

Small prior birth intervals have very high chances of dying for all ages of children. Children having one year of prior birth interval have very high risk of death. The risk declines as the interval increases. Somewhat similar pattern of relation are also observed with subsequent birth intervals. This implies that increase in spacing between the birth may reduce child mortality considerably. Effective use of family planning methods can solve this problem.

Children of parity one are likely to have higher risk of death than the subsequent parities. This pattern remains unchanged throughout their childhood. On the other hand, risk of death for neonatal has a U-shaped relation with parity of birth. For children of other ages, risk declines as the parity increases.

Socio-economic factors have also shown significant differences in mortality. Urban areas have lower neonatal, post-neonatal, infant and child mortality than the rural areas. Male-female differences in mortality are also fairly low in urban areas. Similarly, a slight regional variation has also been observed with mortality rates, but the levels do not show any systematic patterns. However, Khulna has the highest level of neonatal, post-neonatal, infant and child mortality.

Hindus are observed to have higher mortality levels than Muslims. The difference between the religions is fairly high. Among the Hindus, schedule castes have higher mortality levels than caste Hindus. Mortality levels of caste Hindus are about the same as Muslims.

Education is by far the strongest influencing factor for mortality level. Mother's education is much more effective in reducing mortality than the education of fathers as well as other members of the family. Increase in education of women can solve many problems along with mortality more easily. Universal primary education may be introduced immediately for obtaining benefits of various developmental programmes.

Occupation also has a strong association with mortality. In rural occupational structure, agricultural labourers have the highest mortality levels, and the land owners have the lowest levels. Lack of information on mortality pattern with respect to broad occupational classification limited the scope of making comments on the mortality pattern with urban and industrial occupational classification.

Area of dwellings and number of cows owned are essentially economic indicators. Mortality declines as the areas of dwelling and number of cows owned increase. Use of fixed latrine is an essential item in environmental sanitation. Households having fixed latrine has lower mortality than others. After controlling the effect of education, the pattern remains

unchanged. Type of house is also an economic indicator. Low mortality is associated with better type of housing.

Mother's current marital status has relation with mortality. Proportion of children dead of currently married women is about 37 per cent lower than the divorced women, and about 15 per cent than the widows. Differences are also observed for number of times women married. Children of widows married once has lower mortality than that of widows married more than once. Similarly, women divorced and married once, have lower child mortality than women divorced and married more than once. Multiple marriage and current marital status have strong relation with child mortality.

Community characteristics also have influence on mortality levels. The mortality rates of neonatal, post-neonatal, infant and child have shown direct relation with the distance of upazila headquarters, family planning clinic, government dispensary, hospital, primary school and qualified doctors. The rates increase as the distance increases.

Maternal mortality rates from various sources show a declining trend. It has declined from 20 in 1950s to 4.8 in 1982-1983. Highrisks of maternal death are observed with mothers of ages less than 20 and older than 30. A similar U-shaped relation of maternal death is observed with parity and gravidity. High abortion related maternal deaths occur at parity 3, 5, and 6, and at gravidity 0, 1, 3, and 6. It might be a result of strong desire for limiting family size after 2 or 4 children.

Socio-economic factors show complicated relation with maternal mortality. Maternal mortality as observed from a small study, increases as the economic status improves. High maternal mortality is observed with families having 2-3 acres of land holding. It is also higher for women having primary education than other groups. This situation indicates that middle class people are more concerned about limiting their family size. They probably even consider abortion in case of unwanted pregnancy.

With regards to the medical causes of maternal deaths, direct obstetric causes 86.2 per cent deaths. About 37.9 per cent death occur due to sepsis: 20.7 per cent for septic abortion and 10.3 per cent for post-partum sepsis. Eclampsia causes 20.7 per cent and haemorrhage causes 10.2 per cent deaths. The classifical triad of causes – infection, eclampsia and haemorrhage – accounts for 68.9 per cent of deaths.

Transition of causes of death has also taken place over the last few decades. With the limited information on causes of deaths, tetanus is observed to be a major cause of death, accounting for 25.3 per cent of deaths. Diarrhoea and dysentery cause 16.2 per cent of deaths, and respiratory disease is equally prominent for causing high mortality.

For infant, tetanus is the major cause of death, accounting for 44.9 per cent of death in 1982. Diarrhoea and dysentery cause 5.9 and 3.1 per cent death. A very high proportion of deaths remains undetected about their causes. For children of ages 1-4, the importance of diseases changes. For them dysentery is the major causes of death, 26.2 per cent from 1982 Matlab data, and diarrhoea is the second major cause, which accounts for 11.7 per cent of deaths. Measles, a least important cause for infant deaths, and respiratory diseases cause 10.3 and 9.4 per cent of deaths respectively. Male children have higher incidence of deaths due to respiratory problems than female children, but for measles, diarrhoea and dysentery, female children have higher incidence of death than males.

D. HEALTH SERVICES AND HEALTH POLICY

Keeping in view the global strategy 'Health for All by Year 2000', the Government is adopting various policies in Five Year Plan. Accordingly, the Government spelled this policy in five objectives in Second Five Year Plan 1980-1985. The objectives are:

1) to bridge rural-urban gap, and to improve quality and coverage of the health care service with a view to providing minimum medical care to all;

2) to control major communicable diseases and expand preventive measures;

3) to provide health and family planning services in a package to all with a view to increasing family welfare and ensuring population control;

4) to improve quality and availability of drugs and medicines;

5) to develop and integrate indigenous and homoeopathic systems of medicines with the overall health care services.

The overall objectives of Third Five Year Plan (TFYP) 1985-1990 are almost the same, but the strategic targets are slightly differents. In TFTP, Primary Health Care (PHC) will be delivered in three tiers system of consultation and referral. The levels are: a) community

village) level through community health workers/ voluntary health workers/health volunteers, b) intermediate level (ward level) through health post with mid level health manpower, and c) Health Centre level (union level) through Union Health and Family Welfare Centre (UHFWC). All the Upazila Health Complexes (UHC) will be provided with diagnostic and treatment facilities for acting as spearhead for delivery services in primary health care.

Emphasis has been given on expansion of health services at grass root level and graded specialists. Policy also attempts to expand other physical and functional facilities at district hospitals as well as Upazila Health Complexes.

Based on the objectives laid in SFYP, the Government mobilized resources for obtaining required manpower and institutional facilities. This accelerated the growth of UHCs and UHFWCs. Each upazila and union will have a UHC and a UHFWC respectively, with physical and functional facilities for providing health care services both static as well as domiciliary. The domiciliary component consists of home visit, counselling about preventive and promotive aspects of health, family planning, immunization, deworming, distribution of Vitamin A tablet and collection of blood slides. UHCs are expected to have 31-bed hospitals. By 1985, 345 UHCs and 1,351 UHFWCs were found at their functional level. Besides, there are 1,275 rural dispensaries which have been converted to UHFWC. It should be pointed that the capital invested in building rural health infrastructure remains unutilized because of lack of drug and functional requisites, and that there is a lack of monitoring systems at field levels. Without appropriate measures, benefit of the capital expenditure may not reach to the people.

