

DEMOGRAPHY OF AGING : LESSONS FROM BANGLADESH



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**IN MEMORY of
MY FATHER
Late Solalman Sikder
WHO PASSED AWAY
ON SEPTEMBER 03,1996.**

DECLARATION

I declare that the thesis entitled "Demography of Aging: Lessons from Bangladesh" submitted by me in the Department of Statistics, University of Rajshahi for the award of the degree of Doctor of Philosophy in Statistics is based on my research work.

To the best of my knowledge, this work neither in part nor in full has been submitted to any University or Institution for the award of any degree or diploma.

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ABSTRACT

The aging of population is thought to be the outcome of interplay between fertility and mortality. So is the case with Bangladesh. In the face of socio-economic transformations that are taking place in Bangladesh, it is assumed that the demographic transition what has been underway in the country in recent years affects the upper age spectrum of the population and has resulted in increase of the older persons of age 60 and over. However, the demographic consequences of changing population age structure and the growing number of older persons are yet to fully understood. The present study is an attempt to explore the causes and consequences of population aging in Bangladesh.

The aim of the study is to explore the current situation and future trend of population aging under the changing condition of demographic variables, specifically, fertility and mortality. The objectives of the study are:

- to look at the change in the level and pattern of fertility and mortality and their effect on the age structure of the population,
- to examine the impact of undergoing demographic transition on aging of population,
- to investigate the current age-sex structure of the aged population and to assess future trend under various demographic alternatives and
- to understand the consequences of population aging in the country.

The study has been based on secondary sources of data. The secondary data have been taken from different published and unpublished sources. These are Vital Registration, Population Census, Demographic Survey of East Pakistan, Population Growth Estimation Experiment, National Impact Survey, Bangladesh Retrospective Survey on Fertility and Mortality, Bangladesh Fertility Survey, Bangladesh Contraceptive Prevalence Survey, Bangladesh Demographic and Health Survey, Demographic Surveillance System and some others. Besides these sources, data are also taken from United Nations publications. The study has been carried out on the basis of such demographic indicators as crude birth rate, crude death rate, total fertility rate, median age, age and sex composition, marital status, life expectancy, and so on. The study has analysed the demographic transition

caused by reduction in fertility and mortality and also identify the factors affecting the aged population. To estimate and project the aged population, the models viz. Exponential growth model, Modified exponential growth model, Geometric model, Makeham's model and Logistic model have been used. The study has estimated and projected mid-year female population of Bangladesh by age group during 1991-2021 and through applying Frejka's component method in Leslie matrix form. Finally, Cohort component method has been used to estimate and project the mid-year total population of Bangladesh by age group.

The expected trend in aging of population of Bangladesh reveals a clear increasing level in aging population both in case of males and females. As regards age structure it is found that the elderly population(60+) has increased by 1 percent during 1911 to 1991. The projected figure of elderly population in Bangladesh shows that the size of the elderly population is expected to increase from nearly 6.02 million in 1996 to 7.78 million in 2006. It is also evident that there is a consistent increase in the proportion of aged 60+ compared to the population in those of young and adult age groups. Thus older population of Bangladesh is going to increase remarkably between the next two decades from 2010 to 2030. The exponential growth rate of elderly population in Bangladesh is lower than the other Asian countries.

With regard to demographic change the crude birth rate has reduced to as low as 25.6 percent in 1996 from 53.8 percent in 1901. The total fertility rate has also declined with a narrow amplitude. It has reduced from 6.78 in 1961 to 3.41 in 1996. Comparison of crude birth rate with the proportion of aged population reveals an inverse relationship between the two. So is the case between the aged population and total fertility. With the decline of total fertility, the aged population would gradually increase. Crude death rate has also an uninterrupted declining trend over the period of the study. Reduction of mortality has however been the important factor in triggering off the rapid growth of population in Bangladesh. Again a considerable decline in infant mortality is noticed in the second half of the twentieth century. Infant mortality reduced to 67 deaths per 1000 live births in 1996 against 140 in 1960. As regards crude death rate and expectation of life at birth, there is a close relationship between the two variables. The average length of life has increased more than double in this century from 24 years in 1901 to 59 years in

1996. The relation of crude death rate with aged population reveals that about 77 percent variation in the proportion of aged population is explained by crude death rate. About 99 percent variation in such proportion is explained by expectation of life at birth.

As regards to nuptiality, significant changes in marital composition and in the mean age at marriage are noticed. The mean age at marriage of females has increased to 20.1 years in 1996 as against 12.6 years in 1931 and for males to 27.8 years from 19.0 years during the same period. Both the factors are closely related to fertility thereby affect the aging of population.

Estimate and projection of the aged population reveal that in next 20 years their number will exceed nearly one crore and in the mid of the next century the elderly(older persons) is expected to increase nearly 205 times than today. The aged population of Bangladesh will increase gradually upto 2021 and thereafter it will increase remarkably between 2021 to 2051 about 4.6 times by the end of 2051 from the figure of 1981. Thus, we have clear evidence that the aging of population that is taking place in the country can be accounted for the transition of both fertility and mortality i.e. the demographic transition vis-a-vis changes in the age structure.

In view of growing number of elderly in Bangladesh, the aged population gradually emerges as a vulnerable group in our society. The well-being of the older person requires formulation of appropriate policies and programmes through a clear understanding of the problems, needs, and demands of this vulnerable group, their status and functions in the family and society, their living arrangement, support systems, economic activity, potentiality and so on.

Population aging in Bangladesh is becoming a serious concern for the development agendas. The issue should be dealt with much care. The rapid rate of aging of population and the growing cohorts of older persons have particular implications for the development of the country including increasing economic dependency and rising incidence of care giving to older persons by the traditional social unit, the family. Maintenance of joint family system could be a policy option.

CHAPTER-I

INTRODUCTION

1.1 Demographic back ground of Bangladesh

Bangladesh appeared on the world map as an independent and sovereign country in 1971 following a war of liberation. It lies in the north eastern part of South Asia between $20^{\circ}34'$ and $26^{\circ}38'$ North latitude and $88^{\circ}01'$ and $92^{\circ}41'$ East longitude. It is a small country with a land area of 55598 sq. miles or 147570 sq. km. It is bounded by India on the West, North and North-East and Burma on the South-East and the Bay of Bengal on the South. Bangladesh is essentially a flat alluvial plain crisscrossed by seven principal rivers, many tributaries, and rivulets. Bangladesh's economy is predominantly agricultural.

The Bangladesh Bureau of Statistics conducted the third decennial population census in the country during March 12 to 15, 1991. Population of the country reached 111.45 million in 1991. Bangladesh is the ninth most populous country in the world after China, India, The United States, Indonesia, Brazil, Russia, Japan and Pakistan. It is one of the least developed and most densely populated countries of the world. The percentage of urban population was 20.1 while that of rural 79.9. The intercensal (1981-1991) growth rate of population estimated by using adjusted population of 1991 census was 2.17 per annum. According to the 1991 census, 45.1 percent of population is below 15 years of age, 49.5 percent between 15-59 years and 5.4 percent are aged 60 years and above. The mean age at marriage was 24.9 and 17.9 years for male and female respectively. The total fertility rate(TFR) was 4.23. The crude birth rate(CBR) and crude death rate(CDR) was 31.6 and 11.0 per 1000 population. The infant mortality rate(IMR) was 91 per 1000 live births. The expectation of life at birth was 56.5 years for males and 55.6 years for females. Assuming medium variant of declining fertility and mortality the country is expected to reach a population of 129.6 million by 2000 A.D (BBS,1991). The density of population was approximately 647 per sq. km. in 1981. It increased to 755 per sq. km. in 1991. The sex ratio of the population is 106

males per 100 females. The literacy rate of the country, as per 1991 census was 32.4 percent for population 7 years and above. The percentage of Muslim population was 88.3 while of Hindu, Buddhist and Christian was 10.5, 0.6, and 0.3 respectively.

According to Bangladesh Demographic and Health Survey (BDHS, 1997), the CBR and CDR per 1000 population in overall, rural and urban are 23.6, 25.8 and 18.6 and 8.0, 8.5 and 6.8 respectively, the IMR are 72.8, 78.5 and 54.8 per 1000 live births and the expectation of life at birth are 59.6, 58.4 and 62.1 years, and the TFR are 3.1, 3.3 and 2.1 respectively. The morbidity rate per 1000 population is 159.4 and in rural and urban population are 165.1 and 147.7 respectively and among the male and female population are 154.1 and 161.8 respectively. The prevalence of morbidity among the overall, rural and urban elderly are 272.2, 265.5 and 278.8 per 1000 elderly respectively. Such rates among the male and female elderly are 289.1, 281.7 and 306.8 and 250.0, 253.3 and 241.9 respectively.

According to the latest Bangladesh government information (BBS, 1998), the population of Bangladesh is 122.13 million, of which 40.65 percent of the population is below 15 years of age, 51.37 percent between 15-59 years and 7.98 percent people are aged 60 years and above. The literacy rate is 44.8 percent for population 7 years and above. The mean age at marriage is 27.8 and 20.1 years for male and female. The TFR is 3.41. The CBR and CDR are 25.6 and 8.1 per 1000 population respectively. The IMR is 67 per 1000 live births. The expectation of life at birth is 59.1 and 58.6 years for males and females respectively.

Bangladesh contains 1.09 percent of total world elderly population and 2.15 percent of total elderly in Asia in the year 1995. After a period of 25 years i.e. in 2020 percentage of elderly population of Bangladesh will be 1.38 percent of world's elderly and 2.41 percent of Asian's elderly population. According to United Nations projection proportion of elderly population has been 4.54 percent in 1995 and it will be 6.44 percent in the year 2020 an increment of only 1.9 percent in 25 years. But in terms of absolute number the increment of the elderly will be 0.864 million during 1995-2000 and 7.299 million during 2000-2020 in 20 years (UN, 1992).

1.2 Perception of Aging in Bangladesh

In Bangladesh most of the elderly people are afraid. Their daily activities are regulated with traditional values, attitudes and behavioral imperatives that old age is a time for reflection on death and withdrawal from the world, that the elderly should undertake a

passive rather than an active role and that the aged persons should devote more attention and time to leisure pursuits. They fall into despondency. For them socio-cultural bondage is broken into pieces to make them fatalists who seek help from other persons and become victims of ineluctable fate. In reality many elderly people are found to be socially isolated and lonely and they remain devoted to prayer for happiness in the eternal world. This tendency is in fact a form of escapism, stemming from a compromised means to avoid an undesirable reality and to involve oneself deeply in a sublimated existence for transmutation into a form of life imbued with spirituality-the philosophical doctrine that nothing is real but soul or spirit.

There found very few elderly people who look forward to a life that can eschew the worn-out and decayed process which is nearly temporal and nearly contemporaneous. They remain very active in doing their regular manual work to keep themselves physically and mentally fit so that they are able to continue to do their routine duties without help from others. These few elderly people do not like to be on the dole but rather want old age comforts to which they are rightfully entitled by their own thrift, capability and foresight. They would like to follow the elderly people of different communities who live fuller and more productive lives for a longer time. Though there are no reliable records that prove beyond doubt the age of long-lived persons, some of the cultures who are most often referred to as having unusually a good number of very old persons are , for example the Abkhasians in the mountain range of Caucasia , the hunza in Pakistan , the Vilcabambans of Ecuador (Benet 1974 , Davies 1975 , Leaf 1975) . A record of 168 years claimed by the Muslim Shirali in the USSR who died in 1973 has been questioned by many social scientists (Medvedev, 1974).

In Bangladesh there is no accurate government document that can provide proof on date of birth. Moreover, there is no way to determine a person's age through clinical tests as rates of individual aging processes are influenced by genetic, dietary, amount of daily physical activity and environmental factors which vary significantly in different communities.

In Bangladesh there is a long cultural tradition of reverence for the elderly, a tradition that generally encourages old people to exaggerate their age. The cultural tradition of respect for the elderly is supposed to be derived from an attitude of filial piety that is based on religions precepts and from a practice of paying reverence to ancestors.

Bangladesh has enforced deference to the elderly by observing a national day (1st October), Respect for the Elders Day, reminding that the family elders should be honoured by using respectful language when dealing with and speaking to them, by vacating seats for the elderly when travelling in buses and trains etc.. Because of traditional customs on paying special respect to the elderly in Bangladesh, they are expected to be in a relatively enviable position in some years to come. Aging is however regarded to be a fascinating topic because of the insights that can be gleaned from comparisons and contrasts with aging as it emerges in the industrialized and modernized societies. The prospects that the position of the elderly in Bangladesh may undergo significant changes in the current century and the next causing a disproportionate accumulation of the very old and the most vulnerable sector of the population are rather high (Sattar et, al., 1993).

In Bangladesh, mean age at death or the average potential life expectancy has more than doubled during the present century. It has risen from 24 in 1901 to 58.9 in 1996 (Davis,1951, Elahi et.al., 1981, BBS,1997). The Expanded Program of Immunization (EPI) and various medical measures on improving living environments and interventions on better sanitation designed for the far flung rural communities of Bangladesh may presumably postpone occurrence of many premature deaths to draw immediate attention of our national policy makers to examine carefully the undercurrent forces of aging process of Bangladesh population.

Conventionally, there are two processes considered to be involved in the aging of a population, i.e., aging at the base and aging at the apex of the population pyramid. The former results from a reduction of fertility, the latter from a decline in mortality among the elderly. Bangladesh is experiencing a declining fertility with increasing longevity, due to persistent improvement of elderly persons. One can expect life expectancies to grow further in this country and this means more aged people in Bangladesh in the coming years. Currently(1996), the country has about 6.04 million aged people(60+) and they form around 5 percent of the total population. In 2001, this will go upto about 6.93 million and at that time they will constitute about 5.41 percent of the total population. By the year 2021, the absolute number of the elderly people here is expected to be 13.29 million and at that time they will form about 7.3 percent of the total population of the country (Kabir, 1996, BPC, 1991).

In 1950 over half the population of Bangladesh was under 21 years of age but by 2050 over half will be over 37 years of age. In a little over one century, Bangladesh will be transformed from a very young society to a mature society. Another way of looking at this demographic shift is to note that the number of people in Bangladesh aged 65 and over will double between 1950 and 2020 and will double again by the year 2050. The change in the demographic structure of Bangladesh is very important, and it will have occurred in a relatively short period.

Problems of the aged people of different socio-economic groups are not the same. problems are different in rural and urban areas. There has not been significant study on the Aging and Social Services in Bangladesh excepting a few on general aspects of aging counted by different scholars. It is very recently that the attention is given to the aged and it is recognized by society as a social problem. According to UN projections life expectancy of the people of Bangladesh has been increasing from 50.7 years in 1985-90 to 202-2025. About 89-6% of the people of Bangladesh live in below the poverty. Health facilities also are very negligible. Total government expenditure on health including family planning in the year 1991 was 834 crore taka and per capita government expenditure on health and family planning was 76 taka. Thus the increasing number of older people are not getting proper economic and medical facilities, which they need very badly for their survival (Sattar et. al. 1993, BBS 1992)..

In Bangladesh retirement age varies for persons employed in different government, non-government, autonomous and private organizations. For self- employed persons there is no fixed cut off point for retirement. Old age is a period of decline, but all the old people do not form a homogeneous group. Some are physically and mentally more active and sensible, some are not. For some decaying starts early, for some it is late. Besides gender difference there are people belonging to rich and poor economic categories. Usually old age is considered to be accompanied by future of scheduled occupation and the elderly are obliged to retire.

The most common mandatory retirement age is between 57 and 60. Retirement age for a government employee is 57. In autonomous and private organizations it is 60. However they form a very negligible fraction of the total number of elderly people in Bangladesh. In some cases extension in a few autonomous organizations like universities is granted up to age 65. In some government organizations a retired person is sometimes selectively

re-employed for one or two years after retirement at age 57. The self-employed persons work as long as their health permits them to work. For poor families there is no support schemes for the self employed elderly. Usually 60 years is taken as the starting point of old age. But housewives cannot and do not retire, nor do the self-employed and the extremely poor. The following designations have been made for better understanding of elderly people.

- (i) old persons – aged 60-69 years;
- (ii) very old persons – aged 70-79 years;
- (iii) extremely old persons – aged 80 years and over.

Home for elderly, especially for the neglected elderly and those who have no near relatives and good neighbours and friends to care for them is favoured by many persons, old and young. The contribution of the NGOs is of great importance in this regard. The government encourages community organizations to provide services to the neglected elderly who are unable to take care for themselves with substantial material or food prepared and collected from the other members of the community. The government also encourages provision of subsidy to the community organizations to enhance participation and supports of the maintenance of traditional values of mutual assistance. With this end in view the “*Bangladesh Association for the Aged and Institute of Geriatric Medicine*” was established in Bangladesh. This home undertakes various socio-economic projects to keep the elderly busy and to provide health facilities to the elderly who become ill. A voluntary social welfare organization has been established for the retired government persons in Dhaka with many branches in different districts. These organizations execute various welfare projects on education, culture, health, nutrition, entertainment and religion for the elderly.

One of the most significant changes that we can anticipate in the future is an end to the perception of aging as a deviant status. As they increase in number, old people will no longer be thought of as unusual or as synonymous with frailty or disease or death. The later stages of the life cycle will become accepted as a normal status, indicating general social acceptance of the inevitability of aging.

The normal status of the process of growing old will also modify the image of old people as an easily duped or victimized group, a change that should discourage some offenders from concentrating on old people. This change should eventually have the effect of

reducing old people's fear of being victimized, and decreasing their feelings of vulnerability. This, in turn, will encourage them to live their lives in a less inhibited, less fearful way.

In accordance with the social and cultural expectations, the community members usually seek advice from the elderly people for solution of different socio-cultural and domestic problems. Quite frequently the elderly are called upon to perform the role of an arbitrator in a dispute. In Bangladesh the rural population still retain various patterns and aspects of the traditional life-style in which the concept of retirement is almost alien to them. Most of them continue to participate in their normal activities of life as long as they wish, usually uninterrupted, unless and until their physical and mental deterioration takes place. The elderly in rural Bangladesh still contribute, traditionally their knowledge, experience and wisdom to the younger generation without consideration of age.

1.3 Objectives of the Study

Interest in the subject of aging of population is of very recent origin and it still needs research and understanding of the issues and their inter-relationships. International community first debated the question of aging at the United Nations at the initiative of Argentina in 1948. The issue was again raised by Malta only in 1969. In recognizing that longevity was becoming one of the major challenges of the twentieth century, the United Nations organized World assembly on Aging, in Vienna, in 1982. In the same year the United Nation General Assembly endorsed the International Plan of Action on Aging. In 1990 the Assembly designated 1 October as the International Day for the Elderly, later renamed the International Day of the Older Persons. The United Nation General Assembly decided in 1992 to observe the International Year of Older Persons in 1999 with an objective to raise awareness of the first changing demographic picture of older persons, to stimulate debate, promote action strategies and encourage research and information exchange. The theme of the year have been “towards a society for all ages” (Karkal, 2000).

The aging of population is a global phenomenon. Aged populations have received scant attention all over the world. The issues related to aging problem are of great concern not only to the developed countries but also in developing ones. During the past few years, numerous reports both in popular press and professional journals indicate that one of the greatest achievement of the 20th century is the world wide greying of nations or the

survival of more and more people into the advanced stages of life. One hundred year ago, the average life expectancy in most part of the world was 25 to 30 years. Today in most of the developed countries it has stretched to over 70. In Asia, Africa and Latin America, it still remains rather low. But the figure is spurring upwards. Scattered findings around various places in the world indicate that a very strong emphasis is now given on the increasing number of old aged people and the various problems connected with their old age. With the success of the demographic transition and the consequent changes in population size and composition, the household and family structure have been undergoing considerable changes in most Asian societies. As a result, the emphasis of population problems is shifting from high fertility and mortality to the aging of populations, declining labor forces, social security and other related issues. Rapid urbanization and increasing education also provided expanding opportunities for women to be engaged in wage employment outside home. The availability of informal care has been declining as a result of geographical mobility, the employment of women, singlehood, divorce, decreasing fertility and the rising complexity and changing nature of family relationships. Consequently, women tended to be less available for the young and old in the household. Developing countries with aging populations will face challenges providing support and medicare for the elderly.

The population aged 65 years and over in Asia was estimated to be 131.8 million in 1985 (UN, 1986). These elderly persons constitute 4.7 percent of the total Asian population which is considerably lower than the developed regions (11.2 percent) and slightly below the average for the world (5.9 percent). The elderly residing in Asian countries amount to 46.1 percent of the aged population of the world as a whole owing to the large population size in Asia. According to UN population projection, this percentage is expected to rise to 50.9 percent in the year 2000 and to 56.9 percent in 2025. Moreover, the expected huge increase in a single segment of population those aged 65 and over in Asia is historically unprecedented (Myers, 1988).

There were 415 million persons aged 60 and over in the world in 1985 and they are projected to shift to 1.1 billion in the year 2000. According to the United Nations projections, the proportion of the total population in age group 60 and above is projected to jump from 15.8 percent to 23.6 percent in the developed countries and from 6.3 to 11.9 percent in the developing countries before the end of this century. Even it is currently

estimated that about 55 percent of the elderly population of the world is in developing regions. This share is projected to shift to more than 70 percent in the next four decades as a result of their decline in fertility and increase in life expectancy. If we take just the number of people above the age of 80, their numbers will jump from 15.2 million to 67.0 million, increasing nearly four fold by the 2000 in the world. If we take the less developed countries alone, the population of 60 years and older is expected to grow by 57 percent but the group 70 years and older is projected to increase by 63 percent and that 80 years and older by 82 percent during period 1985-2000. In contrast to the growth of older population, the total population of the less developed countries will grow by 32 percent (UN, 1987).

The population of the world will continue to grow older in the immediate future. The median age of the world population will increase rapidly during the twenty-first century. It must be assumed that disease control will be improved especially in those countries which currently have relatively high rates of infant and childhood mortality. It also seems that there will be increased use of contraceptive techniques, which will tend to moderate the worldwide birth rate. Each of these factors will have the effect of increasing the median age of the world population and producing increasing proportions of older people in many societies. However, in the coming decades, many Asian countries including Bangladesh will experience population aging and the aging population will be large in absolute terms. Bangladesh has been experiencing a major change in the age composition of its population, becoming a much more mature society than it was only a few years ago. The median age of the society has decreased from about 21.6 years in 1950 to 18.5 years in 1990 and again increased from about 18.5 years in 1990 to 20.9 years in 2000 and it is expected to go up to about 37.8 years by 2050.

Aging is one of the emerging problems in Bangladesh. This problem has been gradually increasing with its far reaching consequences. With the advancement of medical science and public health care services and other technological developments, the average span of life has become more than double in the present century. Although the aged population in Bangladesh was not very high in 1990. In this year the numbers of aged population of 60 years and above was 5.2 million (about 5 percent of the total population). This number will reach 14.6 million (about 9 percent of the total population) by the year 2025. In the past two decades, the mortality improvements in Bangladesh is remarkable resulting in

the extension of life. This is expected to have effects on the retirement plans of the elderly people in near future. Moreover, fertility has also been declining. As a result of these demographic changes, Bangladesh will also experience rapid growth in elderly population.

The aim of the study is to explore the current situation and future trend of population aging under the changing condition of demographic variables, specifically, fertility and mortality. The specific objectives of the study are:

- to look at the change in the level and pattern of fertility and mortality and their effect on the age structure of the population,
- to examine the impact of undergoing demographic transition on aging of population,
- to investigate the current age-sex structure of the aged population and to assess future trend under various demographic alternatives and
- to understand the consequences of population aging in the country.

1.4 Conceptual Frame Work

The drastic fall in fertility level, reinforced by a steady increase in life expectancy has produced fundamental change in the age structure of the population in the developed as well as developing countries. This structural transformation of age structure has offered a new term in the modern dictionary of demography - which is called "aging".

The study of aging is a recent development, especially in developing countries and at least part of the reason is that many societies have experienced a significant increase in their older populations recently. This change in age structure is a new phenomenon. The world has never before experienced this kind of changes that are currently taking place. According to WHO, 'aging' embraces all the phenomena of growing old. It is only since the second world war that the majority of the developed countries have been affected by significant 'greying' of their population. Though aging has not been conceived of as a potential demographic change in the less developed countries, demographers still forecast substantial increase in the proportion of elderly people as a result of significant decline of fertility and mortality.

Gompertz (1825) summarized the net effects of both intrinsic and extrinsic factors of aging in the mortality curve and obtained the mathematical formula to describe the relationship between the death rate and age:

$$R_n = R_0 e^{at}$$

This formula shows that there is an exponential increase in the death rate with increasing age.

Physiologists, statisticians, demographers, social scientists and other scholars are interested in the study of age structure of a population which have however expressed divergent views on the cycle of human life. French demographer Alfred Sauvy (1954) observed that population aging is most often defined and measured by the proportion of old persons (for instance sixty and over) in the total population.

Table-1.1
Different Variants of Age Composition Used in Demographic Statistics

Variant	Children and Adolescents	Productive Age	Aged Persons
	(1)	(2)	(3)
A	0-14	15-49	50+
B	0-19	20-49	50+
C	0-14	15-59	60+
D	0-19	20-59	60+
E	0-14	15-64	65+
F	0-19	20-64	65+
G	0-14	15-69	70+

Source : Rosset E. (1964). Aging Process of Population, The Macmillan Company, New York. p.99.

Summarizing different views found in the studies of population composition Rosset (1964) identified the schemes given in table 1.1 above to show age composition with different variants used in practice in demographic statistics.

Man has always endeavored to prolong life but even to this day all the answers about what is involved in the aging process are not available. But old age is invariably linked with disease, physical and mental weakness and dependence, and not in terms of productiveness, accumulated wisdom, maturity and experience, skills, etc.

Another vital question is : have the healthy, older people been as fully studied as the elderly sick? While there are many studies on the elderly sick there is a paucity of information and analysis of healthy elderly in order to determine the necessary priorities in government programmes for the aged.

For comparison the need of a scale for the degree of aging process of different populations has been stressed by the United Nations and carefully considering various social and economic consequences of aging the following distinctions have been made:-

- (i) a population having less than 4% of persons aged 65 and over may be designated as "young",
- (ii) a population having 4-7% of persons aged 65 and over may be designated as "mature",
- (iii) a population having 7% or more of persons aged 65 and over may be designated as "aged", and following these distinctions it has been observed that "an overwhelming proportion of world populations may be regarded as young or mature and only a very small proportion as aged,"(UN, 1956).

Aging of human population is a phenomenon reckoned with different connotations in different countries. In the developed countries of the West the problems posed by the aged have assumed serious proportions. But in spite of the recognition of specific problems of the aged and aging in all periods of human history, the scientific interest in the study of the phenomenon is fairly recent (Birren, 1959; Bromley, 1966; Ramachandran, 1994). As a consequence of rapidly increasing proportion of the aged in human population due to increased life expectancy in recent times and partly because of the tendency of fairly distinct sub-cultural behavioral configuration developing among the aged, the study of aging is developing rapidly.

Neary (1961) defines it as "Aging represents some intrinsic process which is fundamental, inevitable and irreversible."

Shock (1964) observes that the fundamental processes of aging may be regarded as intrinsic factors while the effects of environmental conditions as extrinsic and defines the fundamental processes as intrinsic factors while the environmental conditions as extrinsic factors. Jones (1956) observes that "Aging is the end result of the progressive accumulation of random traumatic experiences associated with living as well as disease."

Speculation about immortality is rooted in antiquity and in human hope. It has been assumed that death is always the result of a disease process. If there were no disease, there would be no death. This view is hard to defend. According to Geill (1964) "the cause of death of a living organism must be described by two factors :-

- (i) the actual aging processes,
- (ii) diseases which do not directly induce changes of aging in the cells but which may accelerate these processes and which at least give rise to organic and tissue damage entailing premature death."

Cultural definitions of old age vary according to the longevity of a population, the proportion of persons in the older age, and the degree to which persons at different ages are engaged in useful activities. In these terms a redefinition of old age is now occurring in the United States. Demographers commonly use simple chronological designations to define the bounds of old age corresponding to those ages cited in the principal legislation affecting older persons. These may be 60, 62, 65 or 72. Then there are other bounds for young old age, middle-old age, old-old age, and frail-old age (Neugarten, 1974).

Old age has typically been fixed in terms of years from birth, usually an arbitrary fixed number of years. An alternative concept is linked to the level of longevity. Progress in longevity has also been measured traditionally in terms of years from birth. A very different concept of old age being advanced is based on the average number of years until death (Ryder, 1975; Jackson, 1980). Like average life expectancy, it applies to population groups rather than individuals. According to this concept, old age covers the period of life beginning with the age after which the particular groups have a specified average number of years to live, say 10 or 15 years. Accordingly, groups with lower life expectancies have lower ages for the beginning of old age. For example, the age at which males have 10 years until death on the average is lower (72 in 1977) than the corresponding age for females (78 in 1977).

This concept can have important economic, social, legal and ethical implications. The concept has been used in some recent court decision (Cain, 1979; Cain, 1974). Should the economic and other privileges of old age be accorded to men and blacks at an earlier age than women and whites, respectively? A chronically ill person could claim the benefits of old-age legislation at a younger age than a healthy person. To implement the idea of old age based on age at death would pose serious problems as to the adequacy of current data and methodology.

Questions persist as to the definition of aging and old age. There are social, psychological demographic biological and several other aspects of the aging process and these give rise to alternative definitions and measures of aging. At the individual level, the aging is the

growth of a person throughout life course from infancy through verging on old age. Most literature includes biological and socio-psychological or interactional definitions of population aging, the concept being multi-faceted, the multi-disciplinary social-and behavioural-science research is imperative for development of comprehensive knowledge about aging. Such studies are not however very frequently undertaken, and the subject has more often been based independently on relevant individual treatment of the disciplines. There is still no universally acceptable definition of normal biological aging (Borkan and Norris, 1980; Brown and Forbes 1976). Hence, any reference to the "aging process" still has an uncertain meaning. Researchers are asking whether biological components wear out and at the same or different rates for different individuals (Abernathy, 1979). The genetic and environmental factors in differential aging are also being explored (Schneider, 1978; Finch and Hayflick, 1977).

The nature of the aging process has been the subject of considerable speculation. Both aging and the rate of the aging process are under genetic control to some extent for the manifestation of aging and life span differs between species and individual members of a species. Further, like all chemicals and chemical reactions, the manifestation of aging which reflects chemical composition- and the rate of the aging process should be subject to environmental influences (Harman, 1981). The definition of Harman (1981) is as follows:- "Aging is the progressive accumulation of changes with time that are associated with or responsible for the ever-increasing susceptibility to disease and death which accompanies advancing age. These time-related changes are attributed to the aging process."

According to an empirical research, Aziz et al., (1985) have recognized the following stages of life cycles for rural population of Bangladesh.

- (i) Baby and pre-school child under 6 years,
- (ii) school age 6 - 10 years,
- (iii) pre-adolescent (especially females)... .. 11 -12 years,
- (iv) early adolescent 13 – 15 ,,
- (v) late adolescent, youth (especially males) ... 16 - 20 ,,
- (vi) adult; young man or woman 21 – 40 ,,
- (vii) middle age 41 - 55 ,,
- (viii) old age 55+ ,,
- (ix) very old or too old (senility, point near death) ?

The aging of human populations is a concept that originates in several disciplines. It may be viewed as a result of biological, psychological, sociological, demographic and several other processes. At the individual level, the aging is the growth of a person throughout life course from infancy through verging on old age. The most literature includes biological and social-psychological or interactional definitions of population aging. The concept being multi-faceted, multi-disciplinary social- and behavioural- science research is imperative for development of comprehensive knowledge about aging. Such studies are not however very frequently undertaken, and the subject has more often been based independently on relevant individual treatment of the disciplines(Goha Roy, 1985).

The concept of demographic aging has a distinct character in which the dynamic phenomenon of aging consists of the proportion of old people increasing more rapidly than the population's other age segments. The aging of population obviously results from the significant changes in overall age structure, and the issue should not thus be dealt in isolation from the total population. The fundamental changes in age composition occur mostly for the decline in fertility and not for the decline in mortality, as has been misunderstood at the beginning. In fact, mortality declined significantly long before fertility in Western populations, but the former decline was not adequate in itself to age the populations (Guha Roy,1985).

"To be old is to be physically disabled most of the time" is a much -repeated statement about the aged. A recent article in a journal states "aging begins with the completion of development (about 30 years as soon as the functions are fully developed) countries for two-thirds of life and chiefly through the loss of flexibility and mobilisable reserves, leads to decreased fractional capacity in all systems. Against the back ground of reduced adaptability there is more frequent illness; the incidence of chronic maladies in particular increases with advancing years" (Psychogeriatrics,1989 Vol. II-IV). These statements indicate that the process of aging and diseases are the same and if one is old and ill, there is little that can be done to change for the better. Many gerontologists regard aging as an illness. Most societies (both developed and developing) still believe in and accept this concept of old age. The acceptance of physical and mental weakness and disability with aging as unavoidable, leads to apathy in taking preventive action against illness of the aged and lack of enthusiasm in improving their quality of life. In some instances because

of their age, the elderly may be excluded from the benefits of developing policies and programmes(Penera,1989).

Going by the criterion of self-identification of one being aged may lead to different cut-off points even within a culture. Developing societies commonly recognize that a person attaining age 60 has become old. The United Nations, on the other hand, considers the beginning of old age at 65 years. Quite obviously, developing countries differ from developed countries in consideration of what constitutes old age. For convenience of standardized comparisons, the threshold of demographic old age is usually considered at 60 or 65 years, but no sex differential of the lower bounds is generally made(Guha Roy, 1989) .

Aging can defined as the shift in population age-distributions resulting in increasing proportions of persons in the older age groups (Cair, 1991).

Nair (1994) has stated that 60 years may be considered the landmark for determining the proportion of aged in less developed countries, particularly in Asia. In this relation elderly women are defined who are already reached at the age of 60 years and above.

In common usage the terms “Aged and the Aging” refer to a particular section of the population and the process. But the anthropologist has to take into consideration various factors while thinking about the process of aging and designating a section of the population as aged. These factors include both biological and social-cultural dimensions of the concept. Demographic status and physiological conditions are the most important variables in the determination group. Socially, the aged status is determined by the general level. Culturally it varies from culture to culture where holistic viewpoint is taken into consideration guided by the cultural principles (Halder, 1994).

Old age is a stage in the life of an individual while the aged constitute a segment or a stratum of the population of a society. Aging change over individuals course of life as their personality develops, experiences accumulate and they adjust themselves to new roles in the society. Aging of cohorts is not unique but differs with the conditions of the society in which they belong in particular the physical environment, social values and individual perceptions. There is no unique definition of an old age or the aged, because definition of old age is highly related with occupational subculture. For example a cricketer or a cinema hero is considered old at 35 while a doctor or a professor may be considered promisingly

young at that age. Subjective perception of social position of an individual also defines whether he is old or not.

The biological changes such as greying of hair and /or declining of eye-sight etc. of individuals are often considered as the symbol of old age. In modern times, old age is considered as the retirement age which also varies from country to country and within a country it is again associated with professional subculture. In SAARC countries an individual at the age of 60 or more is considered old.

The aged people are not a homogeneous group except their chronological age. They differ among themselves in education, health, economic and social status, within a country and between countries. The opportunities and attitude of society towards the aged are different in different societies. So, it is very difficult to find out unique measures to address the problem of aging.

The aging of population is a universal phenomenon, an inevitable result of declining fertility or births and improved chances of survival. Declining fertility reduces the proportion of the young in the population resulting in longer proportion of the 'aged'. Similarly improved survival and gains in life expectancy results in longer proportion of the aged in the population and to the aging of population (Karkal, 1998).

The process of human aging is as old as the history of mankind. But it was not a problem until the recent past. Advancement of medical science reduced the infant and child mortality to a great extent resulting in large life expectancy. Side by side widespread use of family planning devices reduced the fertility rates resulting in an increase in the proportion of aged people in comparison with the children. Migration of working age group people intensified the proportion of the aged to some extent also. Theories of aging like Disengagement Theory, Activity Theory, Role Theory, Sub-culture Theory, Exchange Theory etc. explain the process of aging and its impact on individual and society. Studies on the problem of the aged are very much limited both in number and depth. Population Division of ESCAP has undertaken a series of studies in Asian and Pacific countries during 1992-94 mainly on the economic potentiality of the aged with a very limited coverage. Aged people encounter various problems. Nature and dimension of these problems are associated with the socio-economic, educational and health background of the aged. An in-depth study is required to identify the problems and their correlates with a view to chalking out proper plans for the

aged in general and particularly in Bangladesh so that they may be treated as assets of the society rather than liabilities.

Hence, we may start by defining the concept 'aging'. Two different definitions are considered here with reference to demographic and biological aspects. Where an individual is concerned, the concept of aging is rather simple. An individual ages when his/her chronological age increases. Comparing two individuals we say that the older is the one whose age is greater than the other. But where a population consisting of an aggregate of individuals is concerned, we are to consider an age structure instead of an age. How do we define that a population gets older or that a population is older than another one? Now we are to consider the proportion of old people, for example, the proportion of individuals aged 60 years and over known as the "**old population**". Then we can say that a population gets older if the proportion of individuals aged 60 and over (old population) increases. But in an alternative way we may look at the proportion of individuals aged less than 15 years - known as "**young population**". We may also say that the population gets older if the proportion of young population decreases. If the above two definitions were always interchangeable for a given population the problems would be much simpler but unfortunately this does not happen for all cases because the proportions of 'young' and of 'old' increases simultaneously in the same population, which means that a population may become both 'younger' and 'older', at the same time.

Thus it is necessary to define two types of demographic aging:

- (i) aging from the base, when the proportion of 'young' population decreases and
- (ii) aging from the top, when the proportion of 'old' population increases.

It may, however, happen that often both situations coincide. It is thus better to define a third concept of aging - a compromise between the two preceding ones. The third concept refers to the mean age (or the median age). When a mean age is computed, it may be said that the population gets older if its mean age increases. In the remainder of this study, we are dealing with aging from the top, i.e. with increases in the proportion of the population aged more than 60 years - the importance of which has been increasing and which poses more problems.

1.5 Recent Global Trend

Over the last few years there has been an increasing interest in the study of aging in both developed and developing countries. The examination of the age structure of a population of a country or a community at different periods reveals the process of aging of the population. This process increases the population of adults and elderly people in the population and decreases the population of children and adolescents. In the SAARC countries the aging process is rather a recent phenomenon and very recently its effect has attracted the social scientists' interest.

The increase in global concern for old age is comparatively a new phenomenon and it is the result of increase in the population of persons above 60 years in age. The rise in fertility and drop in mortality rates forced the world population to rise, and so is the population of elderly. The population's age composition provides a clearer picture. As the under 15-agegroup now accounts for a sizeable part of the population and is expected to grow further. Side by side, between 1950 and 2025 number of old persons, may increase six fold from 200 million to 1200 million; a rise from 8 to 14 percent of global population. The number of aged over 80 years is expected to rise from 13 to 137 million. All but 1 percent of future population growth will occur in developed countries. More than two thirds will take place in only two regions with poorest quality of life, i.e. Africa and South Asia (Sen, 1998).

Until recent past, aging was viewed to be a feature of the western nations. But in-depth analysis of recent scenario, shows aging is a characteristic of the developing nation too, especially the Asian countries. In 1990, there were 490 million elderly persons (60+) accounting for 9.3 percent of World's population (World Bank, 1994). In relative term, aging is more advanced in the developed countries, where aged accounted for 17 percent of total population, as opposed to 6.9 percent in the developing countries. But in terms of absolute figures, the situation is diametrically opposite. Out of the 490 million World's elderly population, 282 million, that is 57.6 percent live in the developing region, particularly in Asia. Asia alone has 51 percent of the World's aged population. Except for some South Asian countries, majority of the Asian countries will experience a doubling of their aged population by 2025 (Myers, 1982; Treas and Logue 1986). While the world as a whole, is expected to gain 981 million elderly during the period of 1990-2025, two-thirds of this increment will be contributed by Asian countries. Over 40 percent of this gain will

come from China and India. Aging is therefore no longer a problem of the west. However this has drawn considerable attention only in developed countries.

Most of the reduction in fertility has so far occurred in the more developed countries in Europe , the USSR , North America , Oceania and Japan. The Birth rate of the less developed countries in Asia (except Japan), Latin America and Africa has been resisted to decline until relatively recent programs are actively under way in less developed countries to reduce birth rates in order to enhance socioeconomic development. Through bilateral and multilateral arrangements of the United Nations and the specialized agencies like the United Nations Fund for population Activities (UNFPA), the more developed countries are assisting these programs for reducing birth rates in the less developed countries. It is thus expected that birth rates will continue to decline to dampen population growth rate and to increase the proportion of the old persons in less developed countries. The dampened growth rate of population will continue to improve the lot of the masses and thus death rates will show a further downward trend. The declining mortality level will also effectively contribute to increasing the proportion of the old persons as the expectation of life will go up. The prospect is also bright for continued fertility decline enlightening future world for continued population aging in both the less developed countries and more developed countries. It has been estimated that at the turn of the century the elderly in Asia will be 48% of the population of Indian Subcontinent and China where there will be the largest number of the elderly (Kuroda, et. al., 1981).

The last few decades have noticed five demographic milestones which have great significance not only for the rest of this century but possibly for the next as well. These have been (i) on the 11th July, 1987, the total population of the world passed the five billion mark (Population Headliner, ESCAP, July,1987) after reaching four billion just eleven years earlier in 1976. Before this, the world population reached three billion in 1960. It will be about six billion by the turn of the century. Thus, within the short span of 40 years (1960-2000), the world population will have doubled from three to six billion; (ii) the major share of this increase has occurred and will occur in the developed countries. The population explosion continues as part of the world scene, but it is almost exclusively a feature of the less developed regions. This dramatic difference in the rate of growth of less developed and more developed nations undoubtedly contributes to the second milestone we have passed; (iii) the next milestone is the urban population. By the

year 2000, almost two thirds of the world's three billion urban population will live in the less developed world, compared to only one third at mid-century (Goldstein,1977);(iv) the fourth demographic development is the reversal in the patterns of population redistribution in many of the more developed countries of the world; (v)but there is still a fifth one that has manifested itself- this one in the developing and developed countries- the aging of population (Kabir, 1995).

While it has already been stated that the world population is expected to grow older during the next few decades, we can anticipate other age-related changes to occur on a worldwide scale. The expected increase in longevity should bring about a relative increase in the female population and a corresponding decrease in the male population. In other words, the increasing maturation of the world population will probably alter the sex ratio in favor of females. This shift will occur primarily in the last third of the life cycle, which means that the number of the widows will increase (Lissy, 1978).

Aging of the population is a phenomenon present in both developed and developing nations. In this respect UNFPA shows that of the nearly 584 million old persons estimated in 1997, 330 million live in less developed countries and 254 million in developing countries. However, projections for the year 2000 A.D. indicate that while the aged persons in developed countries will increase by 30.3 percent, the increase in developing countries will be approximately 77.4 percent. The aged population in Asia as a proportion of the aged population of the world, will increase steadily from 42 percent in 1970 to 43 percent in 1980 to 46 percent in 1990, and then to 48 percent in the year 2000. South Asia, on the other hand, will show a marginal increase from 16.5 percent in 1970 to 16.7 percent in 1980. In 1990 it will be 18.6 percent and will increase to 20.7 percent in the year 2000. The real situation of South Asia, in Asian context, clearly revealed through this picture. In 1970 the proportion of the elderly persons (65+) was 39.3 percent and this continued steadily up to 1980. Thereafter it increased to 41 percent in 1990 and then to 43 percent in 2000 (UN,1989).

As estimated by the United Nations, in the year 1980 the number of elderly people were more or less equally divided between the developed and the developing countries of the world. However in future the majority of the elderly will live in developing countries especially in Asia region. By the year 2000 A.D it is estimated that Asia will contain 48 percent of the world elderly and the largest world elderly population will be in China and

India respectively. In the last decades most countries of the Asian and Pacific region have begun to pass through the demographic transition shifting from high to lower levels of fertility and mortality. One of the consequences of this transition is a change in the age composition of the national populations with a reduction in the number of children being added to the base of the age pyramid and more people surviving to the older ages at the top of the pyramid. Hence, as countries pass through the transition, the shape of their age structure changes from a flat wide based pyramid toward a more steeply sloped pillar shape. These changes in age structure have very important consequences not only in demographic terms but on the entire social and economic fabric of society since individual level and nature of need for most types of goods and services vary with age(ESCAP,1996).

Countries in Asia are experiencing a rapid increase in the number and proportion of the elderly. The United Nations World population Prospects, 1996 shows that in 1995 the estimated population aged 60 and above in Asia was 8.2 percent. This is projected to increase to 8.7 percent in 2000 and 12.6 percent in 2020. Furthermore, it indicates that a number of countries will have higher percentages of aged in the year 2020 – Japan 31.3 percent, Singapore 23.7 percent, Australia 21.9 percent, New Zealand 20.2 percent, and the republic of Korea 18.6 percent. However, in South Asia, Sri Lanka will be the only country which is expected to have the population aged 60 and above exceeding 15 percent by 2020 (UN, 1998).

Most of the countries of the Asian and Pacific region are experiencing population aging resulting in rapid increase in both the number and the proportion of population 60 and over as well as their life expectancy at birth. During the period from 1970 to 1995, the male population in China, aged 70+ increased from 8.7 million to 19.1 million and their female counterparts increased from 11.5 million to 24.8 million. By the year, this number is expected to increase to 50.3 million for males and 63.3 million for females. Similar change is also expected in Indonesian population. The corresponding figures are 0.9 million and 1.1 million in 1970, 2.1 million and 2.5 million in 1995 and 5.6 and 7.5 million in 2025. Though started late the proportion of the elderly population in South Asian countries, are also experiencing considerable change. the proportion of male population 70+, for India, is increasing from 1.9 percent in 1970 to 2.5 percent in 1995

and 4.5 percent by the year 2025. The proportion of their female counterpart is changing from 2.0 percent in 1970, to 2.5 percent in 1995 and further to 5.5 percent by 2025 (ESCAP,1996).

SAARC countries contain 18.1% of the total elderly population of the world, 31.6% of the elderly population of Asia and 94.4% of the total elderly of South Asia. The total population of the SAARC countries is 23% of the total world population, 36.4% of the total Asia population and 93.4% of the total South Asia population. The total number of elderly population of the SAARC countries is estimated to be 186274 thousand in the year 2020- an increment of 100566 thousands from 1995. The percentage of the aged population in SAARC countries is only 6.9% against 6.5% of aged population in Asia and 9.5% of the aged in the world in the year 1995. Such percentage values are estimated to be 10.0, 12.66 and 12.8 after a time period of 25 years (Abedin,1996).

The demographic changes in SAARC countries does not seem to be rewarding except one or two instances (examples are Sri Lanka and to some extent India). Fertility in Bangladesh, Bhutan, Nepal and Pakistan had not began to decline before 1990, on the other hand, fertility in Sri Lanka and India had begin to decline between 1950 to 1990 (Abedin, 1996).

Presently, Bangladesh is experiencing a demographic transition from high fertility and high mortality to low, low fertility and low mortality which the developed countries have passed through. In the recent past it is evident that mortality rates have reduced considerably and the average life expectancy at birth has increased to 58.2 in 1995 as against 44.9 years in 1970 and will further increase to 69.0 by the year 2025. Further in 1995, 4.9 percent of Bangladesh population are classified as elderly by the year 2025 has risen to 9.3 percent. The old age expectancy ratio, which was 11.2 percent in 1970 has increased to 12.5 percent in 1990 and is estimated to be around 19.1 percent by the year 2025 (UN,1994).

In accordance with the United Nations medium variant projections, by the year 2000 the population aged 60+ years will number 604.71 million in the world. There is a little historical experience to suggest a suitable interpretation of the mounting number of the different segments of the elderly. From their predecessors the elderly are not only living longer but they are growing older too in markedly different ways. It is incumbent upon all

of us to promote measures that enhance the well-being of the elderly. The provision of adequate care to the elderly will require collaborative efforts, mobilization of resources and promotion of concrete policies and programmes that are conducive to the improvement of living conditions among the elderly as well as their continued contribution to the various processes of development activities. The policies present a special challenge not only to the elderly themselves but also to political, social and health leaders who are responsible for implementing the programmes that may affect them. These challenge arise from an increase in many communities, in both the proportion of the elderly and its absolute numbers as well as from the tradition of providing inadequate attention to the well-being of the elderly.

Until very recently it was traditionally assumed by demographers in low mortality countries of the world that there was a little scope for further decreases in mortality and thus increases in life expectancy at the older ages. As a result the prediction of the importance of aging in the countries which had completed their demographic transition got priority in the field of “aging at the bottom” of the age pyramid, considering declines of fertility in these low mortality countries. The prediction based on “aging at the top” was less emphasized. Recently a more balanced view on the prediction of aging has, however, come into play. The traditional assumption that mortality at older age groups was less effective component of aging pattern had to be abandoned. Though it is true that mortality cannot come close to the cumulative effect of fertility on the age structure of a population having low mortality. The most important factor in the short run determination of the future age structure of the population is the unprecedented spectacular decline in the mortality of the elderly.

While a small but robust fraction of population was able to survive into older ages in the past, survival into older ages has now become very common in the low mortality countries. The major demographic effects of this dramatic transition have been explosive growth and aging of population. The ‘epidemiological’ or ‘health’ transition component of the demographic transition is a commonly accepted name of the changes in mortality. It has been characterized by transitions in overall mortality, from high to low infant mortality, from communicable to non-communicable diseases. As the level of mortality of the elderly changed there happened major shifts in the cause specific structure of death at advanced ages. In general the circulatory diseases declined at late ages. Declines in

mortality due to cardiovascular diseases was also an important factor in the decline of elderly mortality, though it did not occur uniformly in all industrialized countries. In some countries the risk of cardiovascular diseases has been low owing to nutritional factors. Here we consider the case of Japan with one of the highest life expectancy in the world, both for males and females. Japan has been able to make a quick transition from a medieval to a modern power.

In 1991 life expectancy in Japan was slightly over 76 for males and slightly over 81 for females. During the last 100 years life expectancy has more than doubled. In the early twentieth century infectious and parasitic diseases were the major causes of mortality including infant and childhood mortality and continued to be the important causes even upto the second World War. The decline in mortality due to the infectious diseases combined with diseases like gastroenteritis, tuberculosis, Pneumonia, bronchitis made effective contributions to the increase in life expectancy. Between 1955 and 1960 there occurred 46% and 38% increase in male and female life expectancy respectively. The greatest contribution to an increase in life expectancy has shifted from the younger age group to older age group. During 1975-85 the greatest contribution to the increase in life expectancy came from the age group 65-79. Over the 1985-1990 period declines in mortality above age 65 contributed respectively 50% and 69% of the improvement in male and female life expectancy (UN,1994).

In Japan as the age pattern in mortality changed there was a spectacular change in the causes of mortality too. In 1990 malignant neoplasm followed by heart disease and cerebra-vascular disease had been the most significant causes of mortality. It is interesting to note that the rate of mortality from cerebro-vascular disease has been declining rapidly and substantially in recent years. In post-war Japan such rapid decline has been one of the most important features in the evolution of mortality. One of the principal reasons for such declining of mortality owing to cerebra-vascular disease is that there was a shift in diet habit. With the introduction of the refrigerator in the Japanese household the use of salt in preserving food has lessened to a large extent enabling the Japanese to eat more fresh food and to change taste. It is expected that the tendency of eating fresh food with animal protein could result in stronger blood vessel tissues to produce less vulnerability to cerebral hemorrhage. Further improvements thus seem to be possible, to a life expectancy at birth of just 80 for males and over 85 for females. In

Okinawa Island which has the lowest per capita income among Japanese prefectures, female life expectancy in 1990 was more than 2.50 years above that of other Japanese women. Changes in dietary habits, and the effects of a strong Chinese influence are expected to be the most significant factors in explaining the more favourable prospects for survival of the inhabitants of Okinawa.

Population aging in China has its special implications as it is occurring in a most populous country with a less developed economy. When its huge population figure, with a big annual increase in absolute numbers, is still troubling the development of the national economy, China has to take up the challenge of the increasingly developed population aging. Confronted with the dual pressure of population size and its coming age structure, the country has to cope with the serious contradiction between the control of population quantity and the improvement of population and family structure. This outstanding issue has now gradually become a great concern in the academic circles and has also drawn the attention of the general public as a whole. China has witnessed a tremendous decline in fertility since the early 1970s. The birth rate declined from 34.1 per thousand in 1969 to 17.7 per thousand, with a Total Fertility Rate (TFR) of about 2 in 1994. At the same time, the process of population aging has developed quite rapidly. The population aged 60 and over increased from 6.1 percent in 1964 to about 9.3 by now.

In accordance with the United Nations medium variant projections, by the year 2000 the people aged 60 and over are to reach 10.3 percent of China's total population, with an absolute number of about 132 million, which would be larger than the total population of Japan by that year. China is experiencing the highest speed of the largest population aging ever seen in the world. This allows China less time than other countries to develop and implement policies dealing with its elderly population. Secondly, China is so far not quite prepared economically for such rapid structural changes in the population as its population aging has been accelerated by the sharp fertility decline due to a well implemented nation-wide family planning programme in the past two decades. Thirdly, China has the largest elderly population in the world with a projected phenomenal increase in the next few decades. China is confronted with great opportunities and challenges. It is indispensable for the Chinese Government to attach importance to the improvement of the population age composition, as the aging problem has been emerging far in advance of the nation's economic modernization (UN, 1995).

India's aged population (60+) was 25.6 million in 1961. Over 30 years it has more than doubled to 56.7 million in 1991. In another 25 years (i.e. by 2016) it will again double itself and reach 113.26 million. In terms of percentage old people constituted 5.8% of the population in 1961 and 6.76% in 1991. The rate of increase of the elderly population was 60% more than that of the general population during 1981-1991. The proportion of women will be more among the elderly in the coming decades. Widowhood will be more among women than men. In 1991, 54% of the women were widowed against 15% men. Expectation of life at birth in India has gone up from 47 years to 59 years for males and from 48.6 years to 59.7 years for females during the period 1961-1991. Expectation of life at age 60 during this period has gone up from 13 years to 14.9 years for males and from 13.4 years to 16.2 years for females. Old age dependency ratio also shows a progressive increase over time. In 1961 it was 10.93 and 12.26 in the year 1991. In 2016, it will be 14.12. This will mean that by 2016, 100 persons in the work force will have to maintain 14 old persons besides themselves (Nayar, 1998).