With regards to institutional facilities, there are 8 medical college hospitals, one post-graduate medical research hospital, 12 TB hospitals, 10 specialized hospitals and 59 district level general hospitals in the country. In addition, there are a number of medical clinics. Only 25,373 hospital beds are available for 89.9 million people. Population per bed is about 3,334; however, it is gradually improving.

Regarding manpower in health services, the country has only 13,000 physicians, and 5,800 nurses for the 89.9 million people. Although population per physician is declining, it is still observed to be very high, 7,438 persons. Rural health services are still in the hand of quacks and traditional healers despite outturn of 1,400 doctors and 653 nurses every year. To attain the target of TFYP, a large number of people will have to be trained with knowledge of health services for carrying out the responsibility of rural health services.

Besides, there are 18,504 practitioners in Homoeopathy, 2,332 in Ayurvedic and 3,131 in Unani in the country. In developmental plans, a strong emphasis has been given for the development of these systems of medicine.

To improve the quality and availability of essential drugs and medicine, the Government has adopted a comprehensive drug policy. About 250 drugs are declared as essential of which 12 at village level, 33 at upazila level, 105 upto the district level, and 100 are specialized drugs. There is also a controlling system over prices of drugs. However, necessary steps are required to ensure quality and availability of drugs.

With a view to improving mortality situation of mother and child, an Expanded Program for Immunization (EPI) was introduced in 1979. During 1979-1984, 60 per cent of children under 15 years of the target, 2 per cent of children under 2 years and 5 per cent of mothers received BCG, DPT and ante-natal care respectively. The targets for TFYP are to cover 90 per cent of children under under 2 years with immunization programme. Success of these targets will definitely improve health and mortality and child. However, high drop out from completion doses create a major hinderance in attaining the targets.

Despite the strong programmatic effort, the contraceptive use rate has not improved much. According to 1983 CPS, only 19.1 per cent of currently married women are using contraception. Of the methods, tubectomy is becoming more acceptable by women. The programme needs to be reinforced for accelerating the use rate.

In the national budget of SFYP, only 2.5 per cent were spent on health, while it was 5.4 per cent and 3.5 per cent in FFYP (1973-1978) and TYP (1978-1980) respectively. Per capital expenditure was about 20.31 taka (about $US 0.66). Including the expenditure on public health engineering, safe water supply, about 1.10 per cent of Gross Domestic Product (GDP) are spent on health, which is about 4.5 per cent in developed countries.

E. NUTRITION

Shortage of food grain in the country is almost a regular phenomenon. Rice is the most dominant food grain in the food habit of the people. Ninety per cent of calories and protein intake comes from rice, wheat, fish, pulses, fruits, potatoes and vegetables, so nutritional

level of the people depends on production and availability of these foods. Production of pulses and fish, major sources of protein, have declined considerably while production of rice, wheat and potatoes have increased, and the corresponding changes are observed in their per capita consumption although largest share of the income, people spend on food. In order to keep the prices of food low, the Government subsidies prices through rationing system. Until now 'Food for Work' programme has been found to be very successful in this regard.

Nutrition surveys documented a declining of per capita food consumption from 886 gm. in 1962-1964 to 807 gm in 1975-1976 and further to 765 gm per day per person in 1981-1982, and the decline is more noticeable in fishes and vegetable consumption.

Food intake by nutrients presents a depressing picture. It shows severe deficiencies in intake of calories and some other nutrients such as Vitamin A, Riboflavin and Vitamin C. Intake of Vitamin A and C is over 50 per cent below the required level. Defficiency of Vitamin A is causing blindness to 30,000 children each year.

Under this severe condition, there is a sharp age-sex differences in allocating food in the family. Cereals, vegetables and roots constitute major portion of children's diet. Intake of milk, fish and meat are fairly low. For adolescents, intake of most food items is higher for male than female. Differences in food intake become wider as age increases; that is, food intake of male is much higher than the female in higher age groups. This indicates that children and mothers are discriminated against adult males in intrafamily food distribution.

Among the children under age 5, 29 per cent suffer from first, 46 per cent from second and 15 per cent from third degree of malnutrition. Nutritional situation of male children are somewhat better than female children. Among the children under 5 years, 7 per cent are suffering from acute undernutrition. More than half of the children under age 11 years suffer from chronic undernutrition. Forty per cent of children under age 5 and 54 per cent of age 5-11 years are facing this problem.

Initiation to breastfeed is universal in Bangladeshi mothers even though the majority of them suffer from malnourishment. However, practice has shown considerable variation between rich and poor, urban and rural, educated and uneducated mothers. Rural, poor and uneducated mothers have higher tendency to breastfeed than other mothers.

F. FUTURE PROSPECT

Keeping in view the global strategy 'Health for All by year 2000', the Government has been formulating Five Year Plans. Previous plans endeavoured to provide essential health care for common people and have been able to cover only 30 per cent of the entire population. In Third Five Year Plan, 1985-1990, the Government makes an attempt.

1) to improve quality of health care delivery system and its coverage;

2) to consolidate and strengthen exsiting PHC programmes and its supporting system;

3) to prevent, control and treat major communicable and non-communicable diseases;

4) to foster appropriate health manpower development and its optimum utilization;

5) to promote systematic development of Homoeopathy, Unani and Ayurvedic systems of medicine on scientific basis;

6) to mobilize resources to support expanding Health Care Services;

7) to promote adequate production, supply and distribution of essential drugs, vaccines and other diagnostic and therapeutic agents;

8) to develop a network of health information system for monitoring and development of an affordable health care delivery; and

9) to promote and provide facilities for bio-medical and health system research.

Based on these objectives, the Government adopted strategic targets various sectors. Success of this plan will undoubtedly improve the health condition and reduce mortality; however, several countervailing factors are always creating problems for the success. Consequently, there is always a time lag between implementation of policy and achievement of strategic targets. This creates a fear about the success of the targets by year 2000.

G. FERTILITY AND MORTALITY

Bangladesh may now be considered in the middle of the second stage of demographic transition. That is, high fertility and moderately high mortality patterns are still prevailing in the country although the levels are observed to be declining. Now, the question is whether the country will ever be able to reach the third stage of demographic transition. The question itself generates a battery of questions connecting all

the influencing factors. Therefore, the answer cannot be given in a simple way. Simultaneous effect of several factors will determine whether it will ever reach the third stage of demographic transition and if it reaches, when.

The size of Bangladesh population primarily depends on the levels of fertility and mortality since role of migration is not very significant in the country. Without substantial decline in fertility, improvement of morbidity and mortality situation cannot be expected. At the macro level, high growth rate will increase the size of population for whom food, shelter, clothing and health services need to be provided. By the year 2000, about 140 million people according to Bangladesh Bureau of Statistics will be living in an area of 55.6 thousand square miles, about 2,525 people per square mile. Now, the question is whether available resources of the country will be able to bear the burden of this large size of population, whether food production and food availability will be enough for all the people after fifteen years, while the per capita protein-calorie intake is observed to be declining, and how far the intensive method of cultivation or new agricultural policy will improve supply at the required level. Answer of these questions are not simple and relates to many factors.

Production of crops in Bangladesh not only depends on agricultural inputs but also extremely to the climatic conditions. Cyclone, flood, draught and heavy rain have always been determining factors of the agricultural production. The ultimate increase in production will depend on how far creation of barrage or embankment can protect crops from flood and improvement of irrigation facilities can protect from draught. Still, question remains at stake whether the country will be able to grow food for 140 million people even with the optimum utilization of land and agricultural inputs at the end of the century. Agricultural sector alone will not be able to provide food and employment for this large size of population.

Can the industrial sector generate enough income to compensate the deficit in food supply by earning foreign exchange to procure food grains from other countries? The answer remains in uncertainty although the country is now entering into new era of industrialization, such as establishment of textile, garments, light engineering and drug industries. The industrial products other than jute product have not got much international market as yet. These are rather at their infancy stage. It will take several years to have a position in international market.

If the shortage of food increasingly become severe, malnutrition will turn to be severe problem, which will result into high morbidity and mortality. Therefore, prospects of food availability is a primary factor for the health condition of the people no matter how much expansion of health services are made available to the people. There should be a balance between the size of population and the resources available to maintain them otherwise repeatation of Malthus positive check will emerge.

Besides, patterns of land utilization have shown an increasing trend of using land for non-cultivable purposes. It indicates that more agricultural land are being used for settlement and establishment. If this trend continues, by the end of the century a large amount of cultivable land will be converted into non-cultivable uses, which will threaten the agricultural production.

At micro level, fertility and mortality have two-way relations. Low fertility of higher order and longer birth intervals contribute to low infant and child mortality as observed in Bangladesh and other developing countries. On the other hand, mortality influences fertility through two mechanism: biological – reducing lactational amenorhea and behavioral – relates to insurance and replacement hypothesis. Unfortunately, the family planning programme which is about 23 years old, does not show much achievement in reducing fertility rate as the total fertility rate is still near about 6 per woman. Therefore, programme efforts should be designed in such a way that reduction in mortality couples with reduction in fertility.

H. SOCIO-ECONOMIC DEVELOPMENT AND MORTALITY

Various studies in Bangladesh, discussed in chapter III, have demonstrated an inverse relation of mortality with most socio-economic indicators with varying strength of the relationship. In cross-nation analysis mortality levels such as infant mortality rates and life-expectancy are usually considered as developmental indicators. The influence of socio-economic development on mortality is therefore well established fact from the experience of Bangladesh as well as other countries. Although there are some instances where substantial reduction in mortality has been achieved without achieving much economic development such as Kerala and Sri Lanka, it may not be possible in the case of Bangladesh. For instance, the literacy rates of Kerala and Sri Lanka are much higher than that of Bangladesh, so it was much easier for them to introduce health programme interventions such as knowledge of environmental sanitation and preventive measures. It is evident that education alone can

influence mortality risk through a number of intermedicate factors. Therefore, effective results of all socio-economic development programme and other programme interventions can be achieved if literacy rate can be enhanced considerably. Although the Government has undertaken a policy of universal primary education, it is yet far from full implementation. With the present declining trend in school enrolment, literacy rate may not increase at all unless it gets emphasis in the priority list. It is probably hightime to expedite the implementation of universal primary education plan, and it will help solve many hindrances of socio-economic development of the country.

It is of course possible to achieve improvement in mortality and morbidity situation with introduction of various health programme interventions, however, it may not be stable in the face of increasing trend of malnutrition which will make it difficult for further improvement of health and mortality situations. Therefore, to achieve and retain better health and reduced mortality, socio-economic development, fertility control and health programme interventions should be integrated in the policy; otherwise, 'Health for All by Year 2000' will not be possible.

Attention should also be paid to employment generation activities. Agricultural sector is coming to a stage of saturation, and has limited scope for generating employment. For the increased population, scope of employment in industrial and service sector should be generated; otherwise unemployment problem will not only create incidence of social deviance but also mortality through other intermediate factors.

Immunization and oral rehydration programme may reduce infant and child mortality considerably and it will have impact on prospective size of labour force population. That means more people will be demanding employment. In the absence of corresponding increase in economic opportunities, this will increase unemployment and under-employment, and thereby negative consequences of them.

I. FINANCIAL CONSTRAINTS

Implementation of strategic targets of Five Year Plan always suffer from budgetory constraints for both development and revenue budgets. Allocation of development fund could not be made in the past as per phases due to position. The annual recurrent (revenue) budget always faces inadequacy to meet increased requirement generated from development programmes and thus creates adverse effect to services and supplies. During the period of Second Five Year Plan, about 40 per cent of the total revenue budget allocated for health was spent on Primary Health Care (PHC) and its related activities, nearly 40 per cent was spent on hospital and clinical services, and only about 20 per cent was spent on drugs and other medico-surgical equipments, which meets only 20 per cent of the total needs. Upazila Health Centres (UHC) and Union Health and Family Welfare Centres (UHFWC) are always suffering from lack of funds for maintenance and running costs, including the cost of essential and life-saving drugs. Consequently, rural people are not getting more than 20 per cent of the total benefit which is expected to be provided by the centres. Therefore, the benefit of the capital investment for establishing UHCs and UHFWCs are not fully obtained. It may be mentioned that the district hospitals constantly suffer from shortage of supplies of drugs and other medico-surgical requisits.

Moreover, inclusion of unscheduled projects without increasing fund for them overburdens the scanty resources. With these financial constraints, how far the functional and physical facilities of these centres can be improved will actually determine the success of the services made available for rural people to achieve the target. Besides, the quality control of the locally produced drugs still need to be improved, otherwise, expenditure on supplies of drugs will not go for the benefit of the people.

Monitoring of field level workers and service delivery system of UHCs and UHFWCs has always been ignored. Even with adequate supplies of functional facilities, people may not get the benefit of services due to workers' efficiency and sincerity. Monitoring and supervisory system should be developed to ensure proper service delivery so as to get return from capital invested for the services. This is specially important from upazila level down to field level.

Thus, poverty, poor health and high mortality are the results of mutually reinforcing and synergistic causes such as low income, insufficient food intake, illiteracy, poor environmental conditions, infection, disease, lack of water and sanitation, and inavailability of curative health services. It is, therefore, impossible to achieve good health by introducing a single intervention. Keeping the preceding discussion in view, the following recommendations are made for the perusal of policy makers.