The 1960s saw a relatively youthful population in Sri Lanka. The country has now entered the third phase of demographic transition, with the declining fertility stage evident since the late 1960s. Among the demographic factors, a decline in fertility plays a significant role in the ageing process. Sri Lanka is one of the few countries that maintained a continuous decline in fertility. The crude birth rate dropped from 36.6 per 1000 population in 1945 to 29.4 in 1970 and further declined to 19.3 in 1995. The total fertility rate and gross reproduction rate indicate that fertility transition is well established in Sri Lanka. The total fertility rate declined from 5.3 in 1953 to 2.3 in 1993 and if the continuous decline of fertility remains unchanged a replacement fertility level of 2.1 is expected by 2001. The crude death rate dropped from 21.9 in 1945 to 7.7 in 1971 and had declined further to 5.8 in 1995. Life expectancy at birth increased from 49.8 years for males and 44.6 years for females in 1945 to 66.1 years for males and 70.2 years for females in 1971. In 1994 it rose to 69.5 years for males and 74.2 years for females (Perera, 1999).

Thailand is a tropical country in the Indo-Chinese Peninsula of South-East Asia with an estimated 1998 population of about 56 million. According to statistics from national population censuses and estimates by the United Nations, the country's elderly population is increasing in both its size and proportion. United Nations estimates reveal

that Thailand's elderly population grew from 1.2 million or 2.2 percent in 1960, to 2.5 million or 3.9 percent in 1990, and is projected to double in size to 5.0 million and 10.2 million in the years 2000 and 2025, respectively. Although the numbers and proportions are relatively low compared with developed countries, the rates of increase exceed the rates of increase of the overall population and are rising (Wongsith and Siriboon, 1999). As the mortality at older age group improves, the quality life of old population is emerging as an important policy issue. Do the old population, as they live longer, enjoy good health and satisfaction of life or their health worsen due to various diseases and disabilities?

1.6 Literature Review

The rapid growth in population and its impact on socio-economic life has attracted attention from different quaters all over the world. Simultaneously, the increasing number of elderly people has been creating social, political and economic problems all over the world and the social scientists has also recognized the same. Very few literature are available in these direction but research on population aging is getting gradual momentum.

In a cross cultural study of aging and modernization, Cowgill and Holmes (1972) rightly concluded that with modernization, the responsibility for the provision of economic security for dependent aged tends to be shifted from the family to the state. Modernization and industrialization disputes not only the family structure but the outlook of the new generation who stress the importance of pity to the aged. This new trend of formation of match-box family warrants the existing government of every country to look into the problem of aging. Therefore social security programmes are the need of the hour. But as far as developing countries are concerned, the financial strength of the government is not sufficient to substitute the care giving strength of family. This throws the issue of aging as a social problem.

Guha Roy (1985), focuses on research concerned with the phenomenon of aging in India. Judged against any standard old-age scale, Indian population is still demographically young, since the demographic factors causing changes in age structure has rather been weak so far. He considers several indicators of population aging and examines the dynamics of changes in the population age composition over a period of hundred years. Another

important consideration is the survival of infants to old age (60+) and further duration of life at this age. Result of analysis shows that the decreasing number of premature death before old age with concomitant fall in infant mortality which entails an increase in the proportion of old persons. The age-curve of old population approximates a reverse -J shape, indicating sharp and sudden fall in the number of old people with age. He considers the potential growth of India's aged population which is a result of the demographic transition that has been started, but not yet matured. By the beginning of the 21st century, India will have 75 old persons for every 1000 population. The proportion of the old people in relation to total population is anticipated to increase at the expense of the proportions of children and adults in the coming years.

In a study Cain (1986) described the living arrangements of the elderly in several areas of rural Bangladesh and India and examined the material consequence of reproductive failure among them which means failure to produce a son who is willingly and physically able to care for aging parents. In this study, majority of persons aged 60 or older (81 percent in the Indian sample and 91 percent in the Bangladesh sample) were found to live either with, or adjacent to, a mature son. However, marked differences were observed according to economic status so that proportionately fewer among the elderly poor lived with, or adjacent to mature sons (mature sons defined as those aged 15 or older) compared with the better-off.

In order to understand the status of the elderly in Bangladesh the following works have been found to contribute important views. Two surveys in the 1986-87 and 1990 on the old people of Bangladesh have been conducted by the Bangladesh Association for the Aged and the Institute of Geriatric Medicine (BAA, 1988; 1990). These two surveys incorporated the data related to health and socio-economic problems. They also differentiate the aged problems according to urban and rural areas. The aged people surviving in a joint families do not feel loneliness except those who have lost their spouses. It is important to note that daughter marriage, patients and lack of respect shown by the younger generation and lack of eye sight are the important problems faced by the elderly in Bangladesh.

Guha Roy (1989) focuses on the phenomenon of aging in India. It examines the state of the aged population, changes in this sub-population in respect of size, composition and distribution, and the determinants and implications of the process. Judged against any

standard old-age scale, Indian population is still demographically young, since the demographic factors causing in age structure have rather been weak so far. It is evident from demographic changes that the aging process would accelerate to India. Of particular interest is the current tendency of the age pyramid to assume a “barrel” shape, which is generally a common feature for a population entering an aging process.

Perera (1989) examined major demographic factors, such as low fertility and mortality, increase in life expectancy and migration, affecting population of Sri Lanka. It would, therefore, be relevant to review these demographic factors as they have discernible impact on the growth of the elderly population. Moreover, there has been an increasing need to cater to a large number lonely and depressed of elderly by their children and kin. This situation may be attributed to a changing Sri Lankan society.

Nair (1990) says modernization of the society and population aging go hand in hand. Industrialization and urbanization will strike at the root of the traditional family- whether extended or joint and will frustrate the economic security which it afforded to the old. The emerging nuclear family has neither the physical space nor the economic resources for supporting the old indefinitely. This is more true when the family has a very old person who needs constant attendance and sometimes costly treatment. The other parameters for good life such as better living conditions, health care services, and services for the elderly at the family level or at the institutional level also depend on the socio-economic situation of the country. Finally elderly people also expect better treatment by family members and the community which are the corner stones of their psychological well being. Thus herculean task is ahead to meet these challenges.

A micro level survey conducted by Kabir (Kabir, 1991) focused that the elderly people of Bangladesh getting more cooperation from their adult children. It seems that the support provided by the adult would not continue for a pretty long time. In these situation a question raised that who will take-care of these helpless elderly people. To meet up their basic needs, recreational facilities, nursing facilities, health facilities, more economic support is urgent.

Cantillon (1991) presented of an empirical analysis of the consequences of socio-demographic changes on income distribution, poverty and the adequacy of social security. The research shows that recent socio-demographic trends are not only accompanied by the increase in the cost of social security but also by important changes in income distribution and in the adequacy of social security. The aging of the population, combined with an

increase in pension levels and the rise in the cost of health care, will probably cause problems for the welfare state in the future, with respect to the distribution of well being, both between generations and between households with the same generation. The starting point for this contribution are the changes in income inequality and poverty within the Belgian population over the period 1976, 1985, as measured by successive surveys conducted by the Arolwerp Centre for society policy.

Rahman (1991) conducted a study among the rural population of eastern districts of Chittagong Division and found that 79 percent of the aged suffered from different kinds of diseases. Among the reported ill 86 percent are females while 75 percent are males. During the survey among the sick people, it was seen that 15 percent of the females did not avail kind of treatment while the percentage of males not receiving any treatment was only 8 percent. Study on health and economic conditions of the rural aged people of Bangladesh shows that they are depressed. A separate medical care unit could be facilitated for the betterment of the elderly people of Bangladesh and free medical care should be gradually introduced besides the present facilities.

Kabir (1992), indicate that proportion of the aged in Bangladesh will be increasing in the coming years. Their problems will hence assume added importance in its impact on this agricultural society. It is true Bangladesh has many years before the problems of aging reaches the dimensions which the developed countries are facing at present. But now is the right time, in the author's opinion, to start thinking about the question of aging.

Ramamurthy (1992), forcefully suggests the need for HRD training for the elderly to meet the challenges of old age. He has been attempt to highlight how the potentialities of the elderly can be utilized for solving the problems of the elderly in particular and for augmenting the process of development of the society in general. Industrialization and urbanization have changed the values and norms of traditional society of India and the covetable high status of the elderly in the society, and more particularly within his family has been seriously affected.

Findings from a household survey (Sattar, 1992) indicate that the proportion of the elderly is not higher than that of the young but their number is gradually increasing which underline the magnitudes of the problems that will face the country in the coming years as population size will continue to swell. Moreover the deteriorating socio-economic conditions coupled with increasing landlessness and poverty have exerted a strong impact on the traditional

joint family systems which have been rapidly changing to a nuclear families consisting of husband, wife and unmarried children. Further the consequence of rural poverty has been a mass exodus of young working population from rural areas to industrialized and urban areas. The populations that remain in the rural communities are in a chronically depressed conditions and fail to maintain many of the basis enterprises and institutions constituting a major national welfare and health problems for the elderly.

Regarding economic status of the elderly people of Bangladesh (Kabir,1992) point out that our elderly people are still far from satisfactory. Even though the majority live in extended families, they are viewed as less economically valuable and more of a social liability. Though the concept of having children so as to provide old age security for parents is still practiced and social accepted in Bangladesh, it has gradually begun to erode due to rapid psychosocial changes. Plans for providing socio-economic security for the elderly need to be developed as soon as possible on the basis of information regarding their number, age , sex and spatial distribution, and other socio-economic characteristics.

Kuroda (1993), policy issues pertaining to the elderly for ESCAP countries should be appropriate to their stage in demographic transition. However, there were 11 relevant issues : the creation of a special unit for the aged, the need for improved economic security in old age, strengthened family relations, population of productive aging, adequate medical and social supports, a lifelong healthy life style, attention to the special problems of migrants and support of the elderly, formation of community volunteer and mutual aid organization for care of the elderly, broad IEC about the problems of the elderly, training for care-givers and research on transitional stages. Aging will be rapid in Eastern Asia, and slow in Western Asia. The stage in demographic transition has affected the speed of aging. Southern countries were the farthest behind. Early and quick demographic transition will result in rapid aging.

In study on theories of Aging, Rahman (1993) tried to demonstrate sociological explanation of the relationship existing between society and the elders as shown in different theories given by some renowned social Gerontologists. Among them Cumming and Henry have prescribed disengagement theory through conducting survey on 275 financially solvent aged people of urban area. They wanted to show that there is a negative correlation between aging process and involvement. In other words disengagement is the natural outcome of aging. Gradually, the elders become isolated

from the society and start taking preparation for death. This process is sometimes termed as anticipatory socialization. Criticizing this theory Rahman opined that colleagues, friends, relatives as well as well-wishers should cooperate with and inspire the aged people so that they can engage themselves in work without taking retirement. It also observed that retired from regular job, many aged people engaged themselves in part time job or in some social activities. Thus, this theory is not free from criticism.

Another theory named activity theory implies that social activity is the essence of life of all people of all ages. For keeping good health and financial solvency, the aged should keep them busy in work. When the elders refrain from work or they are not taking part in the society, they realize that they have lost themselves. Also they feel that they have already been expelled from the society as a result they suffer from some sorts of psychopathic pressure. Thus, they should re-engage to the productive and useful social activities. Rahman criticized this theory by stating that there are some societies including Bangladeshi society where the social position and value of elders is determined by some religious, ethical and social values towards elderly, not by their work or anything else. Therefore, activity theory fails to explain the impact of social structure on elderly like disengagement theory.

Another theory named sub-culture theory states that the elderly are collectively a minority community in the society and living with the communities and create an elderly culture. As a result they become isolated from the society and collectively fight for their rights. In reality, those who are young today, will be old tomorrow. So, if the younger segment creates any sort of organizational support to the elderly, it will also be useful tomorrow to the younger of today.

While, another theory named exchange theory states that there is an imbalance between the society and the elderly. The elderly are dependent on others. So they are in a measurable situation. Gradually, they lose their strength, energy, and vigour and become weak. Taking this advantage the society forces the elderly to retire from their work.

Sattar and Rahman (1993), focuses on the trend of growth of elderly, to provide information about their characteristics and to discuss the policy implications thereof. Such knowledge is necessary to keep at programme of intervention and formulation for the welfare of the elderly in state of preparedness. The multi-dimensional implications of rapid rate of population aging are interrelated inherently with important and dynamic processes of

demographic, psychosocial and economic changes encompassing all age groups of population at the household, community and national levels. Thus there is a need to integrate the elderly in development planing in view of their wisdom, experience and linkage with the rapid changes in the socio-economic dynamics.

Rahman and Parvin (1994) in a study tried to analyze and evaluate the socio-economic and psycho-physical condition of the aged people of Bangladesh on the basis of past working life and job satisfaction. The study was conducted on a sample of 98 socially conscious, highly educated and respected retired persons of Dhaka Metropolitan city. All of them were purposively selected and in the age group of 57 and above. The major findings of the study were as follows:-

(i) Most of the aged persons under investigation were suffering from some specific diseases like heart-disease, Blood-pressure, Diabetes and arthritis. Besides, hard of hearing, blindness, loss of learning ability and loss of problem solving ability were some common problems. Some of them were also suffering from organic brain disorder. While, all of them were mentally weak due to the fear of death. (ii) Two-thirds of the sample data indicates that they felt comfort in working with their colleagues as because they had created an informal relationship with their colleagues. While, a few of them felt free in working with their colleagues. (iii) All of them were spending their time by sleeping, resting, watching TV, reading news paper and taking part in religious activities. Besides, half of them had a habit of morning walk. (iv) They were contributing a lot to their families through spending a part of their time in shopping and taking children to school and bringing them back home. Besides, they were taking part in some social activities. (v) After retirement, their social prestige, honour and power were reduced with the reduction in income. (vi) Among those, who were physically sound but financially weak could not accept their retirement easily. (vii) Most of the aged people were dependent on their wives, sons, daughters and daughters-in-law. Despite, they did not want to transfer the rights of their property to their heirs due to the fear that they might be ill treated by their heirs.

In drawing inference, the authors opined thatⁿ there are very few old-homes and health-care centres in our country for the aged people. Moreover, there is no regulatory body to formulate policy and co-ordinate functions relating to the welfare of the aged people in our country. In such a situation, our aged people are not getting safety and security like

U.S. Society. Thus, realizing the gravity of the problem, the government should establish several old-homes, specialized health-care centres and a separate Ministry for formulating policy and co-ordinate functions relating to the welfare of the aged people.

Razzaque and Sattar (1994), the study traces the recent trends in urbanization and aging in Bangladesh with a view to analyzing the situation in the context of the need for instituting welfare measures for this rapidly growth section of the population. From this that the elderly population of urban Bangladesh is increasing very rapidly while the corresponding rural population is exhibiting a rather slow pace of growth. This calls for provisions to be made at the earliest for appropriate recreational and medical programmes to assist the senior citizens living in urban areas where the risk of death is apparently higher. It may be mentioned here that such an alarming increase of the elderly in urbanized prefectures has never been experienced in Bangladesh and is primarily due to the migration of large numbers of young persons, to these urbanized setting. As in most development countries, rural to urban migration is a significant social phenomenon. Rural to urban migration in Bangladesh has been generated more due to push rather than pull factors. In the year 1901 only 2.4 percent of the total population of Bangladesh was living in urban areas, by 1991 it has increased upto 10.9 percent. UN population projection show that the urban population may increase from 22.9 by 2000 to 42.2 in 2025. Thus the urban population is increasing very rapidly. The problems of the elderly may this become much more serious in urban areas than in rural areas.

Wolf (1994), deficiencies in the literature on kin availability, living arrangements of the elderly, and spatial proximity of the elderly and their kin suggest a need for more explanatory theories, better data collection and methods of analysis, and more comprehensive empirical research. Existing data could be used to explain the complex relationships with kinship patterns and consequences. Decision making methods do not reflect the conflicts in individual preferences or a more complex explanation of migratory behaviour. A variety demographic models have been used to explain changing size and composition of kin networks. Kobron's models, which do not account for the extent of childlessness or adults without living parents, showed the European pattern to be increased mother-daughter ratios which are not apparent elsewhere in the world.

Rutrough and Himes (1994) were to examine the extent of institutional and non-institutional living arrangements among elder's the U.S.A based on 1990 micro sample

data, and to examine how to demographic, socio-economic, and health factors affect differences in living arrangement by residence. Metropolitan or non-metropolitan status differential between places with a minimum population greater than 50,000 or a total population of greater than 100,000 and smaller population areas. Living arrangements included living alone, living with a spouse, living with nankeen, and institutionalized living quarters. Other measures included age, health and disability, ethnically and race, socio-economic status, sex, marital status, and 4 geographic regions. Multinomial logistic regression models are used to explain the effect of residence on living arrangements with controls for other factors. The results shows that elderly residents of non-metropolitan areas were more likely to the living along or with a spouse only and less likely to alive in alternative arrangement.

Sarkar (1996) discusses about the decline of joint family system and its impact on old age in security in Bangladesh. With the advancement of medical science, public health care services and technical development the life expectancy of the people is increasing. On the other hand, in the process of urbanization, industrialization and landlessness in the rural areas the migration of the people is increasing. Consequently, the traditional joint family system is declining with the tendency to form nuclear families. Changes are taking place not only in the family structure but also in the parent-child relationship which putting them in the different places and leads to in security of the aged persons.

Chakrabarti (1996) tried to give an over view of the old age problems in India and tried to emphasis the preventive measures needed to solve the problem of our senior citizens. For integrating the elderly into society an appropriate population policy should be adopted to develop the balanced economic activity, to raise labour productivity and to improve the physical, Psychological and cultural quality of people in general.

Shrestha (1996), the demographic situation of Nepal is this considered to be a high fertility, high population growth rate and declining mortality. These trend indicate the problem of aging population. While viewing through such demographic transition it is rationale to consider the population structure leading to growing segment of elderly population in the coming decades. Hence, one of the major issue in future of a country might be that of old age even through this problem in Nepal has not been widely noticed yet. But the present situation in urban Nepal suggests the social structure is changing slowly. The young generation seem to prefer secular family rather than joint family system. They went to be

independent and lead their lives in their own way. As a result of modernization, the traditional joint family structure is distorting. For many elderly people in urban area specially in the capital city of Kathmandu it appears to be inevitable for them to live their old age in hardship and isolation.

Sattar (1996), the demographic transition, modernization urbanization, industrialization and overall economic development currently under way in Bangladesh are findings that their speedy growth in the fast few decades is producing not only a wealthy and healthy population but one that is increasing aging as well. Decades after taking off on their growth spurt they are causing puzzling signs of graying population akin to the aging demographic profiles which cause an apprehension of a radical impact on the evolution in patterns of family life and pose new challenges to the traditional care system of the elderly. Among these changes two significant evolutionary processes- population aging and break down of traditional pattern of family life, have drawn apt attention of social scientists following the declining trend in mortality and fertility level. These emerging trends call for substantial responses both on the part of governments and on the part of individual family member.

Safder (1996) conducted a study in frame of "Social and Psychological Theories of Aging". The argument focused around the activity theory and disengagement theory. which reveals, one's, will to get involved in certain setups of life and the capacity of involvement on others choice. Disengagement in old age occurs in all cultures but its rate and extent may differ. In our cultural family and friends are the sole sources of assistance and caregivers to the senior citizens living in the community. The senior citizens when interviewed for a study to know their problems it was found that the senior citizens had good relations with their family members fell secured but sometimes feels neglected because they were not fully involved their family matters. The senior citizens wanted to be authoritative in old age. The study further highlighted that people were not all satisfied with the existing services for welfare provided by the government. Further they rejected the idea of old age home as they did not want to live the life of isolation.

Kabir (1996), indicate that joint and extended families in Bangladesh are breaking down into nuclear families. Families have been the major care provides for the aged here. The breakup points to a grim future for them. He also suggest that number and proportion of the elderly in Bangladesh will increase in the coming years, and hence their problems will assume added importance and impact on this agricultural society. Fertility is declining in

Bangladesh. Fewer children in the future will mean a higher ratio of parents to children. With smaller number of children, the burden of providing care for their elderly parents will become heavier, i.e., with less number to share this responsibility.

In Indian conditions Sarkar (1997) analyzed the health crisis of the elderly persons in connection with different types of diseases from which they were suffering. The type of physicians consulted for using various methods of treatment, hospitalization for treatment and the kinship roles to take care of the elderly persons especially those who are sick have been discussed. Each and every elderly sick persons faced more than one problems associated with sickness and treatment. Mortality of elderly persons could not afford to get required medical treatment on account of financial inadequacy.

Reddy (1997), in the study of rural areas of Tripuri found that women with low economic status had poorer attitude towards own health. Because of poverty, people put up with poor health and compromise on health practices. They can not afford to give good attention to their own health and hence have poorer health attitude.

Razzaque and Shofiqul (1997), to provide suitable policies and guidelines for the well being of the aged in Bangladesh, and to study their inherent structure and the differential impact of residence and sex on aging in Bangladesh. They shows that family bond in our country is still very powerful and elderly are not interested in institutional type of residence. Majority of the elderly females remain single and the negligence towards female education during first half of this century is depicted from this study. They also shows that the contribution towards aging by the males and rural population are more pronounced than females and urban population in Bangladesh.

Nath (1997), attempt to explore the problems faced by the old people in Bangladesh and social service programmes that are taken by the government and non-government agencies for the aged. Till recently family was not only the basic unit where an individual from birth to death used to get care, affection, love, respect, but it also provided status and security. But the family situation is changing with the growth of urbanization, migration and various other socio-economic factors of modern life. As a consequence aged people are becoming increasingly helpless and less cared for. Home or family is not able to meet all of their socio-psychological, economic and physical needs and problems. On the other hand, with efficient and sophisticated medical support, life expectancy of the people is increasing day by day. In the changed circumstances, since families are not able to give proper and full

support to the elderly, government and the NGOs have to provide social services to them. He has concentrated on examining the social services programmes for the aged so far taken by government and non-government agencies in Bangladesh.

Kumar and Khan (1997), describes the age pattern of deaths at old ages in Maharashtra and also examine major cause of death together with the prevalence of chronic diseases among the older persons. The major findings indicate that deaths due to anemia, heart attack and congestive and other heart diseases were more concentrated in rural areas whereas in urban areas the incidence of heart disease was highest followed by Neoplasm. More aged females died out of the extreme old age while males died more due to medical cause. The study of incidence of morbidity brings out that about 43.2% of the aged persons in rural areas and 40.9% in urban areas were suffering from chronic diseases and this incidence increased with the advancement of age. Problem of joints was the most important disease prevalent followed by cough in both areas. In urban areas blood pressure and heart diseases were also prominent unlike rural areas.

Ramachandran, Rajasekhar and Purushothaman (1997), deals with the trends in old age life expectancy by sex and residential background. The major findings suggest that the decline in old age mortality has been slowed down during the 1980s and later, as compared to the early 1970s. This was manifested from the lower rate of change in old age life expectancy, the rate of increase was higher for females than males between the periods 1970-75 and 1976-80. Although there was decline in the old age mortality in early 1970s. It was due to the higher rate of decline in mortality among old olds rather than the young olds. As regards the sex differentials in the decline of old age mortality, female old mortality declined faster than male old age mortality in all the states.

Guha Roy (1999), attempts to investigate the issue in the Indian context. It reviews first the global trend of elderly population 60 and above and discusses the share of less developed countries. He addresses the basic issues of threshold of old age and measurement of the rate of aging and the oldness of the old. He estimates the size of the sub-population of elderly to get an idea about its demographic burden. The number of elderly, which would be no less than 69 million in 2001 has been rising faster than any other segment of the population. Public assistance provision needs to provide "safety net" for this growing elderly population in India.

Rahman (1999), state that a small section of the present population of Bangladesh is elderly population (Age 60 and over). The percentage of aged population in the country is only 6 percent against the total population. However this percentage of the aged population rises gradually. Though it is rising slowly but the total number of elderly population is approximately 75 lacs. At present over the globe around fifty nations have less population than that of the above figure. It has been observed that this aged population ratio is small but the total number is significant. Moreover, their general characteristics is that they are physically weak, poor, illiterate, rural, socially and nationally insecure, and that is why they are mentally depressed. Under the auspices of United Nations people of underdeveloped country are treated as elderly when their age is sixty years.

In the view of Gerontology, depending on nature, least purchasing capacity, deprivation from fundamental needs, hunger-ill health-diseases-malnutrition etc. makes Bangladeshi people older by the real age fifty years. Old age is also a burden but it is universal. Problems in life or society or globe can be avoid anyway. As such, death is inter-related with birth, aged is co-related with life if people alive. The creator did not give any option, if so, it is till unknown.

Hossain (2000), concerned with the problems related to unprecedented rate of population increase in Bangladesh and seeks to examine the possible trends in vital rates as reflected by the changing age-sex composition, as well as recent fertility trends in view of contraceptive use and delay marriage. He observed that the rapid change of demographic characteristic causes higher population growth in Bangladesh. A significant size of the aged population observed between the decades 2010 to 2020 and 2020 to 2030. Beside these observations he find that the elderly are the poorest class in the population and they are also dependent on the children for their living.

1.7 Rationale of the Study

It is needless to explain that any academic endeavour or formal research work should have a social relevance and theoretical aspects. The present study has got some rationale from social, economic, academic and policy planning stand points. The rationale of the present study can be stated as follows:-

First, of late, it is clearly noticed that a sizable section of the population of Bangladesh survive till their old age. Such elderly population has emerged as a new phenomenon in our traditional social context. From time immemorial the joint family system has been a unique feature in the sub-continent and the elderly persons have enjoyed a respectable position in their family and community too. But, due to the rapid changes in the socio-economic situation, the traditional joint family system is disappearing from the scene and

nuclear family is coming up. In such a cultural-familial set up an old person is being considered a burden in the family. Thus, they become victims of negligence, insolvency and insecurity. Under such circumstances, the growing number of elderly population has been a social issue that needs to be studied, analyzed and understood in due perspectives. Hence, the present study can reflect some light on the issue and thereby address it in right manner.

Secondly, the presence of elderly population in our country has got some economic and intellectual dimensions too - which need to be deciphered. A fairly large old population is, actually, a dependent population who can scarcely contribute to familial / national economy. Being economically inactive (i.e. dependent) the elderly persons turn into liability to the family and society. Moreover, in most cases elder persons are carriers of different chronic and fatal diseases which claim a lot of expenditure both on personal and / or national level. Food, shelter, medicine and care and nursing for the elderly population is gradually turning to be vital agenda in our economic programmes in near future. Thus, a study like the present one, can help understand the magnitude of economic involvement and the utilization of the physical and intellectual ability of the elderly persons in gainful activities tomorrow.

Thirdly, aging is not simply an economic or a social factor - rather it is equally an important academic matter today. The feature of a population and the on going changes in it deserve immediate attention of experts and academics for greater interest of the humanity and the pursuit of furthering knowledge in the realm of demography. Analysis and projection of the factors associated with the process of aging in a developing country like Bangladesh carry enormous significance for overall betterment of the aged population in particular and the whole nation in general. Hence, the gravity of the present study, on the theoretical plane, can be readily comprehended.

Finally, it is obvious that the proportion of aged population in Bangladesh will be increasing in an unabated manner. This is a positive sign that the national government has rightly perceived the problem of senior citizens and has introduced elderly grant (Boiska Bhata). But this is not the end of the story, it ushers the whole thing extended upto endless future. If the national government has to approach the issue in an appropriate manner it requires in-depth and continuous studies in this line. And thus an integrated national policy and planning for the elderly population - their rehabilitation, support, and

care - can be formulated and executed. Hence, the present study can be of some use to attain such a noble goal.

1.8 Chapterization of the Study

The dissertation organised into nine chapters. To make this piece of work self-sufficient, the first chapter contains a self-contained module of concepts, notations and techniques pertaining to the age structure of the elderly people of Bangladesh. The closely associated factors, demographic back ground of Bangladesh, perception of aging in Bangladesh, recent global trend which are presented in this chapter. The objectives of the study, conceptual frame work, literature review and rationale of the study are also introduced in this chapter.

Chapter-II presents description of data sources, reliability of data, methods and techniques adopted in course of analysis of data. The dynamics of the age and sex structure of a population which constitutes an important component of aging analysis for several reasons and aging indices have been introduced in **Chapter-III**. In this chapter an attempt has also been made to focus the trend of growth of the elderly and different characteristics are involved therein.

While **Chapter-IV** presents the fertility levels, patterns, and trends of the population in Bangladesh along with selected Asian countries.

We have carried out mortality transition, infant and child mortality, age-sex mortality pattern, life expectancy, in **Chapter-V**.

The inherent peculiarities in the age pattern of marriage has been cited in **Chapter-VI**. It also includes the trends and differentials in nuptiality patterns.

In the **Chapter-VII** we depicts the result of demographic transition caused by reduction in fertility level and prolongation of life due to reduction in mortality level. The course of demographic transition due to changes in fertility and mortality rates is discussed in this chapter. And issues of population growth also highlighted.

The main corpus of the present study is presented in **Chapter-VIII** which contains the estimates and projections of aged population by different methods. Projections of the age specific female population have been done by Component method in matrix form. And both male and female age specific population through Cohort component method have also been incorporated in this chapter.

The last chapter, **Chapter-IX**, we have provided a brief summary of the results together with the implications of the study findings, and concluding remarks.

CHAPTER II

METHODOLOGY

2.1 Sources of Data

The study has been based on secondary sources of data. The secondary data have been taken from different published surveys and censuses reports and also from unpublished research works. The sources of data are described below:-

(a) Vital Registration

The registration of vital events was introduced in Bengal in 1873 but the recorded data have been far from accurate and the coverage was incomplete. After partition in 1947, the then East Pakistan adopted the Bengal Births and Deaths Registration Act of 1873. In 1959, this act was modified to suit the basic democratic system and the registration of vital events was made compulsory in the rural areas of the country. The person responsible for reporting vital events in the rural areas was the village watchman. In addition, clinics and hospitals were responsible for reporting the occurrence of vital events to the registration authorities.

In practice, however, the system was not enforced. There has been neither legal or administrative pressure nor any incentive for people to register deaths. Possession of death certificates has not been mandatory and they were not issued at the time of registration. The people were mostly uneducated and did not appear to have any interest in the registration of vital events. The system has never been adequately supervised by a higher authority and thus the quality of statistics has always been very poor. In the urban areas, the clinics and the hospitals have been probably quite efficient in reporting vital events, but they handle a very small proportion of these events.

Bearing in mind the inadequacy of mortality statistics, estimates of mortality levels and patterns have been drawn from the census through an examination of the age structure of the population. However, owing to age misreporting and under-enumeration, proper

inferences cannot always be drawn from the census data (VRS, BBS, 1980). To obtain current information as well as to the information gap about population characteristics obtained from censuses and adhoc Demographic Survey, the sample Vital Registration System was initiated by BBS in 1980 in 103 primary sampling units with random selection of 62 from Rural strata and 41 from Urban strata. The TFR per woman and CBR per thousand population was 4.23 and 31.6 respectively as reported in the year 1991 of sample Vital Registration System (VRS, BBS 1992: 52).

(b) Population Census

The practice of holding census in Bangladesh started in 1872. The second census was undertaken in 1881. From then on decennial periodicity of census was maintained with the exception of 1971 because of liberation war. It was delayed till the year 1974. Bangladesh went back to the decennial periodicity and held the censuses in the years 1981 and 1991. In 1991 for census operation the whole country was divided into 211,538 enumeration areas, 40,712 supervision's areas and 1,690 zones. Each Zone consisted of about 100 enumeration areas. In addition, 40,712 supervisors and 211538 enumerators were temporarily appointed from the local educated unemployed youths for actual enumeration. The large mauzas/villages were divided into two or more enumeration areas and small mauzas/villages were merged to form an enumeration area consisting of about 100 households, keeping in view the terrain and habitation pattern of the locality(BPC, 1991).

(c) Demographic Survey of East Pakistan 1961-62

The Demographic Survey of East Pakistan (DSEP) conducted in 1961-62 in 4 administrative districts, covering 1977 rural and 976 urban households reported a CBR of 46.5 for urban and 49.7 for rural areas. The estimated TFR for rural and urban areas were 6.6 and 6.9 respectively (Obidullah,1966:41).

(d) Population Growth Estimation Experiment 1962-1965

The first national survey was the Population Growth Estimation(PGE) Experiment a dual-record survey conducted from 1962 to 1965. In most sample areas demographic events were recorded both by a longitudinal registration(LR) and by a cross-sectional survey(CS) carried out in each sample area four times a year. Chandra-Deming(CD) formula was then used to estimate the missed events. The validity of this estimate rests on a stringent requirement of independence between the two investigations and the

possibility of adequately matching events collected by the two different methods. The estimated CDR of PGE were 13.7(CS) and 20.0(CD). The IMR estimated was 147.0. Male and female life expectancies were estimated at 45.9 and 45.5 respectively. Three estimates of CBR are provided 42.5 (CS), 44.4 (LR) and 52.6(CD). The estimated TFR ranges between 6.3 to 7.4 (Farooqui and Farooq, 1971).

(e) National Impact Survey, 1968-1969

During 1968 and 1969 the Pakistan Family Planning Association designed the National Impact Survey (NIS) which covered 2889 households. The estimated CBR from this survey is 42.0. The TFR estimates for 1960-62, 1963-65 and 1966-68 are 7.58, 7.02 and 6.02 respectively. All ever-married women aged 55 years or less and husbands of currently married women who spent the previous night in their households became the eligible respondents. Infant deaths were ascertained from the pregnancy histories of the women (Ahmed et al.,1975).

National data on fertility based on vital registration have so far been inadequate both in quality and coverage. The main sources of information on fertility have been in the national censuses. An indirect attempt by National Academy of Science through stable population analysis of 1961 and 1974 census age distributions suggested a birth rate in the range of 44 to 48 per thousand (NAS, 1981:31). The 1974 census estimate of TFR again through various indirect techniques appear to be in the range 6.7 to 7.3 which indicate a crude birth rate of 44.0 to 44.1(Ahmed, 1980:121).

(f) Bangladesh Retrospective Survey on Fertility and Mortality, 1974

A Survey on fertility and mortality was conducted in conjunction with the post-enumeration check of the 1974 population census. This is known as the Bangladesh Retrospective Survey of Fertility and Mortality (BRSFM). The survey covered a population of about 364,000 in 482 such blocks (NAS, 1981:10). All households in a sample of 482 blocks representing 0.5 percent of the census enumeration block were drawn for the study. Mortality analysis was divided into three main categories, namely the estimation of childhood mortality, adult mortality and mortality for the population as a whole. For the measurement of childhood mortality, two sources of information were used the proportion of children who died among the children ever born by women of various age groups and the data of birth and survival of each woman's most recent child. The 1974 BRSFM estimated CDR to be 20 with and IMR of 153. The expectation of life

at birth was estimated to be 45.8 for males and 56.6 for females. This survey provided an indirect estimate of CBR of 48 and a TFR of 7.08 (BRSFM, 1974:3-4).

(g) Bangladesh Fertility Survey, 1975-1976 and 1989

Data used in the study are taken from the Bangladesh Fertility Survey of 1975-76 which is a part of the world Fertility survey (WFS). Three stage sample design was adopted in BFS separately for rural and urban strata. In the first stage 160 rural and 80 urban census circles (PSU) were selected with probability proportional to the number of households and in the second stage one census block from each circle was selected with probability proportional to the number of households, whereas in the third stage, households were selected from each census block with probability inversely proportional to the number of households. This makes the sample self weighting within each stratum (rural and urban). To have a national or a regional estimate some weighting was needed. Rural weight was taken as 1.194 and the urban weight as 0.347 (Ministry of Health and population control, 1978: 31).

Using the above sampling techniques, 6145 households were selected, of which 5855 were successfully interviewed. In the interviewed households there were 6648 evermarried women in the reproductive ages out of which 6513 were successfully interviewed. After interviewing editing, coding, and data checking in Bangladesh, the data were further checked and edited at the world Fertility survey main office in London. These data were modified to conform to the standard data processing guidelines. Information was sought on the survival status of each child and the corresponding age at death. An estimated TFR of 6.34 was suggested from the survey data for the period 1971-75 (BFS, 1975: 73).

Subsequently the Government of Bangladesh conducted the BFS in 1989 to assess the current level and recent trends in fertility that have taken place in the last 10 years and to document the direct causes of changes i.e. marriage, contraception and breastfeeding and also to collect information on variations in fertility and childhood mortality by region, residence, socio-economic status, the estimated TFR of 4.9 was suggested from the survey data (BFS, 1989: 104).

In 1989 Bangladesh Fertility survey (BFS) adopted two stage probability sampling method. At the first stage a sample of areas or clusters was drawn. Each selected area was then mapped and all households were listed. At the second stage, a sample of households

was selected within each area. Thus a total of 11,729 households were selected from the selected areas, of which 11,236 households were successfully interviewed. Two kinds of analysis were carried out namely life table method analysis and multivariate analysis (BFS, 1989).

(h) Bangladesh Contraceptive Prevalence Survey (BCPS) 1991

The 1991 Contraceptive Prevalence Survey was a nationally-representative sample survey of the ever-married women under age 50 that was conducted between June 7 and October 15, 1991. The 1991 contraceptive prevalence survey was the sixth survey of its kind in Bangladesh. These surveys began in 1979 and continued in 1981, 1983, 1985/86, and 1989. The survey was designed to collect data on the patterns and trends of the marriage, fertility, contraceptive awareness and use, source of contraceptive supply and field work visitation, fertility preferences, and child health and child survival. In all 12050 ever-married women were interviewed - 8973 in rural areas and 3077 in urban areas. The survey documents that social and economic development among women remains low in Bangladesh. Sixty-one percent of ever-married women of reproductive age never attended school and eighty-four percent were either not employed or had unpaid jobs. In addition, the mean age of marriage for women was only 17.7 years (BCPS, 1991)

(i) Bangladesh Demographic and Health Survey 1993-94

The 1993-1994 Bangladesh Demographic and Health Survey (BDHS) was a nationally-representative survey of 9640 ever-married women aged 10-49 and 3284 of their husbands. The BDHS was designed to provide information on levels and trends of fertility, family planning knowledge and use, infant and child mortality, and maternal and child health. Fieldwork for the BDHS took place from mid-November 1993 to mid-March 1994. BDHS data indicated that the previously documented rapid decline in fertility in Bangladesh was not only continuing but probably accelerating. The total fertility rate declined from 6.3 birth per women in the mid-70s to 3.4 births for the period 1991-93. The crude death rate has fallen dramatically in Bangladesh from about 19 per 1000 population in 1975 to 11.3 in 1990. Although infant and under-five mortality rates are declining, they are still high (BDHS, 1993-94)

(j) Demographic Surveillance System (DSS)

In addition to the data that are collected on a nation wide basis, demographic information is also collected by the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) (formerly Cholera Research Laboratory), in the rural field station in Matlab thana of Comilla district. Matlab is located about 55 kilometers Southwest of the country's capital Dhaka. The demographic Surveillance System(DSS) is one of the components of this field program. Since 1966 the DSS has maintained the registration of births, deaths, and migrations, in addition to carrying out occasional censuses. The population covered by this system stood at 260,000 in 1977 (Samad, 1979). In 1975 the system was augmented to include marriages and divorces. In October 1977 the Surveillance area was reduced from 233 to 149 villages and a Maternal Child Health and Family Planning(MCH-FP) program was begun in 70 villages. The remaining 79 villages were treated as a comparison area. This area is called the MCH-FP area (DSS, 1994). The CBR for years 1976 and 1977 were 43.3 and 46.4 respectively. The reported TFR for the years were 6.2 and 6.7 (Curlin et al., 1976:87). Now the CBR for year 1994 was 27.6 and TFR was 3.4 respectively (Ginneken et al., 1996:7).

The collection of the data is limited to only two specific areas of the country, namely the villages of the Matlab thana and Taknaf thana and hence national representativeness cannot be substantiated, comparisons between national mortality data and those based on the DSS provide useful information in particular with respect to continuous time trends(Curlin, et al., 1976).

In addition to these sources, which have national coverage, information is available from other regional or small scale studies. Whereas the census, PGE and the nationwide survey (NIS, the Retrospective Survey and BFS) attempt to obtain estimates of birth and death rates for the country as a whole and for its major administrative and economic divisions, the studies attempt to extricate information on factors (social, economic and cultural) associated with differentials in fertility levels.

Both censuses and surveys collected data on marital status classifying the status as Single (never married), Married, Divorced and Widowed categories addressing both male and female population. As such, the distributions of male and female population by marital status are available and taken for analysing the inherent peculiarities of marriage patterns and temporal trends in marital status. Besides these sources of data, some data have taken

from United Nations,(1993), “The Sex and Age Distribution of the World populations , The 1992 Revision”, NewYork, United Nations,(1993), World Population Prospects, The 1992 Revision, NewYork, United Nations (1995), “The Sex and Age Distribution of Population : The 1994 Revision”, Department of International Economic and Social Affairs, United Nations, NewYork, United Nations,(1995), “World Population Prospects, The 1994 Revision”, NewYork, United Nations(1995).

2.2 Reliability of Data

An adequate assessment of the reliability of demographic information is essential for a meaningful analysis of population trends and patterns. In developing countries, it is known that population statistics generated from enumeration, registration or sample surveys are usually affected by errors which preclude the adequate measurement of demographic levels and trends. Thus, the determination of the accuracy of demographic information and the quantification of the magnitude of errors for making compensating adjustments provide a clear understanding of the dynamics of population change.

A more systematic way of assessing the accuracy of the census information was initiated in 1961 through the post-enumeration surveys and the internal analysis of age data. The 1961 census of Pakistan marked the first attempt of the government to check the completeness of enumeration and assess the quality of the data collected through the post-enumeration quality check. The check was made within a week after the census count. There was a remarkable close correspondence in counts. The differences in rural areas are not as great as in the urban areas. Where the post-enumeration survey results exceeded the census count, the difference was only 1.2% for the urban areas and 0.2% in the rural areas for males and 1.0% and 0.8% respectively for females. Where the census count exceeded the post-enumeration survey the difference was 2.8% in both urban and rural areas for males, but 2.7% for urban and 0.9% for rural females.

The post-enumeration check in 1974 was carried out in April, about one month after the termination of the census. This survey aimed (i) to evaluate the coverage error due to omission or duplication of households and (ii) to determine the content error with respect to age and marital status as recorded in the individual census slips. The under enumeration was 6.5% . For the purpose of evaluation, the 2.6 for males and 2.4 for females, a sex ratio score of 1.5 and a joint score of 9.5 for a demographically normal

population with a highly accurate system of age and sex reporting. Compared with this standard, the age-sex distributions of Bangladesh as reported in the censuses of 1901, 1911 and 1921 were extremely irregular. The irregularity, though substantially reduced in the subsequent two censuses, was still very high in the recent censuses of 1951, 1961 and 1974. The age mis-reporting was always more pronounced among the females than among the males.

To determine the extent of under coverage error of the census (1981), a post-enumeration check was conducted two weeks after completion of the field enumeration work. The post enumeration check programme was designed by an independent group of experts and carried out by independent teams of trained supervisors and enumerators who were selected from experienced staff members of the BBS. Analysis of post-enumeration check results showed under coverage error around 3% . This was a recorded achievement compared to under coverage errors of post censuses which were much higher and varied from a low of 8% to a high of 15%.

A rigorous and independent evaluation of coverage of the 1991 census was done by post enumeration check(PEC) survey which was conducted during April 1-7, 1991 three weeks after the census enumeration. For the PEC, the enumerators and the supervisors were selected from amongst the staff members of the Bangladesh Bureau of Statistics (BBS) who were not involved in PEC areas at that time of main census. The result of PEC shows that there was net under count of 4.61% in the population of Bangladesh. This net under count can be attributed to 6.61% for missed rate and 2.00% for erroneously counted (over count) rate. Rural area shows 4.0% net under count which is more than twice of rural rate. The other urban areas rate is 4.99% which is in between the rural and municipal rate.

A post-enumeration check was carried out as a subsample of households included in the World Fertility Survey (BFS,1975), to determine the accuracy of reporting of age and parity. It was shown that 85.2% of the respondents reported ages that were different from those indicated in the main survey. Likewise, the discrepancy in the reported age at marriage was in the magnitude of 77%.

In order to assess the reliability of the BFS (1989) data, a small sub-sample of respondents was re-interviewed. On average the interval between the first interview and the re-interview was three to four months. The respondent's age and age of last child

should have increased by about 0.25% years on average, because of the lapse of three to four months between the two interviews. Conversely, age at first marriage and age at first child's birth should remain the same. In addition to these types of age statement, the post-enumeration survey permits examination of consistency of reporting of number of living children, contraceptive use, marital status, and education. The results gave an identical response at both interviews. The general conclusion from the post-enumeration survey is that the BFS(1989) data are reasonably reliable.

2.3 Evaluation of Data : Indices of Age Preference

Since the errors in reporting age have been common in all censuses and surveys, the incidence of age heaping and digit preferences has been measured through the application of Whipple's Index, Myer's Index and the UN Age-Sex Accuracy Index. Table-2.1 presented the values of the indices for different time points. Single year age distribution of population is not available for the year 1961, therefore it is not possible to compute Whipple's as well as Myer's indices for that year. Criteria to judge the quality of age distribution based on these indices and observations as regards the quality of age data used in the analysis are cited below:-

- (i) Whipple's index suggests that the extent of age reporting with digits ended to 0 and 5 is lower for survey data (viz. 1975 & 1989) than the census data (viz. 1961, 1974, 1981 & 1991). However, some sort of temporal effect is found where the extent of preference of age reporting with such digits becomes low with time. While reporting of age of females with digits ended at 0 and 5 is better for survey data than the males. The opposite is true for census data.
- (ii) Myer's index reflects preference or dislike for each of the ten terminal digits 0 to 9. Myer's index suggests that the extent of age reporting is also better for survey data than census data and it also suggests the preference of age reporting becoming low with time. Reporting of age of females is better for survey data than males but the opposite is true for census data.
- (iii) UN Age-Sex accuracy index indicates that preferences of age reporting are lower in survey data than census age data. It also suggests that the survey data is more or less accurate.

Table-2.1
Various indices to evaluate age preference of indicated years

Year	Whipple's Index		Myer's Index		UN Accuracy Index
	Male	Female	Male	Female	Both
1961	----	----	---	---	74.51
1974	336.96	353.82	70.89	76.97	68.22
1981	315.90	334.76	67.86	71.04	68.35
1991	311.98	327.65	66.43	67.30	69.23
1975	183.84	124.94	34.15	16.53	6.55
1989	166.76	104.73	27.38	6.42	6.87

(--) Not computed.

Based on the indices shown above, it can be said that the single age data seem to suffer from mis-reporting of age. However, these errors do not seem to be of such magnitude as to make the data unusable at the level of quinquennial age groups. The present study is based on the quinquennial age distributions and for the most part no attempt is made to adjust the reported age data. While fully cognizant of the problems involved, it is felt that adjusting the over all age distribution without adjusting the corresponding marital status composition or the age at marriage distribution may lead to more serious distortions. It is not easy to correct the age errors present in the nuptiality data since first marriages are normally concentrated within a narrow age span and any attempt to smooth the data may seriously distort the actual pattern (Sivamurthy and Seetharam, 1976).

2.4 Analytical Methodology

The present study has been carried out on the major demographic indicators:-

(i) Birth rate (ii) Death rate (iii) Median age (iv) Age and sex composition (v) Demographic ratio (vi) Educational levels (vii) Population pyramid (viii) Life expectancy (ix) Residential distribution (x) Marital status (xi) Demographic transition (xii) Population projections. In order to obtain satisfactory results, different methods and techniques have been used for the present study.

A satisfactory understanding of aging requires knowledge on a general index of aging to indicate the differential impact of variables on aging. These are narrated in detail in **Chapter-III**. This chapter also studies the age-sex structure of the elderly people in Bangladesh and other selected countries.

The trend of population growth in Bangladesh accompanied with mortality levels have been considered in **Chapter-IV**. Besides growth rate of population at different age categories for selected Asian countries has also been enumerated in this chapter. A straight line linear regression has been estimated with crude birth rate on aged population and total fertility rate on aged population.

In the **Chapter-V** we have cited the slow declining in the infant mortality rate in 1970s and observed social and economic instability, due to the Liberation war, famines and floods. In these direction, an important phase, the average length of life expectancy at birth become doubled in this century which has been determined through a life table. A straight line linear regression has also been developed with crude death rate on aged population and expectation of life at birth on aged population.

A thorough investigation and understanding of nuptiality pattern have been cited in **Chapter –VI**. A regression line has been estimated with mean age at marriage on aged population and expectation of life at birth on aged population. With the help of Bongart's model we have estimated the effect of marriage on fertility in 1961-1991.

The study of demographic transition caused by fertility and mortality rates has a lot of importance and has been cited in **Chapter-VII**. The concept of fertility and mortality has also been explained in **Chapter-IV** and **Chapter-V** respectively. We have selected six variables such as crude birth rate, crude death rate, total fertility rate, mean age at marriage, expectation of life at birth and aged population. A stepwise regression technique has been used taking different combination of the selected variables to identify the factors affecting the aged population and expectation of life at birth. For this purpose SPSS/PC+ version 7.5 (Windows base) software program has been used.

For better understanding the following models viz. Exponential growth model, Modified exponential growth model, Geometric model, Makeham's model, and Logistic model have been considered in **Chapter-VIII** to estimate the aged population and projected aged population in Bangladesh. Beside Frejka's component methods in matrix form and Cohort component method have been used to project age specific female population, and age specific male and female population in Bangladesh. Computer program in FORTRAN 77 language has been used for these projections. The theoretical ideas of all these models have been described in the same chapter.

CHAPTER-III

SPATIAL, AGE AND SEX DIFFERENTIALS OF THE ELDERLY IN BANGLADESH

3.1 Introduction

The dynamics of the age and sex structure of a population constitutes an important component in demographic analysis for several reasons. The age-sex structure of a population at any time is the product of the combined effects of past trends in fertility, mortality and migration. In turn, the structure influences the current levels of birth, death and migration rates. The age-sex structure of the population provides the basis for estimating the requirements for various essential goods and services of a community. Moreover, the age-sex structure of a population has significant implications for the reproductive potential, manpower supply, school attendance, household formation, child and mother health care and family planning service delivery, aging etc. The age and sex structure of a population is critical for preparing population estimates as well as projection of households, school enrollment and the labour force, which is in turn urgently needed for the formulation of effective socio-economic development plans in different sectors considering the requirements of population of different age groups and sexes.

Like so many countries of the Asia-Pacific region, Bangladesh has experienced a steady decline in mortality accompanied by modest decline in fertility (NAS, 1981, ESCAP, 1981; Mabud, 1987; Kabir and Mosleh Uddin, 1987). If so, the aging process might have started in Bangladesh. But this being a recent phenomenon, the effect might not be felt right now.

Rural-urban residence, rural-urban sex ratios and inter-country compositions are the most important factors that heavily influence the aging and are taken into consideration of this analysis. The basic driving forces behind the aging studies sex ratios, sex structure and age specific sex-ratios have also been incorporated in this piece of work. In turn, these immense forces along with religious composition, religious variation as well as literacy status are also briefly discussed herein. Previous four divisions of Bangladesh viz. Chittagong, Dhaka, Khulna and Rajshahi considered as the region and by aged or elderly population, the population of age 60+ instead of stereotype elderly of age 65 years and above have been selected for the convenience of this work. The choice of aged population, i.e., population aged 60 years and above is though arbitrary part considerations have been given to the fact that in context of Bangladesh, the population of these ages almost lost their validity, they are frail, politically and socio-economically often powerless and reach the age of mandatory retirement from service though they are enormously respected in the family and in the society. Presently people of these ages are undercounted due to memory lapse and or indirect reporting of ages. Regarding age 5 yearly age grouping of population are available by sex, rural-urban residents, marital status from age 0-4 and 60+ for both 1974, 1981 and 1991 censuses by regions of the country. Nevertheless, there is a need to explore the aging situation of the country for its future perspectives and implications. Issues relating to the aging situation should get due attention not only from demographic point of view but also owing to urbanization, modernization and industrialization (Chanana and Talwar, 1987).

The technological advances that are generally considered the basis of the so-called industrial revolution have produced many psycho-social, economic, cultural and political changes that may allow us to take effective measures to cut in half the current rate of growth of population from about 2 percent to only 1 percent by the year 2050. The reversal trend in population growth indicates that the country is about to reach the final phase of demographic transition soon to transform communities from a traditional pre-industrial state to a highly modernized structure and to achieve low fertility and low mortality level for slow growth of population. As that process accelerates, it would have decisive impact on future age and sex structure. The more rapidly the transition would

occur, the more rapid and the more pronounced would be the aging process in Bangladesh population (Coale 1984, UNFPA 1991).

The demographic transition has far reaching effects not only on the structure of Bangladesh's population but also on the country's overall well being. But this being a recent phenomenon, the effect might not be felt immediately. Nevertheless, there is a need to explore the aging situation of the country for its future perspectives and implications. Issues relating to the aging situation should get due attention not only from the demographic angle but it also acquires special significance in a situation when the country swings at different levels on the continuum of tradition and modernity (Randhawa, 1991).

The average length of life has doubled in the present century. It has increased from 24 in 1901 to 58.9 years in 1996 due to the unprecedented triumphs of medical and public health measures. While in the past, only a very few would be fortunate to be octogenarian, in the future, the number of persons, who would survive the natural life span would increase and only a minority would fail to reach the age of 80 years as a result of achievements in the field of social and medical progress never known before. While, in the past, the rare achievement of an individual to be an octogenarian gave a sense of personal triumph but now the number of octogenarians has increased to thousands. In Bangladesh in 1974 there were 159000 octogenarians, in 1981 this number increased to 692000. The United Nations projections find that in 2025 there may be 1292000 octogenarians (BBS 1997, BRSFM 1974, UN 1990). This chapter deals with this topic in two sections, the first section analyses the age structure and the second section analyses the sex structure.

Until very recently in developing countries like Bangladesh problems associated with aging were generally perceived as issues to be considered and resolved at the level of the individual or family concerned. But now as the number of the total population represented by the elderly is rapidly increasing and the system of joint family has been changing to prefer a new system of nuclear family of husband-wife and unmarried children, the process of aging of population is creating significant problems and

consequently the issues such as public health measures, dependency ratios, are required to be addressed by the policy makers in entirely different perspectives (Hossain, 1998).

The elderly comprise a much larger proportion of the population today than ever before. When the medical science was in its infant stage fertility and mortality rates were high, the relative size of an aging population was small. The rapid and faster technological progress in medical sciences control the fertility and mortality rates considerably, and the average composition exhibits a relatively large proportion of the elderly persons.

In Bangladesh changes in the population structure, specially population aging and breaking down of traditional family life are of concern for the social scientists as well as for the government and family members. Further the elderly of Bangladesh will have to be economically more independent in future to cope with the old age problems. The process of aging in Bangladesh is now taking place at such a time when the pattern of life is changing; kinship bonds are weakening and the family composition is undergoing a rapid transformation (Hossain, 1998).

The old age segment in the population represents an important subset of the aggregate population and the elderly as a separate and identifiable group with their own specific needs has emerged as an issue quite recently. Our empirical knowledge about the sub-population in the developing countries is however limited till now. But even for these countries we know the size of the elderly population has increased significantly in absolute terms (Hossain, 1999).

3.2 Aging Index

The most popular traditional measures of the extent of aging consist of identifying a critical level of age above which a person will be considered as 'aged' and then finding the proportion that is 'aged'. As shown by Basu and Basu (1987), a family of poverty measures in economics offers ideas for developing an index which captures the underlying notion of aging.

The conventional aging index is defined as

$$Z(p) = \frac{m(p)}{n(p)}$$

Where $n(p)$ is the number of people in a population 'p' and $m(p)$ is the number of people aged 60 and over.

By analogy with the "Income cap" measure, another indicator, called the "age-difference Index" is given as

$$I(p) = \frac{1}{m(p)} \sum_{i=1}^{m(p)} \left(\frac{p_i - 60}{60} \right)$$

Where p_i is the age(sixty plus) of the i th person. Since the index $I(p)$ is concerned only with the extent of oldness among the old, a good measure of aging is derived by some kind of reconciliation of $Z(p)$ and $I(p)$. The improved index is defined as

$$P(p) = \frac{1}{n(p)} \sum_{i=1}^{m(p)} \left(\frac{p_i - 60}{60} \right)^2 = \frac{1}{n(p)} \sum_{i=1}^{m(p)} \left(\frac{p_i}{60} - 1 \right)^2$$

Further a general index of aging I_r as constructed by Stay R. Chakravarty and Sumita Chakravarty (1993) is used to indicate the differential impact of variables on aging.

$$I_r = \frac{q}{n} \left[\frac{1}{q} \sum_{i=1}^q \left(\frac{y_i}{g} - 1 \right) \right]^r$$

Where, q is the number of old persons

n is the total population

y_i is the age of the i th person

g is the cut of point for old age which is 60 years in our study

r is the non-negative constant.

When $r = 0$ then I_0 is simply the head count ratio H . The term within third brackets measures how old the old are. I_0 does not indicate how old the old are and does not satisfy the properties continuity and monotonicity.

Based on the Index, the trend in population aging in Bangladesh is illustrated with reference to sex-age distributions of the population estimated by the United Nations(1994). The data used as the input for the index are presented in table-3.1.

Table-3.1
Estimated sex-age distribution of population of Bangladesh in the old age
range: 1950, 1980-2030(population in 000)

Age group	1950	1980	1990	2000	2010	2020	2030
Male							
Total	22227	45492	58785	69305	83713	95220	106061
60-64	600	822	958	1251	1718	2882	4209
65-69	390	654	685	904	1237	1812	3076
70-74	215	466	463	592	829	1200	2094
75-79	105	288	292	341	490	719	1111
80+	50	131	226	276	375	566	880
60 and over	1350	2361	2624	3364	4649	7179	11370
Female							
Total	19556	42729	52333	65113	78787	89970	100893
60-64	457	796	921	1291	1725	2672	4195
65-69	340	662	685	935	1310	1902	3036
70-74	230	447	467	600	902	1280	2077
75-79	134	267	304	356	533	812	1262
80+	50	122	200	262	367	604	975
60 and over	1211	2294	2577	3444	4837	7240	11545

Source: The sex and age distribution of world populations, The 1994 Revision, United Nations, NewYork, p.178-179.

The conventional aging index, $Z(p)$, and the Improved index $P(p)$ are presented in table-3.2. While both indicators reveal a clear trend towards further aging in Bangladesh, well into the next century, the $P(p)$ - index seems to be more sensitive, and registers a steeper and larger increase compared to the conventional index, $Z(p)$. The sex differential in aging is also brought out more sharply by the new index than does the traditional index.

Table-3.2
Expected trend in aging of population according to two indicators
for Bangladesh: 1950, 1980-2030

Year	Improve $P(p) \times 100$		% change of $P(p)$		$Z(p) \times 100$		% change of $Z(p)$	
	Male	Female	Male	Female	Male	Female	Male	Female
1950	0.53	0.39	-	-	6.12	6.19	-	-
1980	0.71	0.72	33.96	84.62	5.19	5.37	-15.2	-13.3
1990	0.72	0.73	1.41	1.39	4.70	4.93	-9.5	-8.2
2000	1.02	1.15	41.67	57.53	4.85	5.29	3.2	7.3
2010	1.66	1.89	62.75	64.35	5.55	6.14	14.4	16.1
2020	3.80	3.88	128.92	105.29	7.54	8.08	35.9	31.6
2030	8.44	8.89	122.11	129.12	10.72	11.44	42.2	41.58

Source: Computed from table-3.1.

Using age data of Bangladesh for the year 1950, 1980-2030 the general index I_r for $r = 0, 1, 2, 3$ are computed by dividing the entire population by sex(Male and Female). The numerical results are presented in table-3.3. The decomposition of the population with respect to a characteristic is given in the first row, the second column gives the proportion

Spatial, sex and age differentials of the elderly in Bangladesh

of the total population in different subgroups. Numerical values of I_r for $r = 0, 1, 2, 3$ are given in columns 3-10.

We note from table-3.3 the contribution of males towards the aging is more pronounced than the females which indicates that males live longer than females in Bangladesh. Further the percentage contribution of males and females for different values of the parameter does not differ significantly. However, we note that approximately 55% contribution to total aging comes from male population. The contribution to the total aging by the female population is approximately 45%. It is to be mentioned that the contribution made by the males to total aging is monotonically decreasing in r . But the contribution made by the female population to the total aging in Bangladesh is monotonically increasing in r .

From the comparison of differential impact of sex on aging it is revealed that males contribution to aging is much more pronounced than that of female for Bangladesh whereas in India differential sex impact in aging is not notable as noted by Chakravarty. This clearly indicates that males survive more in Bangladesh than females. Under age marriages, malnutrition, more births, social inadvancement are the factors that might be related to the sex differential in aging pattern in Bangladesh.

Table-3.3
Measures of aging for the population in Bangladesh by sex : 1950, 1980-2030

Year	Male					Female				
	Proportion of all Bangladesh population	I_0	I_1	I_2	I_3	Proportion of all Bangladesh population	I_0	I_1	I_2	I_3
1950	0.53196	.00023	.00077	.0053	0.0418	0.46804	.00025	.00078	.0039	0.0213
1980	0.51566	.00011	.00076	.0071	0.0744	0.48434	.00012	.00077	.0072	0.0741
1990	0.51596	.00009	.00066	.0072	0.0828	0.48404	.00009	.00072	.0073	0.0856
2000	0.51559	.00007	.00074	.0112	0.1882	0.48441	.00008	.00081	.0115	0.1939
2010	0.51515	.00006	.00087	.0176	0.3935	0.48485	.00007	.00096	.0189	0.4189
2020	0.51417	.00005	.00121	.0380	1.4464	0.48583	.00006	.00129	.0388	1.3622
2030	0.51248	.00004	.00188	.0844	4.7572	0.48752	.00005	.00254	.0889	4.9451
Percentage of index										
		I_0	I_1	I_2	I_3		I_0	I_1	I_2	I_3
1950		47.92	49.68	57.61	66.24		52.08	50.32	42.39	33.76
1980		47.83	49.66	49.67	50.10		52.17	50.33	50.35	49.90
1990		47.05	47.83	49.66	49.69		52.95	52.17	50.35	50.31
2000		46.67	47.74	49.34	49.35		53.33	52.26	50.66	50.65
2010		46.16	47.54	48.22	48.75		53.84	52.46	51.78	51.25
2020		45.45	48.40	49.48	51.42		54.55	51.60	50.52	48.58
2030		44.44	48.50	49.75	51.23		55.56	51.50	50.25	48.77

Source: Computed from table-3.1.

3.3 Age Structure

One of the most fundamental characteristics of any population is its age structure. Almost all aspects of human behaviour and attributes are regulated by the age structure of its population. The specific problems and requirements of a community vary in large part with age. From subjective attributes and physiological capabilities to objective socio-economic needs all human behavioral expectations manifestations may be seen as functions of age. A population with a high proportion of old persons may differ considerably from that of young persons in its productive activities, consumption patterns, socio-cultural and political issues and other necessities and problems of life (Stockwell, 1964).

A very important feature of any population is the distribution of its members according to age. The requirements on housing, schools and colleges, medical and health strategies, pension benefits are influenced by age structure. Levels of demographic processes-fertility, mortality, nuptiality, migration of the population are controlled by its age structure. An individual may not follow a tightly structural social and religious values and regulation but beyond that the individual strivings to anchor oneself in values become a private matter make a way through life journey and work out from age to age through life using own stratagems and resources (Erikson, 1968).

The age of an individual in censuses is commonly defined in terms of the age of the person at his last birthday. Other definitions are possible and have been used. In some cases age has been defined in terms of the age at the nearest birthday or even the next birthday, but these definitions are no longer employed in national censuses.

The UN recommendation favors the Western approach, defining age as "the estimated or calculated interval of time between the date of birth and the date of census, expressed in completed solar years" (UN, 1970).

The age structure of a population is of major importance in demographic analysis. It can be mathematically determined by the levels of fertility, mortality and migration, or where the latter factor is negligible, by the first two factors alone. Conversely, given the age structure, the level of fertility and mortality can be estimated under suitable assumptions. Also, as a basic demographic variable, age composition provides several other useful

characteristics of a population and is a potential source to study the dynamics of population growth (Henry, et al., 1971).

Over the last few years there has been an increasing interest in the study of “aging” in both developed and developing countries. The examination of the age structure of a population of a country or a community at different periods reveals a process of aging of the population. This process increases the proportion of adults elderly persons in the population and decreases the proportions of children and adolescents. This phenomenon is comparatively recent (Hayflick 1980) and very recently its effect has attracted the social scientist's interest.

The investigations on age structure have been pioneered by the great Swedish social demographer Gert Stenckhalz who stirred the contemporary thinkers with his concept on population structure by age. The Swedish scientist enriched the field of demography concerning age structure and was regarded as one of the founders of the branch of demography which could play an important role in exploring transformations occurring in the age structure of modern societies known as population aging (Thomas, 1941). Over the last three decades the Population Division of the Department of International Economic and Social Affairs, United Nations Secretariat has been concerned with the issues of population aging and published a landmark study entitled: The aging of populations and its economic and social implications (UN, 1956). In accordance with UN General Assembly resolution 33/52 of 14 December 1978 the World Assembly on Aging was convened in the summer of 1982 to understand and deal with the issues and implications of aging (UN 1982). This assembly opened up a new vista to examine the articulated perceptions and policies on aging by governments in the developing countries of the World. The Economic and Social Council adopted resolution 1985/3 of 28 May 1985 calling for further study, among other things, on trends in population structures and their interrelation with economic and social development. In 1985 the “Group of 77” sponsored resolution 40/30 which stressed upon involvement of the elderly persons over 60 years of age with the development process and observed that “the elderly must be considered an impartial and necessary element in the development process at all levels within any society” (de Alvarez, 1989).

Social scientists of many types have a special interest in the age structure of a population since relationships within a community are considerably affected by the relative number of each age. Many types of planning, particularly planning for community institutions and services, require data on age composition. Age is an important variable in insuring potential school population, the potential voting population, potential manpower, etc. Age data are required for preparing current population estimates and projections; projection of households, school enrollment, labour force, etc., and projections of requirements for school teachers, health services, food and housing.

3.4 Trends in Age Composition

The age data are of major importance for population estimates and other demographic analysis, and as such the accuracy of age statistics should be emphasized. Age data classified by age groups may be affected both by errors in the reporting of ages and by variations in the completeness of enumeration. The common causes of age misstatement in developing countries are ignorance of age, deliberate mis-reporting and misunderstanding of the question on age. Table-3.4 summarizes the age structure of the population for the census years from 1911 to 1991. There has been no major shift in the age composition of the population. A notable feature of the table is the proportional increase in the population 0-4 and 5-9 years of age for the 1961 and 1974 censuses. Such observation could be the result of an improved chance of survivorship in childhood while fertility continued virtually without any volitional control at a high level. Likewise, the percentage of the population 60 years and over rose slightly, possibly because of the mortality decline.

The total population of Bangladesh increased by 21.2 percent between 1951 and 1961, the age group under 10 years of age increased by 52.1 percent and constituted about 37 percent of the total population in 1961 as against the 29.4 percent in 1951. This indicates the effect of the natural increase upon the population entering the labour force as well as those in the school age group in the subsequent decade.

Table -3.4
Comparison of Population age structure, 1911-1991

Census Year		Age Group								
		0-4	5-9	10-14	15-19	20-29	30-39	40-49	50-59	60+
1911	Males	14.6	15.3	12.4	8.7	16.1	14.0	9.9	4.6	4.4
	Females	15.8	16.5	9.9	10.1	18.5	12.3	7.8	4.7	4.4
	Total	15.2	15.9	11.2	9.4	17.2	13.2	8.6	4.9	4.4
1921	Males	13.1	16.5	12.8	8.7	16.4	14.2	9.2	5.0	4.1
	Females	14.7	16.9	10.5	10.3	18.6	12.4	7.8	4.7	4.1
	Total	13.9	16.7	11.7	9.4	17.4	13.4	8.5	4.9	4.1
1931	Males	15.8	14.5	12.6	8.6	17.4	14.0	8.8	4.8	3.6
	Females	16.4	13.1	11.4	10.2	23.2	11.6	6.7	4.6	2.8
	Total	16.1	13.8	12.0	9.4	20.3	12.8	7.7	4.7	3.2
1941	Males	14.0	15.3	12.1	8.9	17.1	14.3	9.3	5.3	3.7
	Females	15.3	15.1	11.0	9.5	19.9	13.1	7.9	4.6	3.7
	Total	14.6	15.2	11.6	9.2	18.4	13.9	8.7	4.9	3.5
1951	Males	13.9	14.3	13.5	9.4	15.6	12.9	9.5	6.2	4.7
	Females	15.4	15.3	11.7	10.6	17.1	12.2	8.0	5.5	4.2
	Total	14.6	14.8	12.7	10.0	16.3	12.6	8.8	5.8	4.4
1961	Males	17.4	18.5	9.9	7.3	14.5	12.3	8.6	5.9	5.6
	Females	19.1	19.1	8.3	8.1	16.3	11.4	7.8	5.0	4.9
	Total	18.2	18.7	9.1	7.7	15.4	11.9	8.3	5.5	5.2
1974	Males	16.2	17.8	13.5	8.5	12.8	11.0	8.4	5.6	6.2
	Females	17.6	18.8	12.2	8.0	14.6	11.1	7.6	4.9	5.2
	Total	16.9	18.3	12.8	8.3	13.7	11.0	8.1	5.2	5.7
1981	Males	16.6	16.0	13.9	9.2	14.4	10.7	7.8	5.3	6.1
	Females	17.4	16.5	12.9	9.5	15.9	10.8	7.2	4.7	5.1
	Total	17.0	16.3	13.4	9.4	15.2	10.8	7.5	5.0	5.6
1991	Males	16.2	16.6	12.6	8.3	15.4	12.1	8.0	5.0	5.9
	Females	16.8	16.3	11.7	8.5	18.3	11.5	7.3	4.5	4.8
	Total	16.5	16.6	12.2	8.4	16.8	11.8	7.7	4.8	5.4

Sources: (1) An appraisal of census population of East Pakistan from 1901 to 1961, by M.A. Rahim, Research Monograph No.2, ISRT, Dhaka University, 1969,
 (2) Population Census of Bangladesh, 1974, National volume, Bangladesh Bureau of Statistics, Dhaka, Bangladesh.
 (3) Bangladesh Population Census 1981, 1991, Analytical Findings and National Tables, Bangladesh Bureau of Statistics, Dhaka, Bangladesh.

Between 1961 and 1974 the population increased by 40.6 percent, the age group under 10 years which constituted about 35.2 percent of 1974 population increased by 34 percent. Again between 1974 and 1981 the population increased by 21.9 percent, the age group under 10 years which constituted about 33.3 percent of 1981 population increased by 15.1 percent. Between 1981 and 1991, the population increased by 22.03 percent, the age group under 10 years which constituted about 33.1 percent of 1991 population increased by 42.5 percent.

Aging is the consequence of declining fertility and mortality. Aging occurs when life expectancy in a population remains constant or improves at the older age (UN 1954, 1956). Old age and aging are two related notions but not identical. Old age is a static notion while aging is a dynamic process. The study of population aging is still in a nascent state from the methodological point of view.

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The method commonly followed when a good precision on the study of aging is desired is to find proportions of the population in specific age groups. For a careful study of aging process the most important point which requires serious attention is to consider “the group of elderly population in the context of age structure shifts” (Kuroda 1987). In this chapter three broad age groups have been distinguished corresponding approximately to three major stages of life cycle:

- (1) Children- Under 15 years of age,
- (2) Adults -- --15 to 59 years of age,
- (3) Old---- -----60 years and over.

According to these three broad age groups the composition of the population of Bangladesh is presented in table-3.5 for the period 1911-1991. The tables 3.5 and 2.6 show the changes that have taken place in each of the three age groups during this period. Classification of the population by three broad age groups in table-3.5 indicates an increase in the proportion less than 15 years by 2.9 percentage points between 1911 and 1991, change from 42.3 percent in 1911 to 45.2 percent in 1991. Concomitantly, the population 15-59 years of age was reduced by 3.8 percentage points and the population 60 and over was increased by 1.0 percentage points.

Table- 3.5
Percentage Distribution of Population of Bangladesh by broad age group , 1911-1991

Year	Age group								
	Total			Males			Females		
	0-14	15-59	60+	0-14	15-59	60+	0-14	15-59	60+
1911	42.3	53.3	4.4	42.3	53.5	4.4	42.2	53.4	4.4
1921	42.3	53.6	4.1	42.4	53.5	4.1	42.1	53.8	4.1
1931	41.9	54.9	3.2	42.9	53.6	3.6	40.9	56.3	2.8
1941	41.4	55.1	3.5	41.4	54.9	3.7	41.3	55.0	3.7
1951	42.2	53.4	4.4	41.9	53.5	4.6	42.4	53.4	4.2
1961	46.1	48.7	5.2	45.8	48.7	5.5	46.5	48.6	4.9
1974	48.1	46.2	5.7	47.5	46.3	6.2	48.7	46.1	5.2
1981	46.6	47.8	5.6	46.4	47.5	6.1	46.8	48.1	5.1
1991	45.2	49.4	5.4	45.3	48.8	5.9	45.0	50.2	4.8

- Sources:** (1) Population Census of East Pakistan from 1901 to 1961, Research Monograph No. 2, ISRT, Dhaka University, Dhaka.
- (2) M.A. Sattar (1981). “Sex and Age Composition of the Population.” Country Monograph, Series No. 8. Population of Bangladesh . United Nations , ESCAP, Bangkok, Thailand.
- (3) Bangladesh Population Census , 1981 and 1991 , National Series, Bangladesh Bureau of Statistics, 1984, 1994, p-21&25.

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Table-3.5 shows that over the last four decades the changes in the proportion of elderly person 60 and over has been rather small. In 1951 the proportion of elderly was 4.4 for both sexes. This proportion rose to 5.4 for both sexes in 1991. The fertility level remained at a high plane. It seems improvement in survivorship, particularly in childhood, accounted for the increase of the older population.

Data in table 3.5 and 3.6 show - how for Bangladesh the parallel lines of change for the three age groups 0-14, 15-59 and 60 years and over have reached a critical point in 1951 before the country awakens to the implications of the effects of improved technology and health measures which have led not only to a doubling of its population size within a single short generation but also to a striking increase in expectation of life. The proportion of elderly persons (60+) is growing at the expense of that of the age group 15-59. Between 1911 and 1951 the age group 15-59 leveled off and from 1961 there was a trend of sharp fall. On the other hand the rise for those 0-14 and 60+ accelerated, the former more sharply from the period of 1941-51. Data both for male and female in table-3.5 and 3.6 show a similar trend for each of these three groups of population.

Table -3.6

Intercensal Change in Percentage Distribution of Population of Bangladesh by Age and Sex, 1911-1991

Year	Age Group								
	Total			Male			Female		
	0-14	15-59	60+	0-14	15-59	60+	0-14	15-59	60+
1911-21	0.0	0.3	-0.3	0.1	0.2	-0.3	-0.1	0.4	-0.3
1921-31	-0.4	1.3	-0.9	0.5	0.1	-0.5	-1.2	0.4	-0.3
1931-41	-0.5	0.2	0.3	-1.5	1.3	0.1	0.4	-1.3	0.9
1941-51	0.8	-1.7	0.9	0.5	-1.4	0.9	1.1	-1.6	0.5
1951-61	3.9	-4.7	0.8	3.9	-4.8	0.9	4.1	-4.8	0.7
1961-74	2.0	-2.5	0.5	1.7	-2.4	0.7	2.2	-2.5	0.3
1974-81	-1.5	1.6	-0.1	-1.1	1.2	-0.1	-1.9	2.0	-0.1
1981-91	-1.4	1.7	-0.2	-1.1	1.3	-0.2	-1.8	2.1	-0.2

Sources: (1) Population Census of East Pakistan from 1901 to 1961, Research Monograph No. 2, ISRT, Dhaka University, Dhaka.

(2) M.A. Sattar (1981). "Sex and Age Composition of the Population." Country Monograph, Series No. 8. Population of Bangladesh. United Nations, ESCAP, Bangkok, Thailand.

(3) Bangladesh Population Census, 1981 and 1991, National Series, Bangladesh Bureau of Statistics, 1984, 1994, p-21 & 25.

Future estimates of population are important for administrative and development planning: so are probable future trends of the sub-population of aged. From the foregoing analysis it appears that currently population aging in the country is not a vital issue if percentage of the aged population is considered but in terms of size it is obviously a

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matters of great concern. This also comes out to be true if we look at the projection figures given in table-3.7. Table-3.7 presents projected mid-year population by age and sex based on BBS medium variant projection (BBS 1994). The size of the elderly population will continue to increase from nearly 6.02 million in 1996 to 7.78 million in 2006. This means that according to projection elderly population size will be almost increase in the next 10 years. This will continuously create problems as how to provide the elderly with necessary material services for their survival and well-being under the prevailing socio-economic condition of the country. The increase in the percentage of elderly population during the projected period is noteworthy at least from the point of view of aging of population. Elderly population will increase to 5.5 percent in 2006 from 4.9 in the year 1996. Sex differential in such percentage of elderly population is virtually meager. However, male elderly proportions are found to be higher than the female elderly proportion in all the projected years.

Table-3.7
Estimates of old age population : Bangladesh, upto 2006

Age	1996		2001		2006	
Males						
	Population (000)	Percent to total	Population (000)	Percent to total	Population (000)	Percent to total
60+	3244	5.2	3609	5.4	4038	5.6
65+	2256	3.6	2241	3.3	2539	3.6
70+	1215	2.0	1422	2.1	1399	2.0
All ages(100)	62354		66951		71757	
Females						
60+	2778	4.7	3293	5.1	3749	5.4
65+	1966	3.3	2000	3.1	2413	3.5
70+	999	1.7	1307	2.0	1304	1.9
All ages(100)	59518		64368		69340	
Aged(60+)%						
Both sexes		4.9		5.3		5.5
Median age		18.5		20.1		22.4

Source:- Bangladesh Bureau of Statistics 1994, Dhaka, Table-1-3, P. 221-225.

Present trends in the components of growth of the population are the determinants of age structure in the future. The prospective trend in broad age-structure of Bangladesh is shown in table-3.8. Table-3.8 shows a consistent increase in the proportion aged 60+ compared to the population in those of young and adult age-groups since 1950. It is clear

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that old population of Bangladesh is going to increase gradually upto the year 2000 and then it will remarkably increase between the decades 2010 to 2020 and 2020 to 2030.

Table-3.8
Prospective trend in broad age-structure of Bangladesh population 1950, 1980-2030

Year	Population in million					
	Male			Female		
	0-14	15-59	60+	0-14	15-59	60+
1950	7.9	13.0	1.4	7.8	10.4	1.2
1980	21.0	22.1	2.3	19.5	20.8	2.3
1990	23.5	29.7	2.6	21.7	28.0	2.6
2000	25.6	40.3	3.4	24.2	37.5	3.4
2010	27.7	51.3	4.7	26.2	47.9	4.8
2020	25.2	62.8	7.2	23.8	58.9	7.3
2030	24.2	70.5	11.4	22.9	66.4	11.5

Source:-The sex and age distribution of world populations, The 1994 Revision, United Nations, NewYork, pp.178-179.

Among the other indicators used to show the process of population aging; mention may be made of the several population structure ratios such as the proportions of working age population in relation to children, aged, and all dependents. Another index is considered to show that with increase in the number of old people, the oldness of the old will also increase. Table-3.9 shows trends of some population structure ratios for Bangladesh: 1950, 1980-2030 for both males and females. If the basic sex-structures of the population from which the indices have been derived are at least approximately accurate, the population can be considered to be heading towards high degree of aging.

Table-3.9
Trends of some population structure ratios for Bangladesh: 1950, 1980-2030

Year	Population structure ratios			
	15-59/<15	15-59/60+	15-59/<15+60+	60-69/80+
	Male			
1950	1.66	9.57	1.41	19.8
1980	1.05	9.36	0.95	11.3
1990	1.26	11.30	1.14	7.23
2000	1.57	11.98	1.39	7.81
2010	1.86	11.06	1.59	7.88
2020	2.50	8.76	1.94	8.29
2030	2.91	6.18	1.98	8.78
	Female			
1950	1.33	8.66	1.16	16.00
1980	1.07	9.09	0.96	11.00
1990	1.30	10.87	1.15	7.03
2000	1.55	10.88	1.36	7.50
2010	1.83	9.89	1.55	7.67
2020	2.48	8.10	1.89	7.87
2030	2.90	5.77	1.93	8.02

Source: The sex and age distribution of world populations, The 1994 Revision, United Nations, NewYork, pp.178-179.

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The direction of change of the first two indicators in table-3.9 is expected to be just opposite, and indicates convincingly the decline in children and concomitant increase in the elderly segment. The third indicator is, in fact, the reciprocal of the conventional dependency ratio, and will maintain an increasing trend so long as the decrease in 0-14 ages population out numbers the increase in the 'aged population'. The last index 60-69/80+ considered here is of special interest. The oldest old ratios show increasing trend. Table-3.10 indicates that in 1990, the aged and young, the two dependent segments constitute jointly 47 percent of the population in Bangladesh, 36 percent in China, 43 percent in India, 43 percent in Indonesia, 44 percent in Malaysia, 45 percent in Philippines, 33 percent in Korea, 40 percent in Sri Lanka and 39 percent in Thailand.

Table-3.10
Percentage change in age composition of the population in selected Asian countries, 1990-2050.

Country / Age category	1990	2000	2025	2050
Bangladesh				
0-14	41.8	37.1	24.7	19.1
15-59	53.4	57.8	65.9	61.2
60+	4.8	5.1	9.4	19.7
China				
0-14	26.9	25.7	20.2	18.9
15-59	64.3	64.2	61.6	55.2
60+	8.8	10.1	18.2	25.9
India				
0-14	35.9	33.2	23.8	20.2
15-59	56.9	58.1	64.0	59.5
60+	7.2	7.8	12.2	20.3
Indonesia				
0-14	36.6	30.1	23.7	20.6
15-59	57.0	62.6	63.9	58.6
60+	6.4	7.3	12.4	20.8
Malaysia				
0-14	38.2	34.8	23.6	19.5
15-59	56.1	58.6	63.3	57.8
60+	5.7	6.6	13.1	22.7
Philippines				
0-14	39.7	37.2	25.5	20.8
15-59	55.4	57.3	64.2	61.0
60+	4.9	3.5	10.3	18.2
R. P. of Korea				
0-14	25.7	21.9	18.3	17.9
15-59	66.6	67.4	59.6	53.5
60+	7.7	10.7	22.1	28.6
Sri Lanka				
0-14	32.0	26.9	21.4	19.0
15-59	59.6	63.9	60.8	55.4
60+	8.4	9.2	17.8	25.6
Thailand				
0-14	33.1	27.2	22.2	19.9
15-59	61.3	65.3	63.6	57.0
60+	5.6	7.5	14.2	23.1

Source: World population projection 1994, Oxford University Press.

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In this period, the strength of the young segment is much larger than that of the aged segment. But this trend will not continue for long. By 2050, the relative strength of the aged population will offset the strength of the young population except Philippines and the joint contribution of the aged and young will rise from 36 percent to 45 percent for China, 33 percent to 47 percent for Republic of Korea, 40 percent to 45 percent for Sri Lanka and 39 percent to 43 percent for Thailand. With the change in age structure, the care giving role of the working generation will have to change its direction, from downward (parents to children) to upward (children to parents).

3.5 Growth of Elderly Population of the World, Regions, and Some Selected Asian Countries

The distribution of the aged persons is not uniform. Table-3.11 indicates that the concentration of the aged persons in the developing countries which accounts 57.6 percent of the total aged as well as in the low and lower middle income countries which accounts 62.5 percent of the total aged persons was much higher than that of the developed which accounts 42.4 percent of the total aged or higher and upper middle income groups countries.

Table-3.11
Percentage and distribution of population 60+ for the world,
major economic and geographic regions, 1990-2050

Region /Economy	1990		2000		2025		2050	
	a	b	a	b	a	b	a	b
World	9.3	100	9.9	100	14.4	100	20.3	100
Developing	6.9	57.6	7.6	60.6	12.0	69.1	18.8	79.2
Developed	17.0	42.4	18.7	39.4	26.6	30.9	29.6	20.8
Regions								
Asia	7.8	50.5	8.7	53.3	13.9	57.9	21.2	61.6
Africa	2.5	6.1	4.8	6.6	8.1	7.6	19.0	11.5
Oceania	12.6	0.6	12.8	0.6	19.9	0.6	24.3	0.5
Americas	10.8	15.8	11.0	14.9	18.2	16.3	24.0	14.6
Europe	18.1	26.0	20.1	24.5	23.2	14.7	30.8	11.4
Economy								
Low income	7.1	44.5	7.7	46.5	11.8	51.3	15.3	57.8
Lower middle	9.7	18.0	10.4	18.1	14.1	17.0	15.3	18.0
Upper middle	8.1	7.7	8.9	7.9	14.7	9.0	20.6	9.7
High income	17.8	29.6	19.1	27.4	28.6	22.5	31.0	14.4

Source: World population projection 1994, Oxford University Press.

a. Percentage of elderly population in respect to total population of that country.

b. Percentage of elderly population in respect to total elderly population of the world.

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By the end of the 2025, the projected contribution of developing economy will touch the limit of 70 percent. It will take another 25 years to touch the target of 80 percent. Three-fourths of this increase will be contributed by the Asian and Latin American countries. Asia alone will be home of 60 percent of the World's aged population. Thus, the problem of aging will become a feature of Asian countries in the near future.

From Table-3.12, it can be observed that most of the countries have begun to experience a dramatic change in the age structure from a definite pyramidal shape to a rectangular shape. In 1990, the percentage of aged population varies from 4.8 percent in Bangladesh to 8.8 percent in China. China alone has 100 million aged persons, which is five times than the total population of Australia and twelve times higher than that of Sweden. by the 2050, the total number of old persons in China, India and Bangladesh will be almost as large as the total population of percent Africa. This gives an insight into the emerging problem related with senior citizens, regarding assistance from the government and family.

Table-3.12

Absolute and percentage distribution of population 60+ for the selected Asian countries, 1990-2050.

Countries	1990		2000		2025		2050	
	a	b	a	b	a	b	a	b
Bangladesh	5330	4.8	6878	5.1	17893	9.5	45602	19.1
China	100646	8.8	126857	10.1	267886	18.2	403342	25.9
India	60724	7.1	79994	7.8	166651	12.1	328315	20.2
Indonesia	11488	6.4	14910	7.2	32705	12.3	63254	20.8
Malaysia	1022	5.7	1436	6.5	4005	13.1	8273	22.7
Philippines	3041	4.9	4248	5.4	11871	10.3	26126	18.2
R. P. Korea	3302	7.7	5007	10.7	11753	22.1	15481	28.6
Sri Lanka	1420	8.4	1758	9.2	4237	17.8	6813	25.6
Thailand	3177	5.6	4868	7.5	11476	14.2	21102	23.1

Source: Same as Table- 3.11.

- a. The total aged population in thousand.
- b. Percentage of aged population.

Classification of countries based on the changing magnitude of aging population over time, Table-3.13 shows that very soon the countries like China, Republic of Korea and

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Sri Lanka will follow the aging pattern of western countries. By the end of this century, these three countries will achieve “double digit” figure. Rest of the countries will too follow the same pattern by or before 2025. It is interesting to note that by 2050, all these countries will have over 20 percent of their population as aged except Bangladesh and Philippines.

Table-3.13
Changing magnitude of aged persons over time: 1990-2050.

Category	1990	2000	2025	2050
0 - 7%	Bangladesh Philippines Thailand Malaysia Indonesia	Philippines Malaysia Bangladesh		
7 - 10%	India China R .P. of Korea Sri Lanka	Thailand Sri Lanka Indonesia India	Bangladesh	
10 - 20%		R. P. of Korea China	India Indonesia Malaysia Philippines Sri Lanka Thailand China	Philippines Bangladesh
20%			R. P. of Korea	China India Thailand Sri Lanka R P. of Korea Malaysia Indonesia

Source: Same as Table- 3.11.

Most of the countries of the region are experiencing population aging resulting in rapid increase in both the number and the proportion of population 60 and over as well as their life expectancy at birth. The number and percentage of population aged 60 and over of selected countries are shown in table-3.14. It reveals that during the period from 1970 to 1995, the male population in China aged 60+ increased from 25.4 million to 54.9 million and their female counterpart increased from 31.4 million to 59.3 million. By the year 2025, this number is expected to increase to 129.9 million for males and 144.2 million for females. Similarly change is also expected for Indonesian population. These corresponding figures are 2.9 million and 3.3 million in 1970, 6.2 million and 7.1 million

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in 1995 and 16.0 and 19.0 million in 2025. In Bangladesh population, the corresponding figures are 2.2 million and 1.8 million in 1970, 2.9 million 2.9 million in 1995 and 9.1 million and 9.1 million in 2025. Similarly for India, the corresponding figures are 17.0 million and 16.2 million in 1970 and 32.8 million and 34.5 million in 1995 and 84.3 million and 88.9 million in 2025.

The proportions of elderly population in Eastern Asian and South Asian countries are also experiencing considerable change. The proportion of males for 60+, for China, increased from 5.9 percent in 1970 to 8.7 percent in 1995 and it will increase to 16.5 percent by the year 2025. The proportion of their female counterpart is changed from 7.8 percent in 1970 to 10.0 percent in 1995 and it will be 19.2 percent by the year 2025. Similarly for Japan, the corresponding figures for males increased from 9.8 percent in 1970 to 17.6 percent in 1995 and it will be 28.9 percent in 2025. The proportion of their females rose from 11.5 percent in 1970 to 22.4 percent in 1995 and it will be 33.7 percent in 2025. In Bangladesh, the proportion of male population 60+, is decreasing from 6.5 percent in 1970 to 4.7 percent in 1995 and further increase 9.1 percent by the year 2025. The proportion of their females counterpart is changing from 5.6 percent in 1970 to 5.0 percent in 1995 and further to 9.5 percent by 2025. In India, the proportion of males population 60+ is increasing from 5.9 percent in 1970 to 6.8 percent in 1995 and 11.8 percent by the year 2025. The proportion of their females counterpart is changing from 6.0 percent in 1970 to 7.6 percent in 1995 and further to 13.1 percent by 2025.

Table-3.14
Number and Percentage of Population aged 60+ of Selected Countries 1970, 1995 and 2025

Country	Number in thousand						Percentage					
	1970		1995		2025		1970		1995		2025	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
China	25432	31353	54870	59289	129859	144219	5.9	7.8	8.7	10.0	16.5	19.2
Japan	4997	6114	10837	14262	17191	21528	9.8	11.5	17.6	22.4	28.9	33.7
Indonesia	2901	3310	6206	7109	15987	19036	4.9	5.5	6.3	7.2	11.6	13.7
Bangladesh	2247	1795	2930	2934	9084	9117	6.5	5.6	4.7	5.0	9.1	9.5
Pakistan	1798	1503	3313	3270	11006	11209	5.3	4.7	4.5	4.8	7.5	8.0
India	17044	16180	32801	34499	84274	88847	5.9	6.0	6.8	7.6	11.8	13.1
Sri Lanka	415	328	775	811	1838	2330	6.4	5.4	8.4	8.8	14.8	18.5

Sources:- The Sex and Age Distribution of the World Population , the 1994 Revision and World Population Prospects : the 1994 Revision (Annex Table)

3.6 Population Pyramid

A very effective and quite widely used method of graphically depicting the age-sex composition of a population is called a population pyramid. A population pyramid is designed to give a detailed picture of the age-sex structure of a population, indicating either single ages, 5 year groups, or other age combinations. The basic pyramid consists of bars, representing age groups in ascending order from the lowest to the highest, pyramided horizontally on one another. The bars for males are given on the left of a central vertical axis and the bars for females on the right of the axis. The number of males or females in the particular age group is indicated by the length of the bars from the central axis.

A special problem is presented in the handling of the oldest age groups. If the data are available for the oldest age groups in the standard class interval (e.g. 5- year age groups) until the end of the life span, the upper section of the pyramid would have an elongated needle like form and convey little information for the space required. On the other hand, the bar for a broad terminal group is not normally used because it would not ordinarily be visually comparable with the bars for other age groups. For this reason, pyramids are usually truncated at an age group where the data begin to run this, e.g. 50 to 59 years, or 60 years and above.

Pyramids may be constructed on the basis of either absolute numbers or percents. A "percent" pyramid is similar, in the geometric sense of the word, to the corresponding "absolute" pyramid. With an appropriate selection of scales, the two pyramids are identical. The choice of one or the other type is more important when pyramid for different dates, areas, or sub-populations are to be compared. Only absolute pyramids can show the differences or chances in the overall size of all the total population and in the numbers at each age. Percent pyramids show the differences or chances in the proportional size of each age-sex group. In general, absolute or percent pyramids to be compared should be drawn with the same horizontal scale and with bars of the same thickness.

The median age of a society is a useful but simple measure of its age structure. Other methods named as population pyramid, a graph that shows each age category, divided

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between males and females, as a percentage of the total population at some particular time. The percentage distribution of the population of Bangladesh by age and sex is shown in table-3.15. Figure -3.1 presents population pyramids for Bangladesh for years 1961 and 1991. In each pyramid the population is divided into five-year age categories. The population pyramids shown in Figure-3.1 have the category “60 and over” at the Top, although it is more common to further divide the older segment of the population into five year age groups (e.g. 60-64, 65-69, 70-74, 75 and over). The “60 and over” grouping is under here because most of the other information that will be presented uses this age category.

Table-3.15

**Percentage Distribution of the Population of Bangladesh
by Age and Sex, 1961,1991.**

Age Group	1961		1991	
	Males	Females	Males	Females
0-4	17.4	19.1	16.1	16.8
5-9	18.5	19.0	16.6	16.5
10-14	4.9	8.3	12.6	11.7
15-19	7.3	8.1	8.3	8.5
20-24	6.9	8.1	7.5	9.2
25-29	7.6	8.2	7.9	9.2
30-34	6.4	6.3	6.2	6.3
35-39	5.7	5.1	6.0	5.3
40-44	4.8	4.5	4.5	4.2
45-49	3.9	3.3	3.5	3.1
50-54	3.6	3.3	3.0	2.8
55-59	2.3	1.8	2.0	1.7
60+	5.5	4.9	5.7	4.8

Source: Census of Population, on 1961, 1991, BBS, Dhaka, Bangladesh.

The formation of the population pyramid with different age groups against the percentage of males and females ages in 1961 no longer looks like a pyramid. It has been observed that the base of the pyramid in the age group 5-9 is longer than the lowest age group 0-4. The median age of Bangladesh population for the year 1961 is 17.5.

The population pyramid for the year 1991 shows best why the graph is called a pyramid. Using the five-year age groups, each older age is slightly smaller than the next younger age group. Since males are placed on the left side of the pyramid and females on the right side and since the numbers of each are closely related, the pyramid is slightly

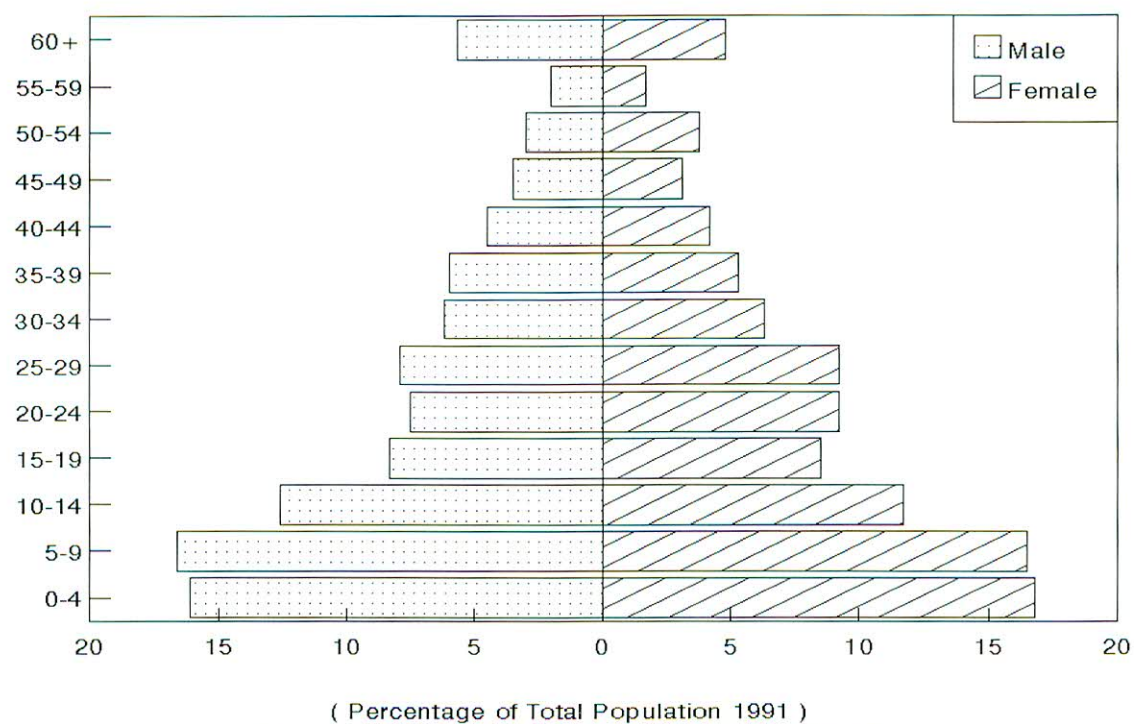
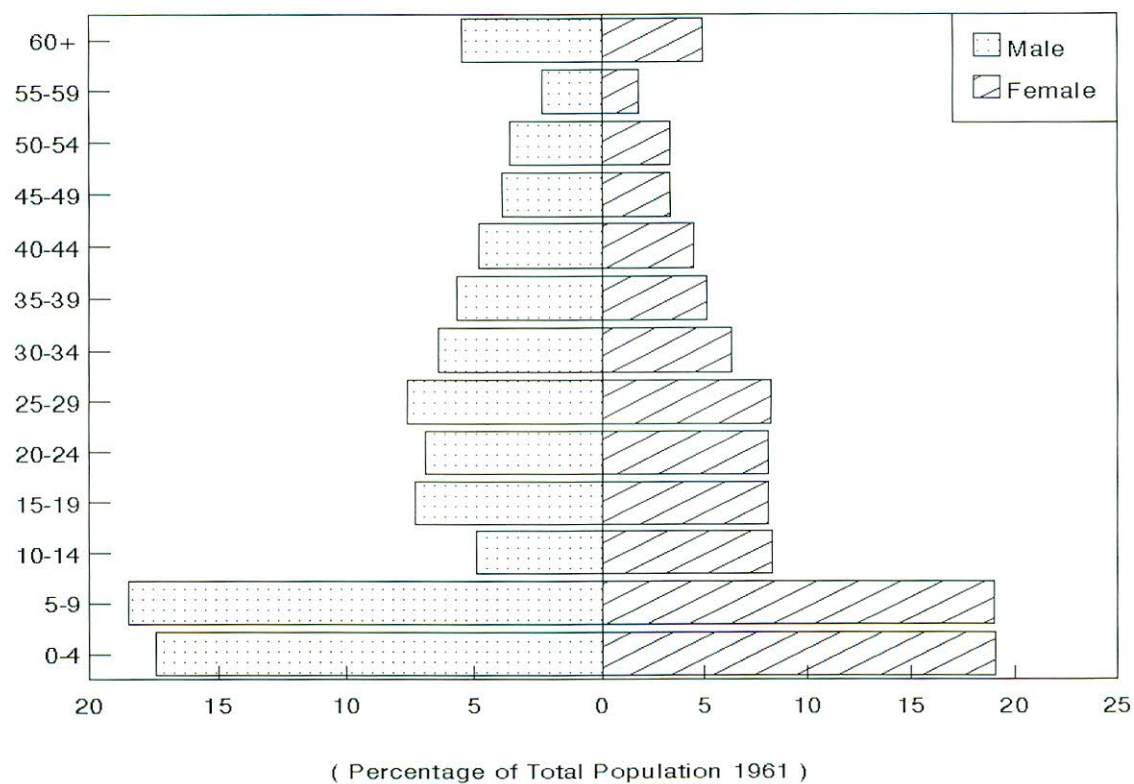


Fig 3.1 : Population pyramids of Bangladesh for the Years 1961 and 1991

symmetrical. The proportion of the population over age 60+ had increased. The median age of Bangladesh population for the year 1991 is 18.0.

3.7 Median Age

Median age is used as a basis for describing a population as young or old. Populations with medians under 20 are taken as young, those with medians 30 or over as old and those with medians in the range 20-29 as of intermediate category.

Among many indicators of whether a population is aging or not; the median age is perhaps the strongest one. It is the figure below or above which half of the population will lie. The most useful single figure summarizing a population age structure is its median age which divides the population into two equal parts, half older and half younger. With high fertility and low life expectancy, median age of a population is expected to be low. The median age of the population in Bangladesh is given in table-3.16. One can discern that the population is “young” in that the median age remained at less than 20 years. Over time, the median age rose from 18.0 to 19.3 years but declined subsequently to 16.5 years. Improvement in mortality, particularly in childhood with the control of infectious diseases, accounts for this decline. From the table it is clear that Bangladesh had a low median age during the period 1911-1991. However, its value in the projected population will be going up from 21.38 in 1995 to 27.37 in 2025.

Table- 3.16
Trends in median age in Bangladesh

From census population 1911-1991		From projected population 1995-2025	
Year	Median age (years)	Year	Median age (years)
1911	18.0	1995	21.38
1921	18.6	2000	22.32
1931	18.9	2005	23.27
1941	19.1	2010	25.17
1951	19.3	2015	26.03
1961	17.6	2020	26.76
1974	16.5	2025	27.37
1981	17.0		
1991	18.0		

Sources: 1) K.M. Elahi, “ Aspects of age structure of the rural Population in Bangladesh ” Rural Demography, vol. 1, 1974; Census of Pakistan , 1961,

2) Bangladesh Census Report , National volume, 1974 to 1991, Bangladesh Bureau of Statistics, Dhaka , Bangladesh.

The population of Sri Lanka will be on the verge of aging from beginning of next century. The median age of the Sri Lanka will exceed 30 years from 2010. The median age of population of SAARC countries during 1950-2020 has been presented in table-3.17. Thus while during 1950-90 almost all the countries in this region lie in the border line between the young and the intermediate categories, during the first two decades of the 21st century, though the median age is expected to increase, only Sri Lanka and to some extent India may be said to belong to the categories of old. Another interesting feature to be noticed is that all the countries became younger between 1950 and 1970. The median age at different years of projection across the countries suggest that population aging in Bangladesh, Bhutan, Maldives, Nepal and Pakistan is a distant problem. This phenomenon of population aging is also suggested by Cain (1985), Conception (1986) and may others.

Table-3.17
Trends in median age of population of SAARC countries, 1950-2020

Country	1950	1960	1970	1980	1990	2000	2010	2020
Bangladesh	21.6	19.8	17.5	16.8	18.5	20.2	22.2	24.9
Bhutan	20.5	20.4	20.4	20.2	20.0	19.9	19.8	22.0
India	20.4	20.4	19.9	20.6	22.0	23.8	26.2	29.7
Maldives	24.9	21.9	19.8	18.7	17.9	18.6	20.6	23.0
Nepal	20.5	20.8	20.0	19.8	18.6	19.6	21.2	23.6
Pakistan	21.2	18.4	16.7	17.5	18.1	18.7	20.8	23.8
Sri Lanka	19.7	19.4	19.5	22.0	24.2	27.3	30.7	33.8

Source: The Sex and Age distribution of the world population: The 1994 Revision,
United Nations, New York.

3.8 Rural-Urban Differentials in Age Composition

The percentage of the urban and rural population by age groups in 1991 is in table-3.18. From the table it found that between the age 15 and 44 years, percentage of males is perceptibly higher in the urban area than in the rural area. This fact may be attributed to age selective male migration to urban areas for better employment opportunities and education.

Table-3.18
Percentage Distribution of the Population by Sex, Age group and Residence, 1991

Age group	Urban		Rural	
	Males	Females	Males	Females
0-4	12.7	14.5	17.0	17.3
5-9	13.5	15.0	17.4	16.9
10-14	12.0	13.0	12.8	11.3
15-19	9.2	10.1	8.1	8.1
20-24	9.9	10.8	6.9	8.8
25-29	9.8	10.1	7.4	9.0
30-34	7.6	6.7	5.8	6.1
35-39	7.1	5.3	5.7	5.3
40-44	5.3	3.9	4.3	4.3
45-49	3.7	2.7	3.5	3.3
50-54	2.9	2.5	3.0	2.9
55-59	1.7	1.4	2.1	1.7
60-64	1.9	1.7	2.3	2.1
65-69	0.9	0.7	1.2	0.9
70+	1.8	1.6	2.6	2.0

Sources: Bangladesh Population Census Report, 1991, National series, Bangladesh Bureau of Statistics, Dhaka. 1994.

Earlier we have examined the age composition of the whole population and its evolution through time. Distribution of elderly population by their age, sex and residence is presented in Table-3.19. The data indicate that at all age groups the number of male elderly is larger than that of female elderly both in rural and urban locations. Furthermore, quite a large proportion of elderly population live in rural areas of the country in comparison to urban area.

Table-3.19
Distribution of elderly population by age, sex and residence: Bangladesh, 1991

Age group	Total		Rural		Urban	
	Males	Females	Males	Females	Males	Females
60-64	1226396	104346	1013952	880180	212444	163566
65-69	631782	461132	529838	390969	101949	70163
70+	1549662	990042	1143934	837262	205728	152780
Total	3207840	2494920	2687724	2108411	520121	386509

Source:-Bangladesh Bureau of Statistics 1994, Dhaka, Table- P 02, P-296-298.

3.9 Dependency Ratio

The dependency ratio is a simple statistic measure of the impact of the age structure on the economic potential of the population. Thus it becomes essential to know how many economically active workers there are compared to that of non-economic non-workers. The relation between the number of such active workers with that of non-workers is indicated by the dependency ratio which is usually defined to be the number of persons of

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age 60 or 65 years and above per 100 persons of working ages 15 to 59 or 64. Though this percentage is normally used to denote the burden of the productive population due to age consideration but in reality in developing countries like Bangladesh many persons aged above 60 years work hard to earn their livelihood and many children under 15 years also work to support themselves and their family members. Table-3.20 presents the dependency ratios for the successive census years from 1911 to 1996. Over the census years, both youth and old age dependency ratios have increased considerably.

In 1911, the youth dependency ratio was 79.4 percent and the old age dependency ratio was 8.2 percent. In 1961, this ratio was 10.2; in 1991 it had risen to 10.9 percent and in 1996 it increased to 15.54 percent, one productive person had to support more than one dependent on the average. But the demographic interpretation of dependency, which is based on population age structure, is quite opposite to economic reality according to which the older populations in the Bangladesh villages are more engaged in some kind of gainful work and therefore less dependent than their urban counterparts.

Table-3.20
Dependency ratios, 1911-1996

Year	Youth ^a	Old age ^b	Total
1911	79.4	8.2	87.6
1921	78.9	7.6	86.5
1931	76.3	5.8	82.1
1941	75.1	6.4	81.5
1951	78.7	8.2	86.9
1961	94.3	10.2	105.0
1974	103.7	12.3	116.0
1981	97.5	11.7	109.2
1991	91.3	10.9	102.2
1996	79.11	15.54	94.65

- Sources:** 1) Population Census of East Pakistan from 1901 to 1961, Research Monograph No.2 (Dhaka, ISRT, 1969) ,
- 2) Bangladesh Population Census Report 1974 to 1991, National volume , Bangladesh Bureau of Statistics, Dhaka, Bangladesh.
- 3) 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka, Bangladesh.