J. POLICY RECOMMENDATIONS

To achieve 'Health for All by Year 2000' requires a multi-secotoral approach. This cannot be achieved merely by increasing expenditure

on Health sector, because socio-economic development, health, nutrition and mortality are closely interrelated. Improvement of general health condition will require concurrent improvement of these issues. Keeping this in view, the following recommendations may be considered for the perusal of policy makers. The recommendations are presented under five different headings.

(a) Health

1) Latent conflict between preventive, curative, academic and administrative components coupled with ineffective cooperation with other socio-economic sectors lead to a reduced efficiency of the present system. The harmonic relation between these components will lead to an effective health services in the country, for which necessary steps for modification of working policy should be taken.

2) Tradition of dependency on curative measure for health should be shifted to preventive measures. Necessary steps should be taken for promoting preventive measures in the country.

3) Community leaders, social workers, volunteers should be trained with the knowledge of preventive health measures.

4) Health education should be introduced in primary and secondary school curriculum. In addition, it should also be introduced in the curricula of all kinds of training programmes as family planning was introduced.

5) Safe water should be made available within the reach of every citizen in the rural areas.

6) Use of fixed latrine should be promoted in rural areas. That is, every family should have a useable latrine.

7) Immunization programme for mother and child should be carried out extensively. Necessary measures such as use of growth chart, should be adopted to avoid drop out before completing the full course.

8) Community people should be taught to use Oral Rehydration Saline (ORS) in the event of diarrhoea.

9) Curative facilities of common diseases should be made available at Union Health and Family Welfare Centres in addition to the facilities of Primary Health Care services.

10) Ward level and village level health workers should be well trained in identifying common diseases and be equipped with common medicines.

11) Referral system with clearly septt-out linkage should be developed so that complicated cases get priority in receiving hospital services at district and specialized hospitals. Upazila Health Centre should be considered as first level of referral systems.

12) Upazila Health Centre should be equipped with essential physical and functional facilities.

13) Union Health and Family Welfare Centre (UHFWC) which establishes the linkage between people and health services, and is considered to be nucleus of Primary Health Care (PHC) system, should have a position for a graduate doctor who will be responsible for health, family planning and nutrition programme in the community, in addition to the present set up.

14) Provision of having health card which can be renewable each year for each individual should be introduced with a nominal cost. This will gather a substantial amount of revenue for bearing considerable proportion of expenditure on health services. This card may be designed in such a way that it will provide some basic socio-demographic information of the individual.

15) Free health services should be restricted to actual needy and subsidized health services should be available for well off people.

16) Development of indigenous medicine and practitioners of indigenous medicine should be brought into the frame of health services. Scope should be provided for their research and development.

17) Quality control of drugs should be made more effective.

(b) Nutrition

Improvement of general health condition of the people and mortality and morbidity situation cannot be achieved unless nutritional problem is taken care with appropriate measures. Poverty along with inadequate knowledge in food and nutrition is the major cause of malnutrition in Bangladesh. To overcome this problem, the following recommendations are proposed:

1) Nutrition education should be introduced in the curriculum of primary and secondary school. Knowledge of food and nutrition should be disseminated in all kinds of training programmes as family planning programme are being considered.

2) Rural health and family planning work-

ers should also be trained with the knowledge of food and nutrition so as to disseminate their knowledge to common people as well as religious leaders, quacks, social workers and school teachers.

3) Mass media should be used to diffuse the knowledge of food and nutrition such as how to make cheap and balanced diet, cooking procedure, duration of food storing, time of introducing weaning food to babies, cleanliness and sanitation.

4) Breastfeeding practice should be encouraged. Mothers should be made aware about the benefit of breastfeeding for the children's nutritional status.

5) Programme should also be undertaken about the maternal nutrition in general and pregnant and lactating mothers in particular.

6) Growth monitoring system should be introduced to detect severe malnutrition.

7) Community supported supplemental feeding programme should be established for the treatment of severe malnutrition.

8) Emphasis should be given in research and scientific development in food science.

(c) Family Planning

Unless population growth is controlled, better health, low morbidity and mortality cannot be achieved with limited resources of the country. Since the realization of the gravity of the problem of uncontrolled population growth, the Government has been trying at utmost level to curb the fertility level of the country. In addition to the existing programmes and strategies of the government, the following recommendations may be incorporated in the programme:

1) Community-based approach in family planning programme should be introduced, and be made more effective and strengthened.

2) Contraceptive availability should be made within the reach of rural common people.

3) This is probably the appropriate time to introduce incentive and disincentive measures for discouraging higher fertility. Couples having more than two children will be getting limited facilities available from the government as against their counterparts having two or less children.

(d) Agriculture

Bangladesh economy is primarily based on agriculture. Development in agriculture has positive effect on country's economy. Major share of foreign exchange comes from agricultural product. Therefore agriculture policy will have important role in increasing agricultural product. The following recommendations may be considered for perusal of policy makers.

1) Although the Government has already taken an extensive programme for expansion and improvement of irrigation facilities in the country, the facilities are not yet at the reach of needy farmers. Agricultural loan is not yet easily available by the poor farmers. Most of the time they fail to get it when it is absolutely needed. Therefore, necessary steps should be made to expedite the process.

2) The policy of diversifying and intensifying growth of vegetables and fruits as well as pulses and oil should be made effective with a view to improving the nutritional standard of the people. People may be encouraged to utilize their homestead for growing essential vegetables.

3) Fallow land should be brought under cultivation, and should be distributed among poor farmers.

4) The policy of production incentives through internal procurement of rice and wheat at prices remunerative to farmers has not yet been very successful; therefore, necessary measures should be taken for making it more effective.

5) Production and marketing of cash crops like jute, sugarcane, cotton require more regulation by the Government so that farmers do not loose their incentive to grow these crops.

6) Agricultural inputs such as fertilizers, pesticides and irrigation equipments should be made locally available through private/public sectors.

7) Production of High Yielding Variety (HYV) of rice should be expanded.

8) The Government needs to formulate policies for increasing employment in non-agriculture sectors. Agriculture sector has already become saturated for further employment.

(e) Education

Illiteracy has always been a major obstacle in developmental activities. Literacy usually enhance openness in people to accept any changes in their traditional ways of thinking and to endeavour for the betterment of their life. To accelerate the development process, illiteracy should therefore be removed from the society.

1) Policy of universal primary education is yet to be implemented. This should get higher priority in development plans. Consideration of possibilities of compulsory primary education should be evaluated with priority and be implemented, if possible.

2) Basic health and nutrition education should be introduced in the curriculum of primary education.

3) Secondary education should be directed to more technical, vocational and scientific education, and curriculum should be changed accordingly.