Note: a) Youth dependency ratio = $\frac{\text{Population 0-14}}{\text{Population 15-59}} \times 100$

b) Old age dependency ratio = $\frac{\text{Population 60+}}{\text{Population 15-59}} \times 100$

This is apparently borne out by the data on activity rate given in table-3.21. Based on census approach, the 'activity rate' is defined as the number of workers per 100

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population, a 'worker' being considered as a person who has been engaged in an economically productive work.

Table-3.21

Activity rate of population aged 60 and over: Bangladesh 1991

Sector	Sex	Activity rate (%)
Rural	Male	85.60
	Female	7.20
Urban	Male	80.20
	Female	9.60
Total	Male	84.80
	Female	7.60

Source:- Bangladesh Population Census 1991, National Series, Vol. 1, BBS, Dhaka, P-155, Table-10.

Though the activity rate of the old people does neither throw light on their income adequacy and financial autonomy nor contribute much to total activity rate, the degree of involvement adjusted males in gainful work is no way negligible. In rural area the male activity rate is 85.20 percent and the female is 7.20 percent. Besides, in urban areas the male activity rate is 80.20 and female is 9.60. Hence, the male activity in rural area is higher than that of urban areas, but the female activity in urban areas is higher than that of rural areas.

3.10 Geographical Variation in Dependency Ratio

Table-3.22 presents the dependency ratios by geographical division for 1974, 1981, 1991 census years, the geographical difference is accounted for by the youth dependency. In 1974 and 1981, Chittagong and Dhaka divisions exhibited lower youth dependency ratios than did the other two divisions and in 1991, Dhaka and Khulna divisions exhibited lower youth dependency ratios than those in the other two divisions. This is due to the influx of workers and the productive segment of the population to these three places where education and employment opportunities exist.

Table-3.22
Dependency Ratios by Geographical Division, 1974,1981,1991

Division	1974			1981			1991		
	Youth ^a	Old age ^b	Total	Youth ^a	Old age ^b	Total	Youth ^a	Old age ^b	Total
Chittagong	99.6	12.5	112.1	92.8	7.2	100.0	93.4	6.8	100.2
Dhaka	101.2	12.6	113.8	90.2	6.7	96.9	83.7	6.1	91.8
Khulna	107.6	12.2	119.8	95.8	6.7	102.5	80.4	6.5	86.9
Rajshahi	109.7	11.6	121.3	95.2	6.5	101.7	88.5	5.6	94.1
Bangladesh	103.9	12.3	116.2	91.2	6.5	97.7	85.6	4.2	89.8

Sources: Bangladesh National Census Report , 1974, 1981, 1991, National Series, Bangladesh Bureau of Statistics, Dhaka, 1977,1984,1994.

Population 0-14
Note: a) Youth dependency ratio = $\frac{\text{Population 0-14}}{\text{Population 15-64}} \times 100$

Population 65+
 b) Old age dependency ratio = $\frac{\text{Population 65+}}{\text{Population 15-64}} \times 100$

3.11 Inter-Country Composition

Table-3.23 compares the dependency ratios for selected Asian countries. Pakistan has the highest dependency burden and it exceeds the productive population by 8 percent. In contrast, for every dependent in Japan there are two supporters; in Nepal, there are 9 dependents for 10 productive people. The dependency ratio in Bangladesh context, however, is an under-estimate of the true dependency burden owing to the low labour force participation rate in the country, on the one hand, and the prevalence of child labour in agricultural pursuits on the other.

Table-3.23
Dependency ratios for selected Asian countries, selected years

Country	Year	Youth	Old age	Total
Bangladesh	1981	87.5	6.3	93.8
Indonesia	1980	73.3	5.8	79.1
Japan	1982	36.2	21.3	57.5
Nepal	1981	78.1	10.8	88.9
Pakistan	1981	93.8	13.9	107.7

Sources:- (a) Bangladesh Population Census 1981, National Series, BBS, Dhaka, p-21,
 (b) Demographic Yearbook 1983, United Nations, New York 1985.

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Dependency ratios for SAARC countries during from 1950-2020 have been presented in table-3.24 under total, child and aged dependency. An examination of table-3.24 shows that in majority of the countries total dependency ratios were at their peak around 1970-80, with a declining trend thereafter. In future major differences in dependency will be in their composition.

Whereas the share of aged to total dependency in 2020 will be 31% in Sri Lanka and 23% in India, countries like Bhutan, Bangladesh and Pakistan would have as low as 10-12 percent of their total dependency due to old age dependency. An examination of table-3.24 shows that in majority of the countries total dependency ratios were at their peak around 1970-80, with a declining trend thereafter. In future major differences in dependency will be in their composition. Whereas the share of aged to total dependency in 2020 will be 31% in Sri Lanka and 23% in India, countries like Bhutan, Bangladesh and Pakistan would have as low as 10-12 percent of their total dependency due to old age dependency.

Table-3.24
Dependency ratios for SAARC countries, 1950-2020(Percentage)

Country	1950	1960	1970	1980	1990	2000	2010	2020
Total dependency ratio								
Bangladesh	70.0	80.9	95.6	100.0	79.9	71.6	64.2	54.1
Bhutan	76.4	74.8	75.4	77.0	78.3	79.2	77.6	71.2
India	73.0	76.1	78.9	74.2	68.1	62.6	55.5	47.5
Maldives	63.7	80.2	86.2	90.1	93.8	85.5	72.0	61.3
Nepal	77.3	73.3	79.5	79.2	86.9	78.6	69.8	60.2
Pakistan	76.3	92.3	98.4	89.7	87.2	82.8	69.2	58.5
Sri Lanka	80.5	84.1	83.5	65.5	60.8	51.2	46.6	48.8
Child dependency ratio								
Bangladesh	63.9	74.0	88.8	93.0	74.5	66.6	58.6	47.5
Bhutan	70.2	69.2	69.8	71.3	72.4	72.9	71.2	64.5
India	67.3	70.1	72.3	67.2	60.5	54.0	46.2	36.6
Maldives	54.0	71.2	76.9	81.7	86.6	79.0	66.0	54.5
Nepal	69.5	66.5	74.1	73.8	81.3	72.7	63.3	53.2
Pakistan	66.8	84.4	92.1	84.2	82.0	77.3	63.6	51.7
Sri Lanka	73.5	77.3	76.9	58.4	52.4	41.4	35.2	33.6
Aged dependency ratio								
Bangladesh	6.1	6.9	6.8	7.0	5.4	5.0	5.6	6.6
Bhutan	6.2	5.6	5.6	5.7	5.9	6.3	6.4	6.7
India	5.7	6.0	6.6	7.0	7.6	8.6	9.3	10.9
Maldives	9.7	9.0	9.3	8.4	7.2	6.5	6.0	6.8
Nepal	7.8	6.0	5.4	5.4	5.6	5.9	6.5	7.0
Pakistan	9.5	7.9	6.3	5.5	5.2	5.5	5.6	6.8
Sri Lanka	7.0	6.8	6.6	7.1	8.4	9.8	11.4	15.2

Source: Same as in table-3.17.

Another important measure of aging is the number of elderly people(60+) divided by the number of children (0-14) multiplied by 100-known as the index of aging. The index of aging for SAARC countries during 1950-2020 are presented in table-3.25.

Table-3.25
Index of aging for SAARC countries, 1950-2020

Country	1950	1960	1970	1980	1990	2000	2010	2020
Bangladesh	16.2	15.2	13.4	12.5	11.8	12.4	15.1	21.8
Bhutan	14.3	13.4	13.1	13.2	13.3	14.0	14.5	15.9
India	14.4	14.1	14.8	16.6	19.7	24.1	30.3	45.2
Maldives	29.1	20.2	18.2	16.0	12.5	12.2	14.1	19.5
Nepal	17.8	15.6	13.3	12.1	11.5	13.3	16.1	20.5
Pakistan	21.9	14.1	10.8	10.4	10.5	11.1	13.6	21.2
Sri Lanka	14.5	13.6	14.1	18.7	24.5	34.7	49.6	66.8

Source: Same as in table-3.17.

$$\text{Index of aging} = \frac{\text{Population 60+}}{\text{Population (0-14)}} \times 100$$

It reveals that in 1950 the ratio was as low as 14 in Bhutan, India and Sri Lanka, i.e. there were few elderly persons in proportion to the number of children. In 2020 the same is expected to increase to 45 in India - more than 3 times the ratio in 1950 and 67 in Sri Lanka - about 5 times that in 1950. The results are in agreement with those obtained by analyzing the median age and such an enormous increase in the index of aging is due to faster rate of increase in the old age population accompanied by an equally faster rate of decline in the child population. There is, however, no uniform pattern as the ratio is expected to increase marginally in Bhutan, Bangladesh, Nepal and Maldives would have lower ratio in 2020 relative to that in 1950.

The shift from young to aged dependency have a major effect on family equilibrium. This would be very clear from the Table-3.26, which shows the support ratios for 1990 and projected ratios for 2000, 2025 and 2050. The young support ratios is projected to decline for all the countries. This rate of decline will be particularly high for Bangladesh and also for Philippines, Malaysia, India and Indonesia. On the other hand, old support ratios ranged from 8.9 percent in Philippines to 14 percent in Sri Lanka in 1990. These rates are projected to rise in all the Asian countries. In 2050, this ratio will be highest for China (40.9%) and lowest for Philippines (29.9%). It is interesting to note that the tempo of monotonic increase in old age dependency in these countries will outweigh the relative speed of decline in young dependency. The index of aging is the reflection of this

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phenomenon. By 2050 the value of this index will cross the limit of 100 for most of the Asian countries which implies that old age population will outnumber the young population.

Table-3.26
Support ratios for selected Asian countries, 1990-2050.

Country/Year	Support ratios				Index of ageing ^e
	Total ^a	Young ^b	Old ^c	Oldest old ^d	
Bangladesh					
1990	87.3	78.3	9.0	18.6	11.5
2000	73.0	64.2	8.8	15.8	13.8
2025	51.8	37.5	14.3	16.8	38.5
2050	63.4	32.2	31.2	26.2	97.0
China					
1990	55.8	42.0	13.8	19.8	32.9
2000	55.7	40.0	15.7	21.4	39.3
2025	62.1	32.6	29.5	21.1	90.4
2050	81.1	34.1	46.9	38.4	137.5
India					
1990	75.8	63.2	12.5	17.0	19.8
2000	70.0	56.6	13.3	18.5	23.6
2025	56.3	37.2	19.0	20.6	50.9
2050	68.0	34.0	33.9	28.3	99.8
Indonesia					
1990	75.2	63.9	11.3	17.6	17.7
2000	60.0	48.5	11.6	17.0	23.8
2025	56.2	37.0	19.2	17.7	52.1
2050	70.5	35.0	35.5	26.6	101.0
Malaysia					
1990	78.2	67.9	10.2	21.4	15.0
2000	70.4	59.2	11.1	19.0	18.9
2025	58.2	37.4	20.7	21.8	55.5
2050	73.0	33.7	39.3	30.8	116.2
Philippines					
1990	80.6	71.7	8.9	17.0	12.5
2000	74.5	64.8	9.5	18.3	14.7
2025	55.9	39.9	16.1	18.7	40.4
2050	64.2	34.2	29.9	27.5	87.2
R. P. of Korea					
1990					
2000	50.1	38.5	11.5	18.9	29.9
2025	48.4	32.5	15.9	12.5	48.9
2050	67.5	30.5	37.2	24.0	122.0
	87.0	33.5	53.5	42.2	159.0
Sri Lanka					
1990	67.8	53.8	14.0	23.6	26.0
2000	56.4	42.0	14.4	22.7	34.3
2025	64.4	35.1	29.3	25.4	83.5
2050	80.5	34.2	46.2	35.4	135.0
Thailand					
1990	63.2	54.0	9.2	20.4	17.0
2000	53.1	41.6	11.5	17.7	27.7
2025	57.3	35.0	22.4	18.2	63.8
2050	75.5	34.9	40.6	32.8	116.5

Source: Same as Table-3.11

- Population 0-14 + 60⁺
- a) Total support ratio = $\frac{\text{Population 0-14} + \text{Population 60}^+}{\text{Population 15-59}} \times 100$
- b) Young support ratio = $\frac{\text{Population 0-14}}{\text{Population 15-59}} \times 100$
- c) Old support ratio = $\frac{\text{Population 60}^+}{\text{Population 15-59}} \times 100$
- d) Oldest old support ratio = $\frac{\text{Population 75}^+}{\text{Population 60}^+} \times 100$
- e) Index of aging = $\frac{\text{Population 60}^+}{\text{Population 0-14}} \times 100$

3.12 Marital Status

An important aspect of demographic analysis relates to the marital status or marital structure of the population and changes in that structure over time. "Marital status is the most important factor in population dynamics as it affects fertility tremendously and mortality and migration to a lesser extent. Also, its effect on other social and economic characteristics, such as school attendance and labour force participation is very important in the late adolescent and young adult age groups" (Henry, et al., 1971. p-283).

Marital status is an important consideration, especially for the elderly because of its influence on their physical and mental stability. Marital status is a demographic characteristic involving Biological, Social, Economic, Legal and in many cases religious aspects.

Marital status and its differentials play a vital role in composition and structure of a population. Marriage, from the demographic point of view, is an event that generally marks the beginning of the potential period of childbearing in Bangladesh. The proportion of married persons in a population has direct influence on the fertility rate. As the age of first marriage and the dissolution of marriage due to widowhood, divorce and separation affect the reproductivity of women, the marital status composition by age, sex and its differentials is vital for fertility analysis. Widowhood is another important consideration with reference to the elderly. In this respect a significant feature is the large number of elderly females falling into the widowed category.

3.13 Marriage Pattern by Age and Sex

In 1991 there are 1050 currently married females for 1000 currently married males. Ratio of currently married male and female are given in table-3.27 for 1961 to 1991 censuses. The table shows an upward trend since 1961. The reason of the excess of females as well as upward trend could be due to husbands working abroad.

The pronounced sex differences in the marital status distribution of the elderly are noticed in table-3.28. The data in table-3.28 show that among all currently married men 14.3 percent of men aged 60 years and over enumerated in 1981(table-3.28-C) were currently married, compared to only 1.7 of all currently married women. This differential

is produced not only by the greater likelihood of widowhood for women but also by the higher remarriage rates for widowers than for widows.

Table-3.27
Male Female ratio of currently married population 1961-1991

Year	Ratio No of females for 1000 males
1961	1005
1974	1010
1981	1043
1991	1058

Source: Bangladesh Population Census 1991, National Series, BBS, Dhaka, p.84

As a result of increased longevity, each successive census has generally reported a higher proportion of persons among the elderly of both sexes as currently married. However among women aged 60 and over, there has been no systematic trend of changes in this proportion- in 1961 this proportion is reported to be only 1.9, in 1974 it had increased to 3.4 but in 1981 it again declined to 1.7.

The vast number of the elderly aged 60 and over, 45.2% both sexes, 62.8% males and 43.3% females was widows in 1981(table-3.28-D). Data in table-3.28-D shows an upward trend in the proportion of widowed. Smaller proportions found among the elderly males than females are however widowed. One of the predominant concern now-a- days is the significant increase in the number of person widowed among the elderly. The emerging issues center on the impact that rapid urbanization will bring on the joint family system and on the existing old-age security system which may fail to absorb the mounting number of widows. The picture for the elderly women is remarkable as the number of widows exceeded the number married. The ratio is high, 2 to 1 in 1974-1981. In comparison with widowed, the trend in the proportion of divorced is rather reverse showing a low level of divorced person (table-3.28-E) and a stable family system. It indicates that the elderly in Bangladesh live mainly with their spouses until they become widowed.

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Table-3.28
Distribution of Population by Age and Sex and Marital Status, 1961-1981

Table 3.28 (A) --Total

(Thousand)*

Sex	1961			1974			1981		
	All age	60+	%	All age	60+	%	All age	60+	%
Both	50840	2653	5.2	71477	4057	5.7	87120	4905	5.6
Male	26349	1462	5.5	37071	2292	6.2	44919	2751	6.1
Female	24491	1190	4.9	34407	1764	5.1	42201	2154	5.1

Table-3.28(B)-Never Married

(Thousand)*

Sex	1961			1974			1981		
	All age	60+	%	All age	60+	%	All age	60+	%
Both	26041	6	0.02	39894	27	0.07	48679	195	0.4
Male	15108	5	0.03	22699	20	0.09	27756	184	0.7
Female	10933	1	0.009	17195	7	0.04	20923	11	0.05

Table -3.28 (C)- Married

(Thousand)*

Sex	1961			1974			1981		
	All age	60+	%	All age	60+	%	All age	60+	%
Both	21348	1443	6.8	27995	2549	9.1	34602	3203	9.3
Male	10648	1236	11.6	13928	2068	14.8	16934	2424	14.3
Female	10700	207	1.9	14067	481	3.4	17668	309	1.7

Table-3.28 (D)-Widowed

(Thousand)*

Sex	1961			1974			1981		
	All age	60+	%	All age	60+	%	All age	60+	%
Both	3275	1194	36.5	3328	1475	44.3	3675	1662	45.2
Male	540	217	40.2	415	203	48.9	371	233	62.8
Female	2735	977	35.7	2913	1272	43.7	3304	1429	43.3

Table -3.28 (E) - Divorced

(Thousand)*

Sex	1961			1974			1981		
	All age	60+	%	All age	60+	%	All age	60+	%
Both	188	10	5.3	262	6	2.3	322	6	1.9
Male	65	5	7.7	29	2	6.9	18	2	11.1
Female	123	5	4.1	233	4	1.7	304	4	1.3

Source: 1990 Statistical Yearbook of Bangladesh, BBS, Dhaka, p.51-52, Table-2.14.

* Number in thousands and discrepancies due to rounding of figure.

Table-3.29 indicates that both in rural and urban areas of the country overwhelming majority of the male elderly 95.1 percent are married. On the other hand, majority of the female elderly 57.1 percent are not in marital union. No marked difference in the marital status distribution of the male and female elderly population by locality is evident but sex differential obviously present among the marital status categories. Large percentage of elderly male in the married category may be due to remarriage of the aged male population.

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Table-3.29

Marital status distribution of the elderly population by sex and locality: Bangladesh, 1991

Locality	Percentage by marital status							
	Male				Female			
	Never married	Married	Widow	Divorce/ Separated	Never married	Married	Widow	Divorce/ Separated
Rural	0.55	95.13	4.18	0.15	0.75	42.73	56.28	0.24
Urban	0.95	94.94	3.97	0.14	1.06	43.90	54.65	0.39
Bangladesh	0.60	95.10	4.30		0.80	42.90	56.30	

Source: Bangladesh Population Census 1991, National Series, BBS, Dhaka.

3.14 Religious Composition

Broad age structure of the population of different religions is shown in table-3.30, which exhibits significant variations between religions. It seems that Muslim, Buddhist and Christian have more population in the younger age groups than that of Hindu population in both the 1981 and 1991 censuses. It is also true in both urban and rural areas.

This reflects prevalence of comparatively lower fertility levels in Hindu community. But it is reverse in old age groups. It seems that Hindus have more population in the old age group than that of Muslim, Buddhist and Christian population in both the 1981 and 1991 censuses. It is also true in rural areas but it is different in urban area. Christian has the highest percentage of old age in 1981 and Hindus have the highest percentage of old age in 1991.

Table-3.30

Percentage Distribution of Population by Age, Religion and locality 1981 and 1991

Age Group	1991					1981				
	Muslim	Hindu	Buddhist	Christian	Others	Muslim	Hindu	Buddhist	Christian	Others
0-14	45.2	40.5	45.6	45.7	57.3	47.2	42.6	44.6	42.8	42.2
15-59	49.1	52.8	49.0	48.6	38.3	47.3	50.7	49.7	50.1	52.2
60+	5.2	6.7	5.4	5.7	4.4	5.5	6.7	5.7	7.1	5.6
Rural										
0-14	46.9	41.7	46.9	48.3	57.1	48.2	43.3	45.0	49.7	43.3
15-59	47.6	51.5	47.7	45.6	38.5	46.2	49.9	49.1	49.0	51.0
60+	5.5	6.8	5.4	6.1	4.4	5.6	6.8	5.9	6.3	5.7
Urban										
0-14	40.7	36.1	41.3	37.4	59.4	42.3	39.0	42.1	36.5	33.1
15-59	55.1	58.0	53.4	58.2	36.7	53.0	54.9	52.6	53.5	62.2
60+	4.2	5.9	5.3	4.4	3.9	4.7	6.1	5.3	10.0	4.7

Source: Bangladesh Population Census 1991, National Series, BBS, Dhaka, p.112, Table-7.8.

3.15 Literacy Status

Data on literacy levels and trend are of crucial significance to the policy makers, researchers and planners for socio-economic and educational planing of a country. Urban-rural differential in literacy is shown in table-3.31. The gap between the two was becoming smaller with the passage of time up to 1981. But in 1991 the gap is slightly big.

Table -3.31
Literacy rate of persons of all ages by sex and residence in census years, 1961-1991

Sex	Urban			
	1961	1974	1981	1991
Both sex	38.7	37.7	34.8	40.3
Male	47.7	45.3	42.3	46.2
Female	26.1	27.9	25.5	33.3
	Rural			
	1961	1974	1981	1991
Both	16.5	18.5	17.0	21.2
Male	24.5	25.7	22.6	25.8
Female	7.8	10.8	11.2	16.3

Source: Bangladesh Population Census 1991, National Series, BBS, Dhaka, p.123, Table-8.3.

The gap between urban-rural male rate has not changed from about 20 percent points in any census period. Literacy rate for females in rural areas has improved to the level 16.3 which is low, but increasing rate is more than that of male. Because each new generation in Bangladesh society has aspired for more education and because opportunities to secure education have expanded over time, the over -65 segment of Bangladesh population is less educated than the younger generations.

3.16 Sex Structure

Personal characteristics of sex holds a position of prime importance in demographic studies. Separate data for males and females are important in themselves, for the analysis of other types of data, and for the evaluation of the completeness and accuracy of the census counts of population.

Sex composition is determined fundamentally by the components of population change-fertility, mortality and migration. The sex composition of a population is the most basic of all demographic characteristics and plays a vital role in population analysis since it affects directly the incidence of births, deaths and marriages. Migration rates, occupational structure and virtually all other population characteristics may be influenced by the ratio between the two sexes. Obviously, the simplest characteristic by which a population characterized is sex. The sex composition of the population is conveniently

described by the sex ratio or the masculinity ratio which is usually calculated by taking the number of males in the population and dividing it by the number of females. Thus, the sex ratio, by definition, gives the number of males per 100 females. A sex ratio above 100 therefore denotes an excess of males and vice versa. The population of Bangladesh classified by sex together with the sex ratio for various census year is shown in table-3.32.

Table-3.32
Sex-ratio for population of Bangladesh, 1901-1996

Year	Sex Ratio
1901	111.3
1911	104.5
1921	105.5
1931	105.9
1941	107.5
1951	109.7
1961	107.6
1974	107.7
1981	106.4
1991	106.1
1996	105.6

Source: (a) Bangladesh Population Census 1991, National Series, BBS, p.69, Table-5.2.
(b) 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka, Bangladesh.

It will be noted from table-3.32 that an excess of males over females has been a feature of all censuses in Bangladesh. The excess of males over females in the total population has largely been attributed to a possible under enumeration of females at the censuses (E. H. Slade, 1951, Vol.-1, p.54). From the table it is found that sex-ratio in 1901 was 111.3 which is the ever highest. In 1911 it has come down to 104.5 which is ever lowest. The reason of high sex-ratio in 1901 may be due to under enumeration of females in the census and a high female mortality. An increasing trend in the sex-ratio till 1951 is observed. Afterwards the sex-ratio decreased. In 1961 and 1974 it was almost same. The sex-ratio obtained in 1991 is lower as compared to those in the past five decades. This may be due to better coverage of females in 1991 census and more male international migration. Again the sex ratio in 1996 is 105.6 which is lower than that of 1991.

3.17 Inter-Country Comparison

An inter-country comparison in the sex-ratio in Bangladesh with selected Asian countries is shown in table-3.33. From the table it is found that Bangladesh, India, Pakistan and Sri Lanka have high sex ratio. On the other hand Indonesia, Japan, Philippines and Thailand have low sex ratios. This indicates that Bangladesh is characterized by a preponderance of males over females among these Asian countries. Bangladesh and India follow Pakistan in having the highest sex ratios. The status of females may have contributed to their under-reporting hence there is high sex ratios.

Table-3.33
Sex Ratios in Selected Asian Countries, 1970-1991

Country	Year	Sex Ratio
Bangladesh	1991	106.4
India	1990	107.0
Indonesia	1990	99.4
Japan	1990	96.5
Nepal	1990	103.4
Pakistan	1990	108.0
Philippines	1990	101.1
Sri Lanka	1990	106.5
Thailand	1990	100.5

Source: (a) Bangladesh Population Census 1991, National Series, BBS, p.68, Table-5.1.
(b) The sex and age distribution of the world populations, The 1994 Revision, United Nations, New York.

3.18 Division Patterns

The 1951, 1961, 1974, 1981 and 1991 sex ratios by administrative division and selected districts are given in the table-3.34. Between 1951 and 1961 the sex ratio slightly decreased but 1961 and 1974, it did not change considerably for the country as a whole. Similarly between 1974 and 1981, the ratio slightly decreased but between 1981 and 1991 did not change. On the division basis, all divisions each exhibited a reduction in sex ratio in all censuses. But Chittagong and Dhaka Division in 1961 and 1974 experienced an increase in the sex ratio. Male in-migration as a result of economic opportunities may explain the increase in the sex ratios in Chittagong and Dhaka. Chittagong is an industrial area and a commercial zone and the harbour stretches along the Karnafulli River and

industrial enterprises such as oil refinery, grain silos, fertilizer factory and steel mills are concentrated there. The southern side of the river is likewise used for industrial and commercial purposes aside from the fish harbour. Dhaka is the capital of the country where government offices and the University are situated.

Table-3.34
Sex Ratios by Division, 1951-1991

Districts	1951	1961	1974	1981	1991
Rajshahi Division	110	107	106	105	105
Khulna Division	110	109	107	107	106
Barishal Division	110	106	105	105	104
Dhaka Division	110	108	109	108	108
Chittagong Division	112	107	109	106	105

Source: Bangladesh Population Census 1991, National Series, BBS, p.71, Table-5.6.

3.19 Urban-Rural Sex Ratio

Sex-ratios of population by urban and rural areas in different censuses are presented in table-3.35. From the table it is found that sex-ratio for the urban population is much higher than that of the rural population. This can be explained by the fact that greater employment opportunities and other facilities available in the cities and other urban areas attract greater number of males to urban areas who leave their female counterparts in rural areas. Hence, there exists greater disparity in sex-ratios between urban and rural areas. In other words, there is a consistent pattern of rural to urban migration of males.

Table-3.35
Sex-Ratios of Rural and Urban Population of Bangladesh, 1941-1991

Year	Urban	Rural
1941	150.1	106.3
1951	150.7	108.5
1961	142.3	106.0
1974	129.4	105.9
1981	125.8	103.3
1991	118.1	103.4

Source: Bangladesh Population Census 1991, National Series, BBS, Dhaka, p.70, Table-5.4.

Analyzing the figures for the years 1941 and 1951, it is found that urban sex-ratio is nearly 50 percent higher than rural sex-ratio. However, with the passage of time this gap

is steadily narrowing. In other words, urban sex-ratio is showing a progressive decline. This would seem to indicate that, more and more females are accompanying the males migrating from villages to towns and cities.

3.20 Age-Specific Sex Ratios

Sex ratio by age groups is furnished in table-3.36. The sex-ratios by age-groups obtained in various censuses may further be analyzed and differentiated by age-group. From the table it is, however, found that sex-ratio pattern for Bangladesh is slightly different. It is found that, in all the censuses prior to 1981, females exceeded males in the 0-4 age group. In the age-group 20-29 also, a similar preponderance of females over males is found. This may be due to bias in age-reporting of females. In all other age-groups, however, there is an excess of males over females. In the later age-group, this is particularly significant and seems to indicate a higher female mortality.

There is one significant evidence apparent from the 1981 and 1991 census data. Unlike previous censuses it is found that sex-ratio for the age-group 0-4 years exceeded 100 in 1981 and 1991 censuses. The highest sex-ratio for the last three decades has been found in age-group 60+. This also indicates lower mortality in male and higher mortality in female population in the age group.

Table-3.36
Sex-Ratio by Age Group, 1911-1991

Age	1911	1921	1931	1941	1951	1961	1974	1981	1991
0-4	94.1	94.2	97.3	98.3	99.1	98.3	99.3	101.4	102.1
5-9	94.3	103.6	111.9	109.3	101.8	104.5	101.2	103.0	106.3
10-14	127.4	129.7	110.5	117.6	126.3	128.2	118.9	114.8	114.8
15-19	88.3	90.1	84.8	101.2	97.6	97.0	114.1	102.8	103.6
20-29	89.0	93.3	75.8	91.7	99.4	96.0	95.2	96.6	89.0
30-39	115.5	121.2	121.1	114.5	115.6	116.3	106.9	106.6	111.7
40-49	130.2	126.3	132.1	125.8	130.7	118.5	119.6	114.9	116.1
50-59	100.9	114.5	106.5	124.4	124.1	126.1	122.5	118.9	116.9
60+	102.4	107.8	126.3	118.3	122.5	123.0	129.9	129.3	128.6
Total	104.5	105.5	105.9	107.5	109.8	107.6	107.7	106.4	106.1

Sources: 1) Country Monograph Series no. 8, Population of Bangladesh, EASCAP, United Nations, p.39,
2) Bangladesh Population Census 1991, National Series, BBS, Dhaka, p.72, Table-5.7.

Bangladesh has not always had more females than males in the older cohorts. Table-3.37 also shows the sex ratios for those over 65 from 1950 to 1990 and also in the projections for this cohort for the years 1995 to 2025. From 1950 to 2005, sex ratio indicates that there were more older males than older females. By 1990 the sex ratio of all people over age 65 was 117. Population projections for the future anticipate that there will be more females than males in the over age 65 cohort, with sex ratios ranging between 96 and 99 except the year 1995, 2000 and 2005 respectively.

Table-3.37
Sex Composition of the Population 65+ years of age 1950-2025

Year	Males		Females		Sex Ratio
	Number	Percentage	Number	Percentage	
1950	76000	50.20	754000	49.80	101
1955	893000	52.84	797000	47.16	112
1960	1040000	54.45	870000	45.55	120
1965	1204000	55.61	961000	44.39	125
1970	1293000	55.30	1045000	44.70	124
1975	1512000	54.86	1244000	45.14	122
1980	1661000	55.22	1347000	44.78	123
1985	1692000	54.25	1427000	45.75	119
1990	1804000	53.79	1550000	46.21	117
Projection					
1995	1989000	52.93	1769000	47.07	112
2000	2241000	51.97	2071000	48.03	108
2005	2537000	50.67	2470000	49.33	103
2010	2914000	49.62	2959000	50.38	99
2015	3411000	49.09	3538000	50.91	97
2020	4105000	48.86	4296000	51.14	96
2025	5373000	48.94	5605000	51.06	96

Source: The Sex and Age Distribution of the World Populations, The 1992 Revision, United Nations, N.Y. 1993. p. 96.

3.21 Religious Variations

Sex-ratio by age-groups of different religious communities have been presented in table-3.38. Sex-ratios for Muslim and Hindu children of age 0-4 years indicate under enumeration and mis-reporting of age. Due to mis-reporting of age it is likely that relatively larger proportion of the male children have been transferred across the range 0-4. High sex-ratio for the Buddhist infant perhaps indicates the local situation. In this table it is found that in 1991 sex-ratios in age-groups 20-24 and 25-29 for both Muslim and Hindu population are less than 100 and for Buddhist and Christians population it is less than 100 for population 15-34 and for the population of other communities the sex ratio is less than 100 for age group 15-29. This may be due to more out-migration of

Spatial, sex and age differentials of the elderly in Bangladesh

males than females. The table shows that sex-ratio in the age group 20-29 is lowest in 1991 and highest in old age i.e., 65+ for both the censuses.

Table-3.38

Sex-Ratio for population of different religious communities by Age groups, 1981 and 1991

Age groups	1981					1991				
	Muslim	Hindu	Buddhist	Christian	Others	Muslim	Hindu	Buddhist	Christian	Others
0-4	101.4	101.1	105.9	97.9	99.1	102.0	101.8	105.0	103.6	109.4
5-9	103.0	102.4	106.5	101.1	101.2	106.4	105.6	109.0	104.6	106.9
10-14	115.6	109.8	109.3	105.8	112.4	115.4	110.4	110.2	103.0	119.6
15-19	101.9	109.8	98.1	95.0	87.6	103.8	103.5	99.1	95.1	84.6
20-24	90.4	102.0	89.3	89.8	89.0	85.6	96.4	84.1	81.1	74.7
25-29	101.7	103.6	98.1	92.6	107.1	91.1	94.1	89.8	83.6	89.7
30-34	101.1	99.0	96.2	100.2	106.1	104.1	106.7	97.8	99.8	102.4
35-39	113.8	110.0	125.2	106.7	121.0	120.2	120.9	125.8	113.6	122.1
40-44	108.2	107.9	108.2	113.8	118.0	113.5	115.5	115.1	110.9	113.9
45-49	124.6	121.3	117.8	121.5	135.8	119.4	119.0	120.1	113.6	114.2
50-54	112.0	113.6	114.9	94.5	120.0	111.3	110.4	124.5	111.5	113.0
55-59	135.1	120.4	121.0	115.4	136.3	127.1	123.2	120.3	125.9	115.0
60-64	117.6	104.1	120.9	130.3	132.1	119.0	107.1	126.9	123.6	116.6
65-69	141.3	143.3	112.4	117.7	129.6	140.3	120.1	125.7	116.2	116.3
70+	140.0	114.4	126.3	130.2	130.9	140.5	113.3	129.0	125.2	126.1

Source: Bangladesh Population Census 1991, National Series, BBS, Dhaka, p.73, Table-5.8.

Sex-ratios by age group for the population of urban and rural areas have been shown in table -3.39. It shows that sex-ratio in the age group 20-29 is lowest in 1991 and highest in old age i.e., 65+ for the two censuses.

Table-3.39

Sex-Ratio by Age-Group for Population of Bangladesh, 1981 and 1991

Age group	1991			1981		
	Total	Urban	Rural	Total	Urban	Rural
Total	106.1	118.1	103.4	106.4	125.8	103.3
0-4	102.1	103.6	101.8	101.4	101.6	101.4
5-9	106.3	106.0	106.4	103.0	103.9	102.8
10-14	114.8	108.3	116.5	114.8	111.8	115.3
15-19	103.6	107.5	102.6	102.8	119.7	99.7
20-24	86.6	108.1	80.7	91.8	131.6	84.2
25-29	91.4	114.3	85.5	101.9	149.9	93.6
30-34	104.4	133.5	97.1	100.8	153.0	92.4
35-39	120.3	159.8	111.3	113.4	168.5	105.2
40-44	113.7	161.6	103.8	108.3	154.9	100.8
45-49	119.3	161.2	111.3	124.1	166.9	118.2
50-54	111.3	139.9	105.9	111.3	134.1	107.7
55-59	126.5	151.3	122.2	132.6	164.6	128.5
60-64	117.5	129.9	115.2	115.8	137.5	112.8
65+	136.7	139.3	136.2	136.8	146.2	135.5

Source: Bangladesh Population Census 1991, National Series, BBS, p.74, Table-5.9.

In urban areas sex-ratio in age group 30-59 is the highest in both 1981 and 1991 censuses. This may be explained by the greater number of young male migrants to urban areas for employment.

3.22 Conclusion

Population of the world will continue to grow older in the immediate future. The median age of the earth's population will increase during most of the twenty-first century. It must be assumed that disease control will improve especially in those countries which currently have relatively high rates of infant and childhood mortality. It also seems likely that there will be increased use of contraceptive techniques, which will tend to moderate the worldwide birth rate. Each of these factors will have the effect of increasing the median age of the world population and producing increasing proportions of older people in many societies.

There is every reason to believe that life expectancy at birth and at older ages will increase throughout the world. While life expectancy at birth will probably show fairly large increases in those countries which achieved a significant decrease in their rates of infant and early-childhood mortality, increases in life expectancy after age 65 will probably be much smaller. There will undoubtedly be some advances in the prevention and control of some forms of cancer, and probably some improved methods of controlling some of the chronic diseases. There is nevertheless no reason to expect large increases in life expectancy at the later stages of the life cycle.

There is also no reason to conclude that life expectancy or the population structure of any society of the world will be drastically altered or severely affected by the application or misapplication of modern forms of technology.

Educational level of the older population will increase in each succeeding generation for the next several decades. It is quite likely that the older population will also become more cognizant of its position in society and more critical of the social structure as it relates to aging.

In a social sense aging is closely related to the structure of society. Most social gerontologists view the experience in the last few centuries; in the years to come, however, the aging population will begin to exert an independent influence on the rest of

the social structure. It is, of course, impossible to know what form the aging experience will take in the future, although it is possible to make some reasonable predictions. In general, more positive view of the aging process will probably be widely accepted, a change in social attitudes that will be brought on partly by the increase in the number of older people and partly by the achievements of this age group. The older people of the next decades will have considerable influence on the meaning of aging in many societies. Bangladesh has been experiencing a major change in the age composition of its population, becoming a much more mature society than it was only a few years ago. The median age of the society has decreased from about 21.6 years in the years 1950 to 18.5 years in 1990 and again it will increase from about 18.5 years in 1990 to 20.9 years in 2000 and its expected to increase to about 37.8 years by 2050. The transformation that is under way in the age composition of Bangladesh population is expected to be complete by the year 2050. At this time number of population age 65 and over in Bangladesh will have grown from 33 lakh in 1990 to about 33 million while life expectancy at birth will increase by more than 20 years during this period (UN 1994, P.544).

Although present study is an exploratory one, some interesting features related to aging situation in the country have come out from our analysis. The last few decades bear witness to the tremendous changes in population structure, particularly the age and sex structure. These changes can be traced back to the rapid rate of urbanization, industrialization and modernization.

Persons aged 60 years and over are however rapidly growing, although their number is yet relatively small. These men and women are living longer in markedly different ways from their predecessors. Analysis of the relevant data indicates that they can no longer remain neglected in polity, health care systems and other socio-economic development programs. Examination of recent trends portends a definite direction of rapid changes in health and disease processes and in psychosocial, cultural and economic systems. Time has come to acknowledge the important contributions that these elderly men and women have traditionally made toward holding together the fabric of families and societies of Bangladesh by presenting a store house of knowledge and wisdom. Under the universal condition of marriage the tendency of elderly males to be in marital union is quite

reflected and such tendency among the elderly females is likely to increase with time perhaps with the effect of modernization .

Regional variations in literacy is not clear but there exists sex and rural urban differentials in these status. Literacy rate of the elderly is perhaps likely to increase with the increase of elderly population in future. The problem of the elderly in Bangladesh is perhaps not so serious at present because of social protection by the family network. But situation could be changed in near future owing to recent demographic and socio-economic changes that are in progress.

Demographic and socio-economic indicators of population aging that have been found in course of our analysis throw some light on the situation of elderly in Bangladesh. At the national level though the proportion of the elderly would not vary much but the size would vary, their attributes might also differ both at the individual and collective levels. It has been observed that the proportion of the elderly (60+) is not higher than that of the young but their number is gradually increasing which underline the magnitudes of the problems that will face the country in the coming years as population size will continue to swell. Further the consequence of rural poverty has been a mass exodus of young working population from rural areas to industrialized and urban areas. The populations that remain in the rural communities are in a chronically depressed conditions and fail to maintain many of the basic enterprises and institutions constituting a major national welfare and health problems for the elderly.

The transformation that is under way in the age composition of Bangladesh population is expected to be complete until about the year 2050. It is very interesting to note that by the year 2050 the population aged 65 and over in Bangladesh will have grown from 3.3 million in 1990 to about nearly 33 million. While life expectancy at birth will increase by more than 20 years from 1990 to 2050.

However, some of the major issues concerning the aging population are described below:-

Due to improvement of mortality condition size of elderly population is increasing progressively at a faster rate than the rest of the population. This unprecedented increase

of aging population of both males and females at urban and rural localities has cultural as well as social and economic implications.

The process of aging in Bangladesh now is taking place at a time when the pattern of life is changing, kinship bonds are weakening and family composition is undergoing a rapid transformation. But with their rapid increase and under the condition of changing family pattern, the elderly population already seems to be experiencing difficulties. Most of the elderly people of Bangladesh live in rural areas where health and recreational facilities are very limited. Majority of them are illiterate. Economic facilities and job opportunities are limited. More than half of the elderly women are widowed, divorced or single. In all these respects elderly women are more disadvantaged than elderly men. A large proportion of elderly men are still in the labour force both in rural and urban areas. But job opportunities are very limited in the country. It is difficult for them to get jobs commensurate with their ages (Abedin, 1996).

Last few decades bear witness to the tremendous changes in population structure, particularly age and sex structure, traditional socio-cultural values, specially filial piety. These changes can be attributed to the rapid rate of urbanization, industrialization, and modernization. Among these changes two significant evolutionary processes- population aging and break-down of traditional patterns of family life, have drawn apt attention of social scientists following the declining trend in mortality and fertility levels.

From the analysis of the sex differential in aging in Bangladesh it is concluded that more care should be taken for females so that socio-economic deprivation in any respect is removed for females. Hence recent steps taken by the government of Bangladesh paying more important role to the upliftment of the socio-economic condition of the females are timely. Specially free education upto secondary levels, pensions for the widows of the service-holders till death, involvement of the destitute in food for works etc. should be channeled properly by the government and the NGO's.

Rapid growth of the aged population in Bangladesh in the next century raises a major policy issue about the funding of health services. Efforts are to be made to redesign medical and health facilities.

Aged population are the respected senior citizens of a country, their needs and demands are different from other segments of the population. There is a need for government policies with respect to senior citizens of the country. In order to facilitate employment of the elderly it is necessary to set up organizations which can provide resource information on talent pool of aged persons (60+) for the purpose so that the elderly are able to do what they can for the society and the future generations. Bangladesh is often faced with budgetary limitations and thereby it is not always possible to allocate money exclusively for this segment of population. Therefore, financial and material care of the elderly should be left with the families. There are so many problems the elderly population of Bangladesh are faced with. A few of them are economic insolvency, loss of authority, social insecurity, inadequate health care services, insufficient recreational facilities etc (Abedin, 1996).

Nevertheless, following key points are of general relevance to the future provision of taking care of the elderly men and women in Bangladesh.

Firstly, there is a need for government policies with respect to senior citizens of the country. The findings of this study suggest that central policy objectives should include measures that lead to increased self-care and early detection of complications arising from the changes in health measures and in socioeconomic and cultural processes. Secondly, the findings identify the likelihood of a very considerable increase in the number of elderly men and women before the end of the present century. Thus health education measures and programs for involving elderly men and women in socioeconomic development should be organized. Thirdly, significant contributions made by these elderly men and women to their families and communities remain in most cases under valued. They are survivors in a young oriented society so pervasive that they lack control over the most basic elements of their livelihood. They are compelled to lead a life that keeps them in lower status in the society. In an effort to provide background information that could be used in policy intervention, in planning and encouraging research programs for elderly men and women, more empirical studies on them should be undertaken.

CHAPTER -IV

TRENDS IN FERTILITY LEVELS AND PATTERNS IN BANGLADESH

4.1 Introduction

In view of urgent needs of the country's social, economic and family planning programs, the study of the behaviour and level of fertility, mortality, and migration has become a vital necessity. Among these three processes which in fact act to change the size and structure of a population, fertility is a major component of the growth function.

Fertility is one of the vital components of the growth function which refers to the actual birth performance of a group of women or to the relative frequency with which the births occur in total population. It is a result of 'fecundity', the physiological capacity to reproduce. Obviously, it is not possible to measure exactly the real capacity of women to produce offspring's; it can only be guessed with the help of the maximum levels of fertility ever observed in a non- contraceptive population.

The analysis of fertility is of vital interest in the field of demography of aging. Its importance, in the light of the role it plays in giving shape to age-sex structure and in producing the change in the size of a population, cannot be over emphasized. Age distribution of a population is more sensitive to the changes in fertility behavior than to the changes in the force of mortality. The proportion of a population that is young or old depends mainly on the birth rate and not on the death rate. This is because as people live longer, the population structure, as a whole, becomes somewhat younger rather than older unless fertility rates also fall. It also means that when a population has an increasing proportion of older people, it is essentially because the birth rates have fallen and not because the death rates have fallen. Any decline in mortality makes the age distribution younger as more children begin to survive. Decline of mortality has very little effect at

middle ages. On the other hand, any decline in fertility necessarily makes the population older since it reduces the proportion of children (Hossain, 1995&1996).

In 1975, crude birth rate in Bangladesh was estimated at 47 births per 1000 population. In the same year, crude death was approximately 20 per 1000 and it gave a rate of natural increase of 2.7 percent a year. The very rapid rate of population growth that these figures imply represents a serious constraint to government development goals. Recent trends of declining real wages, increasing unemployment, increasing proportion of landless peasants and decreasing farm size are all aggravated, if not caused, by rapid population growth. Cognizant of the inherent problems in such growth, Government of Bangladesh has given high priority in its development plans to the control of population growth through fertility reduction.

The interest in the study of fertility also arises because it is a quite complex phenomenon, whose mechanism is difficult to understand. It is affected by a number of socio-psychological and economic variables besides the biological capacity of reproduction. In most under developed countries, reducing fertility is often stated as a goal for family planning but as it involves changes in social values, attitudes, norms and behavior it poses serious problems.

Bangladesh has one of the most rapidly growing populations in Asia. The most recent indication, based on 1991 census is that in Bangladesh population is growing at a rate of about 2.17 percent per year. Whether this rapid growth is the result of the decline in mortality levels accompanied in by constant fertility or is merely due to under relative enumeration in the two census is yet to be resolved (BPC 1991).

4.2 Trends of Population Growth

The demographic pattern is rather changing very fast contributing to a rapid growth of population in Bangladesh. Table-4.1 shows the trend of population growth in Bangladesh during 1650-1991. Doubling of population from 10 million in 1650 to 22 millions in 1872 took 220 years but doubling from 22.6 million in 1872 to 41 million in 1941 took less than 70 years. This period has narrowed down now considerably for doubling of population size. In 50 years time from 1941 to 1991, population of Bangladesh has more than doubled. This fast pace of growth has alarmed the policy makers in Bangladesh. The

sudden upsurge in population growth is assigned to a quick widening of the gap between fertility and mortality levels (Arthur et al., 1978, Mabud, 1989).

Table-4.1
Population Growth in Bangladesh 1650-1991

Year	Population in million	Year	Population in million
1650	10.0	1931	35.6
1800	17.0	1941	41.0
1872	22.6	1951	41.9
1881	24.9	1961	50.8
1891	27.0	1974	76.3
1901	28.9	1981	89.9
1911	31.5	1991	111.5
1921	33.2		

Sources: (a) Population profile, No-19, Bangladesh, United Nations Fund For Population Activities, New York, p-15,
(b) Bangladesh Population Census 1991, National Series, Analytical Report, Bangladesh Bureau of Statistics, Dhaka, p-43.

The total population of Bangladesh as estimated from different censuses since 1872 together with the inter-censal increase and the average annual growth rates are given in table-4.2. Total Population and growth during 1872-1991 has been shown graphically in Figure-4.1.

Table-4.2 shows that up to 1941 census counts seem to suffer from varying degree of coverage errors arising out of the administrative and political milieu. The magnitude of such coverage errors were not indicated in these census reports. The population censuses of 1951, 1961 and 1981 had usual defects of under coverage. The post enumeration check (PEC) of 1951 revealed about 5 percent undercounts for urban population. It is believed that the extent of net under enumeration rate would be much higher (BBS, 1977).

However, with the assumed rate of under enumeration of 4 percent at the national level. The census population of 1951, 1961, 1974, 1981 and 1991 have been adjusted for net under counts rates 4.75, 8.62, 6.88, 3.1 and 4.6 percent respectively and the adjusted numbers have been used for this analysis.

Table-4.2
Inter-Censal Growth Rates of Population, 1872-1991

Census Year	Population in million	Variation		Growth rates (Exponential)
		Number	Percentage	
1872	22.6	--	--	--
1881	24.9	2.3	10.2	1.08
1891	27.0	2.1	8.4	0.81
1901	28.9	1.9	7.0	0.68
1911	31.5	2.6	9.0	0.86
1921	33.2	1.7	5.4	0.53
1931	35.6	2.4	7.2	0.70
1941	41.0	5.4	15.2	1.41
1951	41.9	0.9	2.2	0.22
1961	50.8	8.9	21.2	1.93
1974	76.3	25.5	50.2	3.13
1981	89.9	13.6	17.8	2.34
1991	111.5	21.6	24.0	2.15

Sources:- (a) Population profile, No-19, Bangladesh, United Nations Fund For Population Activities, NewYork, p-15,
(b) Bangladesh Population Census 1991, National Series, Analytical Report, Bangladesh Bureau of Statistics, Dhaka, p-43.

It can be seen from the figures in table that in between 1872 and 1991 population of Bangladesh increased by about 393 percent with some significant irregularities between census years. These irregularities are due to differentials in growth rates in between census years, migration and due to differentials in rates of under enumeration in the census population. Population growth during the period 1872 to 1931 was very slow and it was less than 1 percent except in 1881. In this year, it was 1.08 percent. Again the population growth during the period 1941 to 1961 was very fast and it was less than 2 percent in 1951, it was 0.22 percent. The population growth during the period 1974 to 1991 was rapid and it was about more than 2 percent.

Therefore, the concern of aging in Asia is expected to be much higher, mainly because of large cohorts from the post-second World War “baby boom” will be joining the ranks of persons 65 years or above during this period (Tan Poo Chang, 1992). This fact can be observed from the Table-4.3. Annual growth rate of elderly population is much higher than that of the young (0-14) and working age group population (15-59). During 1990-2000, growth rate of young generation varies from -0.73 percent in Korea to 1.63 percent in Philippines. Except India, Malaysia, and Philippines, growth rate of this generation is significantly low. This growth rates of young generation will not affect the base of the population pyramid but also the working age group in the coming decades. The growth

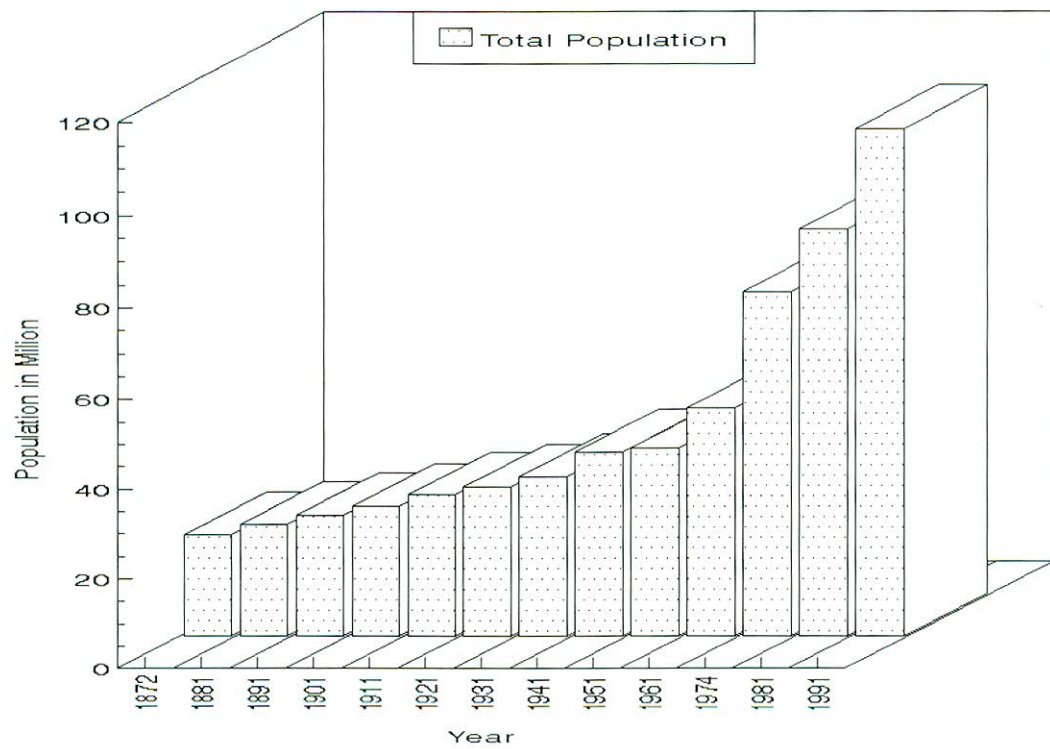
rate of old generation varies from 0.035 percent in Bangladesh to 4.26 percent in Thailand. Similarly, during 2000-2050, growth rate of young generation varies from -0.34 percent in China to 0.24 in Korea and old generation varies from 0.189 in Bangladesh to 4.11 in Korea.

Table-4.3
Growth rate of population by different age category for selected Asian countries, 1990-2000 and 2000-2050.

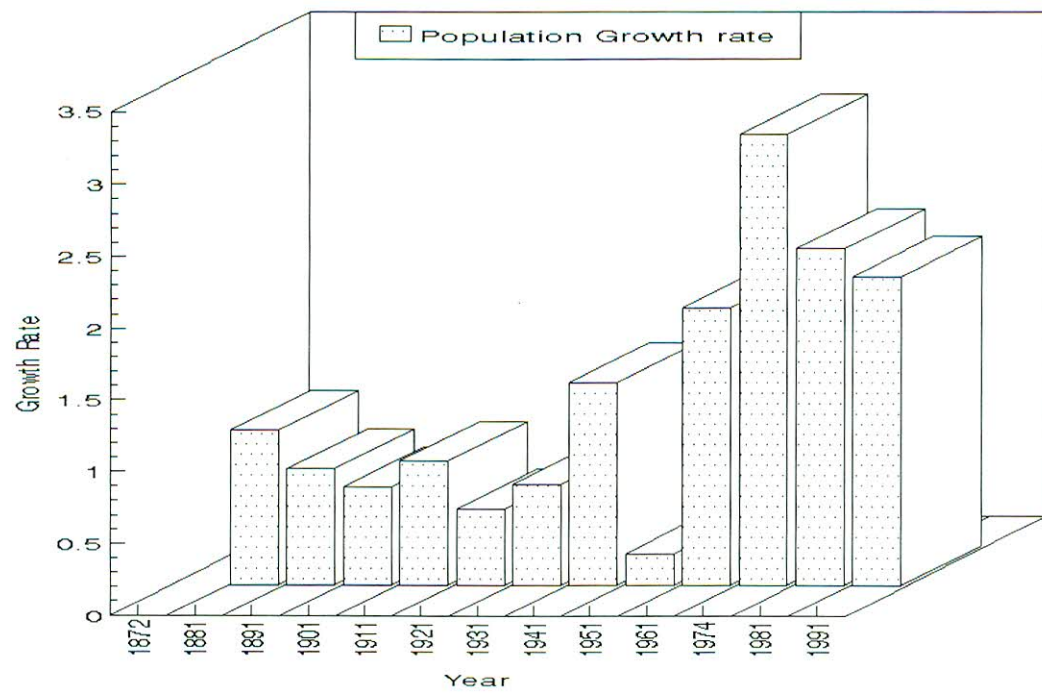
Country/Age category	Exponential Growth rate	
	1990-2000	2000-2050
Bangladesh		
0-14	0.019	-0.026
15-59	0.032	0.057
60+	0.035	0.187
China		
0-14	0.54	-0.34
15-59	1.02	0.47
60+	2.30	2.98
India		
0-14	1.02	-0.13
15-59	2.12	1.52
60+	2.75	2.93
Indonesia		
0-14	-0.40	0.16
15-59	2.36	1.10
60+	2.60	3.14
Malaysia		
0-14	1.15	-0.20
15-59	2.52	1.62
60+	3.40	4.10
Philippines		
0-14	1.63	0.09
15-59	2.63	2.03
60+	3.34	4.11
R. P. of Korea		
0-14	-0.73	0.24
15-59	0.97	0.25
60+	4.16	3.40
Sri Lanka		
0-14	-0.62	-0.03
15-59	1.84	0.68
60+	2.13	3.50
Thailand		
0-14	-0.61	0.10
15-59	2.00	0.78
60+	4.26	3.50

Source: World population projection 1994, Oxford University Press.

Many of the world's countries are currently undergoing two fundamental demographic changes: a rapid concentration of their populations into urban communities and an



(Total Population of Bangladesh during 1872-1991)



(Population Growth Rates of Bangladesh during 1872-1991)

Fig 4.1 : Total Population and Growth Rates in Bangladesh : 1872 - 1991

acceleration in the pace of aging of their populations. the former is usually attributed to rapid technological advances and the resulting modernization and industrialization. The latter, however, follows from demographic changes linked to socio-cultural, economic and health care development. The former may thus be considered as the cause which brings the latter into effect (Razzaque, et. al., 1994).

The inflow of people from rural to urban communities plays a significant role in accelerating the process of urbanization. The compression of a larger and larger population into a particular urban area leads to squatter settlements and shanty communities which, in turn, result in the degradation of the environment and various social and economic problems caused by the rapid influx of conflicting ethnic and cultural groups. On the other hand, those who are compelled to stay back in the rural areas are by the large, the elderly women and children who are face major welfare problems. Thus the rapid concentration of young persons in urban areas, and the consequent higher proportion of the elderly in rural areas, produces unbalanced conditions and socio-economic problems in both urban and rural communities (Ginzberz, 1982).

As a primate city of Bangladesh, Dhaka has maintained its supremacy over other metropolitan areas. Chittagong, one of the two port cities, ranks second among the urbanized cities. Table-4.4 shows that of the country's total urban population, less than a quarter of which was concentrated in Dhaka during the 1950s and 1960s. This grew to a third in the mid-1970s and to two fifths thereafter. The United Nations projections, however, indicate that the urban population of Dhaka may remain almost static at about 40 percent during the present century.

Table-4.4
Urban population and agglomerations - Dhaka, 1950-2000

Year	Population (Million)		Proportion to urban
	Urban	Urban agglomerations, Dhaka	
1950	1.84	0.43	23.37
1955	2.17	0.52	23.96
1960	2.66	0.66	24.81
1965	3.63	1.00	7.55
1970	5.07	1.54	30.37
1975	6.98	2.35	33.67
1980	9.19	3.40	37.00
1985	12.01	4.89	40.72
1990	15.71	6.53	41.57
1995	20.52	8.61	41.96
2000	26.62	11.16	41.92

Source:- The Prospects of World Urbanization: Revised as 1984-1985, Population Studies No. 101, P.151, UN, New York.

Table-4.5 presents the total and urban population of Bangladesh during different census years. The growth of the urban population is evident from Table-4.5. while only 2.4 percent of the total population of Bangladesh was living in urban areas at the beginning of the present century by 1991, a tenth of it (10.9 percent) was urban.

Table-4.5
Total and urban population Bangladesh, 1891-1991

Year	Population (in thousand)		
	Total	Urban	Urban/Total (%)
1891	24668	537	2.18
1901	26273	629	2.39
1911	28546	657	2.30
1921	30868	716	2.32
1931	36690	1126	3.07
1941	39785	1345	3.38
1951	41932	1820	4.34
1961	48199	2641	5.48
1974	71481	6257	8.75
1981	87052	9268	10.65
1991	108000	11788	10.91

Sources: 1980, 1981 and 1991 Statistical Yearbook of Bangladesh, BBS, Dhaka, Bangladesh.

Table-4.6 presents intercensal growth rates expressed as the percentage of the total and urban populations. The rate of growth of the urban population during different inter-

census intervals is observed to be far more than that of the total population. As seen in the table, the growth rate during 1961-1974 is unusually high. This is because the time interval is longer than that between two normal census years. Similarly, it is much lower during 1974-1981 due to the shorter span of time between the two census points. The annual percentage growth rates show a rise in the urban population since 1940, with a considerably higher growth during 1961-1974.

The annual percentage growth rate of the total population during the 1960s and 1970s was 3.42, suggesting the insignificant contribution of population control programmes. Further, the annual percentage growth rate of the urban population during this period indicates the impact of urban-based industrial expansion and heavy migration from rural to urban areas after independence. Population projection show that the percentage of urban population may increase to 22.9 by 2000, and to 42.2 in 2025 (BBS, 1981, 1991; UN, 1991).

Table-4.6
Intercensal percentage growth rate

Intercensal period	% growth rate for	
	Total population	Urban population
1891-1901	6.51	17.13
1901-1911	8.65	4.45
1911-1921	8.13	8.98
1921-1931	18.85	57.26
1931-1941	8.44	19.45
1941-1951	5.40	35.31
1951-1961	14.95	45.11
1961-1974	48.30	136.92
1974-1981	21.78	48.12
1981-1991	24.06	27.19

Table-4.7 gives a distribution of the population aged 60 years and above by sex and urban and rural residence for the census years 1974, 1981 and 1991. The data indicates an increase of 244.1 percent in the 60+ population in urban Bangladesh during the seventeen-year period 1974 to 1991, while the corresponding increase in the rural areas was only 24.0 percent. Again an increase of 146.4 percent in the 60+ population in urban Bangladesh during the seven-year period 1974 to 1981, while the corresponding increase in the rural areas was only 12.3 percent. Also an increases of 39.66 and 10.78 percent in

urban and rural areas during the ten-year period 1981 to 1991. It is expected that increasing industrialization and the availability of better facilities in urban areas will contribute to the rapid increase in the 60+ population thereby widening the gap between the urban and rural growth of this population segment. It may be mention here that such an alarming increase of the elderly in urbanized prefectures has never been experienced in Bangladesh, and is primarily due to the migration of large numbers of young persons to these urbanized settings. The problems of the elderly may thus become much more serious in urban areas than in rural communities.

Table-4.7
Distribution of population aged 60+ by age, sex and residence, 1974, 1981 and 1991
(population in thousand)

Age groups	1974			1981			1991		
	male	female	total	male	female	total	male	female	total
Urban									
60-64	68	47	115	153	112	265	212	164	376
65-69	28	18	46	67	51	118	102	70	172
70+	57	45	107	159	106	265	204	153	357
Rural									
60-64	850	718	1568	893	791	1684	1014	880	1894
65-69	402	287	689	465	333	798	530	391	921
70+	886	651	1537	1014	763	1777	1146	837	1983

Sources: (a) 1980, 1990, Statistical Yearbook of Bangladesh, BBS, Dhaka, Bangladesh
(b) Bangladesh Population Census 1991, National Series, BBS, Dhaka, Bangladesh.

An interesting feature of this growth is that in both urban and rural areas, the number of persons in the 65-69 and 75+ age groups are more or less the same, and constitute about half the number of persons in the 60-64 age group. The number of males in each of the three age groups is also consistently higher than the number of females. In 1974, in the urban 60-64 age group, there were approximately 1.5 times many as females, clearly indicating that males have a higher life span than females. However, unlike in the urban areas, the rural distribution provides a clear indication of an increase in numbers with an increase in age, beyond 65 years and above. Though the variation is insignificant, it suggests that after the age of 70, the rural elderly are less prone to the risk of death than

their urban counterparts. The pollution- free rural environment may be a possible contributory factor to the higher life span of the rural elderly.

The inter-censal growth rate of urban population during 1901-1991 is shown in table-4.8 and geographical representation in Figure-4.2. The proportion of urban population of Bangladesh reached 19.63(Adjusted) percent in 1991 from 2.43 percent in 1901. The proportion of urban population was almost same during the period 1901-1921. After that it sharply increased and reached 8.78 percent in 1974, 15.18 percent in 1981 and 19.63 percent in 1991. About 4.45 (Adjusted) percent of the urban population growth during 1981-1991 could be explained by the extended definitions of urban area in 1991.

Table-4.8
Inter-censal Growth Rate of Urban Population , 1901-1991

Census Year	Population		Inter-censal variation		Average annual growth rate (Exponential)
	Number	Percent	Number	Percent	
1901	702035	2.43	--	--	--
1911	807024	2.55	104989	14.95	1.39
1921	878480	2.64	71456	8.85	0.85
1931	1073489	3.02	195009	22.20	2.00
1941	1537244	3.66	436755	43.20	3.59
1951	1819773	4.33	282529	18.38	1.69
1961	2640726	5.19	820953	45.11	3.75
1974	6273602	8.78	3632877	137.57	6.62
1981	13228163	15.18	6954560	110.85	10.63
1991	20872204	19.63	7644041	57.79	4.67

Source:- Bangladesh Population Census 1991, BBS, Dhaka, p-48, Table-4.1.

A consistent rising trend in the growth of urban population was found over the period 1901-1991 except in 1911-1921 and 1941-1951 decades which were largely due to plague, epidemic, and small pox. These led to depopulation in the urban areas. Lower growth rate of urban population during 1941-1951 might be the effect of devastating Bengal Famine, the second world war and the partition of India in 1947. In absence of industrialization and modern amenities during colonial British Rule the level of urbanization suffered to a great extent. With the achievement of independence in 1971 it has been growing at a faster rate which is attributed to some industrial development during 1960s and the emergence of Bangladesh as a sovereign nation. Number of urban centers has increased from 78 in 1961 to 108 in 1974, 492 in 1981 and 522 in 1991. Industrial areas and other notified towns such as railway station, tourists and big market centres with electricity and other urban facilities have been included as urban localities.

Again table-4.9 compares the national population growth rates with the urban growth rates of SAARC countries and some selected Asian countries.

In table-4.9 comparison is done for the SAARC and some selected Asian countries in respect of Urban growth rate and national population growth rate. Bhutan has the highest urban growth rate as compared to national population growth rate followed by Bangladesh Nepal and Pakistan.

Table-4.9
Urban Growth Rates in Selected Countries of SAARC and ESCAP Region

Name of country	Year	Population (in million)	Annual population growth rate	Annual urban growth rate
Bangladesh	1991	111.5	2.17	3.2
Bhutan	1990	1.5	2.3	3.6
India	1991	853.1	2.1	1.7
Nepal	1990	19.1	2.3	3.2
Pakistan	1990	122.6	2.9	3.0
Sri Lanka	1990	17.2	1.3	1.2
Indonesia	1990	184.3	1.8	2.8
Malaysia	1990	17.9	2.3	1.8
Myanmar	1990	41.7	2.1	1.1
Thailand	1990	55.7	1.4	2.6
Singapore	1990	2.7	1.1	0.0
Japan	1990	123.5	0.4	-0.1
Maldives	1990	0.2	---	----

Source:- Bangladesh Population Census 1991, BBS, Dhaka, p.50, Table-4.2.

It is evident from the previous discussion (Chapter-III) that the Asian population will continue to age through the expansion of upper extreme of the age pyramid. This rectangularization of age pyramid will directly impose heavy burden on the working class and indirectly on the family ties and structure. However, to what extent working generation will be capable of bearing the burden of elderly population or to what extent changing family structure will affect the status of the aged depends not only on the degree of demographic transition but on the stage of modernization which includes urbanization, industrialization, education, changing awareness and value system.

There is no unanimity regarding the impact of modernization on the family structure as well as the aged (Hugo, 1991). The postulates of three school of thoughts relating to modernization and family's responsibility are as follows:-

The first school claimed an inverse relationship between level of modernization in society and family support for the elderly (Cowgill, 1972).

According to the second school an inverse relationship will hold good at the early stage of development but in the later stage, modernization will enhance the status of the aged through strong social security measures (Heisel, 1984).

The third school completely rejected the above mentioned nations and suggested that reports of a decline in family support due to urbanization is exaggerated (Evandrou et. al., 1986; Hunt, 1978).

Evidence from Asian literature however, shows that modernization in developing countries might worsen the situation of the elderly (Hugo, 1991; Ramos, 1995; Mason, 1992). The most crucial component of modernization which may the family support for the aged, is urbanization and industrialization.

Like developed World, urbanization is a striking aspect of Asian population. Table-4.10 represents the proportion of population living in urban areas for selected Asian countries 1950-2025. At the beginning of the second half of the twentieth century, only 11 percent of the population of China and Thailand lived in urban areas and by 1990 it has doubled to 21 and 23 percent respectively. Again only 4.2 percent of the population of Bangladesh lived in urban areas and by 1990 it has four times to 1950. Remarkable advancement has been made by Republic of Korea, where the level has increased from 21.4 percent in 1950 to 72 percent in 1990. It is predicted that by the end of the first quarter of the twenty first century, 88 percent of the Korean population will reside in urban zones. Moreover by this time, most of these countries (except Sri Lanka China and Bangladesh) will cross the level of 50 percent. The annual growth rate of the urban population in the developing countries is thus higher than in the developed countries (Mechelen, 1985).

Table-4.10
Proportion of population living in urban areas for selected Asian countries 1950-2025

Country	Year		
	1950	1990	2025
Bangladesh	4.2	16.4	42.2
China	11.0	21.4	43.7
India	17.3	28.0	53.6
Indonesia	12.4	28.8	55.9
Malaysia	20.4	42.3	67.1
Philippines	27.1	42.4	66.1
R. O. Korea	21.4	72.0	87.9
Sri Lanka	14.4	21.4	42.6
Thailand	10.5	22.6	49.2

Sources: World Urbanization Prospects: The 1992 Revision United Nations, New York.

4.3 Trends in Fertility

4.3.1 Crude Birth Rates

The most commonly used measure of fertility which is also the easiest to calculate and understand and requires minimum of information is crude birth rate (CBR). It is the ratio of the total number of births during a given year to the average or mid-year population in that year.

Table-4.11 gives the trend in the crude birth rates of Bangladesh from 1901 to 1996 and geographical representation is shown in Figure-4.3. The rates were estimated from various sources and are of varying reliability. On the whole, however, they indicate that, probably until the 1970s, Bangladesh had spanned the second phase of the demographic transition and high fertility was needed to off set the high but declining mortality operating in the country. As is evident from table-4.11, crude birth rates fluctuated around 50 per 1,000 population throughout the period until late 1960s. After 1971-1996, fertility declined from 47 to 26 per thousand. Crude birth rate took nearly a long 95 years to come down from 53.8 in the period of 1901-1911 to 25.6 in the period of 1991-1996, though the workers entrusted with achieving the objectives of family planning programs had fought tooth and nail over the last 2-3 decades to bring it into line. Recent surveys have however claimed that fertility level in Bangladesh has shown a further declining trend.

Table-4.11
Crude Birth Rates of Bangladesh, 1901-1996

Period	Crude birth rate (per 1000 population)
1901-1911	53.8
1911-1921	52.9
1921-1931	50.4
1931-1941	52.7
1941-1951	49.4
1951-1961	51.3
1961-1971	50.0
1971-1974	47.4
1974-1981	34.6
1981-1991	31.6
1991-1996	25.6

Sources:- (a) 1978 Statistical Pocketbook of Bangladesh, BBS, Dhaka, p-95,
(b) 1992 , 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka, p-52 .

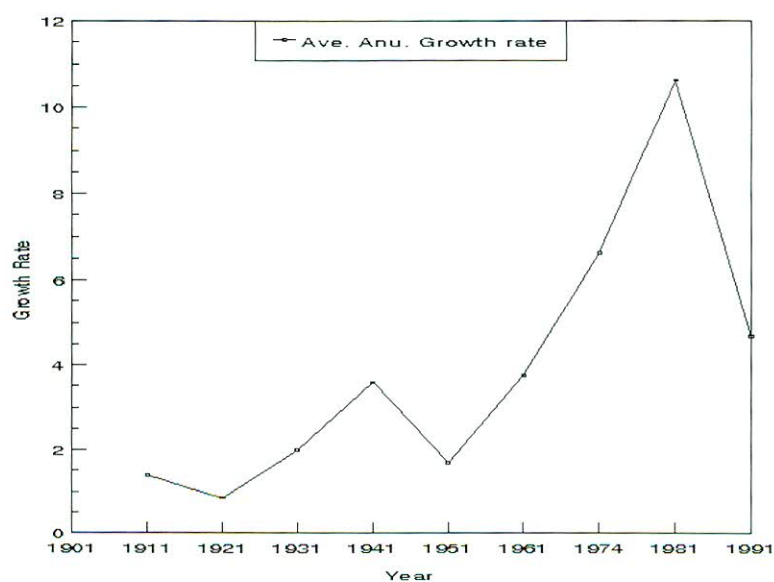


Fig 4.2 : Intercensal Growth Rates of Urban Population, 1901-1991

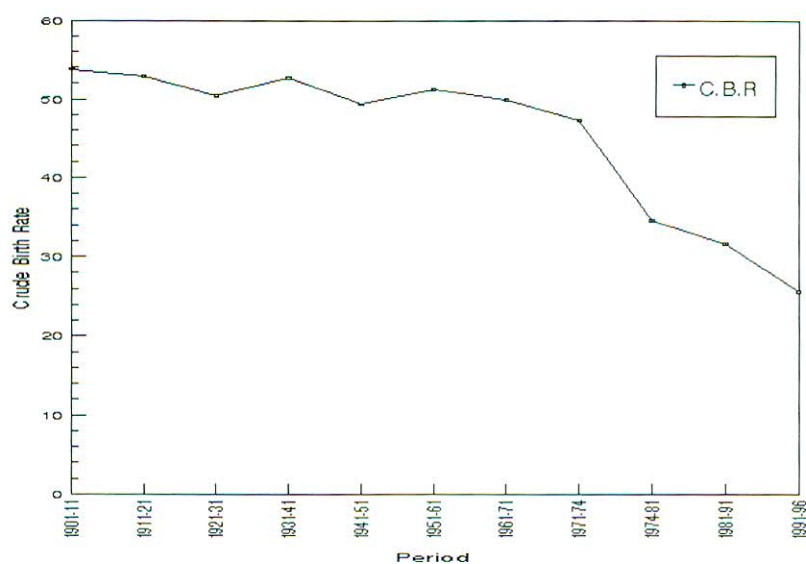


Fig 4.3 : Crude Birth Rate of Bangladesh, 1901-1996

It is not possible to be more precise about the onset of the fertility decline. The estimates of the crude birth rate arrived at by various researchers vary considerably. For instance, Obaidullah (1966) puts the crude birth rates in 1961-1962 at 49.7 and 46.5 per 1000 population in the rural and urban areas respectively. In contrast, for the period 1962-65, Farooqui and Farooq (1971) estimated the birth rate for Bangladesh at 53 per 1000 population. The crude birth rates and total fertility rates during the year 1961-1996 are shown in table-4.12. Also the graphical representation is shown in Figure 4.4. The crude birth rates and total fertility rate for more than three decades (1961-1996) do suggest a definite decline and rather fluctuations with a narrow amplitude.

Table-4.12
Crude Birth Rates(CBR) and Total Fertility Rates (TFR),1961-1996

Sources	Year	CBR per 1000	TFR
DSEP	1961	47.0	6.78
PGE	1963	44.0	6.78
PGE	1964	42.0	6.16
PGE	1965	37.0	5.79
NIS	1968-69	42.0	6.28
BFS	1975	49.9	6.34
Pilot Survey, BBS	1978	37.0	5.77
BLDS, BBS	1980	33.4	4.99
VRS, BBS	1981	34.6	5.04
VRS, BBS	1982	34.8	5.21
VRS, BBS	1983	35.0	5.07
VRS, BBS	1984	34.8	4.83
VRS, BBS	1985	34.6	4.71
VRS, BBS	1986	34.4	4.70
VRS, BBS	1987	33.3	4.42
VRS, BBS	1988	33.2	4.39
VRS, BBS	1989	33.0	4.35
VRS, BBS	1990	32.8	4.33
VRS, BBS	1991	31.6	4.23
VRS, BBS	1992	30.8	4.18
BDSR, BBS	1993	28.8	3.84
BDSR, BBS	1994	27.8	3.58
SVR, BBS	1995	26.5	3.45
BDSR, BBS	1996	25.6	3.41

Sources:-1992, 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka, p-52 & 35.

Although not representative of the country as a whole, DSS provides reliable data on the demographic indicators. Crude birth rates and total fertility rates for over three decades(1966-1996) do not suggest a definite decline and rather show fluctuations with a narrow amplitude in table-4.13.

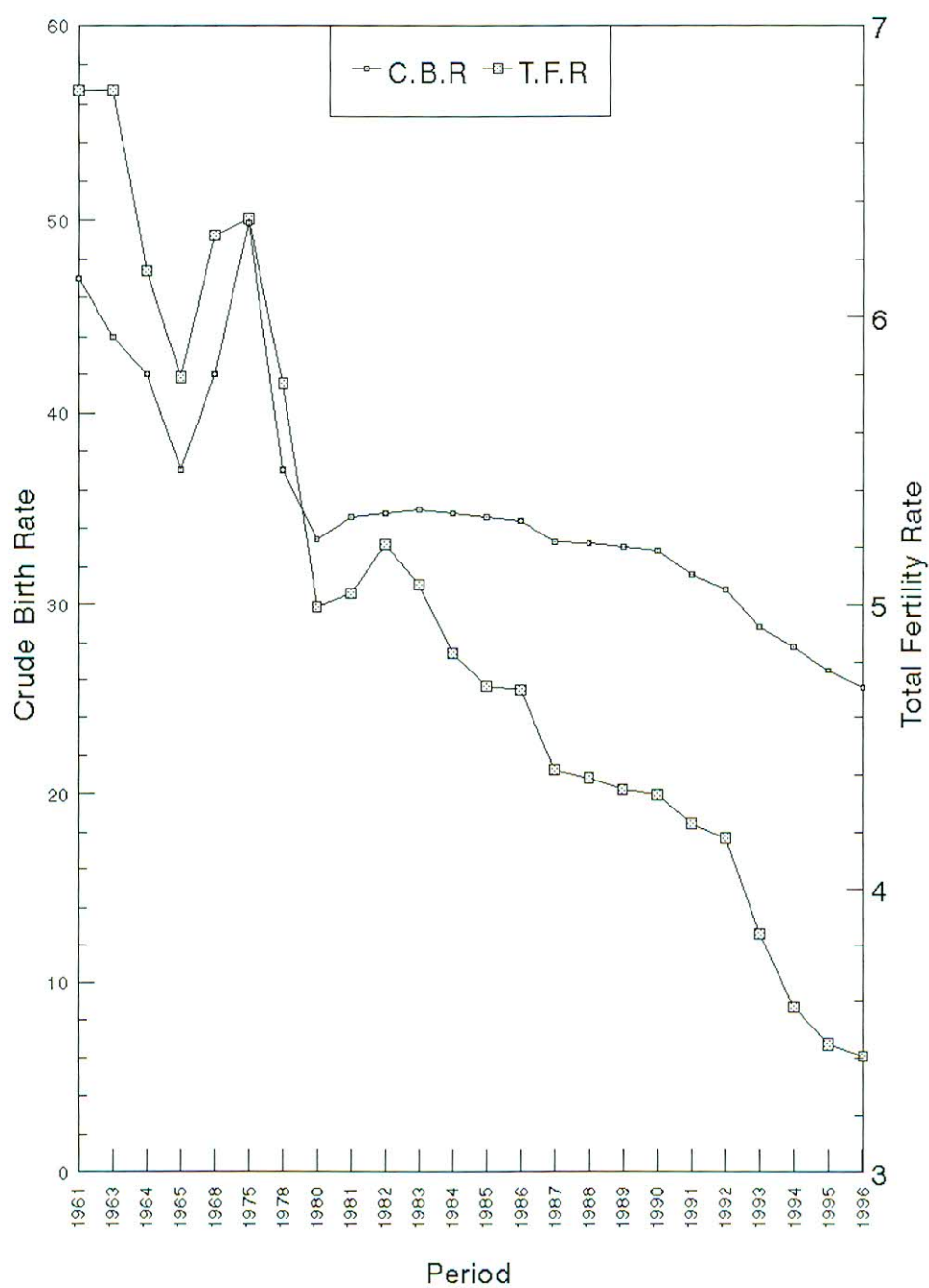


Fig 4.4 : Crude Birth Rate and Total Fertility Rate of Bangladesh, 1961-1996

Factors contributing to the persistence of high fluctuating levels of fertility are complex. Although family planning programmes have been operating in the country since mid 1960s their effect on fertility has so far been negligible. It may also be noted that early 1970s were punctuated by a series of political and economic crises which hindered widespread implementation of the family planning programme. The slight decline of fertility in 1972 as reflected in the CRL data could have been occasioned by the unsettled conditions and disruption due to war of liberation.

Table-4.13
Crude Birth Rates and Total Fertility Rates, in the DSS area of CRL , 1966-1996

Year ^a	Crude Birth Rate			Total Fertility Rate		
	OTA ^b		NTA ^c	OTA ^b		NTA ^c
1966-1967	46.8		--	6.7		--
1967-1968	45.2		--	6.4		--
1968-1969	46.4		44.9	6.7		6.7
1969-1970	45.2		44.0	6.6		6.5
1970-1971	43.6		44.8	6.4		6.6
1971-1972	44.5		43.8	6.5		6.4
1972-1973	41.8		41.8	6.1		6.1
1973-1974	47.8		46.6	7.2		7.2
1974 ^d	--	42.9	--	--	6.5	--
1975 ^d	--	29.4	--	--	4.3	--
1976 ^d	--	43.3	--	--	6.2	--
1977 ^d	--	46.4	--	--	6.7	--
1978 ^d	--	34.8	--	--	5.0	--
1979 ^d	--	40.9	--	--	5.9	--
1980 ^d	--	41.2	--	--	5.9	--
1981 ^d	--	39.5	--	--	5.5	--
1982 ^d	--	40.7	--	--	5.6	--
1983 ^d	--	38.3	--	--	5.3	--
1984 ^d	--	34.0	--	--	4.5	--
1985 ^d	--	38.5	--	--	5.2	--
1986 ^d	--	36.5	--	--	4.9	--
1987 ^d	--	36.4	--	--	4.8	--
1988 ^d	--	35.5	--	--	4.5	--
1989 ^d	--	32.4	--	--	4.1	--
1990 ^d	--	32.9	--	--	4.1	--
1991 ^d	--	29.0	--	--	3.6	--
1992 ^d	--	28.2	--	--	3.5	--
1993 ^d	--	27.0	--	--	3.3	--
1994 ^d	--	27.6	--	--	3.4	--
1995 ^d	--	26.5	--	--	3.2	--
1996 ^d	--	24.5	--	--	3.0	--

Sources: (a) Demographic Surveillance System-Matlab, Vol-3, 4, 5 & 6,
(b) Demographic Surveillance System-Matlab, Scientific Report No-67, 68, 69,
70, 71, 72, 73, 74, 75, 76, 77, 81, 82 ICDDR,B, Dhaka.

Note: a) Period from 1 May of a given to 30 April of the subsequent years.
b) Old vaccine trial area, population about 112,000.
c) New vaccine trial area, population about 109,000.
d) Calendar year; DSS data for a population of about 260,000-208552.

Return to normalcy after the war and the upsurge in marriages and family building can be gleaned from the rise in the crude birth rate in 1973. The 1975 birth rate, however, declined substantially to 29.4 as a result of harsh economic conditions and consequent famine which swept the Matlab area and other parts of Bangladesh following the floods which damaged the main *aman* rice crops in 1974 (Chen et al., 1977, Ruzicka et al., 1978). This fertility situation was transient because fertility has rebounded to the level that prevailed in the area in late 1960s.

One important aspect of research on fertility is the study of fertility differentials among various population groups such as inhabitants of rural and urban areas. Present discussion on differential fertility in Bangladesh is restricted to some important socio-economic variables such as rural-urban residence. Table-4.14 shows crude birth rates by residence during the period 1980-1996. It also shows that urban fertility tended to be lower than rural fertility. In most low fertility counties, urban fertility has been found to be lower than rural fertility.

Table-4.14
Crude Birth Rate(CBR) by Residence, 1980-1996

Year	National	Urban	Rural
1980	33.4	29.2	33.9
1981	34.6	24.8	35.7
1982	34.8	22.9	36.9
1983	35.0	27.1	36.4
1984	34.8	25.0	36.1
1985	34.6	28.0	35.3
1986	34.4	25.9	35.4
1987	33.3	24.8	34.6
1988	33.2	28.9	34.5
1989	33.0	24.4	34.3
1990	32.8	24.6	34.1
1991	31.8	23.9	32.9
1992	30.8	23.7	32.2
1993	28.8	21.0	30.0
1994	27.8	20.2	29.1
1995	26.5	19.4	28.5
1996	25.6	19.0	27.8

Source:- (a) Same as table-4.7

(b) 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka.

It is difficult to establish temporal trends in fertility as well as their determinants. It may be ascertained that fertility levels in Bangladesh have been relatively high and fluctuating within a relatively narrow range except in catastrophic situation such as wars and

famines. Prospects for a dramatic decline in the birth rate does not appear to be bright given the age structure of the population, the early age at marriage, universality of marriage and high traditional value given to childbearing and large families in the Islamic as well as the Hindu cultures. Slow pace of mortality decline, particularly the persistence of high infant and child mortality, does not provide a strong incentive for family limitation either. Fluctuations in birth rates at the high levels indicate forces operating that serve to compensate for the high mortality resulting from the recurrent epidemics, famines, and consequent worsening nutritional situations. Vigorous efforts by the Government of Bangladesh to control the present population growth and the emphasis of the population control programme on more effective approaches may bring about a more pronounced decline in fertility in the foreseeable future.

4.3.2 Trends in proportion old, vital rates and natural increase

The general demographic situation prevailing in Bangladesh which is presented in table-4.15. The proportion of old persons aged 60 and over is little over 3 percent. However, the birth rate pass through three categories, namely over 52, around 50 and less than 32 which indicates that moderate changes are taking place. It has been observed that the death rate declining gradually at the first site and then rising and again declining. The reason behind this, the natural increase accelerated due to the widening gap between the birth and death rates. It has been shown (Keyfitz, 1975) that older population is a function of rate of growth in a stable population. It is evident from the table that the percentage rate of natural increase showed a rising trend till 1961 except 1941, while after that period a declining trend was set in . However, naturally the growing rate of natural increase is a clear indicator of increasing aged population in Bangladesh.

Table-4.15
Proportion of age 60 and over, vital rates and rates of natural increase: Bangladesh, 1911-1991

Census year	Percent aged 60 and over	Average decadal		Percent rate of natural increase
		Birth rate	Death rate	
1911	4.4	52.9	46.3	0.66
1921	4.1	50.4	41.7	0.87
1931	3.2	52.7	37.8	1.49
1941	3.5	49.4	40.7	0.87
1951	4.4	51.3	29.7	2.16
1961	5.2	50.0	18.5	3.15
1974	5.7	47.4	19.4	2.80
1981	5.6	34.6	11.5	2.31
1991	5.4	31.6	11.0	2.06

Sources:- (1) Population Census of East Pakistan from 1901 to 1961, Research Monograph No. 2, ISRT, Dhaka University, Dhaka.

(2) M.A. Sattar (1981). "Sex and Age Composition of the Population." Country Monograph, Series No. 8. Population of Bangladesh. United Nations, ESCAP, Bangkok, Thailand.

(3) Bangladesh Population Census, 1981 and 1991, National Series, Bangladesh Bureau of Statistics, 1984, 1994, P-21&25.

4.3.3 Patterns of Fertility

4.3.3.1 Age-Specific Fertility Rates (ASFR)

A detailed and more meaningful analysis of the pattern of fertility in a population is provided by the fertility rates calculated for various ages. ASFR can be calculated separately for each age or for any convenient age groups. Set of fertility rates calculated by single years is too detailed and clumsy for comparative purposes and is affected by the misreporting of age of mothers. It is the ASFRs in quinquennial age groups that are more commonly used in demographic literature.

4.3.3.2 Total Fertility Rate (TFR)

Total fertility rate summarizes the pattern of fertility exhibited by the age-specific fertility rates and presents a single index of total fertility.

Age-specific fertility rates and total fertility rates for Bangladesh at various periods between 1953-1996 are given in table-4.16. The data coming from a variety of sources, are often fragmentary and in certain instances represent estimates of uncertain reliability.

This has to be borne in mind when comparisons are attempted and conclusions drawn as to the change in fertility over time. In the second column of table-4.16, the total fertility

rate is given, which may serve as an indicator for trend analysis. The evidence seems to suggest that in the 1950s and 1960s, total fertility rate, that is, the number of children a woman would bear during her reproductive life if the age-specific fertility rates at each age remained constant over time, was within the range of 3.4 to 7.4 children. The only two sets of nationwide data for the 1970s come from the BFS (1975) and the Retrospective Survey (1974). The former, which reflects fertility of the unsettled period of 1971-75, gives a total fertility rate of 6.3 children while the latter for 1973-74 presents a rate of 7.1 children. It is possible that the decline of about 13 percent is accounted for by the disruption to family life and family formation during the war of liberation of 1971 and the famine of 1974-75 rather than to deliberate and wide spread fertility control.

Table-4.16
Trends in Age-Specific Fertility Rates(ASFR) and Total Fertility Rates(TFR), 1953-1996

Year	TFR	Age-specific fertility rate (per 1000 women)						
		15-19	20-24	25-29	30-34	35-39	40-44	45-49
1953-56 ^a	7.35	292.0	372.0	337.0	246.0	152.0	70.0	--
1957-60 ^a	6.43	305.0	301.0	280.0	206.0	123.0	48.0	17.0
Demographic Survey in East Pakistan								
1960-61	6.61	234.0	337.0	280.0	258.0	161.0	34.0	18.0
Population Growth Estimation (PGE)								
1963	6.78	230.2	322.7	327.2	266.9	149.9	47.9	12.0
1964	6.16	235.7	303.1	315.6	185.6	138.0	46.6	7.4
1965	5.79	217.2	282.7	290.8	208.4	100.0	48.8	10.8
1963-65	6.28	229.5	303.2	313.1	221.2	128.8	48.1	12.8
National Impact Survey								
1966-68	6.02	252.0	301.0	250.0	198.0	126.0	37.0	3.0
1967-68	6.28	225.4	341.0	269.2	232.9	143.9	39.8	4.2
Bangladesh Fertility Survey								
1971-75	6.34	109.0	288.6	291.1	250.2	184.8	107.4	34.7
1974-76	6.34	186.0	322.0	300.0	227.0	148.0	69.0	16.0
1989	4.89	142.2	259.9	225.4	164.2	114.1	55.5	17.6
Bangladesh Retrospective Survey of Fertility and Mortality								
1973-74	7.07	198.0	337.0	311.0	262.0	197.0	95.0	14.0
Bangladesh Demographic Pilot Survey, BBS.								
1978	5.93	124.0	256.0	229.0	304.0	119.0	110.0	38.0
Base Line Demographic Survey, (BLDS),BBS.								
1980	4.99	121.4	243.5	227.8	194.7	126.8	59.7	24.8
Vital Registration System, (VRS), BBS.								
1981	5.04	133.0	275.5	238.4	166.7	129.6	46.5	18.5
1982	5.21	121.8	269.1	253.8	193.0	128.5	57.3	18.9
1983	5.07	91.0	267.0	271.0	193.0	134.0	44.0	11.0
1984	4.83	103.0	255.0	235.0	182.0	130.0	42.0	19.0
1985	4.71	89.0	285.0	246.0	180.0	113.0	42.0	14.0
1986	4.70	85.0	265.0	247.0	177.0	110.0	40.0	15.0
1987	4.42	86.0	247.0	243.0	161.0	105.0	31.0	10.0
1988	4.39	78.1	248.0	243.6	153.4	100.3	37.9	17.2
1989	4.35	80.1	244.7	225.6	157.8	107.2	37.2	14.8
1990	4.33	79.0	240.1	233.3	158.1	108.7	34.2	12.0
1991	4.24	77.6	236.2	228.6	154.2	103.9	33.9	11.7
1992	4.18	75.0	232.0	232.0	152.0	103.0	32.0	10.0
1993	3.98	60.0	228.0	214.0	152.0	103.0	27.0	7.0
1994	3.58	56.0	205.0	207.0	126.0	98.0	18.0	6.0
1995	3.45	54.0	201.0	204.0	121.0	90.0	15.0	5.0
1996	3.41	52.0	199.0	203.0	120.0	86.0	14.0	5.0

Sources:(a) M, Obaidullah, Demographic Survey in East Pakistan, 1961-62, Dhaka, ISRT,
 (b) Final Report of the Population Growth Estimation, 1962-1965,
 (c) Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality, Dhaka,
 (d) 1992, 1997 Statistical YearBook of Bangladesh, BBS, Dhaka, p-53, Table-2.22 & p.36.

Note: (a) T.P. Schultz and J. Da Vanzo, Analysis of Demographic Change in East Pakistan (AID, 1970).

A closer inspection of the age-specific fertility rates indicates that more notable reductions in fertility were probably restricted to the age groups 10-14 and 15-19 years.

Two circumstances may have contributed to such reductions:-

- (i) The shift in the average age at marriage from about 14 to 16 years with the corresponding changes in the proportions of married women in the two age groups;
- (ii) Increased sub-fecundity of the younger wives possibly associated with the nutritional status.

The first point was documented by D'Souza and Rahman (1978) in a comparison of proportions never married by age as obtained from various censuses and surveys.

The age pattern of fertility can be studied with reference to age-specific fertility rates (ASFRs) as well as age specific marital fertility rates (ASMFRs). In table-4.17 are presented the age-specific fertility rates per 1000 women by residence, 1980-1996. The Bangladeshi fertility curve more or less conforms to the broad peak type. It will be seen that ASFRs, are the highest in the age-groups 20-29 for rural as well as urban Bangladesh and that there is a steady decline in these rates after the age 35. Thus in Bangladesh, child-bearing starts at an early age, and continues at a substantially high level until the age 35-39. The shape of the age-specific curve is determined, among other factors, by the female age at marriage, the incidence of widowhood, divorce and separation among women in reproductive age, the extent of the use of birth control methods and the age pattern in the use of such methods.

Table-4.17
Age-Specific Fertility Rates per 1000 Women by Residence, 1980-96

Year	TFR	Age-Groups						
		15-19	20-24	25-29	30-34	35-39	40-44	45-49
National								
1980	4.99	121	243	228	195	127	60	25
1981	5.04	133	275	238	167	130	47	19
1982	5.21	122	269	254	193	129	57	19
1983	5.07	91	267	271	193	134	44	11
1984	4.83	103	255	235	182	130	42	19
1985	4.71	89	258	246	180	113	42	14
1986	4.70	85	265	247	177	110	40	15
1987	4.42	86	247	243	161	105	31	10
1988	4.39	78	248	244	153	100	38	17
1989	4.35	80	245	226	158	107	37	15
1990	4.33	79	240	233	158	109	34	12
1991	4.23	78	236	229	154	104	34	12
1992	4.18	75	232	232	152	103	33	10
1993	3.96	60	228	214	152	103	32	7
1994	3.58	56	205	207	126	98	27	6
1995	3.45	54	201	204	121	90	18	5
1996	3.41	52	199	203	120	88	15	5
Rural								
1980	5.13	126	250	230	201	133	61	25
1981	5.28	141	290	248	174	135	48	20
1982	5.50	130	285	266	203	135	61	19
1983	5.36	97	284	286	204	143	47	10
1984	5.08	108	268	248	192	137	44	21
1985	4.91	94	268	255	186	118	46	15
1986	4.89	91	275	258	184	114	41	16
1987	4.65	94	259	257	168	110	31	10
1988	4.65	85	262	256	161	107	41	18
1989	4.59	87	259	239	166	113	39	15
1990	4.57	86	255	247	164	115	35	12
1991	4.48	85	250	242	160	113	34	12
1992	4.33	80	244	237	157	111	29	11
1993	4.00	66	227	216	144	112	25	8
1994	3.79	60	214	211	136	108	23	6
1995	3.78	58	212	210	134	104	21	7
1996	3.76	56	210	208	132	102	21	7
Urban								
1980	3.87	88	200	210	137	74	42	23
1981	3.20	76	176	163	108	78	34	4
1982	3.01	60	155	161	113	71	26	4
1983	3.45	61	176	189	135	86	26	17
1984	3.10	70	173	151	116	80	21	4
1985	3.52	63	193	181	138	86	29	14
1986	3.26	47	186	172	126	75	32	13
1987	3.05	44	175	164	121	71	22	13
1988	2.90	43	172	168	110	59	18	8
1989	2.89	42	167	147	114	67	27	12
1990	2.95	40	160	156	127	70	29	9
1991	2.88	39	159	155	126	67	28	8
1992	2.88	37	157	156	125	66	28	8
1993	2.62	28	150	151	125	52	15	6
1994	2.58	25	150	148	123	53	12	5
1995	2.50	24	142	142	121	51	12	5
1996	2.48	24	141	140	121	50	12	5

Sources:-(a) 1990 Statistical YearBook of Bangladesh, BBS, Dhaka, p-60, Table-2.26,
(b) 1992, 1997 Statistical YearBook of Bangladesh, BBS, Dhaka, p-54, Table-2.23 and p.37.

4.4 Differentials in Fertility

4.4.1 Urban-Rural Residence

Children ever born to ever-married woman varies only marginally between urban and rural populations. Even the largest difference detected in the four sets of data given in table-4.18 was less than 10 percent. Actually, for many reasons, one would expect a

greater difference between urban and rural fertility as well as a more dramatic change over time.

Table-4.18
Children Ever-born Per Ever-married Women by Urban-Rural Residence, 1974-1989

Age group	BRSFM 1974		Census 1974		BFS 1975		BFS 1989	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
15-19	0.7	0.6	0.7	0.7	0.5	0.9	0.7	0.7
20-24	2.0	1.9	1.8	1.9	2.1	2.4	1.7	1.9
25-29	3.4	3.5	3.1	3.3	3.9	4.3	3.0	3.2
30-34	4.8	5.0	4.3	4.6	5.5	5.7	4.0	4.7
35-39	5.9	5.9	5.2	5.6	6.6	6.7	5.1	5.8
40-44	5.8	6.2	5.3	5.9	6.7	7.1	6.1	6.7
45-49	5.8	6.1	5.4	6.0	7.0	6.7	7.2	7.3

Sources:-(a) Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality, Dhaka, p-114,

(b) Bangladesh Population Census 1974, National Volume, p-583,

(c) Bangladesh Fertility Survey 1975, First Report, Ministry of Health and Population Control, Bangladesh,

(d) Bangladesh Fertility Survey 1989, First Report, NIPORT, Dhaka.

The better educated, higher income groups are concentrated in the urban areas. Any incipient change in reproductive as well as social behaviour such as increased age at marriage, changing role of women and their investment in economic activities outside the home, desire for smaller families and higher aspirations for one's children, for whom better education is provided, often at great cost, all are likely to be first detected in the urban environment. Progress in the urban society is likely to be at a faster pace than in the rural areas.

4.4.2 Education

It has been widely observed that higher educational achievements especially of females tend to reduce fertility levels. It is true for both urban and rural areas. Improvement of educational levels in a population affects fertility because of an increase in the value of two intermediate variables viz. age at marriage and proportion of those who marry, as well as in the attitude regarding the number of children desired and in the acceptance of family planning methods.

Table-4.19 shows the average number of children born alive as reported by ever-married women in the 1974 census according to age and women's education.

Table-4.19
Reported Average Number of Children Born alive to Evermarried
Women by Educational Level and Broad Age Groups, 1974

Educational level and Age group	All areas	Urban	Rural
No schooling	3.9	3.5	3.9
Less than 25	1.2	1.2	1.2
25-34	3.8	3.6	3.9
35-44	5.6	4.5	5.6
45+	5.3	4.4	5.3
Primary	3.4	3.8	3.3
Less than 25	1.3	1.5	1.2
25-34	4.1	4.1	4.1
35-44	6.1	6.0	6.1
45+	6.1	5.7	6.2
Secondary and Over	2.6	2.9	2.4
Less than 25	1.1	1.3	1.0
25-34	3.5	3.4	3.6
35-44	5.6	5.3	5.8
45+	5.7	5.3	5.9
Not reported	3.4	3.6	3.4
Less than 25	1.2	1.4	1.2
25-34	3.9	3.8	3.9
35-44	5.8	5.6	5.8
45+	5.5	4.9	5.6

Source:- 1980 Statistical YearBook of Bangladesh, BBS,Dhaka, p-70, Table-2.50.

The average number of children born alive to women aged 45 and over with some primary education was 6.1, compared with 5.3 children born to women with no schooling and 5.6 to women with secondary and higher levels of education.

The difference could be attributed to many behavioral causes, such as differentials in age at marriage, probability of marriage breakdown, higher probability of using contraception for birth spacing, family size limitation etc., but also to more accurate reporting by the women with some education and higher survival rates of their children.

Secondary education did have a slight depressing effect on fertility. This was also confirmed by the findings of BFS in table-4.20. From the association between education and age at marriage, and between marriage duration and fertility in a non-contracepting society, it is obvious that the differentials between the parities of women of various educational subgroups must be qualified in terms of differential exposure to childbearing. Less than 5 percent of the respondents interviewed in BFS went to school for more than five years.

Their age at marriage was on the average about two years higher than that of their less educated peers. It was less likely that their marriage would be dissolved by divorce: 24 percent of first marriages of women with no schooling were dissolved by divorce in contrast to 9 percent of those with higher than primary education. Although they married somewhat later in life, their marital and reproductive life cycle was not likely to be interrupted by a marriage breakdown (WFS, op. cit., p-53, 57 & 67).

Table-4.20
Average Parity by Education and Current Age of Women, 1989

Current age	All women	Level of education			
		No schooling	Primary	Secondary	Higher
Less than 20	0.73	0.78	0.63	0.79	0.54
20-24	1.92	2.02	1.89	1.86	1.46
25-29	3.21	3.29	3.45	3.07	2.65
30-34	4.69	4.89	4.71	4.43	3.59
35-39	5.82	5.87	6.27	5.43	4.38
40-44	6.65	6.62	7.12	6.22	6.26
45-49	7.29	7.29	7.39	7.21	6.73

Source:- Bangladesh Fertility Survey 1989, Analytical Tables, NIPORT, Dhaka, P.A42-43, Table-2.7(A)-7(B).

4.4.3 Religion

Religion is another important factor in fertility differentials in Bangladesh. In many societies, religion plays an important part in determining behaviours. In Bangladesh, majority of the population is Muslim, and the second largest single group is Hindu. Both groups place a high value on children and, in particular, have a strong preference for sons. It is, thus, not surprising to find only marginal differences in average parities between Muslims and non-Muslims shown in table-4.21. The age-standardized mean number of children everborn was 4.0 for Muslims in 1975 and 2.9 in 1989 and 3.9 for non-Muslims in 1975 and 2.7 in 1989.

Table-4.21
Mean Parity by Age of Wife and Religion, BFS 1975 and BFS 1989

Current age	BFS 1975			BFS 1989		
	All	Muslim	Non-Muslim	All	Muslim	Non-Muslim
Less than 20	0.7	0.7	0.8	0.7	0.6	0.7
20-24	2.4	2.5	2.3	1.6	1.6	1.5
25-34	4.8	4.9	4.5	3.0	3.1	2.9
35-44	6.9	6.9	6.8	4.4	4.7	4.0
45+	6.8	6.9	6.1	4.9	5.2	4.6
Total	4.0	4.0	3.9	2.8	2.9	2.7

Source:- Bangladesh Fertility Survey 1975, 1989, Main Report, Dhaka.

4.4.4 Husband's Occupation and Education

Women whose husbands have white collar occupations tend to have lower than average fertility in most societies. This, by and large, also applies to Bangladesh, as BFS indicates in table-4.22. When a dichotomy was made between husbands in agricultural and non-agricultural occupations, non-agricultural workers clearly manifested lower parities. Within agricultural sector, there was little difference between the share croppers and land owning farmers, but the landless agricultural workers appeared to have the lowest fertility within this sector. It is the husband's education that often determines the social status of the family. Education is not universal in Bangladesh and, in particular, the better educated males belong to the upper socio-economic stratum in the society. The better educated males exhibit a smaller family size which is well marked for husbands with higher than secondary education.

Table-4.22
Mean Parity by Wife's Current Age and Husband's Education and Occupation, 1989

Wife's Current Age								
	Less than 20	20-24	25-29	30-34	35-39	40-44	45+	Total
Husband's education								
All	0.73	1.92	3.21	4.69	5.82	6.65	7.29	3.73
No schooling	0.78	2.02	3.29	4.89	5.87	6.62	7.29	3.97
Primary	0.63	1.89	3.45	4.71	6.27	7.12	7.39	3.78
Secondary	0.79	1.86	3.07	4.43	5.43	6.22	7.21	3.15
Higher	0.54	1.46	2.65	3.59	4.38	6.26	6.73	2.93
Husband's occupation								
All	0.72	1.62	3.0	4.25	5.40	6.56	7.52	3.67
Unclassified	0.76	2.12	3.26	4.97	5.43	6.98	7.78	3.57
White collar	0.73	1.92	3.21	4.70	5.78	6.58	7.36	3.62
Cultivator: Own land	0.78	1.96	3.24	4.79	6.18	6.82	7.19	4.25
Cultivator: Share cropper	0.64	2.02	3.40	5.08	5.98	7.13	7.27	3.92
Landless agriculture worker	0.82	1.92	3.23	4.54	5.89	6.26	7.70	3.58
Other occupation	0.39	1.47	2.89	4.37	5.37	5.69	6.65	3.02

Source:- Bangladesh Fertility Survey 1989, Analytical Tables, NIPORT, Dhaka, P.A46-47, Table-2.7(E).

4.4.5 Respondent's Work Experience

It was found in many surveys that women who have worked outside their home often have lower fertility than those who have not worked at all. This is confirmed by BFS shown in table-4.23. At all ages, women who had ever worked for salary or wages or were engaged in other gainful pursuits had lower average parity than those who had solely attended to their domestic duties.

This association, however, is not simple and straightforward. In the traditional, rather conservative society like Bangladesh, the small proportion of women who work outside their home are either the poorest ones who have to supplement the family income by their earnings, the widowed and divorced women who did not or could not remarry, or, in contrast, the small minority of the better educated, often professional women are predominately concentrated in the urban areas. R.H. Chaudhary (1978) found in a survey of 1,130 women in Dhaka that urban working women had fewer children than their counterparts who were not in any gainful occupation. In contrast, the family size of the better educated working wives did not differ significantly from that of non-working wives with a similar level of education, although both were much lower than the parities of illiterate or less educated women.

Table-4.23
Mean Parity by Respondent's Work Experience and Current Age, 1975 and 1989

Respondent's work status	Current age					
	Less than 20	20-24	25-34	35-44	45+	Total
BFS 1975						
All	0.7	2.4	4.8	6.9	6.8	4.0
Did not work	0.7	2.5	4.9	7.1	7.0	3.9
Worked	0.6	2.3	4.7	6.1	5.5	4.2
BFS 1989						
All	0.7	1.8	3.8	6.1	7.4	3.7
Did not work	0.7	2.0	3.9	6.2	7.3	3.8
Worked	0.7	1.7	3.6	6.0	7.5	3.7

Sources:-(a) Bangladesh Fertility Survey 1975, First Report, Ministry of Health and Population Control, Bangladesh,
(b) Bangladesh Fertility Survey 1989, First Report, NIPORT, Dhaka.

4.5 Crude birth rate, Total fertility rate and Aged population(60+)

The crude birth rate and aged population (60+) of Bangladesh during the year 1961-1996 are shown in table-4.24. And also the graphical representation is shown in Figure 4.5.

Table-4.24
Crude Birth Rate and Aged Population (60+) of Bangladesh, 1961-1996

Year	Crude birth rate	Aged population(60+)
1961	47.0	2.64
1966	38.3	3.06
1971	44.6	3.52
1976	45.6	4.28
1981	34.6	5.03
1986	34.4	5.53
1991	31.6	6.02
1996	25.7	6.51

Sources:- 1978, 1992, 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka.