BIBLIOGRAPHY

Ahmed, S. and M.C. Gesche Preliminary Report of a maternal mortality study Conducted at Matlab, East Pakistan, In: Proceedings of the Cento Symposium of demographic Statistics, Karachi, 5-12 November 1968, pp. 177-180.

Ahmed, S. A prospective study of patterns of morbidity and growth in infant in a low Economic Urban Community in East Pakistan, Afro-Asian Pardiatric Congress, Karachi February 1968.

Ahmed, S. Fertility infant mortality and socio-economic status of rural women: A case study of the district of Chittagong, Department of Statistics, University of Chittagong, 1978.

Ahmed, S. and M.C. Gesche "Maternal Mortality Study in the Matlab area of rural East Pakistan," 8th Annual Medical Symposium, Jinnah post graduate Medical Centre, Karachi, 8-9 August 1969.

Ahmed, G. and P.K. Muhuri. Second Phase Assessment of Zero Population Growth Programme in Bangladesh 1981, Dhaka: Research Evaluation and Training (RET) Consultants, 1982.

Alauddin, M. and others. A Case Study of Family Planning in Two Villages, Dhaka: Institute of Social Welfare and Research, University of Dhaka, 1981.

Alauddin, M. and N.R. Sorcar. SES – A Booster for the Rural Poor: An Evaluation of the Rural Family and Child Welfare Project. A joint Programme of the International Union for Child Welfare (IUCW) and the Department of Social Welfare, Dhaka, 1981.

Alauddin, M. and M. Yahia Khan. A study of Five NGOs in Population Activities in Bangladesh, Dhaka. The Ministry of Health and Population Control and UNFPA, 1983.

Alauddin, M., N.R. Sorcar and M. Yahia Khan. An Evaluation of Concerned Women for Family Planning Activities, Dhaka, The Quest, 1983.

Alauddin, M. and N.R. Sorcar. An Evaluation of the FPIA Supported Family Planning Project. A joint Programme of the International Union for Child Welfare (IUCW) and the Department of Social Welfare, Dhaka, 1981.

Alauddin, M., N.R. Sorcar and M. Ali/Shamsher. An Evaluation of Family Planning Activities Through Swanirvar, Dhaka: Population Control and Family Planning Subvention Committee, Ministry of Health and Population Control, 1983.

Al-Kaber, Ahmed. Influence of Community Factors on Infant and Child Mortality in Rural Bangladesh "Second Bangladesh Popuation Association Conference", 1984.

Alam, I. and J. Cleland. "Infant and child mortality: Trends and determinants" in I. Alam and J. Cleland (eds) *Fertility in Pakistan: A Review of Findings from the Pakistan Fertility Survey,* Voorburg: the Netherlands International Statistical Institute.

Alamgir, M. "Economic Activity of the Population", *Population of Bangladesh.* Country monograph series No. 8. United Nations Economic and Social Commission for Asia and the Pacific, 1981.

Arthur, W. Brain, and Geoffery McNicoll. "An analytical survey of population and development in Bangladesh", *Population and Development Review,* vol. 4, No. 1, March 1978, p. 29.

Aziz, K.M.A., W.H. Mosley, and M. Fahimuddin. Present trends of birth and death in rural East Pakistan. Paper at the 5th Annual Medical Symposium, Jinnah post graduate Medical Centre, Karachi, 8-13 August 1966.

Bairagi, R. Alternative anthropometric indicators of nutrition of young children. (unpublished doctor of science thesis). The Johns Hopkins University, 1981.

Bairagi, R., Mridul K. Chowdhury and James F. Phillips. "A multi-variate regression analysis of childhood survival: the interaction of household economic status with sex of the child infant and child mortality". Institute of Statistical Research and Training, University of Dhaka, 1982, pp. 79-110.

Becker, S. and A.M. Sarder Seasonal patterns of vital events and migration in Matlab, Bangladesh: review of basic patterns and detailed analysis of mortality. Conference on Seasonal Dimension to Rural Poverty, Institute of Development Studies, University of Sussex, Brighton, July 1978, pp. 3-6.

Becker, S. "Seasonality of births." Workshop on Recent Trends of Fertility and Mortality in Bangladesh, Dhaka, 3-5 April 1979.

Begum, S. Firoza. Abortion and Maternal Mortality, Dhaka: Bangladesh Fertility Research Programme, December 1981.

Bhatia, S., J. Chakrabarty and A.S.G. Faruque "Indigenous birth practices in rural Bangladesh and their implication for a maternal and child health programme." *Scientific Report* No. 26. Dhaka: International Centre for Diarrhoeal Diseases Research, Bangladesh, 1979. Bangladesh Bureau of Statistics: Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality. Ministry of Planning, Dhaka, Bangladesh. Bangladesh Rural Advancement Committee (BRAC); Diarrhoeal Interventions in Rural Bangladesh: Results from a survey of Bamijachang Thana. Dhaka, November 1980.

– Oral Therapy Extension Programme: Annual Report, Dhaka, July 1981.

– Oral Therapy Programme: Ajmirigonj Thana, Dhaka, November 1979.

– The Retention of Knowledge about labangur Oral Rehydration Saline: Glimpses from a survey in Rural Bangladesh.

Black, R.E., K.H. Brown, S. Beeker, A. Alron and M.H. Merson. Contamination of weaning foods and transmission of enterotoxogenic *Escherichia Coli* diarrhoea in children in rural Bangladesh. *Trans R Soc Trop Med Hyg* 76 (2), pp. 259-264.

Chen, L.C., M.C. Gesche, S. Ahmed, A.I. Chowdhury and W.H. Mosley, Maternal Mortality in Rural Bangladesh, Studies in Family Planning. 1974, 5, pp. 334-341.

Chen, L.C. Control of diarrhoeal disease mortality and morbidity: Some strategic issues. *American Journal of Clinical Nutrition* December 1978, 31(12), pp. 2284-2291.

Chen, L.C., M.C. Gesche, S. Ahmed, A.I. Chowdhury and W.H. Mosley, Maternal Mortality in Rural Bangladesh, Studies in Family Planning, 1974, 5, pp. 334-341.

Chen, L.C., M. Rahman and A.M. Sarder "Patterns and causes of death among children in a rural area of Bangladesh: Priorities for death programmes Workshop on Recent Trends of Fertility and Mortality in Bangladesh, Dhaka, 3-5 April 1979.

Chen, L.C. "Epidemiology and causes of death among children in a rural area of Bangladesh" *International Journal of Epidemiology,* 1980, 19, pp. 25-33.

Chen, L.C., E. Huq and S. D'Souza. "Sex biases in the family allocation of food and health care in rural Bangladesh". Population and Development Review, 1981, vol. 7(I), pp. 55-70.

Chen, L.C., M. Rahman and A.M. Sardar, "Epidemiology and census of death among children in a rural area of Bangladesh." Intl. J.E. Pid. May 1980, 9(i), pp. 15-34.