From the Figure 4.5, it is seen that during the period 1961-1996 with the decline of crude birth rate, the aged population gradually increased. A straight line linear regression fitted to the data gives the following result.

$$X_1 = 10.818 - 0.165 X_2, \quad R^2 = 0.758$$

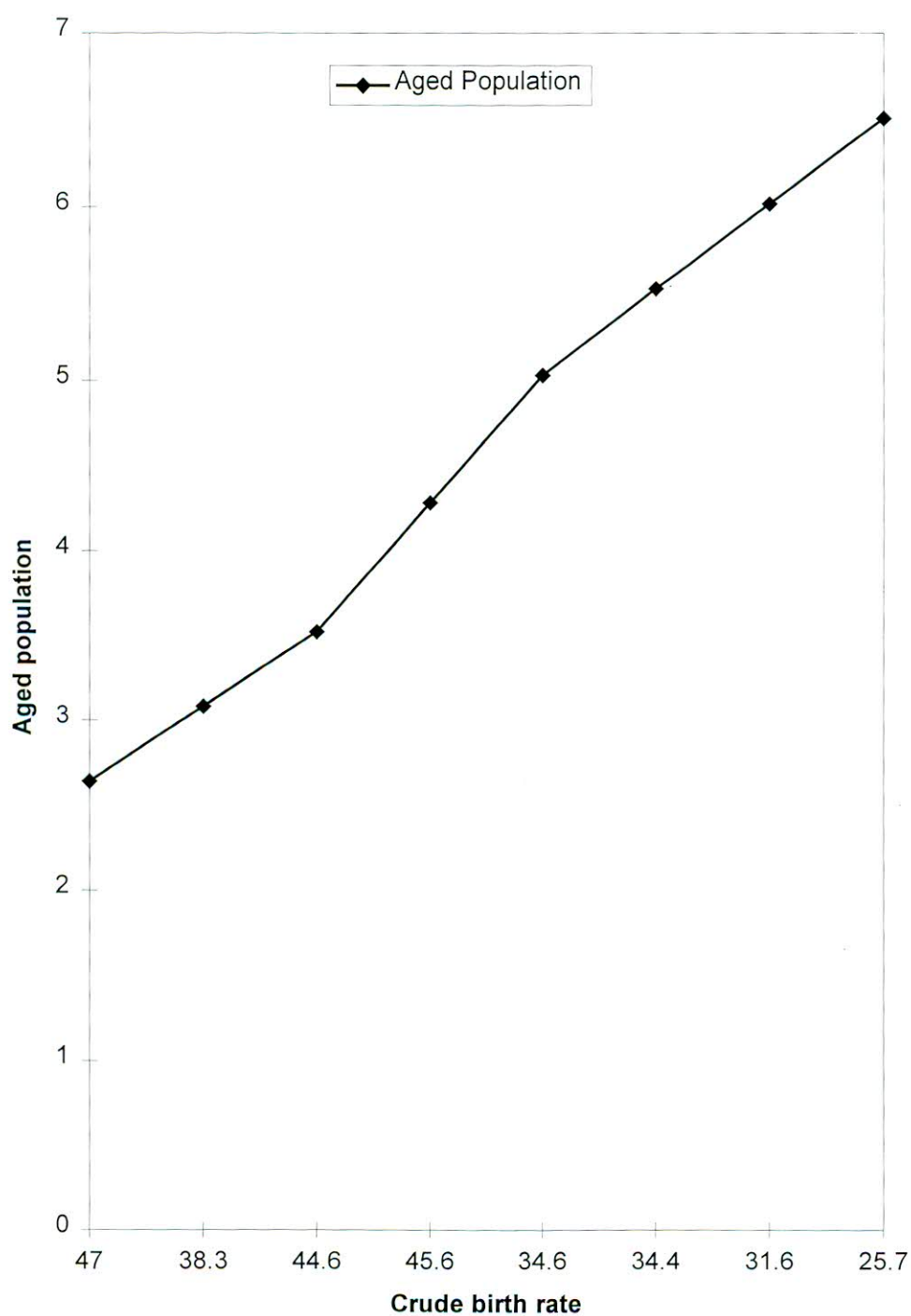
(1.463) (0.038)

Where X_1 = Aged population (60+)

X_2 = Crude birth rate

From the above results we observe that about 75.8 percent of the variation in aged population is expected by crude birth rate. The regression effect of crude birth rate on the aged population is estimated to be -0.165 which is significant at 1 percent level. This regression co-efficient indicates that if the crude birth rate decreases by 1 unit then the aged population would increase by 0.165 unit.

Fig 4.5 Crude birth rate and aged population (60+) of Bangladesh, 1961-1996



Again table-4.25 shows the total fertility rate and aged population(60+) of Bangladesh, 1961-1996 and also depict it on Figure-4.6.

Table-4.25
Total Fertility Rate and Aged Population (60+) of Bangladesh, 1961-1996

Year	Total fertility rate	Aged population(60+)
1961	6.78	2.64
1966	5.54	3.06
1971	5.59	3.52
1976	6.15	4.28
1981	5.04	5.03
1986	4.70	5.53
1991	4.23	6.02
1996	3.41	6.51

Sources:- Same as Table-4.16

From the graph it is observed that during the period 1961-1996 with the decline of total fertility, the aged population gradually increased. A straight line linear regression fitted to the data gives the following result.

$$X_1 = 10.875 - 1.214 X_4, \quad R^2 = 0.825$$

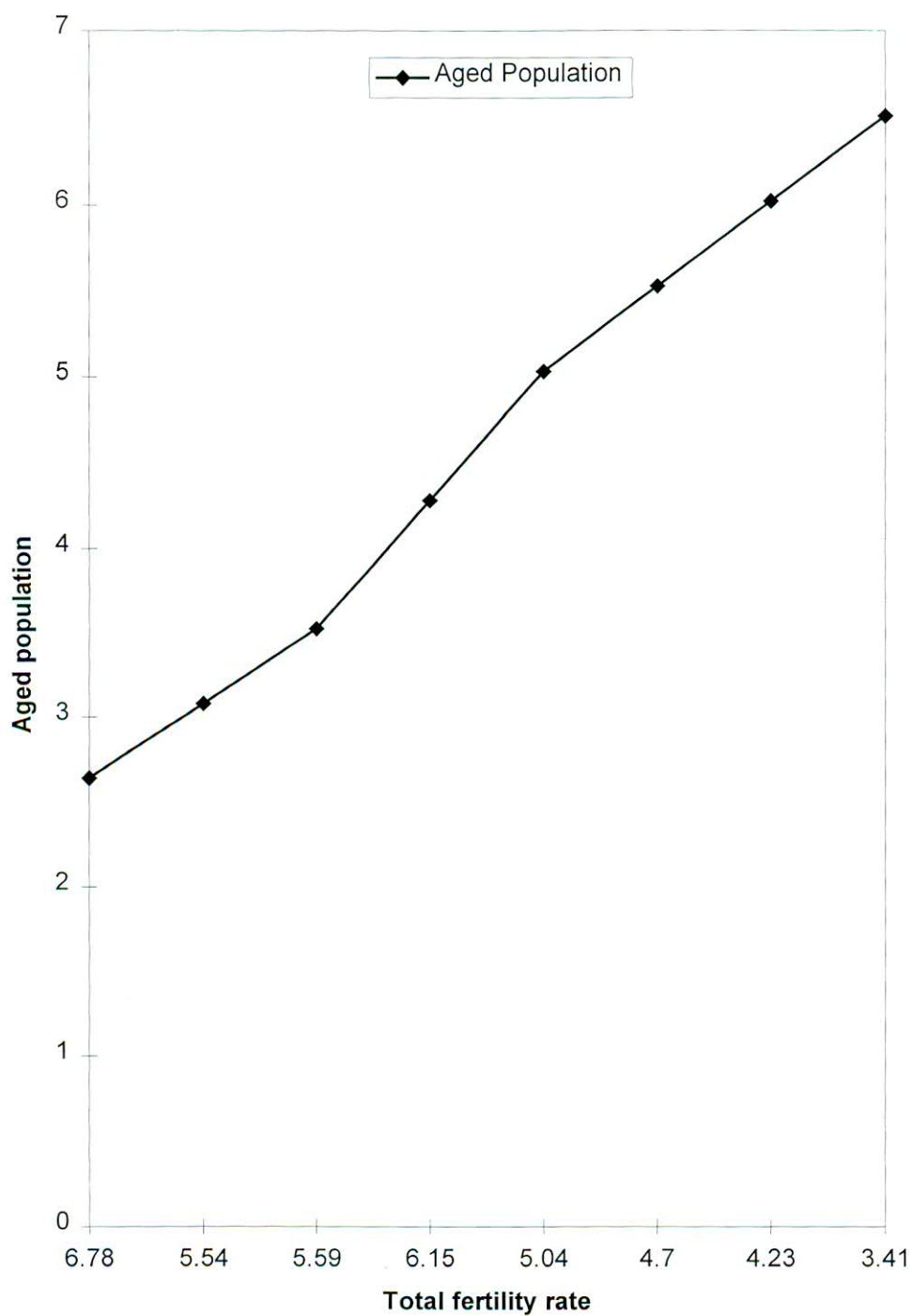
(1.205) (0.224)

Where X_1 = Aged population (60+)

X_4 = Total fertility rate

From the results we seen that about 82.5 percent of the variation in aged population is explained by total fertility rate. The regression effect of total fertility rate on aged population is estimated to be -1.214 which is significant at 1 percent level. This regression co-efficient indicates that if the total fertility rate decrease by 1 unit then the aged population would increase by 1.124 unit.

Fig 4.6 Total fertility rate and aged population (60+) of Bangladesh, 1961-1996



4.6 Conclusion

The study of fertility differentials among various societal groups is one of the most important aspects of the study of fertility. Knowledge of fertility in various population groups can help to formulate ideas regarding the expected growth and proportions of different groups in the population in the future. Knowledge about differential levels and trends among the subgroups and the expected proportions of the subgroups in the population in the future, can provide significant clues regarding the future fertility trends in the entire population. The identification of the high fertility groups and their causation would be of great utility to demographers, planners, policy makers, and administrators of family planning programmes. It is also useful for the planners and administrators to see where exactly the impact of family planning is the greatest in order to gain comprehension regarding its underlying causes, and to locate the groups with poor performance which would deserve greater attention.

From the above analysis it is clear that the elderly population of urban population Bangladesh is increasing very rapidly while the corresponding rural population is exhibiting a rather slow pace of growth. This calls for provisions to be made at the earliest for appropriate recreational and medical programmes to assist the senior citizens living in urban areas where the risk of death is apparently higher. Moreover, economic programmes must immediately be initiated to help the elderly in both urban and rural areas.

When a society gradually shifts from an agrarian to a more urbanized and industrial character, family structures also change from the extended to nuclear families including parents and unmarried children. The elderly are left to live by themselves, and to face health, psychological and economic problems on their own. The growing trend towards to nuclear families in future generations is also being observed in Bangladesh. Moreover, old age brings with it physiological deterioration. Thus, there is an obvious need for special geriatric care which could include medical care provided by general hospitals in geriatric clinics, as well as other low-cost or free medical care and preventive and curative services provided through other channels.

A review of the fertility differentials so far discussed reveals the existence of regional fertility differentials. However, what is crucially more important in the development

context, as shown in the present analysis, is the emergence of fertility differentials by rural-urban residence and by education of the wife in Bangladesh. Even the religious differences in fertility can be explained partly by the education of husband and wife. This has an important bearing on the future course of fertility in the country. The emergence of such fertility differentials is an indicator of the onset of declining fertility in Bangladesh. Experience of the developed countries also shows that it was the highly educated urban population which first began to show a reduction in fertility, and that pattern was later adopted more uniformly by other classes. In the light of these observations, the decline in fertility which has already set in has every potentiality for further acceleration with the growth of urbanization and education in Bangladesh.

It is possible that fertility levels in Bangladesh may rise further following the introduction of universal primary education because its fertility-reducing effect through raising age at marriage will be minimal and by espousing the younger generation to rudimentary rules of hygiene and better dietary habits, it may generate higher fecundity without influencing traditional family formation habits (Sultan, 1980). But if mass education is also introduced at this level of education where socio-economic disadvantages of having more children at the individual and family level will be taught, then people may be motivated to change their attitudes towards family size, which are formed early in life. Since the level of education in Bangladesh is very low to show significant effect on the level of fertility, further increase in the level of education in future, if continued to secondary or higher levels, may ultimately exhibit considerable impact on the level of fertility.

As noted in this discussion, fertility in Bangladesh has begun to decline, especially since 1960s with the intensification of the family planning programme in the country. Although a family planning scheme was introduced in Bangladesh in the early part of the 1960s, its impact on the rate of growth of population is not yet being felt to a great extent. Thus, more efforts and action in this direction are necessary to motivate people to have smaller families and extend more family planning facilities in order to abate the high rate of population growth in the country. Analysis of fertility differentials has also revealed the emergence of differentials in fertility by rural-urban residence and education.

According to the threshold hypothesis, in a developing country when fertility is initially high, improving economic and social conditions are likely to have little if any effect on fertility until a certain economic and social level is reached. Once that level is achieved, fertility is likely to enter a phase of decided decline and to continue downward until it is again stabilized at a much lower plane (UN, 1963). This theory provides a positive indication of the future prospects of fertility decline in Bangladesh. Moreover, the decline has also been associated with the emergence of fertility differentials by some development variables. This would account for the relevance of the development theory in the decline of fertility in Bangladesh.

According to some eminent demographers and sociologists, it is economic and social development which is primarily responsible for the reduction in the number of children desired and born per couple. The advocates of the development school of thought postulate with conviction that the best possible way to attack the runaway population growth in the developing countries is through economic development and social change. They believe that development is the best contraceptive, and question the usefulness of family planning programmes in bringing down the birth rate. According to them, there cannot be a separate population policy; it can exist only as a constituent element of socio-economic development policies. As people desire different numbers of children depending upon their background needs and socialization, problems of fertility control are intimately connected with the levels of development. According to Kingsley Davis, the conditions that cause births to be wanted or unwanted are beyond the control of any nation which relies on family planning alone as its population policy (Davis, 1967). The advocates of family planning believe with equal conviction in the efficacy of family planning programmes in the reduction of the birth rate and assert that with special programmes couples can be induced to adopt family planning despite the fact that they are rural, illiterate and poor (Donald, 1970). According to Berelson, it would be absurd to advocate development as a cure for high birth rates, because no one would worry about the birth rate if development is achieved (Berelson). Late marriage and celibacy were important factors of the decline in birth rates to a large extent in western countries during the period of demographic transition (Dixon, 1971).

In both these arguments, development appears to be viewed as a simple pill. Development is a much too complex phenomenon and should be viewed from its multiple and multi-dimensional facets. For the developing countries, development is still an evolving concept, and in transition may take on the several possible forms depending upon the background and emphasis. Apart from the general broad categories, there is no real index of development. A country which falls fairly high on one development variable may not be so on some other. In other words, development itself can be a fairly selective process, especially in its transitional stages.

It is unfortunate that advocates of development and family planning should appear to be competitive, when in fact they should be complementary. This statement will be best understood if we attempt to understand the role of each, development or family planning, in bringing about reduction in the birth rate (Rcle, 1975). There is ample literature to show that economic and social development normally creates the need, or goal for a small family. In the developed countries, individual couples responded to this goal, which they themselves perceived and defined, through a variety of means to control their family size. A family planning programme, however, typically provides the means to control the family size to couples who are normally motivated, or marginally motivated, to restrict their family size. It is not best suited to create the desire among couples to have a small family. Once the goal of a small family is created through the forces of economic and social development, family planning is likely to be most effective in providing the necessary means to the couples in achieving their goal of a small family. Since the roles of development and family planning programmes are different and distinct in bringing about reduction in fertility, they are more complementary than competing in the whole strategy of fertility control. Working together, economic and social development will create the demand or goal, for a small family, and family planning programme will supply the means to meet this demand and help in accelerating the decline in the birth rate. The pace at which some of the developing countries and territories of Asia; like Hongkong, the Republic of Korea, Singapore, Malaysia and Sri Lanka, have succeeded in reducing their birth rates in the recent past-under the joint influence of development and family planning programmes is unprecedented in history. They illustrate the supportive influence of the joint strategy, and show how even under moderate and selective

achievements of development, family planning programme can work as a catalyst to accelerating the decline of birth rate.

Induced abortion is not legalized in Bangladesh for termination of unwanted pregnancy excepting on health grounds. But informally people are compelled to induce abortion for the sake of prestige and position in the society to avoid illegitimate pregnancy (Sarker, 1981). In countries such as India, China and Japan where abortion is legalized for humanitarian, socio-economic grounds and for the failure of contraceptives, population growth is comparatively lower. So, the Government of Bangladesh might think for the adoption of a policy about the legalization of abortion only for the married couples who wish to terminate pregnancy because of failure of contraceptives.

The importance of social development which implies increasing literacy and educational attainment, higher age at marriage, rural development and acceptance of family planning cannot be denied. These developments, in turn, would induce a fertility decline.

CHAPTER-V

DETERMINANTS OF MORTALITY TRANSITION

5.1 Introduction

Mortality is considered to be one of the components of population change. But for most of the underdeveloped countries of the world the analysis of the future of mortality-levels, patterns and differentials, presented special problems owing to the inadequacy of basic data usually collected by two traditional sources of demographic estimation: Vital registration system is nonexistent in most of the underdeveloped or developing countries or even if it exists the data it produces are severely flawed, and population censuses; being second component of traditional demographic estimation input are also far from yielding perfect data.

Some studies have indicated that changes in overall mortality have occurred and consequently child (from age one to five) mortality level has been declining since mid 1975. But the level is still considered to be very high as compared to many developing countries. D'souza and Chen (1980), Mojumder (1989), Koenig and D'Souza(1986), Nadarjah (1983) etc. have reported that mortality rate for female children is higher than that for male children. Cochran (1980), Caldwell and McDonald (1981), Bairagi (1980), have found negative relationship between maternal education and child mortality.

Caldwell (1979) and Preston (1978) have argued that advances in female education represent a potent and cost effective means of reducing infant and child mortality.

D'Souza and Bhuiya (1982) and Behm (1991) have found that father's education is strongly associated with the child's probability of dying and therefore a significantly

greater risk always persists for the children of those fathers who have no or little education. UN(1985; 1991) reported that children of professionals and white-collar workers tend to have lower mortality, and children of production workers and workers in the agricultural sectors have the highest mortality risks.

Hobcraft et al.,(1984) have found that death rates between one to five years tend to be lower in urban than in rural areas, and lowest of all in metropolitan areas. World Bank(1980), Rosenzweig and Schultz(1982), Kabir and Moslehuddin(1987), UN(1985), Ahmed(1986) etc. also found similar areal differentials. They explained that the lower mortality in the urban areas is associated with the availability and accessibility of health care services, improved socio-economic status, better environmental and housing conditions and other development facilities. The quality of the dwelling place is an important factor which influences the infant mortality. The quality of water used by the household, the quality of house building materials, the type of lavatory facilities and the method of refuse disposal show the expected association with child mortality. They directly affect contamination of the household environment and this may facilitate the dissemination and incidence of various infectious diseases particularly diarrhoea(UN, 1991).

Merrick(1983) in Brazil showed poor sanitary conditions and lack of electricity proved to be connected with child mortality even after controlling for geographical and socio-economic variables(UN, 1991; Motin et al., 1983). Generally speaking, poor housing reflects a rural, marginal residence, low income and disadvantaged social class. Religion and ethnicity of the parents reveal strong association with child mortality, which persists when the effects of other factors are controlled(UN, 1991). UN(1985) study shows that ethnic differentials in child mortality are of considerable size in 11 countries, mainly in Africa and Asia.

Level of maternal morality is an important indicator of the status of maternal deaths. Maternal morality is still considered to be high in Bangladesh with about 6-8 per thousand live births. Each year in Bangladesh around 30,000 women die from reproductive causes. Some 16-25% of the maternal deaths are due to abortions, generally septic abortions. Another 20% is because of eclampsia (convulsive condition during

pregnancy resulting in death). A further 5-10% is due to post-partum sepsis and another 5-10% to tetanus. The remaining major causes are bleeding, prolonged labour and violent deaths. Different conventional measures of mortality are described in this chapter (Kabir, et al., 1994). A number of factors are responsible for the higher maternal mortality: young age and frequent pregnancies being the main factors. Besides, poor health and inadequate health services make each pregnancy dangerous, and many pregnancies multiply that risk. Reliable measures of maternal mortality and its causes and determinants are crucial for the successful implementation of maternal and child health programmes (Khan, et al., 1986). However, there is limited information on pregnancy related mortality in Bangladesh. During 1950s and 1960s, some urban based hospital studies found maternal mortality which varied from 200 per 10,000 live births to 340 per 10,000 live birth (Khan, et al., 1986). In Matlab thana, a rural area of Bangladesh for example; the overall maternal death rate is 570 per 1,00,000 live births but reached even higher levels in the 15-19 age group (740 per 1,00,000 live births); a rate almost 50 times greater than in developed countries (Chen, et al., 1974). Mortality in Bangladesh and the trend in infant mortality have considerable implications for the overall growth rate of the country. It has been found that 15 to 20 percent or more of the live births die before completing their first age of birth (Abjad et al., 1995).

Infant mortality- that is mortality during the first year of life- has traditionally been considered an important indicator for describing mortality conditions, health progress and indeed, the overall social and economic well being of a country. It has been increasingly realized, however, that for several reasons, child mortality- that is mortality from age 1 to 4 - needs to be examined in addition to infant mortality (UNO, 1988). Infant and child mortality in Bangladesh have long been of interest to population researchers because of their apparent relationship with fertility and indirectly with the acceptance of modern contraception.

During 1921-51, mortality level was about 40 per thousand, while the period 1951-61 recorded a rapid change in overall mortality level, and CDR was around 20 per thousand in 1962. Since 1965, a downward trend in mortality has been found. The general improvement in medical technology, availability of health care services and eradication

of malaria and other contagious diseases may be cited as the reasons for low crude birth rate. However, the rate has been reversed due to devastating cyclone in November 1970 and the War of independence (1971) which took a heavy toll of lives(UN,1981).

5.2 Trends and Levels of Morality

Crude death rate (CDR) is the commonest and most widely used measure of mortality. It is a measure of mortality, describing the frequency with which death occur in a population in a specified period. It is simply expressed as the rate of deaths during a time interval to the average (or the mid year) population. Table-5.1 presents the crude death rate from 1881 to 1991 of Bangladesh and it is also shown graphically in Figure-5.1.

Table-5.1, reveals that mortality in the area has undergone two distinct phases of change. The first phase was a period of slow decline that began in the mid and late 1920s (Mitra 1979) and continued until about 1970 with a temporary halt and possibly even a reversal during the 1940s because of the famine (1943) and the effects of partition (1947) (Robinson 1967). Death rate dropped gradually from around 40, a level which prevailed at the turn of the century; to about 30 in the 1950 decade. The pace of the decline accelerated after 1950 and the crude death rate was around 20 in 1962. There is some evidence suggesting that mortality was further reduced during the period 1965-1969 (Khan 1973).

During the 1970s, the downward trend in the death rate was arrested and may have even been reversed for a number of reasons. The devastating cyclone in November 1970 and the war of independence that started in March 1971 took a heavy toll on the population. Official estimates put the civilian deaths during the wars as high as three million(Khan and Robinson). Following the liberation in December 1971, rehabilitation was disrupted by a major famine resulting from the fragile economic base, the poor transport and communication system and the inefficient food distribution. Although mortality rates at the national level during the war and the immediate subsequent years could only be speculated upon, it is suggested by the studies based on the DSS in Matlab thana of the then Cholera Research Laboratory (CRL) (Curlin et al., 1976) that the death rates rose abruptly, probably by as much as one third in 1971 and did not resume what may be considered the normal level before 1973.

While normalization proceeded, the monsoon flooding in 1974 triggered another disaster; the flood destroyed a large proportion of the *aus* and *aman* rice crops (Chen 1977). Crop failure led to unemployment in the rural areas as well as hoarding and escalation of rice prices and consequently a famine broke out in late 1974 and early 1975 throughout the country. The death rate in the Matlab thana rose sharply from 14.6 in 1973-74 to 20.0 per 1000 population in 1974-1975. There are indications of incipient reduction in late 1975 and early 1976. (Ruicka et al., 1978).

Table-5.1
Crude Death Rate (CDR) of Bangladesh, 1881-1996

Year	Source	Crude death rate per 1000 population	Year	Crude death rate per 1000 population
1881-1891	(Davis)	41.3	1984 VRS, BBS	12.3
1891-1901	„	44.4	1985 „	12.0
1901-1911	(BBS)	45.6	1986 „	11.9
1911-1921	„	46.3	1987 „	11.5
1921-1931	„	41.7	1988 „	11.3
1931-1941	„	37.8	1989 „	11.4
1941-1951	„	40.7	1990 „	11.3
1951-1961	„	29.7	1991 „	11.2
1961-1965	„	18.5	1992 „	11.0
1965-1974	„	19.4	1993 BDSR, BBS	10.0
1980-BLDS	„	10.2	1994 VRS, BBS	9.0
1981-VRS, BBS		11.5	1995 „	8.4
1982 „		11.9	1996 „	8.1
1983 „		12.3		

Sources: (a) 1990, Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.64, Table-2.31.

(b) 1992, 1997 Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.58, Table-2.28 & P.39.

Notes: Davis:- Kingsley Davis, The population of India and Pakistan, Princeton University Press, Princeton, 1951, p-36,

BLDS:- Bangladesh Line Demographic Survey,

VRS:- Vital Registration System, BBS.

Mortality decline has however been the important factor in triggering off the rapid growth of population in Bangladesh, as in many developing countries. The scattered estimates presented in table-5.1 suggest that crude death rate (CDR) has rapidly leveled off at or just above 10 in the 1980s. After 1980 crude death rate showed an uninterrupted declining trend. The same reduced to 8.1 in 1996 from 10.2 in 1980. Figure-5.1 shows the crude death rates from 1881 to 1996. The declining trend in mortality since 1920s is probably due to the health measures that were instituted and to some extent the improvement in living standards.

The fall in mortality level is usually assigned to the factors on prevention and control of communicable diseases like cholera, smallpox, typhoid, malaria and plague (UNFPA, No-19). At one time these diseases used to account for the highest proportions of deaths in Bangladesh.

Other infectious diseases such as dysentery, tuberculosis and parasitic infestations have been endemic almost throughout the country. Large-scale programs have been undertaken to reduce infant and child mortality by establishing maternity and child welfare institutions all over the country during the late 1960s. In 1968, the Ministry of health, with the assistance of the World Health Organization (WHO), launched a nationwide programme to eradicate smallpox. By 1970, the reported incidence of smallpox had fallen to undetectable levels. In early 1972, however, the return of infected refugees from India after the liberation war of 1971, reestablished endemic smallpox in the country. Nevertheless, the smallpox eradication programme was strengthened and by 1976 the country was declared free of smallpox. An anti-tuberculosis programme through vaccination with BCG has been in existence since the 1950s. The incidence of malaria has been controlled through a programme which aimed at eliminating the mosquito through repeated periodic checks of blood for causative parasites and to provide treatment for detected cases. Recently, however, malaria has reappeared as a result of a relaxation in the surveillance.

Diarrhoeal diseases are still prevalent, the most common being cholera and gastro-enteritis. They exhibit a seasonal pattern achieving their peak in March to April and in September to November, the latter coinciding with the monsoon floods. Mortality in childhood emanates from infectious diseases such as dysentery, or whooping cough, measles and diphtheria and often prove fatal when the child is poorly nourished (McCormack et al., 1973).

Death rates for years since 1980 obtained from the VRS, & BDSR, BBS data are given in table-5.2. The over all death rates for recent years seem to suggest a gradual decline in mortality.

Table-5.2
Crude Death Rate (CDR) Per 1000 Population By Residence in Bangladesh , 1980-1996

Year	National	Urban	Rural
1980 VRS, BBS	10.18	6.81	10.77
1981 ..	11.50	7.21	12.23
1982 ..	12.20	6.90	12.80
1983 ..	12.30	7.50	13.20
1984 ..	12.30	8.50	12.90
1985 ..	12.00	8.30	12.90
1986 ..	11.90	8.40	12.30
1987 ..	11.50	7.60	11.80
1988 ..	11.30	7.40	11.80
1989 ..	11.40	7.30	12.30
1990 ..	11.30	7.80	11.80
1991 ..	11.20	7.30	11.50
1992 BDSR, BBS	11.00	7.20	11.40
1993 ..	10.00	7.20	10.40
1994 VRS, BBS	9.00	7.10	9.30
1995 ..	8.40	6.20	8.20
1996 ..	8.10	6.50	8.8

Sources: (a) 1986, Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, p.57, Table 2.39

(b) 1992, 1997 Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.58, Table-2.28 & P.39.

5.3 Infant Mortality

Infant mortality rate (IMR) is a measure of mortality among infants. It is customarily defined as the ratio of the infant deaths (deaths in the first year of life) in an year to the number of births in that year, usually multiply by 1000. The importance of study of IMR is obvious because of several reasons. At first, the IMR is one of the most sensitive indicators of the medical and health facilities in a population. Second, it measures the mortality in that segment of the population where it is extremely high and to which the expectation of life at birth is very sensitive. Third, any reduction in mortality in general affects, first and to a greater extent, the IMR and it is through this that it influences the age distribution.

5.4 Trend in Infant Morality

Table-5.3 shows the trends in infant mortality for Bangladesh from 1911 to 1996 and it is also shown in Figure-5.2. Some figures were obtained from the Cholera Research laboratory (CRL) reports, Bangladesh Demographic Survey and Registration System (DSRS), and Bangladesh Fertility Survey (BFS) by Mitra. A considerable decline in infant mortality rate was realized in the first half of the twentieth century. Subsequent reductions were realized and infant mortality hovered around 140 deaths per 1000 live births in the 1960s.

The slow decline in the infant mortality rate in the 1970s reflects the unsettled social and economic conditions, the liberation war, periods of localized famines and floods. In 1975, the annual infant mortality rate based on the CRL report rose to almost 200 as a result of the 1974-75 famine. In 1976, it dropped considerably to 103. This figure, however, is an underestimate of the actual risk of death during infancy. Again in 1977, it increased to about 114. Similarly it also increased in 1986 but it dropped in 1987 and also again increased in 1988 and further declined in the year 1983, 1990 and 1996. The usual procedure in the calculation of infant mortality rate makes it sensitive to fluctuations in the number of births. Under normal circumstances, such fluctuations are minimal and the rate becomes a valid estimate of the risk of death during infancy.

Table-5.3
Infant Mortality Rate (IMR) of Bangladesh, 1911-1996

Year	Infant mortality rate (per 1000 live births)
1911	205
1921	198
1931	179
1951	168
1961	144
1971	125
1969-1970	152
1970-1972	158
1972-1973	154
1974	153
1975	192
1976	103
1977	114
1980	101
1981	112
1982	122
1983	118
1984	122
1985	112
1986	116
1987	113
1988	116
1989	98
1990	94
1991	91
1992	88
1993	84
1994	77
1995	71
1996	67

- Sources:** (a) 1983-84, Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.102, Table-3.49
 (b) 1986, Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.138, Table-2.61
 (c) 1992, 1997 Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.59, Table-2.30 & P.40.

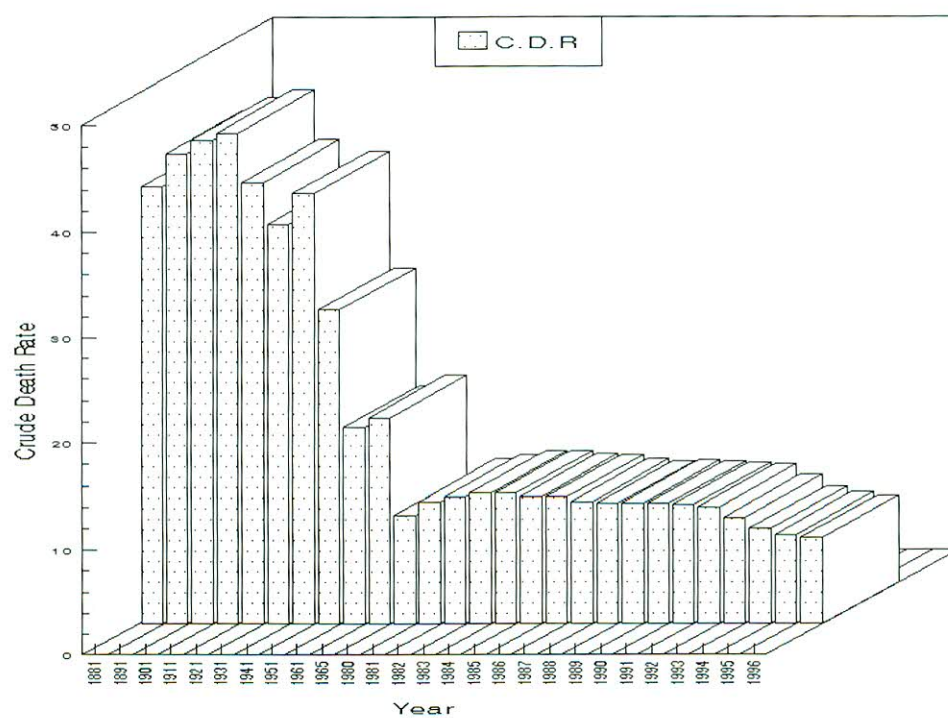


Fig 5.1 : Crude Death Rate of Bangladesh, 1981-1996

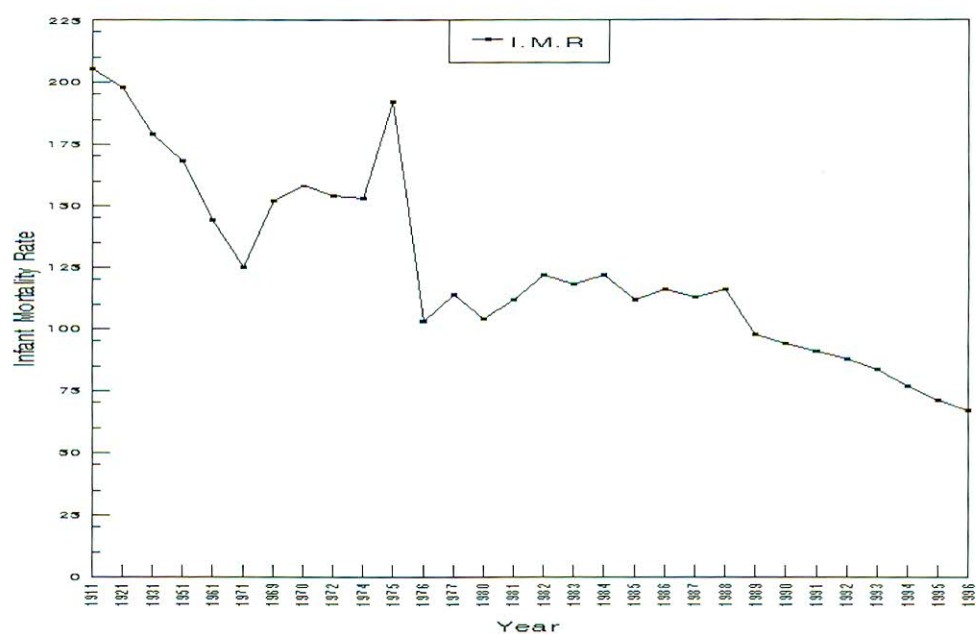


Fig 5.2 : Infant Mortality Rate of Bangladesh, 1981-1996

It is also evident from table-5.4 that infant mortality rate in the rural areas is higher than in the urban areas where the availability of health facilities is substantially more. The table also shows that there has been a significant decline in the level of infant mortality in the rural areas between 1986 and 1996.

Table-5.4
Infant Mortality Rates in Bangladesh Based on Vital Registration Survey Data , 1980-1996

Year	National			Rural			Urban		
	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Box Sexes
1980	102	97	101	106	101	104	84	76	81
1981	113	110	112	114	111	113	105	93	99
1982	124	119	122	125	122	123	114	92	103
1983	119	116	118	121	121	121	107	91	99
1984	134	109	122	132	111	122	141	97	120
1985	114	109	112	115	112	113	109	87	99
1986	122	111	116	123	112	118	104	97	101
1987	120	105	113	112	107	115	102	87	95
1988	116	105	116	108	107	112	96	87	91
1989	102	95	98	106	101	105	90	81	84
1990	98	91	94	101	93	97	73	68	71
1991	95	90	92	98	95	94	72	65	69
1992	90	86	88	95	90	91	68	62	65
1993	86	81	84	90	86	88	62	59	61
1994	77	76	77	82	79	79	56	58	57
1995	73	70	71	80	76	78	55	52	53
1996	70	67	67	78	74	76	52	49	50

Sources: (a) 1984, Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.122

Table-2.55

(b) 1989, Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.65

Table-2.33

(c) 1992, 1997 Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, P.59, Table-2.30 & P.40.

Sex differential in infant mortality is considered to be a key indicator of the sex-bias in parental care of infants. It is also indicated that male infant mortality rate has been consistently higher than the female rate.

The special feature of infant mortality is that its causes and intensity vary markedly from very early to the later part of the first year of life. For this reason, it is customary to break down infant mortality into two main phases each with a distinct etiology-neonatal mortality which occurs within the first four weeks and post-neonatal mortality occurring within the remainder of the first year after birth. The neonatal mortality is attributed to endogenous factors such as genetics influencing the growth of our organism, damage

during gestation, birth injuries and conditions arising from delivery hazards. The post-neonatal mortality is largely attributable to exogenous factors such as infection, respiratory and digestive disorders and neglect and faulty care of the infant and is therefore more amenable to medical and environmental controls.

Table-5.5 gives the infant mortality rates in selected countries and they are also shown in Figure-5.3. Bangladesh shows an infant mortality rate that is among the highest in Asia. Environment-related conditions and infectious diseases contribute more than congenital or birth-related factors (Taylor, 1965) to the high level of infant mortality. Gastric and respiratory diseases probably account for about two-thirds of all infant deaths (Robinson, 1967).

Table-5.5
Infant Mortality Rates in Selected Countries, 1990

Country	Year	Infant mortality rate (per 1000 live birth)
Bangladesh	1990	119
China	1990	50
India	1990	93
Indonesia	1990	75
Japan	1990	5
Pakistan	1990	105
Philippines	1990	53
Republic of Korea	1990	14
Sri Lanka	1990	24
Thailand	1990	40
U.S.A	1990	10

Source: World Population Prospects, The 1994 Revision, United Nations, New York, 1995.

Socio-economic conditions and hygienic standards are the prime determinants of post-neonatal mortality. Although infants and young children are breast-fed for a long time in Bangladesh, post-neonatal mortality is also related to the availability and quality of food supplementation which determines susceptibility to pathogenic micro-organisms (YanKaner 1969).

The crude death rate and expectation of life at birth for Bangladesh are compared with the corresponding values for selected developing and developed countries in table-5.6 and the expectation of life at birth shown in Figure-5.4. It will be noted from the table that mortality level in developed countries such as Japan and United States of America is

much lower than in Bangladesh and this difference is more marked when values of expectation of life at birth are considered. Comparison of the Bangladesh mortality level with those of developed countries serves little purpose except to set of a target to be hoped for in the distant future.

Table-5.6
Death Rates and Expectation of Life at Birth in Bangladesh and Selected Countries, 1990

Country	Year	Death rate	Year	Expectation of life at birth	
				Males	Females
Bangladesh	1990	13.6	1985-1990	53.1	52.5
China	1990	6.7	1985-1990	65.8	68.4
India	1990	11.2	1985-1990	57.8	57.9
Indonesia	1990	9.4	1985-1990	58.5	62.0
Japan	1990	6.3	1985-1990	75.4	81.2
Pakistan	1990	10.8	1985-1990	58.1	60.1
Philippines	1990	7.2	1985-1990	62.2	69.9
Republic of Korea	1990	6.1	1985-1990	65.8	73.7
Sri Lanka	1990	5.9	1985-1990	68.5	73.0
Thailand	1990	6.4	1985-1990	64.9	70.2
U.S.A	1990	8.7	1985-1990	71.6	78.5

Source: World Population Prospects, The 1994 Revision, United Nations, NewYork, 1995.

Among the developing countries included in table-5.6. Sri Lanka is unique in that the registration of births and deaths is almost complete (ESCAP,1981). Sri Lanka never had such high death rates as high as Bangladesh, the highest being 30.4 in 1911-1920. Since the latter half of the 1940s, Sri Lanka experienced a dramatic decline in its death rate and today that country's death rate of around 7 per thousand is one of the lowest in the world. By contrast, the current death rate in Bangladesh is one of the highest among the developing countries of the ESCAP region. It would appear that mortality levels in India and Pakistan are some-what close to the Bangladesh levels.

5.5 Age and Sex Patterns of Mortality

While the crude death rate provides a generalized and convenient picture of the level of morality, it cannot specify relative risks of death at various ages. A comparison can be made in terms of the death rates calculated separately for each age. It can separate the component of mortality from the inherent effect of age composition on the number of

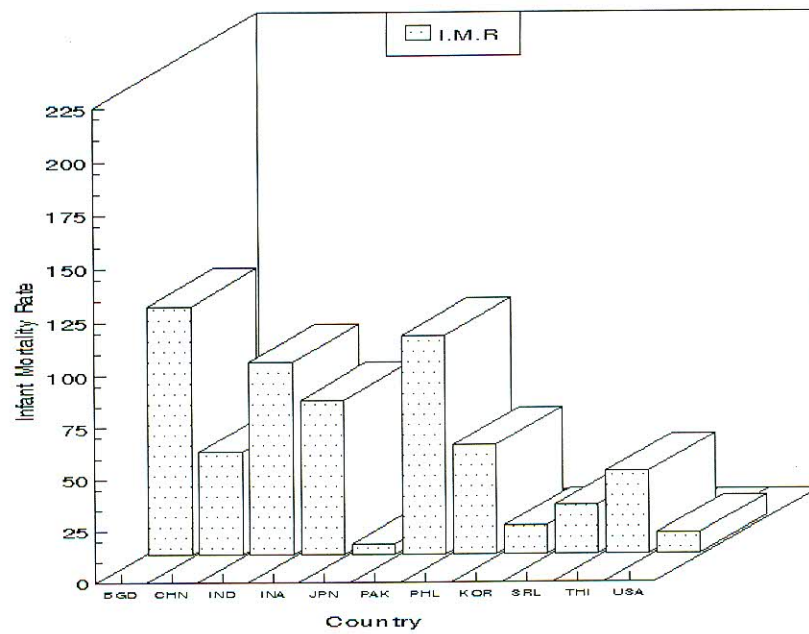


Fig 5.3 : Infant Mortality Rate in Selected Countries, 1990

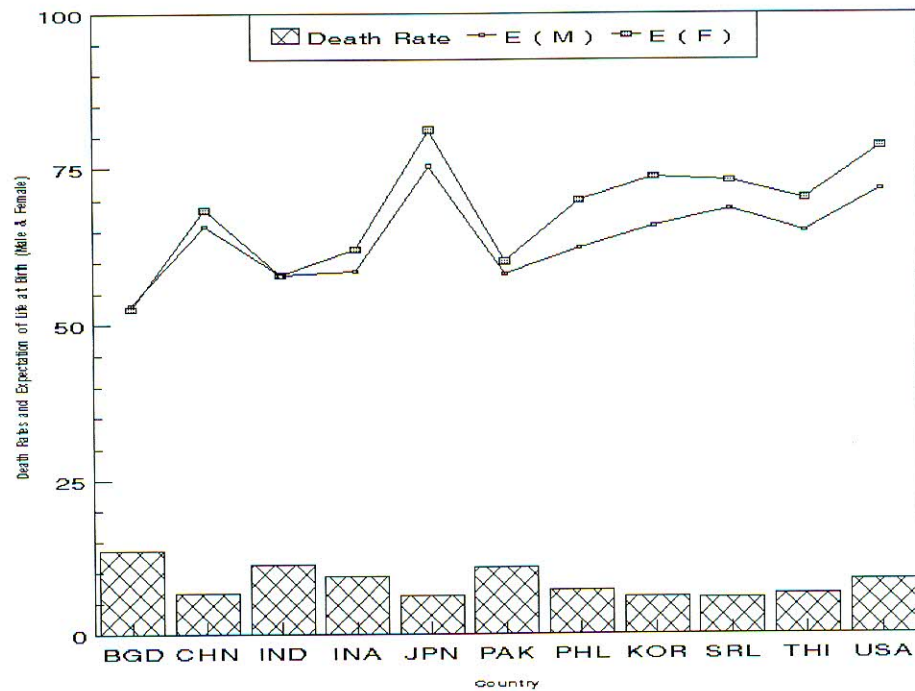


Fig 5.4 : Death Rates and Expectation of life at Birth in Selected Countries, 1990

deaths and its ratio to the population. Death rates specific for age are generally calculated separately for the two sexes, so as to exhibit variations by sex.

In the absence of adequate data, various indirect techniques were used in the past; in particular, the results of the PGE project (Yusuf, 1967) in 1962-1964 and of the Bangladesh Retrospective Survey of Fertility and Mortality of 1974 were used for such a purpose. In addition, data collected by CRL from the Demographic Surveillance System, though not representative of the country as a whole, give further insight into the patterns of mortality by age and sex. The results of these studies are set out in table-5.7 and Figures 5.5 and 5.6. Real time trends could not be gleaned from the figures due to differing sources.

The classical U-pattern of mortality is reflected in the age-specific death rates set out in table-5.7. The rate for 1974 and 1975 were affected by the famine ; it appears that those who suffered most were the very young and the very old.

To assess the trends in age and sex-specific mortality with an assurance of reliability, one would need more accurate data than the indirect estimates of rates based on the registration in a relatively small population. Despite this limitation, it is apparent that mortality rates have been declining at least at some ages between the 1960s and mid-1970s.

The two nationwide surveys (PGE, 1962-64 and the Retrospective Survey, 1974) suggest a higher female than male mortality prevailing at certain ages. The Retrospective Survey shows slightly higher female than male mortality at ages 40 and over, whereas the PGE indicates also a higher female mortality in childhood (age 1-4 years) and in the whole range of ages from 10 to 44 years and 55 and over. Some of these differences, particularly in the Retrospective Survey, are very small.

However, the CRL data disclose, for 1983 and 1996, higher female mortality from early childhood (ages 1-4 years) through adolescence and the prime ages of childbearing up to about the age group 35-39 years. In addition female mortality exceeded that of males in old age (60+). The age specific death rates of the aged population by sex is shown in table-5.8. The death rate firstly decline and further rise sharply with age for males, but

Table-5.7
Age-specific death rates, 1962-64, 1974 and 1983-1996 (Deaths per 1000 population)

Age	PGE 1962-1964		Retrospective Survey 1974		CRL 1983		CRL 1984		CRL 1985		CRL 1986		CRL 1987	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
0	161.1	127.5	179.1	160.6	100.9	111.5	127.2	115.7	107.0	100.6	88.7	86.5	90.6	83.1
1-4	22.6	27.4	47.5	45.4	21.9	37.0	24.3	39.9	14.4	27.6	12.8	22.0	8.7	16.7
5-9	6.8	6.3	5.6	5.4	3.2	4.8	3.3	5.4	2.8	4.0	2.9	2.4	2.1	2.5
10-14	2.1	2.6	2.9	2.9	1.3	1.4	1.2	1.1	1.4	1.2	0.8	1.5	1.3	0.8
15-19	1.9	6.8	4.0	3.9	1.4	1.8	1.1	2.0	0.8	2.5	1.0	1.6	0.9	1.7
20-24	3.2	6.6	7.4	7.3	1.6	2.9	1.4	2.9	1.7	1.8	1.7	2.3	1.4	2.2
25-29	3.1	8.8	7.7	7.6	2.0	2.9	1.8	3.8	1.9	3.0	2.4	2.8	1.3	2.6
30-34	5.4	8.3	7.6	7.6	1.9	2.5	2.9	3.2	1.9	2.0	2.4	2.2	1.3	3.4
35-39	6.2	9.8	8.3	8.3	1.6	3.5	2.5	2.2	3.5	3.4	3.6	4.4	2.3	4.4
40-44	8.1	9.5	9.6	9.7	5.6	4.8	6.0	2.6	4.1	2.7	3.3	2.3	3.3	3.3
45-49	12.0	9.7	11.9	12.0	7.8	5.2	8.0	6.7	6.5	3.9	7.8	5.4	8.2	6.6
50-54	17.0	15.5	15.2	15.5	14.3	8.3	14.4	9.2	11.8	4.9	15.1	11.3	12.8	8.0
55-59	21.3	25.8	20.5	21.0	24.7	21.9	27.4	22.0	17.3	13.2	24.1	12.2	21.1	11.1
60-64	33.4	40.3	28.7	29.6	34.9	31.0	38.2	34.5	28.8	29.4	30.2	25.2	27.1	21.9
65-69	49.9	54.8	41.2	42.9	52.5	43.8	70.0	66.4	41.8	34.4	50.0	35.3	51.7	45.7
70-74	76.3	85.7	61.1	63.9	75.8	92.8	76.4	94.0	70.7	68.9	63.3	68.7	53.2	60.5
75+	111.3	136.0	92.4	97.1	120.9	124.6	147.1	154.2	135.4	134.9	110.9	120.0	128.9	129.3

Contd.

Age	CRL 1988		CRL 1989		CRL 1990		CRL 1991		CRL 1992		CRL 1993		CRL 1994		CRL 1995		CRL 1996	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Male	Female
0	87.6	91.7	88.8	77.8	87.3	76.8	104.1	94.2	90.4	80.9	88.0	76.7	76.5	75.5	74.1	62.7	73.5	63.6
1-4	8.7	13.6	6.5	11.6	6.2	8.6	7.8	8.4	6.6	10.0	6.4	9.9	5.7	6.8	6.8	8.6	6.7	7.4
5-9	2.2	2.9	1.5	1.2	1.8	1.3	1.6	2.3	1.6	1.9	1.9	1.2	2.3	1.9	1.3	1.2	1.1	1.5
10-14	0.7	0.8	0.6	0.2	0.9	0.9	0.8	0.7	0.7	0.8	0.8	0.9	0.5	0.9	0.9	0.3	1.1	0.7
15-19	1.2	1.6	0.7	1.6	0.8	1.2	0.7	1.1	0.7	1.0	1.0	0.9	1.4	1.2	0.6	1.0	1.4	0.7
20-24	1.0	2.5	0.7	2.3	0.9	1.6	1.0	1.6	1.3	1.0	1.7	2.0	1.3	1.3	0.9	2.0	1.8	2.1
25-29	2.2	2.5	2.2	1.8	1.5	2.2	1.2	2.4	1.4	3.2	2.6	2.1	1.3	1.9	1.2	1.6	1.3	1.3
30-34	3.0	1.4	2.4	2.2	0.9	1.8	1.7	1.9	0.8	1.5	1.9	1.5	2.7	3.1	2.0	2.3	1.7	2.1
35-39	1.7	0.7	2.5	2.7	3.1	2.0	3.1	2.3	3.5	2.2	3.0	2.2	1.9	3.1	2.1	1.7	2.3	3.1
40-44	5.3	2.0	3.7	4.4	1.1	4.0	5.3	4.1	3.4	4.1	4.5	4.0	6.8	3.9	5.6	2.7	4.6	2.8
45-49	3.7	6.7	7.0	3.4	7.5	3.5	8.0	4.4	7.3	3.8	6.7	3.7	4.7	4.4	6.9	4.9	4.1	3.5
50-54	10.6	8.0	11.3	8.5	13.6	6.0	10.7	7.7	12.8	9.5	15.4	7.3	11.7	6.4	7.7	8.7	7.3	4.5
55-59	18.6	13.8	20.3	11.4	19.9	10.8	18.0	11.4	19.1	12.1	20.4	11.6	17.8	9.2	18.8	9.5	15.6	10.5
60-64	28.4	24.2	35.1	17.9	26.4	21.3	23.6	21.7	36.1	20.5	28.7	20.6	28.1	22.6	23.5	19.5	27.4	17.7
65-69	45.2	34.1	45.5	30.8	34.7	31.0	48.7	37.3	45.2	42.4	45.1	39.2	51.1	41.5	46.3	38.4	39.3	36.3
70-74	65.3	59.3	57.2	67.5	71.2	54.8	67.0	58.3	71.1	70.7	63.6	66.3	67.5	61.9	55.3	53.6	63.4	58.5
75+	122.8	123.2	103.2	103.5	111.5	106.7	102.0	98.0	108.2	118.4	122.4	132.4	122.4	120.3	125.9	106.9	98.1	124.5

Sources: (a) Country Monograph no -8, Population of Bangladesh, ESCAP, United Nations, P.48

(b) Demographic Surveillance System(DSS)-Matlab, Scientific Report No- 64, 65, 67, 68, 69, 70, 71, 72,73,74,75,76,77, 78, 82, ICDDR,B, Dhaka.

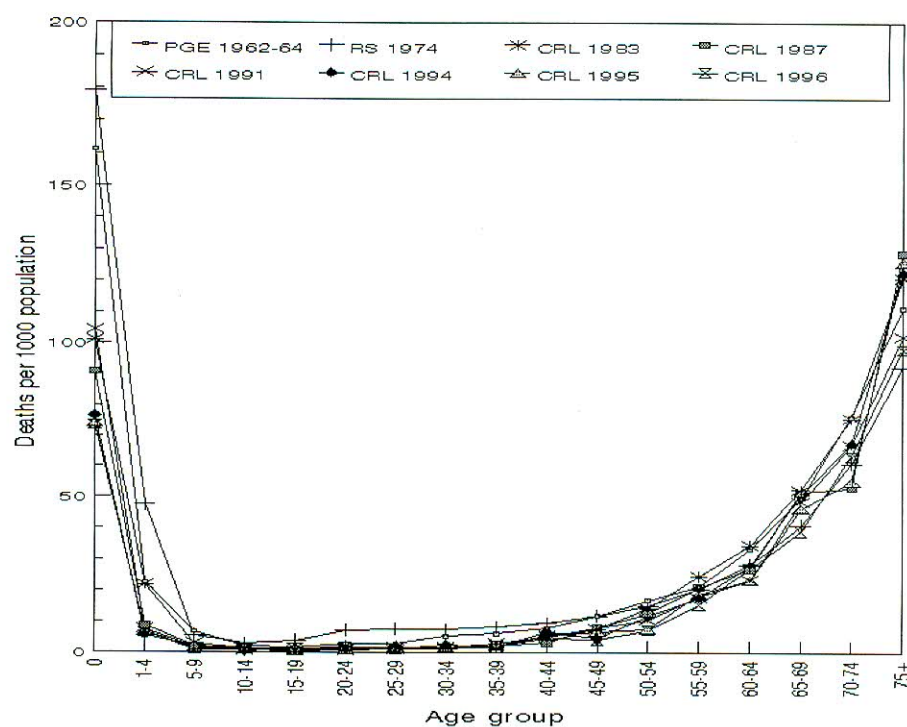


Fig 5.5: Age Specific Death rates for Males in different years

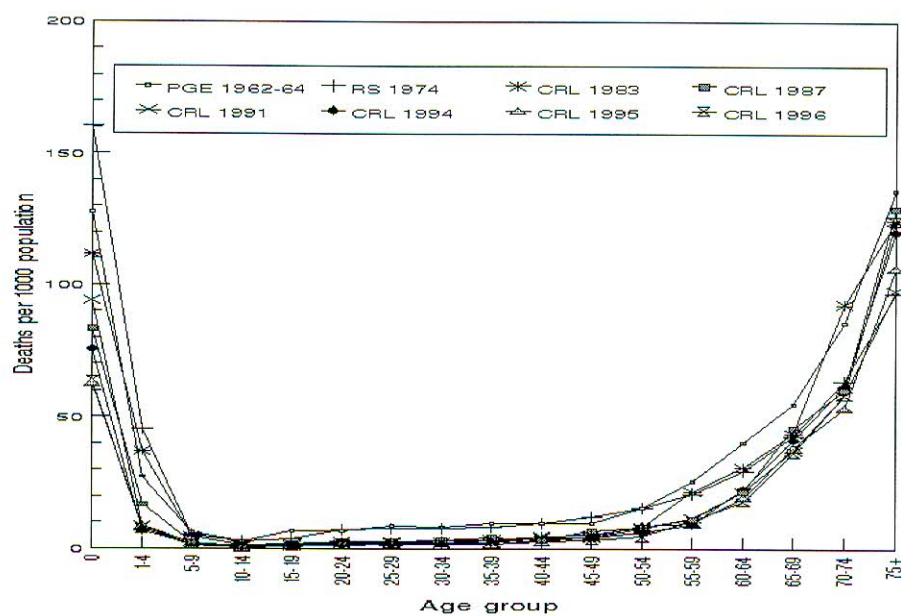


Fig5.6:Age-specific death rates for Females in different years

falls rather slowly for females. The possible result of a decrease in mortality in the older age groups is the aging of the population from the apex.

Table-5.8

Age specific death rates of the aged population by sex : Bangladesh, 1962-64, 1974, 1984 and 1990

Age group	1962-64		1974		1984		1990	
	Male	Female	Male	Female	Male	Female	Male	Female
60-64	33.4	40.3	28.7	29.6	38.2	34.5	26.4	21.0
65-69	49.9	54.8	41.2	42.9	70.0	66.4	34.7	31.0
70-74	76.3	85.7	61.1	63.9	76.4	94.0	71.2	54.8
70+	111.3	136.0	92.4	97.1	147.1	157.2	111.5	106.7

Sources:- (a) Country Monograph no.8, Population Of Bangladesh, ESCAP, United Nations, P.48.

(b) Demographic Surveillance System-Matlab, Scientific Report no. 65 & 72, ICDDR,B, Dhaka.

5.6 Childhood Mortality

In the absence of accurate vital statistics, child mortality rates, that is, age-specific death rates at ages 1-4, 5-9 and 10-14 years have to be obtained indirectly from census data. Such estimates, however, are subject to errors because of age mis-reporting and under-enumeration of children, particularly under the age of five.

More recently, estimates of child mortality have become available from three surveys: the Retrospective Survey (1974), BFS (1975, 1989) and the Nutrition Survey of Rural Bangladesh conducted in 1975-1976 by the University of Dhaka. In addition, CRL has published child mortality rates derived from the Demographic Surveillance System in Matlab thana for 1966-1969 and 1974-1996.

5.7 Trend in Childhood Mortality

For the 1956-1957 period, mortality of children aged 1-4 years was estimated by Schultz (1972) as about 20 per 1000 in the rural and 18 per 1,000 in the urban areas. Obaidullah (1966) calculated similar rates for 1961-1962 as 20 and 21 per 1000 respectively. The data of the former CRL on child mortality from 1966 to 1996 are summarized in table-5.9. The interpretation of these data requires caution. First, the CRL data are not likely to be representative of the country as a whole. Secondly, the period covered includes the 1974-75 famine which greatly affected the mortality of the most vulnerable group-children and women. Thirdly although population of Matlab under demographic

surveillance is about 260,000, the number of children of either sex is around 15,000-16000 rendering the rate unstable due to the comparatively small numbers.

Broadly, it appears that child mortality has not changed markedly during the past 10 years, remaining on the average greater than 20 per 1000. In the famine period it (1974-75) almost doubled, the excess mortality falling more heavily upon the female than the male children.

Table-5.9
Child Mortality in DSS Matlab Thana by Sex, 1966-1969 and 1974-1996

Year/ Period	Deaths per 1000 persons aged 1-4 years	
	Matlab Thana	
	Males	Females
1966-1969	22.3	29.6
1974	18.3	32.9
1975	28.8	41.3
1976	25.5	33.9
1977	14.5	25.2
1978	16.8	28.2
1979	16.1	27.6
1980	16.5	28.0
1981	16.0	28.2
1982	15.8	31.2
1983	21.9	37.0
1984	24.3	39.9
1985	14.4	27.6
1986	12.8	22.0
1987	8.7	16.7
1988	8.7	13.6
1989	6.5	11.6
1990	6.2	8.6
1991	7.8	8.4
1992	6.6	10.0
1993	6.4	9.9
1994	5.7	6.8
1995	6.7	8.6
1996	6.7	7.4

Sources: (a) CRL Scientific Reports , 11, 12, 13, and 18, working paper No. 13,
(b) Demographic Surveillance System - Matlab, Scientific Report Nos, 60, 61, 62, 63, 64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 79, 82 ICDDR,B, Dhaka.

There is a wide variation of child mortality in Matlab region. During 1977, male child mortality in Matlab registered a rate of 14.5 and the females 25.2 per 1000 children which increased to 24.3 and 39.9 during 1984 and it also decreased to 6.7 and 7.4 during 1996 shown in table-5.10. In this case female child mortality is higher than males, low level of literacy among the mothers and lack of medical care facilities might be cited as the reasons for such increase. Respiratory diseases, malnutrition, diarrhoea and measles were causes of childhood (1-4 years) deaths accounting for more than 45 percent of all deaths in the Matlab region and the female child mortality is more than males. A lower mortality rate is observed in other age groups than under 1 and 1-4 years age groups. In 1977, age group of 5-14 recorded a death rate of 2.7 (male-2.3, female-3.1) per 1000 population in

Table-5.10
Distribution of death rates per 1000 population by age and sex , Matlab , 1977-1996

Age Group	1977		1978		1979		1980		1981		1982		1983		1984		1985	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
All ages	13.2	13.8	12.8	13.5	13.4	14.2	12.0	14.1	12.6	13.7	13.9	14.5	13.6	15.1	15.0	15.7	12.0	12.4
Under 1 year	113.1	114.5	115.7	123.7	118.9	114.0	90.2	118.5	105.1	118.2	115.8	108.9	100.9	111.5	127.2	115.7	107.0	100.6
1-4	14.5	25.2	16.8	28.2	16.1	27.6	16.5	28.0	16.0	28.2	15.8	31.7	21.9	37.0	24.3	39.9	14.4	27.6
5-14	2.3	3.1	2.0	3.5	2.8	3.3	1.9	2.5	1.9	2.6	2.3	3.4	2.0	3.2	2.3	3.3	2.1	2.6
15-44	2.4	3.0	2.7	2.3	2.0	3.3	2.3	2.6	2.1	2.6	2.5	2.9	2.8	2.8	2.1	2.8	1.9	2.5
45+	31.5	28.0	30.6	25.9	30.4	28.6	28.5	27.1	29.0	24.8	33.4	28.1	31.5	27.5	37.2	32.5	29.2	22.8

Age Group	1986		1987		1988		1989		1990		1991		1992		1993		1994		1995		1996	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
All ages	11.0	11.0	10.2	10.3	9.9	9.8	9.2	8.3	9.1	7.9	9.7	8.5	9.5	8.6	9.6	8.2	9.2	8.0	8.6	7.2	8.2	7.3
Under 1 year	88.7	86.5	90.6	83.1	87.6	91.7	88.8	77.8	87.3	76.8	104.1	94.2	90.4	80.9	88.0	76.7	76.5	75.5	74.1	62.7	73.5	63.6
1-4	12.8	22.0	8.7	16.7	8.7	13.6	6.5	11.6	6.2	8.6	7.8	8.4	6.6	10.0	6.4	9.9	5.7	6.8	6.8	8.6	6.7	7.4
5-14	1.9	2.0	1.7	1.7	1.5	1.9	1.1	0.7	1.4	1.1	1.2	1.6	1.4	1.2	1.4	1.1	1.4	1.4	1.1	1.1	1.1	1.1
15-44	2.0	2.4	1.2	2.6	2.0	1.9	1.7	2.3	1.5	1.9	1.7	2.0	1.9	2.0	2.1	1.9	2.2	2.2	1.8	1.7	2.0	1.9
45+	30.8	23.5	30.0	23.1	28.0	22.3	28.5	19.3	28.3	19.3	28.8	20.8	31.4	23.2	31.6	22.9	31.0	22.0	29.1	21.4	27.0	21.9

Sources: Demographic Surveillance System(DSS)-Matlab, Scientific Report No- 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 82 ICDDR,B, Dhaka.

Matlab, and the same was recorded at 1.1 (male-1.1, female-1.1) for Matlab in 1996 indicating a declining trend in areal extent. In these age group also female showed a higher mortality rate than that for males during 1977-1988 but again male higher mortality rate than female during 1989-1993. The age group 15-44 shows a rate of 2.7 (male-2.4 Female-3.0) per 1000 population in 1977, and 2.8 (male-2.8, female-2.8) in 1983 for Matlab respectively. It is seen that Matlab shows a upward trend but in 1984-1996, it was slightly down. This age group also records higher female mortality. About one third of adult female deaths, during reproductive period (15-44 years) are maternity related, Fever, Respiratory and heart diseases are the main causes of deaths in this age group. However, mortality at age 45+ has been declining and males show higher mortality than females in Matlab. For all age groups, it is observed that mortality is negatively correlated with socio-economic status- the higher the levels, the lower the mortality rates.

The poor living condition; particularly in the rural areas, is one of the important causes of the recent stagnation in mortality level. Chronic malnutrition deficiency, poverty, lack of proper hygienic and health care knowledge and the least availability of health services in the rural areas, account for the low status of the health of the major population. Although health infrastructure and manpower have been extended but still vast majority of the people in the rural areas did not get the benefit of them. Thus modern health care is very limited in the rural areas of Bangladesh.

Three surveys, the Bangladesh Retrospective Survey of Fertility and mortality in 1974 and the Bangladesh Fertility survey (BFS) in 1975, and 1989 allow estimation of child mortality by indirect methods from the numbers of children ever born and surviving by age of the mother. Of these estimates, the probabilities of dying between birth and exact age of two years ($q(2)$) and three years ($q(3)$) are generally considered to be the most reliable and stable. Mitra estimated that $q(2)$ and $q(3)$ derived from the BFS(1975) refer to mortality in 1972-1973 and 1971-1972 respectively. Similar estimates derived from the Retrospective Survey and BFS(1989) should be dated approximately to 1970-1972 and 1969-1971 and for $q(2)$ and $q(3)$ respectively. The estimates obtained from the three surveys are set out in the table-5.11.

Considering that the three sets of data refer to mortality for the calendar period, the results are close enough to provide reasonable assurance as to their reliability. The persistence of a comparatively high infant and child mortality indicates that only four out of five live births are likely to survive to the age of two years; and of the survivors, another 1 or 2 percent would die before reaching the age of three years.

Table-5.11
Estimated proportion of children dying between birth and exact ages 2 and 3 years, 1974 -1989

Survey	q (2)	q (3)
Retrospective Survey(1974)	0.203	0.213
BFS (1975)	0.193	0.216
BFS (1989)	0.140	0.148

Sources: (a) Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality, Dhaka 1977, P.101,

(b) S.N Mitra, " Infant and childhood mortality in Bangladesh: levels and differentials" unpublished M.A. thesis, Development Studies Centre, Australia National University, Canberra, 1979,p-27,

(c) Bangladesh Fertility Survey , 1975, 1989, Main report, Dhaka.

5.8 Expectation of Life

Life expectancy is derived from a life table, which is the life history of a hypothetical group of people, such as those born in a particular year . In other words, life expectancy is the average number of years lived by the number of a cohort . This life expectancy figure can be computed for the number of a cohort at any age, but usually it refers to life expectancy at birth. The expectation of life at births (e^0_0) is the life table function often used as an index of the mortality level. It is defined as the average number of years that will be lived by a new-born, assuming that the current age-specific mortality rates will prevail throughout his or her life. This is shown in table-5.12.

Improvement in CDR in Bangladesh has resulted in the survival of more children and people at the advanced stages of life. It has caused a gradual increase of expectation of life at birth in Bangladesh as shown in table-5.12 and it is also shown in Figure-5.7. The average length of life has more than doubled in this century. It has risen from 24 in 1901 to 59 years in 1996 due to the triumphs of medical science.

The declining mortality trend as reflected in the increases of e^0_0 can be perceived as taking place in two stages. The first stage covers the period prior to 1941 and is characterized by a slow gain in life expectancy. During the phase, the e^0_0 increased by

only 10 years. The second phase started in the following decade when expectancy increased by about 15 years between 1941 to 1961; temporary fluctuations were noted in 1971 and 1974 that arrested this declining trend or increasing.

Table-5.12
Expectation of life at birth in Bangladesh , 1901-1996

Year	Both Sexes	Males	Females
1901	23.7	23.6	23.9
1911	22.9	22.6	23.3
1921	20.1	19.4	20.9
1931	26.7	26.9	26.6
1941	31.8	32.1	31.4
1962-63	41.1	49.2	46.9
1973-74	50.7	51.6	49.7
1982	54.5	54.5	54.8
1983	54.9	54.2	53.6
1984	54.8	54.9	54.7
1985	55.1	55.7	54.6
1986	55.2	55.2	55.3
1987	56.4	56.9	56.0
1988	55.4	55.9	54.4
1989	56.0	56.0	55.1
1990	56.0	56.4	55.4
1991	56.1	56.5	55.6
1992	56.3	56.8	55.9
1993	57.7	57.8	56.6
1994	58.0	58.2	57.9
1995	58.7	58.4	58.1
1996	58.9	59.1	58.6

Sources: (a) Country Monograph no -8, Population of Bangladesh, United Nations, ESCAP, NewYork, 1981, P.60.

(b) 1990 Statistical Yearbook of Bangladesh, BBS, Dhaka, p.66, Table 2.35.

(c) 1992, 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka, p.60, Table 2.32.

It may also be noted that declining mortality affected the male more than the female population. This is indicated in the sex differentials in mortality and borne out by the sex differences in e^0_0 disadvantaging the females although a narrowing occurs.

A high percent of the years of life lost to non-traumatic premature death are expected to be eliminated as a result of Expanded Program of Immunization (EPI). Most premature deaths may now occur due to the Chronic diseases of the later years. Medical measure and intervention designed now for the far flung rural communities of Bangladesh may presumably postpone occurrence of Chronic illness (GOP 1965, GOB 1990). Other health care strategies now undertaken to improve the quality of life require immediate attention

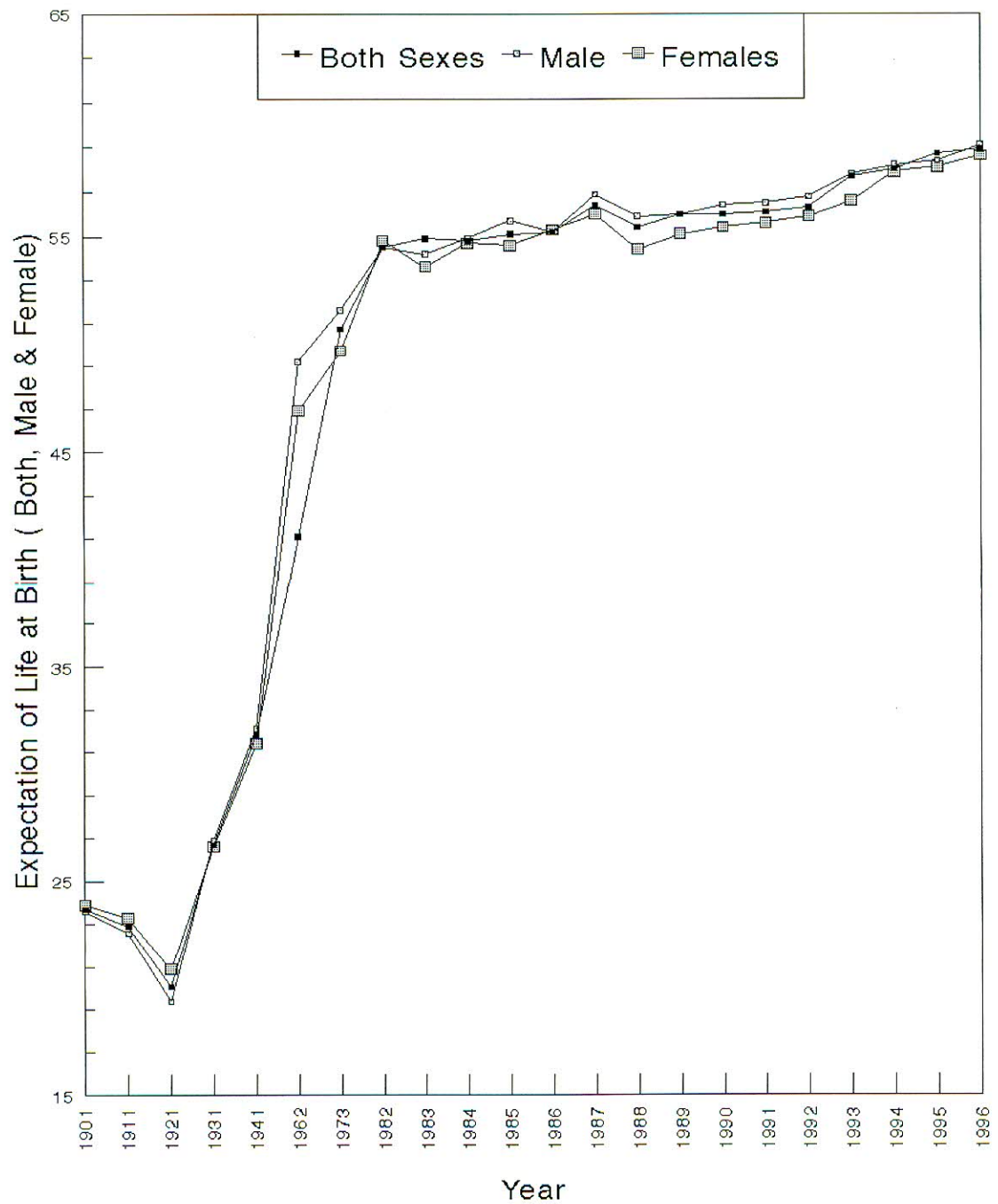


Fig 5.7: Expectation of Life at Brith In Bangladesh 1901-96

of the policy makers to examine carefully the variability of the phenomena of the aging process active as an under current forces in Bangladesh population.

The life expectancy at birth of selected countries is shown in table-5.13. The table-5.13 reveals that the life expectancy at birth is also increasing for all the countries. In China, the male life expectancy at birth is increasing from 62.5 years in 1970 to 68.2 in 1995 and further to 72.6 by 2025. The females life expectancy at birth is increasing from 63.9 in 1970 to 71.7 in 1995 and to 76.7 by 2025. Similarly for Japan, the corresponding figures for male are 70.6 years in 1970 to 76.8 years in 1995 and to 78.8 in 2025. In Bangladesh, the males life expectancy at birth is increasing from 45.6 years in 1970 to 58.1 in 1995 and further to 68.4 by 2025. The females life expectancy is increasing from 44.1 in 1970 to 58.2 in 1995 and to 69.6 by 2025.

Table-5.13
Life Expectancy at Birth of Selected Countries, 1970, 1995 and 2025

Country	Life expectancy at birth					
	1970		1995		2025	
	Male	Female	Male	Female	Male	Female
China	62.5	63.9	68.2	71.7	72.6	76.7
Japan	70.6	76.2	76.8	82.9	78.8	84.9
Indonesia	48.0	50.5	63.3	67.0	70.7	75.2
Bangladesh	45.6	44.1	58.1	58.2	68.4	69.6
Pakistan	50.6	50.5	62.9	65.1	70.8	74.4
India	51.2	49.3	62.6	62.9	70.5	73.3
Sri Lanka	64.0	66.0	70.9	75.4	75.3	80.0

Sources:- Same as table-5.6.

Projections of the United Nations indicate wide variation in population aging in countries of Asia, currently Japan, China, Indonesia have a large elderly population. In South Asia, Sri Lanka is the only country which has considerable proportion of elderly population followed by India.

5.9 Differentials in Life Expectation

The information on differential life expectancy at birth is limited. Owing to the methodology involved in transforming age-specific death rates into life expectancy at birth, minor differences in mortality between males and females in infancy and childhood may affect the difference between male and female life expectancy more markedly than

such differences in adulthood. Besides, the incompleteness of death registration calls for the derivation of life tables from survey data or indirectly from comparisons of census populations by age. Various techniques of graduation and smoothing of the resulting estimates have to be used based on the model life tables. The estimates, hence, are approximations and the differences in life expectation between males and females may vary from one period to another.

The estimates of expectation of life at birth at selected ages presented in table-5.14 may not bring out the precise levels for the different years. However, the picture of the trend in expectation of life they provide over time is unmistakable. It will be noted from the table that life expectancy at birth (e^0_0) for both males and females actually increased until the year 1987 but thereafter it has shown a steady decline upto 1990 and again increased in 1996. Table-5.12 also shows that between 1974 and 1991 there has been a gain in expectation of life at birth by 13.3 years for males and 12.04 years for females. However, the gain in longevity occurred at a much more repaid rate in the first two years than the latter years. During the 13 year period of 1974-1987, there was a much more gain of 11.1 years for males and 9.4 years for females but during the subsequent 6 years, 1990-1996, the gain was only 2.71 years for males and 4.24 years for females.

Table-5.14
Expectation of life in Bangladesh , 1974-1996

Year	$0(e^0_0)$		$20(e^0_{20})$		$40(e^0_{40})$		$60(e^0_{60})$	
	Males	Females	Males	Females	Males	Females	Males	Females
1974	45.8	46.6	42.5	42.2	28.1	27.7	14.4	14.4
1982	54.5	54.8	50.0	50.9	31.7	32.2	16.5	15.8
1987	56.9	56.0	49.5	48.3	31.6	31.4	19.5	15.8
1990	56.4	54.4	47.9	46.5	30.3	29.6	15.2	14.8
1991	56.5	55.6	47.8	47.0	29.9	29.9	14.8	15.3
1996	59.1	58.6	47.4	47.9	29.9	30.6	13.7	15.4

Sources: 1980-81, 1983-84, 1990, 1992, 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka.

It is observed that until 1987, expectation of life at birth was higher for females than for males, but there after male expectation of life at birth has been higher than that of female. It is also evident from table-5.14 that not all people have shared the gain in longevity equally as the risk of mortality was different at different ages. The gain is very largely concentrated in the younger ages reflecting the substantial decrease in infant mortality

rate. The steady improvement in the mortality of the younger sections of the population from the very low initial level is also confirmed.

The gains at ages 0 and 20 are significant in that they reflect the saving of infant and maternal lives due to vast improvements in pre and post-neonatal care of mothers and control of infectious and parasitic diseases and diseases of early infancy. Naturally then, a generation starting out with favourable (low) mortality rates at the beginning of life and early years is likely to experience better mortality rates at later ages also. Expectation of life will consequently be higher for this group of persons as compared with those who had poorer experience in early ages. The percentage increase in the expectation of life at 40 has generally followed the pattern of age 20 for each consecutive year. Similarly the percentage in the expectation of life at 60 has generally followed the pattern of age 40 for each year. In the case of females, however, the improvement has been comparatively slower signifying the existence of greater risk of life even at that age.

5.10 Crude Death rate, Expectation of life at birth and Aged population (60+)

The crude death rate and aged population(60+) of Bangladesh during the year 1961-1996 are shown in table- 5.15 and also the graphical representation is shown in Figure 5.8.

Table-5.15
Crude Death Rate and Aged Population of Bangladesh, 1961-1996

Year	Crude death rate	Aged population(60+)
1961	29.7	2.64
1966	18.5	3.08
1971	16.5	3.52
1976	14.6	4.28
1981	11.5	5.03
1986	11.9	5.53
1991	11.2	6.02
1996	8.10	6.51

Sources:- Same as Table-5.2.

It is seen from the Figure 5.8 that during the period 1961-1996 with the decline of crude death rate ,the aged population gradually increased. A straight line linear regression fitted to the data gives the following result.

$$X_1 = 7.456 - 0.188 X_3, \quad R^2 = 0.770$$

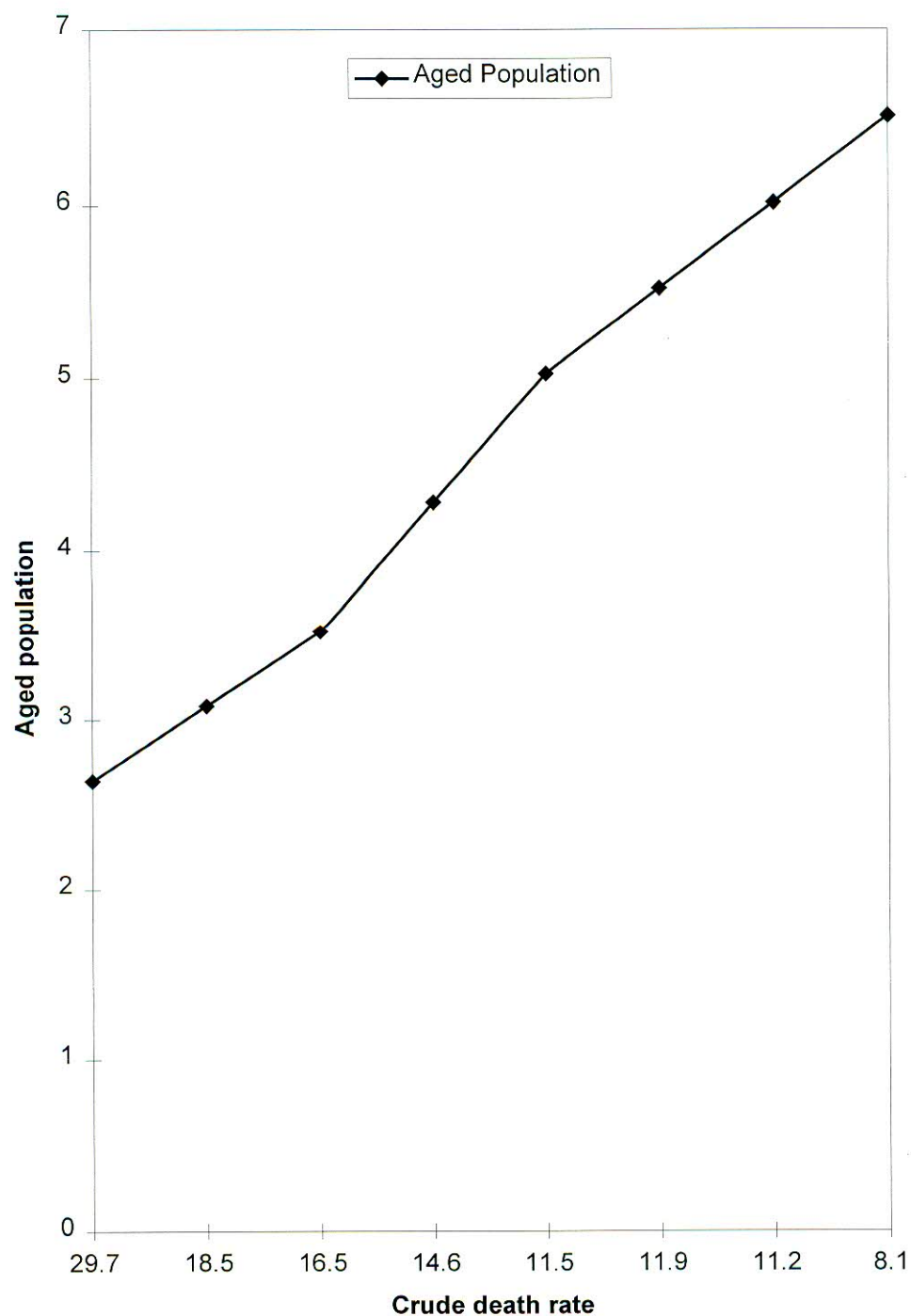
(0.692) (0.042)

Where X_1 = Aged population (60+)

X_3 = Crude death rate

From the above results we observe that about 77.0 percent of the variation in aged population is explained by crude death rate. The regression effect of crude death rate on the aged population is estimated to be -0.188 which is significant at 1 percent level. This regression co-efficient indicates that if the crude death rate decreases by 1 unit then the aged population would increase by 0.188 unit.

Fig 5.8 Crude death rate and aged population (60+) of Bangladesh, 1961-1996



Again table-5.16 shows the expectation of life at birth and aged population(60+) of Bangladesh, 1961-1996 and also depict it on Figure 5.9. It is observe from the Figure 5.9 that during the period 1961-1996 with the increase of expectation of life at birth, the aged population gradually also increased. A straight line linear regression fitted to the data gives the following result.

$$X_1 = -7.592 + 0.236 X_6, \quad R^2 = 0.891$$

(1.752) (0.034)

Where X_1 = Aged population

X_6 = Expectation of life at birth

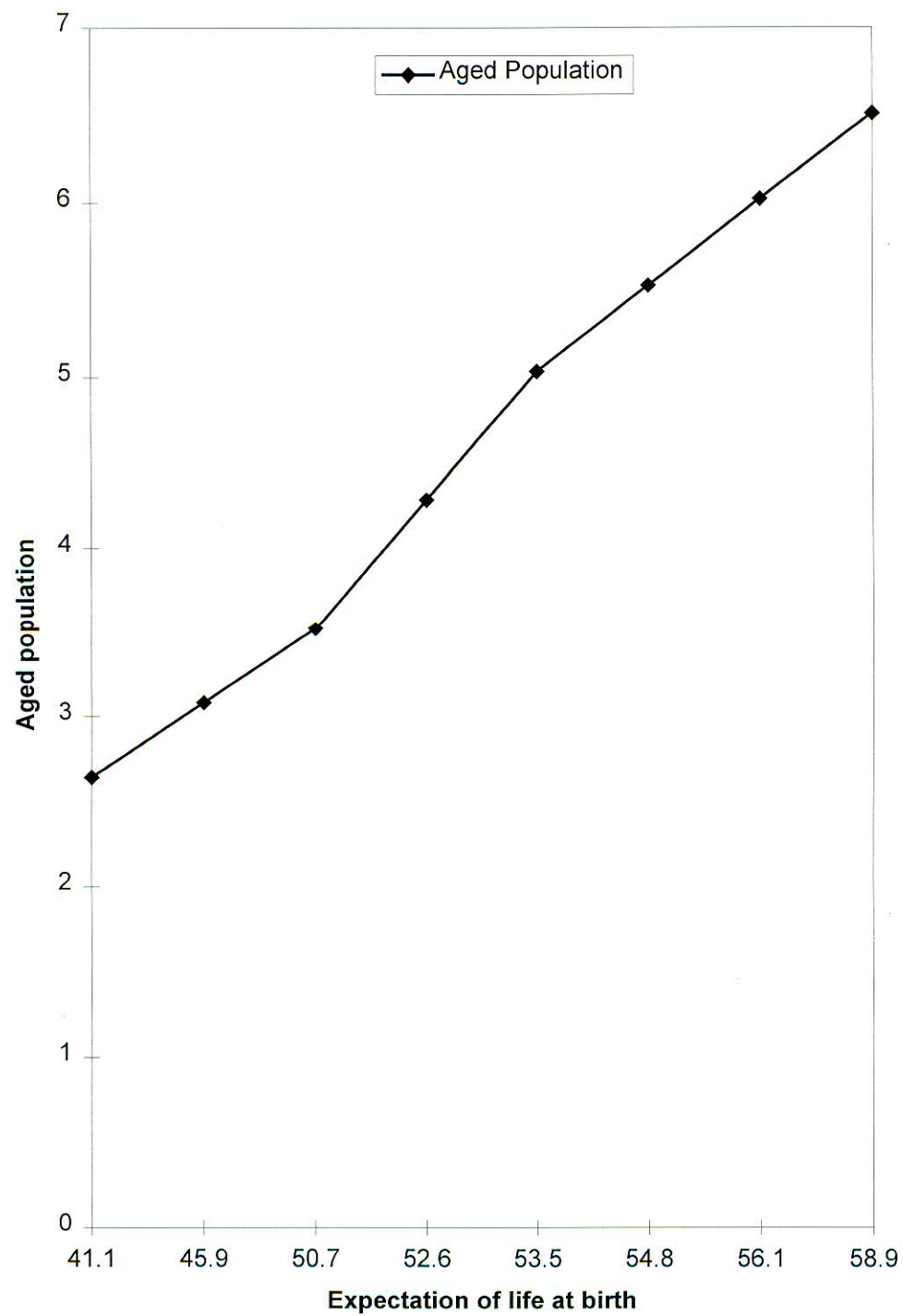
From the above results we observe that about 89.1 percent of the variation in aged population is explained by expectation of life at birth. It shows that expectation of life at birth has positive effect on aged population which is significant at 1 percent level. Here the regression co-efficient indicates that if the expectation of life at birth increases by 1 unit then the aged population would increase by 0.236.

Table-5.16
Expectation of life at birth and Aged Population of Bangladesh, 1961-1996

Year	Expectation of life at birth	Aged population(60+)
1961	41.1	2.64
1966	45.9	3.08
1971	50.7	3.52
1976	52.6	4.28
1981	53.5	5.03
1986	54.8	5.53
1991	56.1	6.02
1996	58.9	6.51

Sources:- Same as Table-5.12.

Fig 5.9 Expectation of life at birth and aged population (60+) of Bangladesh, 1961-1996



5.11 Mortality by Diseases

5.11.1 Diarrhoeal Diseases

A great variation of death rate due to diarrhoeal diseases and other causes is found to occur during 1977 to 1996 in Matlab area. Mortality by years and diseases have been represented in table-4.17. However, on the average, more than 15 percent of all deaths in Matlab appeared to be related to diarrhoea. It is observed that diarrhoeal diseases cause largest proportion of deaths but the longitudinal pattern shows a significant decline over time from 1977 to 1981. Deaths caused by diarrhoeal diseases was 16.3 percent in 1977 and 10.8 in 1981 in Matlab. So, it is found that deaths due to diarrhoea have been declining since 1977. The rates for the place have been increasing after 1981 and there was a peak in diarrhoeal mortality in 1984 (27.6%). This finding suggests that further improvement in the control of diarrhoeal diseases in the Matlab area as well as in the country is needed. Now in present decade it has also decreased. In the developing countries it is estimated that about 20 percent of the 7.5 million deaths among the under 5 years children are associated with diarrhoea (WHO, 1978). At all times, the children aged 1-4 years, particularly the girls recorded the highest diarrhoeal mortality rates. The peak number of diarrhoeal deaths occurred during the winter months of October through January with maximum deaths in November and December which might be due to neonatal deaths and deaths of old people at this time and the minimum in the months of February and June in Matlab during 1981.

5.11.2 Tetanus

Infants are mostly affected by this disease. A great variation of infant deaths is observed in Matlab area. It has been found that in 1977 about one third of total deaths in Matlab. It is obvious that the Matlab area has been showing increasing trends of mortality caused by tetanus during the period 1977-1982. Total deaths caused by tetanus in Matlab were 13.3 percent in 1977 and 15.9 percent in 1982. The increasing trend suggests that an immediate action should be taken with possible measures to reduce the tetanus deaths. However, they are also declining in the recent years.

5.11.3 Respiratory Diseases

This category includes whooping cough, pneumonia, Asthma, Tuberculosis, Bronchitis etc. It has been observed that Matlab area had been showing increasing trend of these diseases during 1977-1986. Drawing an attention of the government to take positive measures to reduce deaths due to this disease. Respiratory diseases are highest in cold season, particularly during November through January in Matlab area. But in the last year it declined.

5.11.4 Fever

A considerable number of deaths, particularly, in 5-14 age group is mainly affected by this disease which is followed by those in 15-44 age group. Of all deaths, 8.9% were recorded in Matlab during 1977 while, during 1996, the proportion became 7.1 for Matlab respectively. The Matlab area has been showing a declining trend since 1977 .

5.11.5 Heart Diseases

Generally, Cardiovascular attack, Congestive cardiac failure, Hypertension, Rheumatism etc. have been included in this category of disease. The period 1977-1982 shows an increasing trend in death rate caused by heart disease with an exception during 1983 which shows a slight decreasing tendency. Matlab recorded in 1977 only 4.1 percent which increased to 4.6 percent in 1983 with a peak in 1980 of 5.8 and lowest in 1985 of 0.2. It is observed that mortality from this heart diseases has been showing increasing trend since 1977 which may be attributed to the increasing tension of the old people due to economic depression and other social problems. These seem to be the major causes of heart disease.

5.11.6 Accidental Deaths

Accidental deaths include deaths due to drowning. It can also be cited as one of the major causes of deaths in Matlab. It is observed that mortality from this accidental death has been showing a decreasing trend since 1977 upto 1981 and then an increasing trend since 1982 upto 1983 and it is also decreasing trend in 1984 and again increasing tendency since 1985. Accidental deaths are maximum in July due to increased drowning during monsoon in Matlab.

5.11.7 Birth Related Deaths

Matlab recorded 0.6% and 1.2% deaths in 1977 and 1996, whereas on the average, the proportion appeared to be 0.7%. It is seen that in Matlab region proportion of deaths out of birth associated events has been declining since 1977 due to the extensive services extended to mothers by the DSS programme.

5.11.8 Measles

This is a viral disease which is spread by infection. Generally, children particularly the infants are highly affected with measles and a great variation is observed within the children group. Boys are affected three times more commonly than girls. The national rate is 3.0 per 1000 population (1976), while the case appears to be reversed in Matlab with 0.9% in 1977 and 2.3% in 1986. The peak of 4.0% of all deaths was recorded during 1985 in Matlab. However, MCH-FP and other services were able to reduce the prevalence of this disease considerably in recent years.

5.11.9 Other Diseases

Cholera, dropsy, malnutrition, old age, suicide, murder etc. have been included in this category. On the average, here is the higher percentage of deaths. The proportion appears to be very high due to inclusion of so many diseases into one category. Of all these diseases, the age group 45+ are mainly affected by old age diseases and have got more contribution than any other diseases considered individually. In Matlab area, since 1977, deaths arising out of old age has been declining during 1977-1986 and again increased in 1987 and showed further decreasing tendency from 1988 to 1996.

5.12 Seasonality of Deaths

An interesting feature of Bangladesh mortality is its seasonal pattern. Increases are observed in November and December and through June and July. Seasonal or monthly variations of deaths are evident in most parts of the world. In recent times, significant proportion of deaths in most of the countries are observed in the winter months, and hence, the monthly patterns in the northern and southern hemispheres are reversed.

Respiratory diseases are usually the major components for the increase in the cool season, while diarrhoeal diseases in the summer. Using CRL data, Becker and Sarder (1978) attributed seasonality in infant deaths to the seasonal peaks of births in the earlier months

Table-5.17
Cause Specific Death in DSS Matlab Thana, 1977-1996

Diseases	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Diarrhoeal ¹	16.3	17.3	14.1	13.3	10.8	18.1	22.8	27.6	23.3	24.3	15.9	15.1	14.9	10.1	12.7	13.9	14.1	12.8	11.5	9.93
Tetanus	13.3	16.9	14.8	19.7	15.5	15.9	11.5	6.5	13.1	8.8	2.6	2.4	1.4	1.0	1.0	0.3	0.5	0.5	0.3	0.2
Respiratory ²	6.9	6.9	11.3	8.9	12.6	13.9	10.0	11.1	9.3	15.6	3.8	2.6	5.9	5.6	4.7	6.8	5.7	5.2	5.9	6.0
Fever	8.9	8.2	4.4	9.2	5.4	7.4	8.1	7.1	8.1	7.2	7.0	8.6	7.0	8.1	8.4	6.3	6.3	6.9	6.1	7.1
Heart ³	4.1	4.4	4.7	5.8	5.1	5.5	4.6	4.1	0.2	1.3	2.1	2.5	5.2	4.8	5.6	6.5	7.1	6.8	6.7	7.0
Accidents	3.5	3.8	3.3	3.3	3.3	3.5	3.5	0.7	1.1	1.1	1.8	2.1	2.6	1.5	2.0	1.7	2.0	2.4	2.9	2.5
Birth related ⁴	0.6	0.7	1.2	0.6	0.7	0.7	0.4	0.5	0.8	0.4	0.9	0.9	0.7	0.9	0.5	0.7	0.6	1.0	1.1	1.2
Measles	0.9	3.0	3.7	3.3	3.8	2.4	2.2	4.0	4.0	2.3	-	-	-	-	-	-	-	-	-	-
Other	45.5	38.8	42.5	35.9	42.8	32.7	36.9	38.4	40.1	39.0	66.1	65.8	63.0	68.0	65.1	63.8	63.7	64.4	65.5	66.1

Sources: Demographic Surveillance System(DSS)-Matlab, Scientific Report No- 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 82 ICDDR , B, Dhaka.

Note : 1) Diarrhoeal / Dysentery / acute gastroenteric etc.

2) Phneumonia / asthma / whooping cough / bronchities / bronchopneumonia etc.

3) Congestive cardiac failure / hypertension / hypovolaenic shock / shock / rheumatism etc.

4) Prematurity / congenital deformity / birth injury.

and the corresponding large number of neonatal deaths in the subsequent months. For post-neonatal deaths, a peak is achieved in March to May. However, for the age group 1-4, a slight peak is observed in March-April which is not carried on in subsequent ages. An effort was made to link seasonal variations with socio-economic status, using education, type of housing and occupation as indications. No significant differentials in the seasonal pattern in neonatal mortality for the three upper educational groups were noted. For post-neonatal mortality, in families whose head had one or more years of education, no seasonal pattern was observed. In contrast, in families where the head had no formal education, a highly significant seasonal pattern of post-neonatal mortality was seen with a peak in early April. The post-neonatal mortality of the lower socio-economic classes was found to be more responsive to seasonal changes than that of the upper classes. No seasonal patterns were found for deaths; but the peak of deaths was found to occur in December and the least in February.

5.13 Conclusion

Mortality is generally considered to be one of the most important components for population change and subsequently, the spatial mortality differentials by geographical regions also help to frame the national policy for taking preventive and curative measures against the communicable and other diseases to improve the general health conditions of the people.

The preceding discussion has demonstrated the declining trend in mortality in Bangladesh since the turn of this century. But relative to a large number of countries, mortality level in Bangladesh is very high. This is particularly true of infant and child mortality which is a major factor in raising the overall mortality level. Unlike the countries which have succeeded in reducing their mortality to low levels females in Bangladesh experience higher mortality than males up to age 45. In rural areas, which constitute 80 percent of the total Bangladeshi population, mortality is substantially higher than in urban areas because of the inadequacy of public health and medical services, lack of adequate safe drinking water and poor environmental hygiene.

Average diet of people is unbalanced and most people suffer from shortages of Calorie intake and Vitamin A and B deficiencies. The situation is very serious in respect of the pre-school population which additionally suffers from iron and calcium deficiencies and for the school - going population aged 10-13 protein intake is a little below the recommended level. A significant proportion of children below age 15 shows signs of malnutrition and deficiency diseases. Lactating mothers suffer from a deficiency of most of the nutrients including iron and calcium. Nutrition intake of the vulnerable group is also far below the desired levels impairing its productivity when it reaches working age. This also makes them easy victims of fatal diseases.

Ineffective and parasitic diseases account for a substantial proportion of deaths in the country. The more important of these diseases are tuberculosis, typhoid, tetanus, enteritis, measles, diphtheria and infectious hepatitis. Among the diseases of the circulatory system, heart diseases and cerebrovascular diseases play an important role. Bronchitis and pneumonia are also important killers while anemia, nutritional deficiencies, meningitis, peptic ulcer and cirrhosis of the liver are also important causes of death. Though not numerically important, marital deaths have a special significance in the context of female mortality and its effects on the child and the family. Diseases of early infancy and congenital malformations have special importance in the context of infant mortality.

Some of the significant aspects of the declining trend in mortality in Bangladesh are given below:-

Although there has been a steady decline in crude death rate since the beginning of this century, the rate of decline has been rather slow during the last few years owing to, among other things, occurrence of a number of disasters such as wars, famine and epidemics. Mortality in Bangladesh is still high with a crude death rate of about 8, expectation of life at birth at 59 years and an infant mortality rate of 67.

This study revealed that child mortality rate has been declining in recent years though the level is still very high compared to many developing countries. Therefore, further reduction in child mortality should be achieved. To reduce the prevailing child mortality, medical and health care facilities, level of mother's education as well as father's education should be increased in rural areas ; people should be aware of the

disadvantages of early marriages, higher birth orders and lower birth spacing. Each person should have minimum knowledge about hygiene and sanitation . Every newly married couple should be motivated to use contraceptive method to space their children . Breast-feeding and female participation in all activities should be encouraged. The EPI programme should also be strengthened in the future.

Infant mortality is also very high in Bangladesh . Mother's poor education, poor environmental health , malnutrition etc. may be contributing to the higher rate of infant mortality. The overall decline in mortality can be only possible if this infant mortality can be reduced drastically through the extension of MCH programmes, raising the living standard, improving the health facilities and making other conditions favourable for such action.

It has further been found that diarrhoeal and the tetanus diseases cause high mortality. At present, Matlab areas have been recording a declining trend in mortality in these diseases. So if the national policy associated with the above parameters are taken up, this would lead to further decline of mortality. One of the reasons for areal differentiation of mortality is the socio-economic structure of the area. Mortality and socio-economic status is inversely related. So, improvements in sanitation, medical care including maternal child health and family planning services, supply of drinking water, hygiene environment should be made effective to reduce the diseases to a moderately low level.

Benefits of development should percolate to the large rural masses and to the disadvantaged sections of the population if there is to be any considerable reduction in mortality. A hopeful sign is that government planning is now being focused on the development of rural areas and extension of health services to the rural masses.

The foregoing recapitulation clearly indicates that many of the factors contributing to the high mortality in Bangladesh can be controlled substantially by a proper use of existing knowledge, techniques and resources . Nutrition is essentially a problem related to poverty, however, much can be done by propaganda and health education though this is a slow process. Spectacular successes have been achieved in eradicating smallpox and effectively reducing incidence of malaria a few years back. It is encouraging to note that general health and nutrition of the people show encouraging signs of improvement.

Changes in mortality take place concomitantly within a set of interrelated socio-economic and medico-environmental changes. Some improvements in the economic conditions may

have taken place and the availability of drugs and preventive measures also could have hastened the reduction in death rates . Its is possible that establishment of rural health complexes throughout the country will have a direct impact on the future reduction of mortality levels.

Nevertheless, some diseases that are preventable still persist in the country. As long as the birth rate remains high there is a limit to mortality reduction. Given the large number of high parity births and the substandard hygienic environment in rural areas as well as the urban poor where the majority of birth occur, it seems unlikely that maternal and infant mortality will decline dramatically. High rates of infant mortality, however, may delay the emergence of the motivation for the limitation of fertility.

In this situation ,future reduction in mortality in our opinion would depend much upon:

- (i) Prevention and treatment of the most common diseases, particularly in the rural area.
- (ii) Reduction in the existing high level of childbearing.
- (iii) Improvement of sanitation and water supply, particularly in the rural areas.
- (iv) Improvement of the nutritional level of the population.

CHAPTER-VI

TRENDS AND DIFFERENTIALS IN NUPTIALITY PATTERN

6.1 Introduction

In recent years, nuptiality analysis has come to be recognized as an important branch of demographic studies. This is because it is being increasingly realized that age at marriage has an important bearing on family formation and the level of fertility. An important dimension of the compositional structure of a population deals with marriage. From a demographic point of view, marriage is an event that marks the beginning of the potential period of childbearing. Marriage rates at each age and proportions of the population in each marital status category are vital to fertility analysis. Since one of the important factors responsible for the high rate of population growth in most developing countries is the very low age at marriage, demographers generally agree that an upward shift in marriage age would help lower fertility level and thus reduce the rate of growth of population.

Age at marriage can significantly affect the rate of population growth of a country, particularly of a non-contraceptive society where births take place within legal marriage (Coale, et al., 1961). In a situation of limited control of fertility within marriage, a negative association between age at marriage and family size is generally considered almost inevitable. In view of this, raising age at marriage is considered a policy intervention “beyond family planning” that may initiate a fall in population growth on a major scale in developing countries. In explaining the decline of fertility in the developed

countries, Ryder maintains that low fertility has been achieved in Western Europe through four transitional phases: high nuptiality- high marital fertility; low nuptiality- high marital fertility; low nuptiality- low marital fertility; high nuptiality- low marital fertility; whereas Eastern Europe has cut the sequence by omitting the two intermediate stages (Ryder, 1967). Coale asserts that the presently low fertility countries achieved this state by employing both Malthusian and Neo-Malthesian methods of fertility regulation (Coale, 1967). Hence; age at marriage and proportion marrying occupy a very important place in studies related to policy interventions for reducing fertility in countries with sustained high fertility like Bangladesh (Duza and Baldwin, 1977). There has been a growing interest in the study of nuptiality not only for its great impact on fertility but also in its own right as an important demographic factor which affects the marital life cycles of a vast majority of people in a society. Role of nuptiality in population growth has drawn the attention of not only demographers but also of the policy makers and planners for the reason that delayed marriage can contribute significantly to reduction in fertility and in turn; the population growth. Study of nuptiality has long been a concern of sociologists and anthropologists. Demographers have only recently started to devote significant attention to this field (Duza and Mokhtari, 1976). Basically, two phenomena seem apparently to characterize the nuptiality behavior, namely, the age at first marriage and proportion marrying which has great implication for fertility. Normally, both the factors seem to change over time contributing to change in marriage patterns.

Nuptiality patterns and levels have also certain implications for non-demographic socio-economic fields; for example, raising age at marriage would permit a greater exposure to young adults for non-familial activities including education, greater mobility opportunities and attractive labour markets for both sexes. Avoidance of very early child-bearing certainly contributes to the health of mother and children (Westoft, 1975). Marriage policies can be directed to a variety of objectives such as the social condition of unmarried women's, the welfare of the unmarried elderly population, the effect of migration on the marriage market and social and legal aspects of illegitimate children. The implication deals primarily with demographic aspects, and more specifically, with the fertility implications of marriage in countries where current level of fertility is not

deemed satisfactory, with proper incentives and legislation, marriage policies could be geared either to increase or to decrease fertility.

In Bangladesh, fertility is high and fertility regulation is low, the possibility of action to raise the minimum legal age at marriage is a policy measure that has found to be working well. Obviously; with no or negligible pre-marital conception, delayed marriage of women can have a significant impact on the reproduction of adolescents. However, taking into consideration the large size of the female population aged 15-19 years, potential total number of births that can be avoided by delaying marriage among teenagers can be considerable.

Finally, marriage and marriage dissolution are among the important variables associated with population growth. Patterns of age, sex and other socio-demographic characteristics of the population by marital status are used for study of fertility and reproduction and of various related sociological and medical problems (Davis and Blake, 1956). According to Chen, Huffman and Satterwaite (1977) reproduction lifespan of a woman is influenced by behavioral variables, such as marriage, divorce, celibacy and terminal conception and biological variables such as menarche, menopause, sterility and widowhood. Hence in a society where use of contraception is little and celibacy is virtually absent, behavioral variables which influence the reproductive lifespan of women only include marriage and marriage dissolution.

6.2 Changes in Marital Status

6.2.1 Trends in Proportion Married

Timing of nuptiality indicates the pace at which marriage takes place and quantity, the ultimate proportion of persons getting married. Both features of nuptiality are captured from proportion single of the marital status distribution. Such distribution further reflects, to some extent, the mark of the beginning of marriage or the timing of marriage. Various studies on nuptiality pattern of Bangladesh at the national and subnational levels indicate that marriage in Bangladesh starts very early, progresses fast and almost all persons marry (Kabir, 1978, Abedin, 1982, ESCAP, 1981).

Percentages of the population who have never married at different ages for the periods 1951 to 1991 are presented in table-6.1. Data in the table show some changes in

proportion of the never married population in the age groups of 10-14, 15-19, 20-24 and 25-29 over time. This phenomenon is quite evident from both census and survey data. A remarkable change has taken place in age groups 10-14 and 15-19 of both males and females and such change among females of age <20 is noteworthy. The data further indicate that by age 25 almost all females get married. Increase in the percentage of never married males at younger ages over the years is succinctly demonstrated by the data. At the ages 10-14 the percentage of nevermarried males remains almost the same over the period 1951 to 1991. For example, in the 1951 census; the proportions of nevermarried females in age groups 10-14, and 15-19, were reported to be 73.7 and 11.3 percent respectively. In the 1991 census, the corresponding figures were 96.8 and 48.7 percent respectively. This increase in proportion of never married females at age groups 10-14 and 15-19 over time has been observed in both rural and urban areas. However, the above trend is more rapid among rural females also shown in Table-6.2. Among males, pace of decline in the proportion never-married has been relatively slow.