Chen, L.C. "Control of diarrhoeal disease mortality and morbidity: Some strategic issues". *American Journal of Clinical Nutrition* December 1978, 31(12), pp. 2,284-2,291.

Chowdhury, A.I. and K.M.A. Aziz, "Occupation: a determinant of birth and death rates in rural Bangladesh". *Rural Demography* Summer 1974, 1(i), pp. 12-20.

Chowdhury, A.K.M.A. A report on neo-natal and post neo-natal mortality in Matlab vaccine trial area in Bangladesh. In: Proceedings of the 9th Meeting of the Scientific Review and Technical Advisory Committee of the Cholera Research Laboratory and reports of the collaborative studies between Centre for Medical Research and cholera Research Laboratory. Dhaka, Cholera Research Laboratory, 1975, pp. 263-282.

Chowdhury, A.K.M.A, A.R, Khan and L.C. Chen. "The effect of child mortality experience on subsequent fertility: An empirical analysis of Pakistan and Bangladesh data". In Seminar on Infant Mortality in Relation to the Level of Fertility, Bangkok, 6-12 May 1975.

Chowdhury, A.K.M.A, A.R, Khan and L.C. Chen. "The effect of Child mortality experience on subsequent fertility: In Pakistan and Bangladesh." *Population Studies* June 1976, 30(2), pp. 249-261.

Chowdhury, A.K.M.A, D. Huber and G.T. Curlin. "Fertility and mortality – Recent changes in rural Bangladesh". Conference of the World Population Society, Washington D.C. 12-13 December, 1976.

Chowdhury, A.K.M.A, G.T. Curlin. Recent trends in fertility and mortality in rural Bangladesh, Seminar on Fertility in Bangladesh, Cox's Bazar, Bangladesh, 13-15 December 1976.

Chowdhury, A.K.M.A, K.M.A. Aziz and W.H. Mosley. "Fetal and neonatal mortality in rural East Pakistan", 8th Annual Medical Symposium, Jinnah post graduate Medical Centre Karachi, 8-9 August 1969.

Chowdhury, A.K.M.A, D. Huber, G.T. Curlin. "Fertility and mortality – recent trends in rural Bangladesh." Annual Meeting of the population Association of America, St. Lousis, Missouri, 21-23 April 1977.

Chowdhury, A.K.M.A, A.R. Khan and L.C. Chen. "Experience in Pakistan and Bangladesh: In. *The effects of infant and child mortality on fertility,* New York, Academic Press, 1978, pp. 113-133.

Chowdhury, A.K.M.A, and G.T. Curlin. Recent trends in fertility and mortality in rural Bangladesh, 1966-1975. Working paper No. 3, Dhaka, Cholera Research Laboratory, January 1978, p. 14.

Chowdhury, A.K.M.A. and others "The interaction of nutrition, infection and mortality during recent food crisis in Bangladesh", Food Research Institute Studies, 1977, 16(2), pp. 47-61.

Chowdhury, A.M.R. "A design for evaluating the impact of a Health intervention programme on mortality." Paper presented at the first National Conference of Bangladesh Population Association, Dhaka, April 1981.

Chowdhury, S.A. and others "Causes of death: Companyganj, Bangladesh 75-78" CCDB, Dhaka, 1980.

Chowdhury, A.K.M. A. "Infant deaths, determinants and delemmas: A cohort analysis for rural Bangladesh", *Scientific Report,* No. 46. Dhaka, International Centre for Diarrhoeal Disease Research.

Chowdhury, A.K.M. A. "Recent trends in fertility and mortality in rural Bangladesh 1966-1975", ICDDR,B, January 1978.

Chowdhury, A.K.M. A. "The concept of intermediate level variables in mortality studies", *Infant and Child Mortality in Bangladesh.* Institute of Statistical Research and Training, University of Dhaka, January 1982, pp. 29-37.

Chowdhury, A.M.R. and S. D'Souza "A design and field methods for monitoring impact on mortality of an oral, therapy programme" *Infant and Child Mortality in Bangladesh.* Institute of Statistical Research and Training, University of Dhaka, January 1982, pp. 173-202.

Chowdhury, A.K.M.A. "Education and infant survival in rural Bangladesh". *Health Policy and Education,* vol. 2, No. 3-4, Amesterdam, Netherlands, March 1982, pp. 369-74.

Chowdhury, A.K.M.A. "Fertility and mortality in Bangladesh: A report". Panel Meeting of the National Academy of Sciences (USA) London, February 1980.

Chowdhury, A.K.M.A. "Infant mortality in relation to internal migration in rural Bangladesh", *Social Biology,* 1983, 30(4).

Chowdhury, A.M.R. and S. D'Souza, "A design and field methods for monitoring impact on mortality of an oral therapy programme." ICDDR,B Working paper No. 27, July 1982, p. 23. International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh.

Chowdhury, A.I. and J.F. Phillips. "The trends in neonatal, infant and child mortality over the pre and post project period of the Matlab Family Planning Health Services Project", Second Bangladesh Population Association Conference, 1984.

Claquim, P. "Private health care provides in rural Bangladesh". Soc. Sci, Med., 1980.

Cohen, Nicholas. "Smoking, health, and survival: prospects in Bangladesh", Lancet, No. 8299, 16 May, 1981, pp. 1,090-1,200. Boston, Mass./London, England.

Cockburn, T.A. Infections diseases and the population of East Pakistan, in Aqureshi M.I. (ed) Population Growth and Economic Development, PIDE, Karachi, 1960.

Curlin, G.T, M. Khan, D. Palmer, T. Jackson, F. Koster, and K.M.A. Aziz. "A longitudinal prospective study of diarrhoeal mortality nurtition and immunological status in rural Bangladesh village". In: Proceedings of the 9th Meeting of the Scientific Review and Technical Advisory Committee of the Cholera Research Laboratory and Reports of the Collaborative Studies between Center for Medical Research and Cholera Research Laboratory, Dhaka, Cholera Research Laboratory, 1975, pp. 48-54.

D'Souza, S., A. Bhuiyan and M. Rahman "Socio-economic differentials in mortality in

a rural area of Bangladesh", WHO/ESCAP Meeting on Mortality in Asia: A review of Changing Trends and Patterns 1950-1975.

D'Souza, S. and L.C. Chen. "Sex differentials in mortality in rural Bangladesh", *Population and Development Review,* 6(2), June 1980, pp. 257-270.

D'Souza, S. and A. Bhuiya. "Socio-economic mortality differentials in a rural area of Bangladesh", *Population and Development Review* December 1982, 8(4), pp. 753-69.

Edmoston, Barry. "Maternal factors affecting infant and child mortality in Bangladesh: A multivariate logistic analysis", *Infant and Child Mortality in Bangladesh,* Institute of Statistical Research and Training, University of Dhaka, January 1982.

Edmoston, Barry. "The age pattern of infant and child mortality in Bangladesh: Applications of the Weibull distribution", Proceedings of the American Statistical Association, Washington, D.C, American Statistical Association.

Edmoston, Barry, William Greene and Kan Smith. "Multivariate analysis of survival data: An appraisal using Bangladeshi mortality data". Proceedings of the American Statistical Association, 1981, Washington D.C; American Statistical Association.

Ewbank, D.C. "The sources of error in Brass's method for estimating child survival: The case of Bangladesh." *Population Studies* London, England November 1982, vol. 36, No. 3, pp. 459-74.

Gescho, C. and others, "Maternal mortality in rural East Pakistan". Dhaka, East Pakistan Research and Evaluation Centre, November, 1968.

Guerront, R.L. and others "Infection disease: Treatment of cholera and other dehydrating diarrhoeal illness". In L.C. Chen (ed) *Disaster in Bangladesh, Health Crisis in Developing Nation.* Oxford University Press, 1975.

Grimes, D., A. Satterthwaite, A. P. Rockhat, R. W. Akhter, Nargis. "Death from Contraceptive Sterization in Bangladesh: rates, causes, prevention." *Obstetrics and Gynecology,* New York, November 1982. vol. 60, No. 5, pp. 635-40.

Hill, Ken, Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality. Census Commission. Ministry of Population. Government of Bangladesh 1977.

Huda, Khawza Shamsul, "Effect of community factors on childhood mortality in Bangladesh". Infant and Child Mortality in Bangladesh. Institute of Statistical Research and Training, University of Dhaka, January 1982, pp. 141-172.

Huffman, S.L. and others. "Socio-economic status-relevancy of the 1974 census data (Matlab)" as a measure of the Socio-economic Status in 1976, Dhaka, ICDDR,B.

Islam, M. Shafiqul and Beeker, S. "Interrelationships among certain socio-economic variables in a rural population of Bangladesh". *Rural Demography,* vol. VI (1 and 2); pp. 51-65.

Islam, M. Shafiqul. "Fertility and childhood mortality estimates for Bangladesh based on pregnancy history data." (unpublished M.A. thesis), Australia National University, Canberra, March 1981.

Islam, M.S., M.M. Rahman, M.H. Munshi and M. Rahman "Birth care practices and infant mortality in Teknaf-analysis of correlative". Fourth Bangladesh Science Conference. Rajshahi, 2-5 March 1980. Abstract in: Proceedings, 1980. p. 183.

Islam, M. Shafiqul, M.M. Rahman, K.M.S. Aziz M. Rahman, M.H. Munshi, and Y. Patwari. "Infant mortality in rural Bangladesh: an analysis of causes during neonatal and post-neonatal periods". *Journal of Tropical Pediatrics,* Oxford, England, December 1982. vol. 28, No. 6, pp. 294-8.

Islam, M.S. "Socio-economic differentials of diarrhoea morbidity and mortality in selected villages of Bangladesh". In: Proceedings of the 2nd Asia Conference on diarrhoeal Diseases, Calcutta, 1983, p. 68.

Islam, M.S. *Levels and Patterns of Fertility and Mortality in two Rural Areas of Bangladesh.* (unpublished M. Ph. thesis), Cairo Demographic Centre, Cairo, 1982.

Islam, M.S., M.M. Rahman, K.M.S. Aziz and Y. Patwari "Traditional childbirth practice; implications for neonatal mortality in Bangladesh". Proceedings of a Conference on infant and child mortality, Dhaka, January 1982. Dhaka, Institute of Statistical Research and Training, University of Dhaka, 1982, pp. 203-16.

Kabir, M. "Infant and child mortality in Bangladesh: Estimated from the 1975 Bang-

ladesh fertility survey". *Infant and Child Mortality in Bangladesh,* Institute of Statistical Research and Training, University of Dhaka, January 1982, pp. 38-55.

Kabir, M. Humayun. "Determinants and consequences of infant mortality: A short review". *Infant and Child Mortality of Bangladesh.* Institute of Statistical Research and Training, University of Dhaka (January 1982): 20-28.

Kabir, M. and A.A. Howlader "Socio-economic determinants of mortality in Bangladesh." *Rural Demography,* 1980 vol. 7, pp. 1-13.

Kabir, M. "A review of the mortality level in Bangladesh estimated from cholera research, PGE, and the 1974 survey data". *Rural Demography,* 1977 vol. 4, pp. 35-60.

Khan, Mashihur and Amminur Rahman Khan. "Demographic process in Bangladesh". Background paper for the Seminar on Population Policy Bangladesh, Dhaka, Bangladesh, 15-21 May 1975.

Langstar, R. "The demographic situation in comaniganj; Findings 1975 and implications". Seminar on Fertility in Bangladesh, Cox's Bazar, 21-23 December 1976.

Maudood, Elahi and L.T. Ruzicka. "Trends and differentials in mortality". *Population of Bangladesh;* Country Monograph Series No. 8 New York, United Nations, 1981, pp. 43-63.

McCord, C. and others. "Death rate, land and the prices of rice". Noakhali, Companiganj Health Project, 1980. Evaluation Unit Report No. 04, pp. 75-76.

Mia, Ahmadullah and others, *Impact study of UNICEF Project Villages,* Dhaka: Institute of Social Welfare and Research, University of Dhaka, 1982.

Mitra, S.N. "Infant and child mortality in Bangladesh – Levels and differentials". (unpublished M.A thesis.) Australian National University. Canberra, 1979.

Miranda, Armindo. "The demography of Bangladesh data and issues". Department of Social Science and Development. DERAP Publication No. 144, Norway, 1982.

Moslehuddin, M., M. Alauddin and Ahmadullah Mia. "Causes of death in children 0-4 years old in Bangladesh". *Infant and Child Mortality in Bangladesh.* Institute of Statistical Research and Training, University of Dhaka, January 1982, pp. 56-68.

Mushi, M.H., M. Rahman, K.M.S. Aziz, and M.M. Rahman. "Morbidity and mortality trend in Shigellosis in Teknaf during 1976 and 1977" Fourth Bangladesh Science Conference, Rajshahi, 2-5 March 1980. Abstract in Proceedings 1980, p. 177.

Munshi, M.H, M.M. Rahman, K.M.S. Aziz and Y. Patwari "Diarrhoeal mortality in two Bangladesh: Villages with and without community-based oral rehydration theory". National workshop on oral rehydration, Institute of Public Health Auditorium, Dhaka, 26-28 September 1979. Abstract in: Proceedings, 1980, p. 13.

NAS. "Estimation of recent trends in fertility and mortality in Bangladesh." *US National Academy of Science,* Report No. 5, National Academy Press, Washington, 1981.

Nortman, D. "Parental age as a factor in pregnancy outcome and child development". *Reports on Publication Family Planning.* No. 16, 1974.

Oberte, N.W., M.H. Merson, M.S. Islam, A.S.M.M. Rahman, D.H. Huber, and G.T. Curlin "Diarrhoeal desease in Bangladesh epidemiology, mortality averted and cost at a rural treatment centre." *International Journal Epidemiology,* December 1980, 9(4).

Obaidullah, M. *Demographic Survey of East Pakistan (DSEP) 1961-62.* Part II, chapter two, ISRT, Dhaka University, Bangladesh, 1966.

Rahman, M. and others. "Reduction of neonatal mortality by immunization of non-pregnant women and women during pregnancy with aluminum absorbed". *Tetanus Toxoids Monograph,* International Centre for Diarrhoeal Disease Research, Bangladesh, 1980.

Rahman M. and S. D'Souza "A review of findings on impact of health intervention programmes in two rural areas of Bangladesh". Dhaka, International Centre for Diarrhoeal Disease Research, Bangladesh. ASG. November 1980.

Rahman M.M. and others "The people of Teknaf: birth, death and migrations (1976-77)", Working Paper No. 13 Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1979.

Rahman, Mokhlesur. "Reduction of Neo-natal Mortality by Immunization of Neo-pregnant women and pregnant woman in

rural Bangladesh," *Scientific Report* No. 41. Dhaka, International Centre for Diarrhoeal Disease Research, Bangladesh, (January 1980.

Rahman, S. *Neo-natal Mortality Pattern in Rural Bangladesh,* Dhaka, National Institute of Population Research and Training, 1980.

Rahman, Shafiqur. "The effect of traditional births attendent and tetanus toxoid in education of neo-natal mortality". Institute of Statistical Research and Training, University of Dhaka, January 1982.

Rahman, M., M.M. Rahman and K.M.S. Aziz. Fertility and Mortality in Teknaf. Workshop on Recent Trends of Fertility and Mortality in Bangladesh, 28 August 1980. Abstract in: Proceedings, 1980.

Rahman, M.M. *Malnutrition and Mortality from Diarrhoeal Diseases in Children.* 11th Re Union Festival of the Dhaka Medical College Studies. Union, Dhaka, 15-18 February, 1967.

Rahman, M.M. Reduction of general childhood mortality following early oral rehydration by glucose electrolog solution. Abstract in: Proceedings of the 3rd Bangladesh Nutrition Seminar, Dhaka, 22-24 March, 1979: 97-98.

Rahman, M.M., K.M.S. Aziz, Y. Patwari, and M.H. Munshi "Diarrhoeal Mortality in two Bangladeshi Villages with and without Community-based oral rehydration therapy". *Lancent* 1979, 2, pp. 809-12.

Rahman, M.M., M.A. Majid, M.A. Wahed and A.S.M.M. Rahman. Nutritional Status and Subsequent risk of mortality in Hospitalized Diarrhoeal Children. XIIth International Congress of Nutrition, San Diego, California, 16-21 August 1981. Abstract in: Proceedings 1981, p. 107.

Rahman, M.M., K.M.S. Aziz, M.H. Munshi, Y. Patwari and M.A. Rahman. "Diarrhoeal clinic in rural Bangladesh; influence of distance, age and sex on attendance and diarrhoeal mortality." *American Journal of Public Health,* October 1982, 72(10), pp. 1124-8.

Rizvi, N. Food Habits and Practices in Pregnancy and Post-Partum Priod in Rural and Urban Food Behaviour in Bangladesh. (Unpublished Ph.D. dissertation.) University of California, 203 Los Angeles, 1979, pp. 210-231.

Robinson, W.C. "Status in demography of Pakistan," *PIDE,* Karachi, 1960.

Roy, S.K., A.K.M.A. Chowdhury and M.M. Rahman. "Excess mortality among children discharged from hospital after treatment diarrhoea in rural Bangladesh." *British Medical Journal,* 15 October 1983, 287 (6399), pp. 1097-9.

Roy, S.K., A.K.M.A. Chowdhury and M.M. Rahman Excess Mortality Among Children Discharged from Hospital After Treatment for Diarrhoea in Rural Bangladesh (reply). *British Medical Journal,* 19 November 1983, 287 (6404), p. 1553.

Samad, Abdus. "Demographic survey of collection of baseline data at four concentrated thanas." Institute of Statistical Research and Training, University of Dhaka, 1976.

Samad, A. and others, "Fertility differentials in rural Bangladesh." *Rural Demography* (Dhaka) ICI 1974, pp. 49-54.

Samad, Aporn, Kashem Sheikh, A.M. Sardar, Stanley Becker and Lincoln C. Chen. "Demographic Surviellance System Matlab." *Vital Events and Migration 1977.* Dhaka: ICDDR, Bangladesh, 1979, vol. 6.

Sattar, A. Infant and Child Mortality Experience and Family Planning Acceptance Rates in Bangladesh. A case study of the restrospective survey data. University of Rajshahi, Bangladesh, 1978.

Schultz, Paul T. and Julie Davanzo. Analysis of Demographic Change in East Pakistan: A Study of Retrospective Survey Data. Pond Publication, Santa Monica.

Sommer A. and M.S. Lowenstein "Nutritional status and mortality: A prospective validation of the quack stick." *American Journal of Clinical Nutrition,* 28, pp. 287-292, March 1975.

Smucker, C.M., G. Simmons, S. Bernstain and B.D. Mitra "Neo-natal mortality in South Asia. The special role of tetanus." *Population Studies,* 1980, 34(2), pp. 322-324.

Stoeckel J. and A.K.M.A. Chowdhury "Neonatal and Post-neo-natal mortality in a rural area of Bangladesh." *Population Studies,* March 1972, 26(I): pp. 113-120.

Stoeckel, John and others *Fertility, Infant Mortality and Family Planning in Rural Bangladesh.* Oxford University Press, Bangladesh, 1973.

Stoeckel, J. and A.K.M.A. Chowdhury, "Pregnancy termination interval in a rural area of Bangladesh." *Demography*, May 1974, vol. 11(2)

Swenson, I. "Expected Reductions in Fetal and Infant Mortality by Prolonged Pregnancy Spacing in Rural Bangladesh." *Bangladesh Development Study* 1-16 January 1977, 5(I).

Swenson, Ingrid. "The effects of pregnancy spaning on neo-natal and post neo-natal mortality in Bangladesh" *Journal of Tropical Pediatrics* (forth coming).

Swenson, Ingrid and A. Harper Pond "High risk mortality factors related to fetal wastage in rural Bangladesh". *Journal of Biosocial Science.* October 1979, pp. 465-471.

Swenson, Ingrid. "Relationships between pregnancy spacing, sex of infants, maternal age, and birth order, and neonatal and post-neonatal mortality in Bangladesh." *Social Biology*. Madison, Wisconsin. Fall-Winter 1981. vol. 28, No. 3-4, pp. 299-307.