In 1951, 83.9 percent of males in the age group 15-19 were nevermarried, in 1991, the corresponding percentage was 95.0. For the 20-24 age group, 46.3 percent remained unmarried in 1951 compared to 68.4 percent in 1991. The percentage of never married in the age group 45-49 indicates the degree of permanent “celibacy” present in the society. It is obvious from Tables-6.1 and 6.2 that this is virtually absent in Bangladesh.

It may be further noted from these tables that proportion currently married is very high and there is hardly any difference between the rural and urban areas. This implies that most of the women are in the married state during the reproductive period; this contributes to high fertility.

The universality of marriage in Bangladesh is shown in Table-6.3, where the percentages of the married for male and females were compared with those in other countries. The marriage percentage of Japan at the age group 20-24 is 46.1 which is less than half of the female population. And in Sri Lanka and the Republic of Korea married female percentage are 54.3 and 61.1 respectively at the same age group.

Table-6.1
Percentage of the population who have never married by current age, 1951-1991

Current age	1951 Census	1961 Census	1961-1962 DSS	1965 PGE	1974 Census	1974 Retrospective Survey	1975 BFS	1981 Census	1989 BFS	1991 Census
Females										
10-14	73.7	67.4	75.1	82.0	90.5	94.0	91.2	98.0	96.2	96.8
15-19	11.3	8.3	10.2	13.0	24.5	32.3	29.8	31.3	49.0	48.7
20-24	3.0	1.3	1.7	1.6	3.2	4.6	4.6	5.1	12.0	10.5
25-29	1.1	0.5	0.5	0.2	0.9	1.1	1.0	1.3	2.3	2.4
30-34	0.5	0.4	0.3	0.3	0.6	0.4	0.2	1.0	0.3	1.1
35-39	0.2	0.2	0.8	0.3	0.4	0.2	0.4	0.4	0.1	0.6
40-44	0.2	0.2	0.0	0.2	0.5	0.2	0.2	0.7	0.2	0.6
45-49	0.2	0.1	0.0	0.2	0.3	0.3	0.0	0.3	0.1	0.4
Males										
10-14	97.9	97.8	99.7	99.4	99.3	98.7	99.5	99.9	99.5	99.5
15-19	83.9	87.8	91.1	93.3	92.3	94.5	93.0	93.3	96.5	95.0
20-24	46.3	49.7	54.5	51.5	60.1	65.7	61.5	59.7	72.1	68.4
25-29	15.1	17.3	15.2	11.7	22.5	24.0	20.5	21.2	32.6	26.4
30-34	5.5	5.3	3.6	2.3	5.7	5.9	5.1	6.3	8.7	7.2
35-39	2.6	2.6	0.7	1.7	2.2	2.0	1.4	2.3	1.9	2.1
40-44	2.0	1.1	0.0	0.5	1.5	0.9	1.0	1.9	1.1	1.1
45-49	1.3	0.8	0.0	0.7	1.1	0.8	1.1	1.2	0.7	0.6

Sources:- (a) Census of East Pakistan 1951, 1961, Karachi, Government of Pakistan, 1951, 1961.

(b) Demographic Sample Survey of 1961-62,

(c) Population Growth Estimation from 1962-1965,

(d) Bangladesh Retrospective Survey on Fertility and Mortality in 1974, ISRT, Dhaka University, Dhaka,

(e) Bangladesh Fertility Survey 1975, 1989, First Report, Dhaka, Bangladesh,

(f) Bangladesh Population Census 1981, 1991, BBS, Dhaka.

Table-6.2
Percentage of never married, by age 1961-1991 and BFS 1975

Age of women	Census 1961		Census 1974		BFS 1975		Census 1981		Census 1991	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
10-14	66	91	91	95	88	93	93	95	97	98
15-19	7	48	22	45	26	41	29	45	45	61
20-24	1	13	3	10	3	10	4	11	8	18
25-29	1	5	1	2	1	3	1	3	2	4

Sources:-

- (a) A. Rashid, Census of East Pakistan, 1961, Karachi, Government of Pakistan, 1961,
- (b) Bangladesh Retrospective Survey on Fertility and Mortality in 1974, ISRT, Dhaka University, Dhaka,
- (c) Bangladesh Fertility Survey 1975, Ministry of Health and Population Control, Dhaka, Bangladesh,
- (d) Bangladesh Population Census 1981, 1991, BBS, Dhaka.

Table-6.3
Percentage of married by sex in selected countries

Country	Year	Males		Females	
		20-24	25-29	20-24	25-29
Japan	1982	19.6	45.9	46.1	36.9
Sri Lanka	1979	33.7	38.7	54.3	19.1
Republic of Korea	1981	22.4	59.4	61.1	25.8
Bangladesh	1981	39.9	78.3	90.9	94.4

Sources:- (a) Bangladesh Population Census 1981, National Series, BBS, Dhaka,
 (b) Demographic Yearbook 1983, United Nations, P. 510-511, Table-24.

In Bangladesh, the percentage was 90.9. In the age group 25-29, 94.4 percent of the females in Bangladesh had already been married compared to 19.1 percent in Sri Lanka, 25.8 percent in Republic of Korea and 36.9 percent in Japan.

The marital compositions of population for the five consecutive censuses of 1951, 1961, 1974, 1981, and 1991 are shown in Table-6.4 and graphically in Figure-6.1 and 6.2. The marked shift in the proportion of unmarried females between the ages 10-14 and 15-19 has been discussed in the fertility chapter. An interesting feature of this table is the rate of movement of the population from the never married to the married to the widowed/divorced state. In 1951, among the males, more than 51.9% were already married in the 20-24 age group. Among the females, 85.1 percent were married at age 15-19. In 1961, 1974, 1981, and 1991, the percentages of males married in the 20-24 age-group were 48.8, 39.1, 39.9 and 31.4 respectively. The corresponding figures for females who were married in the age group 15-19 were 89.4, 71.8, 65.4 and 49.6 for 1961, 1974, 1981 and 1991 respectively. The transition from the married to widowed/divorced state is notable. At ages 30-34, 12.5 percent of the females in 1951 were widowed, divorced. In 1961, the percentage was 8.6, in 1974 it was 6.0, in 1981 it was 6.1, and this further declined to 5.1 percent in 1991. In the age group 35-39, the percentages widowed and divorced were 20.5, 15.1, 9.8, 9.6 and 7.3 for 1951, 1961, 1974, 1981 and 1991 respectively. This shows a decline in the dissolution of marriage over time. This decline, however, is mainly due to the reduction in the incidence of widowhood shown in table-6.5. The marital status by sex and ages is shown in table-6.5. There are a number of interesting figures. Of particular note is the very large difference between men and women in the proportions who were widowed. For women, the percentage of the widowed rose from 8 percent in the

Table-6.4
Percentage Distribution of the population aged 10 years and above by marital status, Age and Sex , 1951-1991

Age groups	1951					1961					1974					1981					1991				
	Never married	Married	Widowed/ Divorced	Never married	Married	Widowed/ Divorced	Never married	Married	Widowed/ Divorced	Never married	Married	Widowed/ Divorced	Never married	Married	Widowed/ Divorced	Never married	Married	Widowed/ Divorced	Never married	Married	Widowed/ Divorced				
Male																									
Total	37.2	58.6	4.2	33.5	63.0	3.5	43.3	53.9	2.8	42.8	55.9	1.3	42.1	57.2	0.7										
10-14	97.9	2.0	0.1	97.8	2.2	0.1	99.3	0.7	-	99.0	1.0	-	99.5	0.5	-										
15-19	83.9	15.5	0.6	87.7	12.0	0.3	92.3	7.5	0.2	93.3	6.6	0.1	95.0	4.9	0.1										
20-24	46.3	51.9	1.8	49.7	48.8	1.5	60.1	39.1	0.8	59.7	39.9	0.4	68.4	31.4	0.2										
25-29	15.1	82.1	2.8	17.3	80.4	2.3	22.4	76.3	1.2	21.2	78.3	0.5	26.4	73.3	0.3										
30-34	5.5	91.0	3.5	5.3	92.1	2.6	5.7	93.0	1.3	6.3	93.1	0.6	7.2	92.5	0.2										
35-39	2.6	93.5	3.9	2.6	94.7	2.7	2.2	96.6	1.2	2.3	97.0	0.7	2.1	97.6	0.3										
40-44	2.0	93.1	4.9	1.1	95.1	3.8	1.5	96.8	1.7	1.9	97.1	1.0	1.1	98.5	0.5										
45-49	1.3	92.8	5.9	0.8	94.3	4.9	1.1	96.8	2.1	1.2	97.5	1.3	0.6	98.7	0.7										
50-54	1.2	90.5	8.3	0.7	92.9	6.4	1.0	95.8	3.2	1.7	96.3	2.0	0.7	98.1	1.2										
55-59	0.7	86.6	12.0	0.6	91.9	7.5	0.8	95.4	3.8	1.2	96.2	2.6	0.4	98.0	1.6										
60+	0.7	77.7	21.6	0.4	84.5	15.1	0.8	90.2	9.0	0.7	90.7	8.6	0.6	95.1	4.3										
Female																									
Total	14.8	66.9	18.3	10.5	70.7	18.8	24.4	61.2	14.4	23.7	63.4	12.9	25.2	64.8	10.0										
10-14	73.7	25.4	0.9	67.4	31.8	0.8	90.5	8.8	0.7	98.0	70.0	-	96.8	3.0	0.2										
15-19	11.3	85.1	3.6	8.3	89.4	2.3	24.5	71.8	3.7	31.3	65.4	3.3	48.7	49.6	1.7										
20-24	3.0	93.4	3.6	1.3	95.6	3.1	3.2	92.9	3.9	5.1	90.9	4.0	10.5	86.6	2.9										
25-29	1.1	92.1	6.8	0.5	94.7	4.8	0.9	95.2	3.9	1.3	94.4	4.3	2.4	94.0	3.6										
30-34	0.5	87.0	12.5	0.4	91.0	8.6	0.6	93.4	6.0	1.0	92.9	6.1	1.1	93.8	5.1										
35-39	0.2	79.3	20.5	0.2	84.7	15.1	0.4	89.8	9.8	0.4	89.8	9.6	0.6	92.1	7.3										
40-44	0.2	66.1	33.7	0.2	71.5	28.3	0.5	81.4	18.1	0.7	81.9	17.4	0.6	86.9	12.5										
45-49	0.2	60.5	34.3	0.1	63.3	38.6	0.3	75.1	24.6	0.3	74.5	25.2	0.4	81.7	17.9										
50-54	0.2	43.9	55.9	0.1	45.2	54.7	0.3	60.3	39.4	1.4	62.3	36.3	0.5	70.6	28.9										
55-59	0.2	35.2	64.6	0.1	37.5	62.4	0.4	52.9	46.7	0.7	54.4	44.9	0.4	64.3	35.2										
60+	0.2	20.2	79.6	0.1	17.4	82.5	0.4	27.3	72.3	0.5	32.9	66.6	0.8	42.9	56.3										

Sources:- (a) E.H. Slade, Census of Pakistan 1951, Karachi, Government of Pakistan, 1951,
 (b) A. Rashid, Census of Pakistan 1961, Karachi, Government of Pakistan, 1961,
 (c) Bangladesh Population Census 1991, Analytical Report, BBS, Dhaka, Bangladesh, P.85, Table-6.2.

Table-6.5
Percentage distribution of the adult population according to marital status by age and sex (Census 1961-1981 and BFS, 1975, 1989)

Age group	Never married					Currently married					Widowed					Divorced or Separation				
	1961	1974	1975	1981	1989	1961	1974	1975	1981	1989	1961	1974	1975	1981	1989	1961	1974	1975	1981	1989
Females																				
10-14	67	91	91	93	96	32	-	8	7	4	0	-	0	0	0	1	-	0	0	0
15-19	8	24	30	31	49	90	9	65	65	48	1	0	1	1	0	1	1	5	2	3
20-24	1	3	5	5	12	96	72	90	91	83	2	1	2	2	1	1	3	3	2	4
25-29	1	1	1	1	2	95	93	92	94	91	4	2	4	3	2	1	2	3	2	4
30-34	0	1	0	1	0	91	95	91	93	93	8	3	7	5	4	1	1	2	1	3
35-39	0	1	0	0	0	85	90	84	90	90	14	6	13	9	8	1	1	2	1	2
40-44	0	0	0	1	0	72	81	79	82	84	28	9	20	17	13	1	1	1	0	1
45-49	0	0	0	0	0	61	75	71	75	80	38	18	28	25	18	1	1	1	0	1
50-54	0	0	0	1	0	45	60	63	62	65	54	24	35	36	33	1	0	1	0	1
55-59	0	0	2	1	1	38	53	48	54	54	62	39	50	45	45	1	1	0	0	0
60+	0	0	3	1	1	17	27	25	33	31	82	46	72	66	68	0	0	0	0	0
Males																				
10-14	98	99	100	100	100	2	1	0	1	0	0	-	0	0	0	0	0	0	0	0
15-19	88	92	93	93	97	12	8	6	7	3	0	0	1	0	0	0	0	0	0	0
20-24	50	60	62	60	72	49	39	37	40	27	1	0	1	0	0	1	0	1	0	1
25-29	17	23	21	21	33	80	76	78	78	66	2	1	1	0	0	1	0	1	0	1
30-34	5	6	5	6	9	92	93	92	93	90	2	1	2	1	0	1	0	1	0	1
35-39	3	2	1	2	2	95	97	97	97	97	2	1	1	1	1	0	0	0	0	0
40-44	1	2	1	2	1	95	97	96	97	98	4	2	2	1	0	0	0	1	0	0
45-49	1	1	1	1	1	94	97	96	98	98	5	2	3	1	0	0	0	0	0	0
50-54	1	1	0	2	0	93	96	96	96	98	6	3	3	2	1	0	0	0	0	0
55-59	1	1	1	1	0	92	95	95	96	96	7	4	4	3	3	0	0	0	0	0
60+	0	1	2	1	0	85	90	87	91	92	15	9	11	8	8	0	0	0	0	0

Sources: (a) A. Rashid, Census of Pakistan 1961, Karachi, Government of Pakistan, 1961,

(b) Bangladesh Fertility Survey 1989, Main Report, NIPORT, Dhaka, P. 42, Table-4.1.

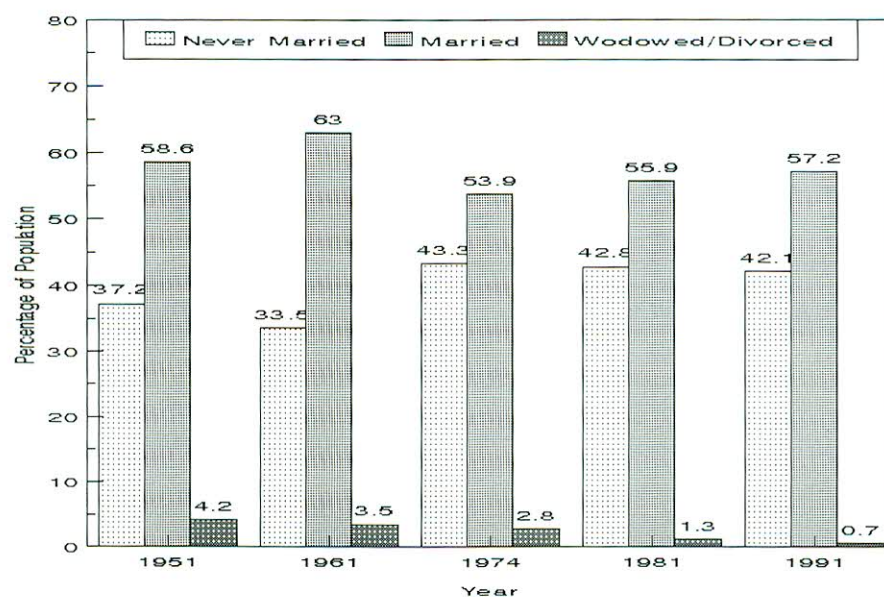


Fig 6.1 Percentage distribution of Male Population aged 10 years and above by Marital Status

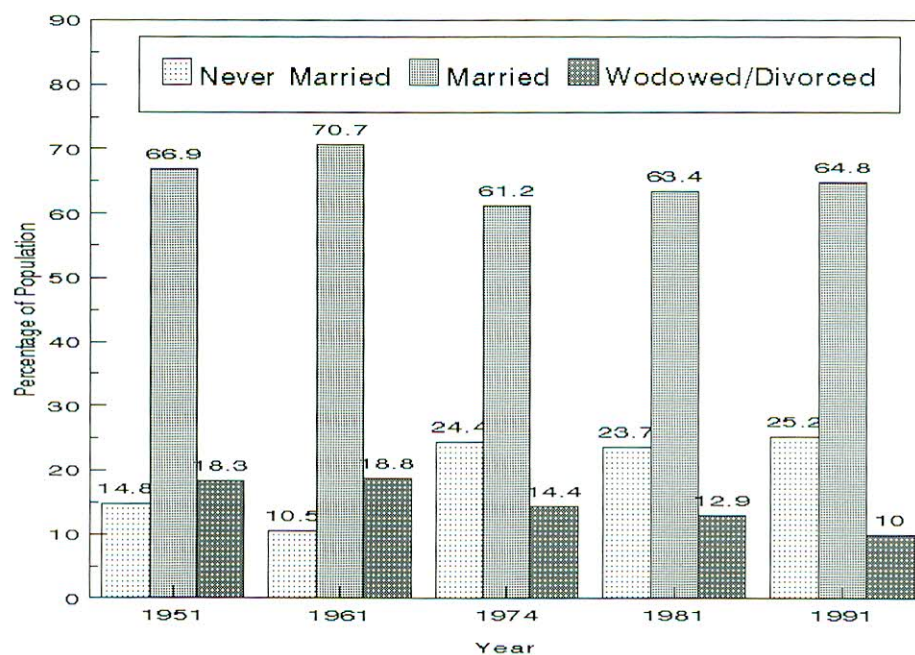


Fig 6.2: Percentage distribution of Female Population aged 10 years and above by Marital Status

35-39 age group up to 68 percent among for those aged 60 and over. Among the male population, the proportions reported as widowers are negligible below age 60 and rise only to 8 percent among men aged 60 or more. There are two reasons for this huge disparity. First, there is a large age difference between husbands and wives in Bangladesh and therefore, husbands usually die before their wives. Second, the figures imply that men are much more likely to remarry than women.

Number of persons described as divorced or separated is very low for both sexes. Almost certainly, there has been some under reporting, particularly among older women who may find it more acceptable to declare themselves as widows than as divorced or separated. For instance, among women aged 40 to 44, the percentage widowed fell from 28% in 1961 to 18% in 1974, and rose from 18% to 20% in 1975 and again fell from 20% in 1975 to 17% in 1981 and to 13% in 1989. The main reason for this trend is the declining adult mortality but higher probabilities of re-marriage for widows may also have played some role. As a result of declining widowhood, the proportions of women who are currently married were higher in 1989 than in 1961 at all ages above 30. The net effect will be to increase fertility at ages 30 to 50, thus offsetting the decrease in fertility at younger ages due to later marriage ages.

Finally, it may be noted that Bangladesh is still characterized by universal marriage. Number of women aged 30 or more who are still single is effectively zero. For men, there is still a tiny lingering number of bachelors, aged 30 to 50, but, above aged 50, almost no single men are reported.

Overall proportions of persons aged 10 and above at different marital status categories, viz. Single (never married), married, widowed and divorced, for both males and females are shown in table-6.6.

A remarkable change in the proportion of single persons is noticed during 1961-1974 in both sexes and a slow but steady increase in such proportion is also evident during 1974-1991. This indicates that the age patterns of marriage might have changed considerably during these periods. An increase of about 12 percent in the overall proportion single of males and about 18 percent of females from 1961 to 1989 is perhaps a clear indication of

Table-6.6
Proportion of persons aged 10 and above by sex and marital status of Bangladesh: 1961-1991

Year	Male				Female			
	Single	Married	Widowed	Divorced /Separation	Single	Married	Widowed	Divorced /Separation
1961	33.5	63.0	3.2	0.7	10.5	70.6	18.1	0.8
1974	41.2	57.0	1.7	0.1	21.2	64.4	13.1	1.1
1981	42.8	55.9	1.2	0.1	23.7	63.4	11.9	1.0
1991	42.1	57.2	0.6	0.1	25.7	64.8	9.4	0.6
1975	45.0	52.6	20.	0.4	26.0	59.4	12.5	2.1
1989	45.3	53.2	1.2	0.3	28.0	59.1	10.7	2.2

Sources:- (a) Census of East Pakistan ,1961, Karachi, Government of Pakistan,1961,
 (b) Bangladesh Fertility Survey 1975 ,1989, Main Report, Dhaka, Bangladesh,
 (c) Bangladesh Population Census 1974,1981, 1991, BBS ,Dhaka.

changes in marriage pattern, at least rise in age at marriage and also shift in the mark of the beginning of marriage of both sexes.

The declining tendency of proportion of the married of both males and females with time may be the results of tendency of persons to remain single in greater proportion and /or greater intensity of marital dissolution through divorce and widowhood. A decreasing tendency of widowhood proportion is perhaps an indication of improved mortality condition. A relatively high proportion of female widows could be associated, not with the sex differentials in mortality; but with the deaths of husbands older than their wives as a consequence of substantial inter-spousal age difference in which cases husbands are older than wives. It is hard to say anything definitely about the stability of marriage over time by looking at the face values of proportion divorced.

6.2.2 Trends in Mean Age at Marriage

The average age at first marriage is a useful summary measure for comparing the distributions of first marriages. In the absence of adequate sources of marriage data, the mean age can be computed from census tabulations by age and marital status through a method developed by Hajnal (1953). This method determines the mean age at first marriage for all males and females in a synthetic censal cohort who marry for the first time before a certain advanced age, e.g., 50 years. Marriage probabilities for such a population are procured and the estimation of mean age at marriage consists in finding the total number of years lived in the single state by a generation from birth to age 50 years and dividing this total by the number who have been removed by marriage from a no mortality cohort. The average number of single years lived is also the average age at first marriage and described as the singulate mean age at marriage.

Table-6.7 indicates an increase in the singulate mean age at marriage from 1931 to 1996. The mean age at marriage for females has increased to 20.1 years in 1996 from 12.6 years in 1931 while that for male also increased to 27.8 years in 1996 from 19.0 years in 1931. Thus over the last 65 years the age at marriage for females has increased by about 7.5 years, i.e. it has increased at the rate of 1.4 months per year during the same period. Age at marriage for males has increased by about 8.8 years i.e. male's age at marriage has risen by 1.6 months per year which is a little faster rate than that of females. The gap

between male and female age at marriage has on the other hand increased from 6.4 years in 1931 to 7.7 years in 1996. It seems that minimum age fixed for marriage of females by the Family Law Ordinance has yet to be followed rigorously.

Table-6.7
Mean age at marriage in Bangladesh, 1931-1996

Sources	Year	Males	Females	Difference
Population Census	1931	19.0	12.6	6.4
Population Census	1941	21.5	13.7	7.8
Population Census	1951	22.4	14.4	8.0
Population Census	1961	22.9	13.9	9.0
PGE 22	1965	22.9	14.8	8.1
Population Census	1974	24.0	15.9	8.1
BRSFM	1974	23.9	16.6	7.3
BFS	1975	24.5	16.4	8.1
BLDS, BBS	1980	24.9	16.4	8.5
Population Census	1981	25.8	17.8	8.0
BFS	1989	25.5	18.0	7.5
Population Census	1991	24.9	17.9	7.0
VRS	1996	27.8	20.1	7.7

Source: (a) Bangladesh Population Census 1991, Analytical Report, BBS, Dhaka, P.96, Table-6.8.
(b) 1997 Statistical Yearbook of Bangladesh, BBS, Dhaka, P.31.

Again a summary of the result on singulate mean age at marriage estimated by different researches at different time points is presented in table-6.8. The data in table-6.8 indicate an increase in the singulate mean age at marriage from 1921 to 1989. The mean age at marriage for females increased from 12 years in 1921 to 18 years in 1989. The low value in marriage age in 1931 could be attributed to the Child Marriage Restraint Act (Known as Sarda Act) which was enforced on 1st April 1930. The voice of social reformers against the course of early marriage, especially of females, resulted in passing of this Act, which prohibited all marriages involving girls under 14 and boys under 18 years of age. The Bill itself was debated vigorously in the legislative assembly; it became a law on 1st October 1929 and was enforced on 1st April 1930. Many persons took advantage of the delay of the Act and solemnized early marriages of their children which might not have taken place in the ordinary course of time. Age at marriage in 1951 is found to be a little higher than that of 1961. This departure from the expected finding may be explained as follows. Pakistan emerged as an independent country from British India in 1947. During the immediate post independence period, many people migrated in and out of former East Pakistan and there was dislocation in every aspect of society and the economy. As a

result, people had to postpone their marriages at least for a few years. This may have pushed up the age at marriage in 1951.

Table-6.8
Singulate mean age at marriage of the women of Bangladesh
at indicated years obtained from different sources

Source	Year	Mean age
Sadiq (1965)	1921	12.3
Sadiq (1965)	1931	10.8
Sadiq (1965)	1941	13.4
Sadiq (1965)	1951	14.4
Sadiq (1965)	1961	13.9
Afzal (1967)	1961	14.9
Alam (1968)	1964	14.9
BRSFM (1977)	1974	16.5
Census (1978)	1974	15.9
Cain (1978)	1976-78	16.0
BFS (1978)	1975-76	16.0
Ruzicka and Chowdhury(1978)	1975-76	16.7
Shahidullah (1980)	1975	16.0
Shaikh (1984)	1979	16.9
Ahmed (1985)	1975	16.3
Islam and Islam(1993)	1989	18.0

Data on mean age at marriage by sex and residence over time are shown in table-6.9 which reveal that mean age at marriage at any point of time is seen to be higher in urban area than that in rural area. This implies lower proportion of married persons at younger age groups in urban area i.e. the urban population marry generally at higher age than do the rural population.

Table-6.9
Mean age at marriage by sex and residence, 1974, 1981, 1982, 1991

Residence	1974		1981		1982		1991	
	Male	Female	Male	Female	Male	Female	Male	Female
Bangladesh	24.0	15.9	25.8	17.8	25.6	17.7	24.58	17.93
Urban	25.6	17.8	27.8	19.1	27.1	18.7	26.29	19.06
Rural	23.7	16.3	25.4	17.6	25.7	17.5	24.38	17.61

Source:- Bangladesh Population Census 1991, Analytical Report, BBS. Dhaka, P.98, Table-6.9.

The difference observed in the mean age at marriage for male and female was about 7.23 years in urban areas and about 6.77 years in rural areas in 1991 and it was 8.7 years and 7.8 years respectively in 1981. Data also reveal that mean age at first marriage in urban areas is consistently higher than that in rural areas by about 2 years and this is applicable for both males and females. This may be partly due to the consciousness of urban people about their family burden and partly to the fact that the urban people try to receive higher education which refrain them from early marriage.

The increasing trend was substantiated when the mean age at first marriage of the women was tabulated against their year of marriage. It appears from table-6.10 that mean age at

first marriage increases in a steady manner from the older to the younger marriage cohorts. The oldest marriage cohort(1947-1950) married at an average of 11 years. For the youngest marriage cohort, (1986-1996), the average was 24.0 years.

Table-6.10
Mean age at first marriage by year of marriage cohorts, 1947-1996

Year of marriage	Mean age at first marriage
1947-1950	11.2
1951-1955	11.5
1956-1960	11.6
1961-1965	12.4
1965-1970	13.3
1971-1975	14.4
1976-1980	20.7
1981-1985	21.6
1986-1990	21.6
1991-1996	24.0

Sources:- (a) Bangladesh Fertility Survey 1975, Ministry of Health and Population Control, Dhaka, Bangladesh,
(b) Statistical Yearbook 1992, 1997 BBS, Dhaka, Bangladesh.

6.2.3 Decline in Child Marriages

The decline in child marriages is evident in table-6.11. In 1881, the percentage have among females was 8.8. Since then, a downward trend has been noted, except in 1931 when the percentage rose to 15.3. This was a reaction to the child marriage Restraint Act of 1930 where early marriages were solemnized prior to its implementation. By 1974, the proportion was negligible. From infant to 10 years, data was not available for the years 1981 and 1991.

Table-6.11
Percentage distribution of persons married before 10 years of age, 1881-1991

Year	Males	Females
1881	0.7	8.8
1891	0.6	7.5
1901	0.7	6.6
1911	0.7	0.5
1921	0.6	4.2
1931	4.2	15.3
1941	0.4	2.6
1951	0.1	0.1
1961	0.0	0.0
1974	0.0	0.5
1981	--	--
1991	--	--

Sources:(a) Reports on Census of India 1901-1941,
(b) Census of Pakistan 1951,
(c) Bangladesh Population Census 1974,1981,1991, BBS , Dhaka.

Note: (--) is not available.

6.2.4 Mean Age at Marriage, Expectation of life at Birth and Aged population (60+)

Mean age at marriage and aged population of Bangladesh during the year 1961-1996 are shown in table-6.12 and geographical representation is shown in Figure-6.3.

Table-6.12
Mean Age at Marriage and Aged Population of Bangladesh, 1961-1991

Year	Mean age at marriage	Aged population (60+)
1961	11.76	2.64
1966	12.58	3.08
1971	13.52	3.52
1976	15.66	4.28
1981	20.88	5.03
1986	21.60	5.53
1991	20.08	6.02
1996	24.00	6.52

Sources:- Same as Table-6.10.

It is observe from the Figure-6.3 that during the period 1961-1996 with the increase of mean age at marriage, the aged population gradually increased. A straight line linear regression fitted to the data gives the following result.

$$X_1 = -0.546 + 0.289 X_5, \quad R^2 = 0.967$$

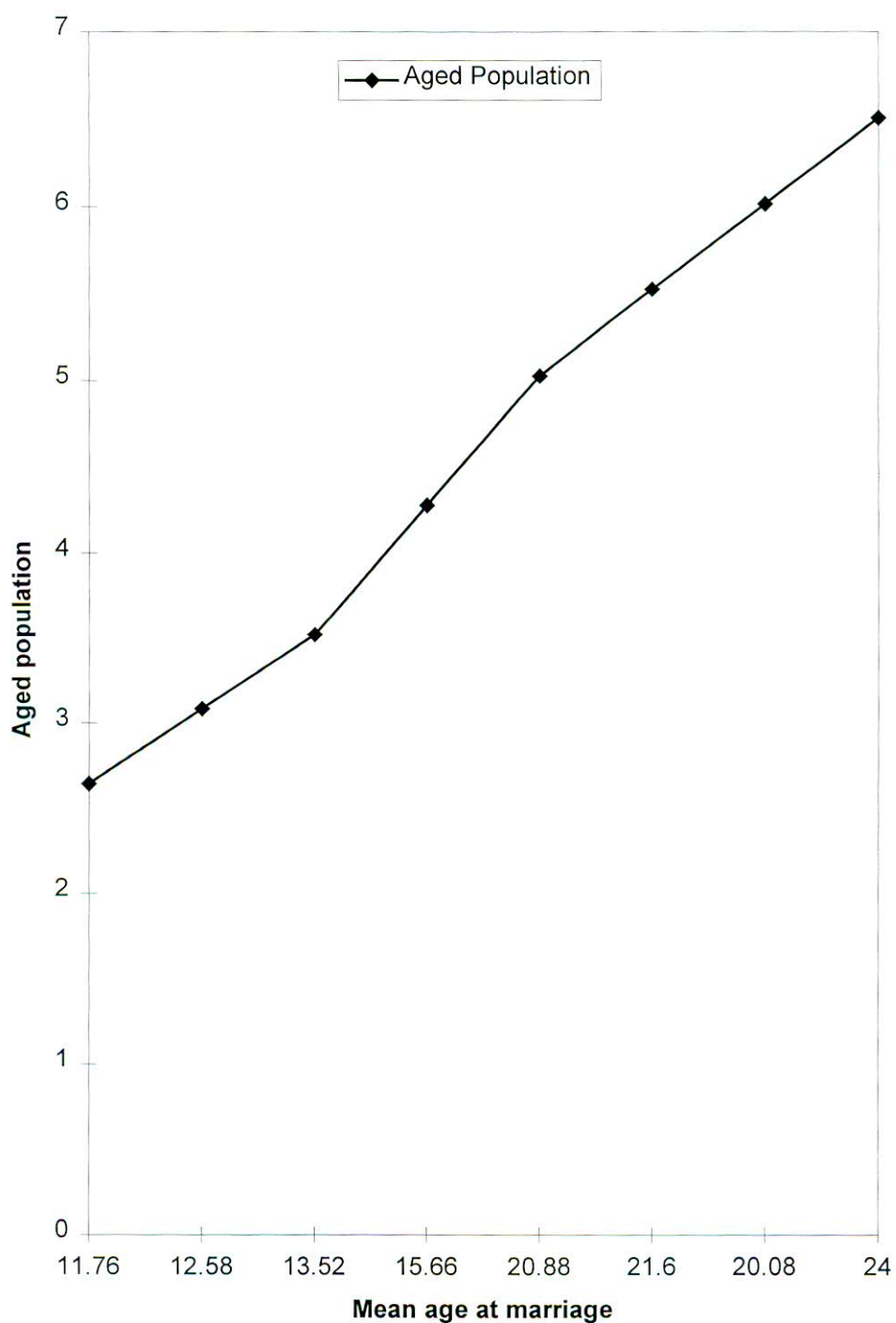
(0.398) (0.022)

Where X_1 = Aged population (60+)

X_5 = Mean age at marriage

From the above results we observe that about 96.7 percent of the variation in aged population is explained by mean age at marriage. The regression effect of mean age at marriage on the aged population is estimated to be 0.289 which is significant at 1 percent level. This regression co-efficient indicates that if the mean age at marriage increased by 1 unit then the aged population would increase by 0.289 unit.

Fig 6.3 Mean age at marriage and aged population (60+) of Bangladesh, 1961-1996



Again table-6.13 shows the mean age at marriage and expectation of life at birth of Bangladesh during 1961-1996 and also shown in Figure-6.4

Table-6.13
Mean Age at Marriage and Expectation of Life at Birth, 1961-1991

Year	Mean age at marriage	Expectation of life at birth
1961	11.76	41.1
1966	12.58	45.9
1971	13.52	50.7
1976	15.66	52.6
1981	20.88	53.5
1986	21.60	54.8
1991	20.08	56.1
1996	24.00	58.9

Sources:- Same as Table-6.10 and Table-5.12.

It is seen from the Figure-6.4 that during the period 1961-1996 with increase of mean age at marriage, the expectation of life at birth also gradually increased. A straight line linear regression fitted to the data gives the following result.

$$X_6 = 32.863 + 1.061 X_5, \quad R^2 = 0.812$$

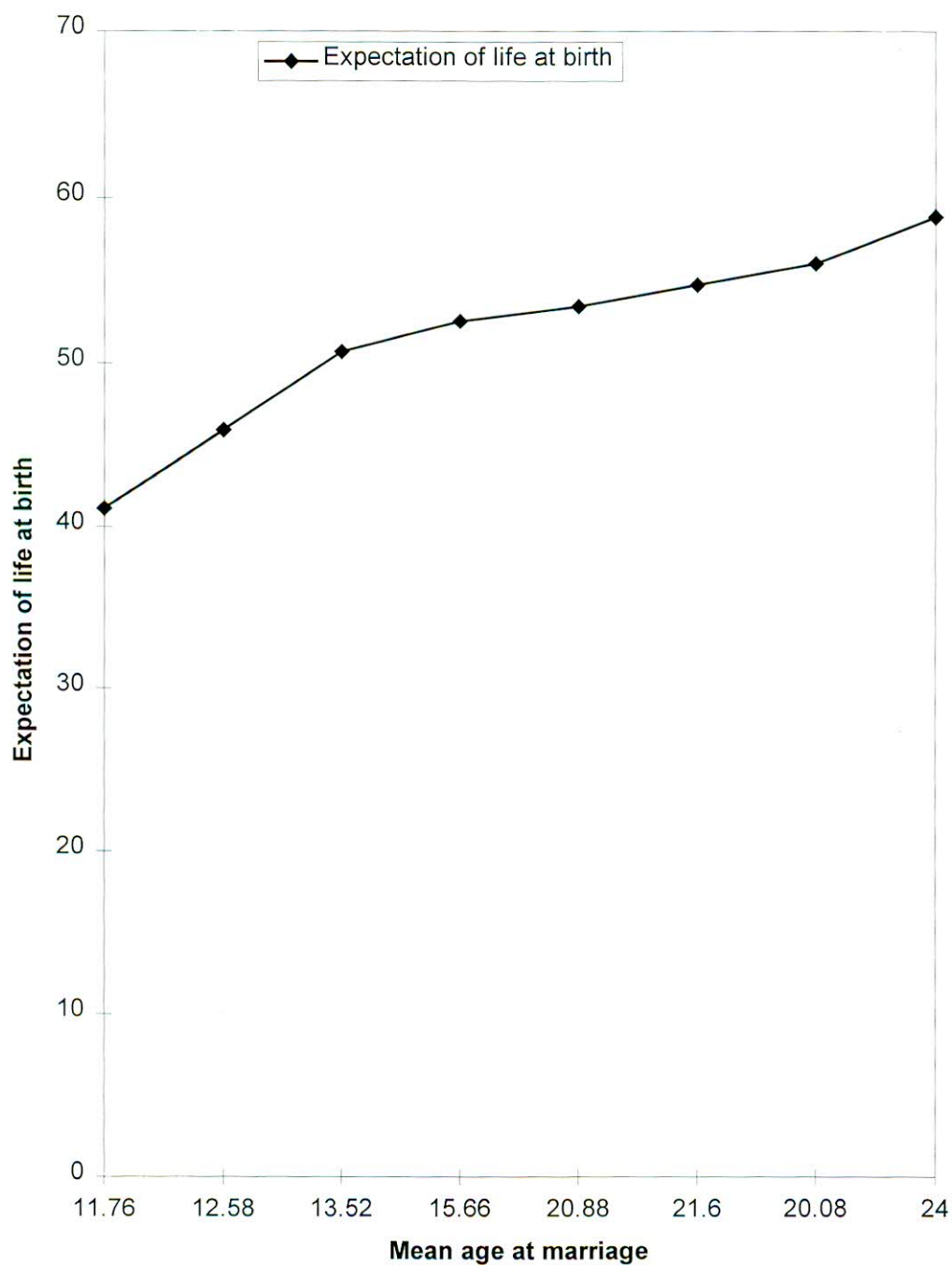
$$(3.824) \quad (0.209)$$

Where X_5 = Mean age at marriage

X_6 = Expectation of life at birth

From the above results we observe that about 81.2 percent of the variation in expectation of life at birth is explained by mean age at marriage. It shows that mean age at marriage has positive effect on expectation of life at birth which is significant at 1 percent level. Here the regression co-efficient indicates that if the mean age at marriage increases by 1 unit then the expectation of life at birth would increase by 1.061 unit.

Fig 6.4 Mean age at marriage and expectation of life at birth of Bangladesh, 1961-1996



6.2.5 Differentials in Age at Marriage**6.2.5.1 Residential Differentials**

In demography, residence means the type of community ranging from the rural to the urban, in which people live (Kammeyer, 1971). Differences exist in the ways of life in rural and urban places which have important implications for almost every aspect of human behaviour including demographic behaviour. Mean ages at first marriage of all evermarried women by current age and place of residence during childhood and current residence are presented in Table-6.14. The place of residence is categorized as childhood residence and current residence both of which are classified as rural and urban. Irrespective of place of residence and time, urban women in general have a higher average age of marriage than rural women. The overall age of marriage was 1.1 years higher in 1975 and about 1.3 years in 1989 in case of childhood residence. For current residential status, urban-rural difference is not very prominent - only 0.7 and 0.5 years respectively. The percentage increase of the average age of marriage during 1975-89 was 13.1% in rural area and 13.5% in urban area with respect to childhood residence, and such increments were 13.1% and 10.9% respectively in case of current residence. The age of marriage by urban childhood residence is found to be higher than that of current urban residence. The percentage increase in age at marriage in both rural and urban areas is found to be remarkable in younger age cohorts, than the older cohorts. This might be an indication of change of age of marriage in recent times. Thus, age of marriage of women in Bangladesh has shown an increasing trend overtime in both rural and urban areas. Whatever change in age at marriage has taken place in the country is a recent phenomenon.

6.2.5.2 Educational Differentials

Education is found to be one of the strong correlates of age at marriage in Bangladesh. Table-6.15 and 6.16 show educational differences in age at marriage by current age. The tables indicate that age at marriage rose gradually with increased level of education both

in 1975 and 1989. Young females of each educational status in 1975 and 1989 had higher age at marriage. This is an indication of increased age at marriage over time.

So far as the effect of women's education is concerned, average age at marriage during 1975-89 increased by 1.6 years on the average for no education, 1.3 years for primary education and 1.9 years for high school and above respectively. This implies that increase in age at marriage over time is highly associated with education. It is also noticed from table-6.16 that husband's education does not seem to have a different effect from that of the wives education on age at marriage. Husbands of higher education have their wives ages at marriage as high as 14.3 years in 1975 and 16.6 years in 1989. It is quite likely that the best educated wives means a delay in marriage. During 1975-89 for husband's education, the average age of marriage has increased by 1.6 years for no education and also for primary education, 1.7 years for high school and 2.3 years for higher education respectively.

6.2.6 Patterns of Marriage Dissolution

Marriage dissolution is brought about by two forces of attrition (a) in compatibility resulting in separation or divorce, and (b) death of one spouse. Table-6.17 gives the percentage widowed and divorced in each age group for the five consecutive censuses, 1951, 1961, 1974, 1981 and 1991. The proportion remaining widowed or divorced is relatively low for males because of remarriage. However, among females, a larger percentage remaining in the divorced or widowed state is observable. In 1951, more than one fifth of the women aged 35-39 were either divorced or separated. The percentage was 39.3 for the age group 45-49. In the age group 50-54, 55.9 percent have been widowed and /or divorced. There has been a reduction in the proportion in this state over time but this was due to possibly reduction in the incidence of widowhood.

6.2.7 Effects of Marriage Pattern on Fertility

The approximate effect of marriage pattern on fertility can be measured by adopting Bongaarts Model (Bongaart's, 1982). The model assumes that women who are not

currently married would experience the same fertility as their married counterparts, if they themselves were married as shown table-6.18. It includes the relevant data for 1961, 1974, 1981, 1975, 1989 and 1991. Column 1 gives the all-women age-specific fertility rates, averaged for the five year period prior to the survey. By multiplying these rates by the reciprocal of the proportions evermarried at the time of the survey, an estimate is formed of hypothetical fertility in the absence of any postponement of marriage beyond age 15, which is shown in column 3. Column 4 shows the proportions who are currently married among those who evermarried. The reciprocal of these proportions multiplied by the rates in column 3 gives an estimate of hypothetical fertility in the absence of any postponement of marriage beyond age 15 and in the absence of divorce and widowhood shown in column 5.

In absolute terms, postponement of marriage in 1961, 1974, 1981, 1975, 1989 and 1991 is estimated to reduce fertility by 0.141, 0.406, 0.406, 0.323, 0.893 and 1.036 births respectively. Further widowhood and divorce reduced fertility by 0.563, 0.526, 0.377, 0.765, 0.450, and 0.372 births respectively in these years. The table also shows the effect of postponement of marriage on fertility by age. The effect of postponement of marriage on fertility in 1991 was higher than that on any other point of time. This implies that age at marriage was higher and also fertility was lower in 1991 than those in other study periods. This also indicates that effect of marriage to fertility is higher in recent times. Again divorce and widowhood have a major contribution to fertility reduction. This indicates that the contribution has been decreasing. This implies that proportion of divorced and widowhood has decreased in recent times.

The table also indicates the reduction in fertility due to the effect of marriage pattern by 9.40%, 11.65%, 13.44%, 14.69%, 21.52% and 23.27% respectively in the years 1961, 1974, 1981, 1975, 1989 and 1991. Thus, fertility reducing effect of marriage pattern has increased over time. This is because the impact of changing marriage patterns between 1961 to 1991 may have caused reduction in fertility.

Whatever be the causes of changing marriage patterns, their net effect has not been large. The table also shows that a downward effect on fertility at young ages caused by rising

Table 6.14
Residential differentials in Mean age at first marriage by current age
and rural-urban residence, BFS 1975 and 1989

Current residence	Current age							
	20-24	25-29	30-34	35-39	40-44	45-49	Total	
1975	Rural	13.3	13.0	12.7	13.0	12.6	12.9	13.0
	Urban	13.9	14.0	13.5	13.4	13.0	13.8	13.7
1989	Rural	15.2	15.0	14.7	14.4	14.1	13.8	14.7
	Urban	15.7	15.7	15.7	15.1	14.5	13.9	15.2
Absolute change (1975-1989)								
	Rural	1.9	2.0	2.0	1.4	1.5	0.9	1.7
	Urban	1.8	1.7	2.2	1.7	1.5	0.1	1.5
Current age								
Children residence	20-24	25-29	30-34	35-39	40-44	45-49	Total	
1975	Rural	13.3	13.0	12.7	13.0	12.6	13.0	13.0
	Urban	14.5	14.2	14.1	13.6	14.0	13.4	14.1
1989	Rural	15.2	15.1	14.9	14.5	14.2	13.8	14.7
	Urban	16.3	16.9	16.2	16.3	15.2	14.6	16.0
Absolute change (1975-1989)								
	Rural	1.9	2.1	2.2	1.5	1.6	0.8	1.7
	Urban	1.8	2.7	2.1	2.7	1.2	1.2	1.9

Table-6.15
Educational differentials in mean age at first marriage by current age and women's education, BFS 1975, 1989

Women's education	Current age						
	20-24	25-29	30-34	35-39	40-44	45-49	Total
1975	No schooling	13.1	12.9	12.6	12.8	12.5	12.8
	Primary	13.7	13.6	13.3	13.8	13.0	13.6
	Higher	15.1	15.0	14.0	14.6	13.1	14.7
1989	No schooling	15.0	14.7	14.5	14.2	14.0	14.4
	Primary	15.4	15.2	14.8	14.7	14.5	14.9
	Higher	18.3	17.0	17.3	16.7	15.4	16.6
Absolute change (1975-1989)							
No schooling	1.9	1.8	1.9	1.4	1.5	0.9	1.6
Primary	1.7	1.6	1.5	0.9	1.5	0.4	1.3
Higher	3.2	2.0	3.3	2.1	2.3	0.6	1.9

Table-6.16
Educational differentials in mean age at first marriage by current age and husband's education, BFS, 1975, 1989

Husband's education	Current age						
	20-24	25-29	30-34	35-39	40-44	45-49	Total
1975	No schooling	13.2	12.9	12.5	12.7	12.5	12.8
	Primary	13.2	13.1	12.6	13.4	12.7	13.0
	Secondary	13.6	13.3	13.2	13.7	12.7	13.4
	Higher	14.6	14.7	13.9	13.8	13.7	14.3
1989	No schooling	15.0	14.7	14.5	14.1	13.9	14.4
	Primary	15.2	15.0	14.5	14.2	13.9	14.6
	Secondary	15.6	15.4	15.2	15.0	14.6	15.1
	Higher	16.9	17.0	17.2	16.4	15.6	16.6
Absolute change (1975-1989)							
No schooling	1.8	1.8	2.0	1.4	1.4	1.0	1.6
Primary	2.0	1.9	1.9	0.8	1.2	0.7	1.6
Secondary	2.0	2.1	2.0	1.3	1.9	0.3	1.7
Higher	2.3	2.3	3.3	2.6	1.9	1.0	2.3

Table-6.17
Percentage widowed and divorced by age 1951-1991

Age group	Males						Females					
	1951	1961	1974	1981	1991		1951	1961	1974	1981	1991	
10-14	0.1	0.1	0	0	0		0.9	0.8	0.7	0	0.2	
15-19	0.6	0.3	0.2	0.1	0.1		3.6	2.3	3.7	3.3	1.7	
20-24	1.8	1.5	0.8	0.4	0.2		3.6	3.1	3.9	4.0	2.9	
25-29	2.8	2.3	1.2	0.5	0.3		6.8	4.8	3.9	4.3	3.6	
30-34	3.5	2.6	1.3	0.6	0.2		12.5	8.6	6.0	6.1	5.1	
35-39	3.9	2.7	1.2	0.7	0.3		20.5	15.1	9.8	9.6	7.3	
40-44	4.9	3.8	1.7	1.0	0.5		33.7	28.3	18.1	17.4	12.5	
45-49	5.9	4.9	2.1	1.3	0.7		39.3	38.6	24.6	25.2	17.9	
50-54	8.3	6.4	3.2	2.0	1.2		55.9	54.7	39.4	36.3	28.9	
55-59	12.7	7.5	3.8	2.6	1.6		64.6	62.4	46.7	44.9	35.2	
60+	21.6	15.1	9.0	8.6	4.3		79.6	82.5	72.3	66.6	56.3	

Source: Same as Table-6.4.

Table-6.18
Estimation of the effect of marriage on fertility in 1961-1991 and BFS 1975, 1989

Age	(1) Fertility rate	(2) Proportion ever married	(3) ASEMPR col-1/col-2	(4) Proportion currently married	(5) ASMPR col-3/col-4
1961					
15-19	0.2302	0.9170	0.2510	0.9758	0.2572
20-24	0.3227	0.9870	0.3270	0.9689	0.3375
25-29	0.3272	0.9950	0.3288	0.9527	0.3451
30-34	0.2669	0.9960	0.2680	0.9116	0.2940
35-39	0.1499	0.9980	0.1502	0.8482	0.1771
40-44	0.0479	0.9980	0.0480	0.7160	0.0670
45-49	0.0120	0.9990	0.0120	0.6138	0.0196
$\sum_{15}^{50}$	6.7840		6.925		7.4875
			0.141		0.5625
1974					
15-19	0.1983	0.7550	0.2626	0.9502	0.2764
20-24	0.3373	0.9680	0.3485	0.9661	0.3626
25-29	0.3109	0.9910	0.3137	0.9603	0.3267
30-34	0.2615	0.9940	0.2631	0.9390	0.2802
35-39	0.1970	0.9960	0.1978	0.9023	0.2292
40-44	0.0954	0.9950	0.0959	0.8175	0.1173
45-49	0.0135	0.9970	0.0135	0.7539	0.0179
$\sum_{15}^{50}$	7.0695		7.4755		8.0015
			0.4060		0.5260

Contd.

1981					1975				
0.1330	0.6870	0.1936	0.9518	0.2034	0.1090	0.7020	0.1090	0.9260	0.2450
0.2755	0.9490	0.2903	0.9577	0.3031	0.2886	0.9540	0.2886	0.9460	0.3198
0.2384	0.9870	0.2415	0.9560	0.2526	0.2911	0.9960	0.2911	0.9300	0.3161
0.1667	0.9900	0.1684	0.9379	0.1796	0.2502	0.9900	0.2502	0.8960	0.2798
0.1296	0.9960	0.1301	0.9015	0.1446	0.1848	0.9980	0.1848	0.8420	0.2203
0.0465	0.9930	0.0468	0.8245	0.0568	0.1074	0.9960	0.1074	0.7720	0.1394
0.0185	0.9970	0.0186	0.7471	0.0249	0.0347	0.9980	0.0347	0.6910	0.0502
5.0410				5.8235 0.3770	6.3290	1.0000	6.6515 0.3225		7.4185 0.7670
1989					1991				
0.1822	0.5100	0.2215	0.9470	0.2339	0.1910	0.5330	0.3583	0.9586	0.3738
0.2599	0.8800	0.2953	0.9410	0.3138	0.2350	0.8770	0.2680	0.9422	0.2844
0.2254	0.9770	0.2307	0.9350	0.2467	0.2030	0.9720	0.2088	0.9489	0.2200
0.1642	0.9970	0.1697	0.9360	0.1813	0.1500	0.9950	0.1508	0.9343	0.1614
0.1141	0.9960	0.1146	0.9020	0.1271	0.0890	0.9990	0.0891	0.0948	0.0985
0.0553	0.9980	0.0554	0.8470	0.0654	0.0500	0.9970	0.0502	0.8581	0.0585
0.0176	1.0000	0.0176	0.8090	0.0217	0.0100	1.0000	0.0100	0.7746	0.0129
5.0945		5.7870 0.8925		6.2370 0.4500	4.6400		5.6760 1.0360		6.0475 0.3715

age at marriage has been balanced by an effect at older ages caused by decreasing widowhood and divorce.

6.3 Conclusion

Nuptiality assumed importance in demographic studies in view of the increasing realization of the relationship of the age at marriage to the level of fertility and consequently to population growth. The present study describes the national marriage pattern as well as fertility changes which have occurred in Bangladesh. The study covers a period of 40 years from 1951 to 1991. The trends in the marriage pattern as well as in the levels of fertility are examined for this period of study. Attempts are made to find the correlated components of marriage and fertility responsible for giving rise to such trends as are observed during the course of analysis. The study experimented with various demographic and statistical techniques. In both rural and urban areas of Bangladesh, marriage is almost universal, people marry at an early age, and there is a short time span during which most marriages take place. Permanent celibacy is virtually absent in Bangladesh. The temporal changes in various marital status categories viz. nevermarried, married, widowed and divorced are apparent. Distribution of population by age and sex at different marital status categories together with absolute changes over time bear the evidence of changes in the marriage pattern over the years. A remarkable change in the proportion of single persons is noticed during 1961-74 in both sexes and a slow but steady increase in such proportion is also evident during 1974-1991. This indicates that age patterns of marriage might have changed considerably during these periods. The declining trend of proportion married of both males and females with time may be the results of tendency of persons to remain single and greater proportions and /or greater intensity of marital dissolution through divorce and widowhood.

The age at marriage of women has shown an increasing tendency over time. Whatever changes in age at marriage have taken place in the country is a recent phenomenon, such change might be attributed to the changes in socio-economic variables, particularly, changes in the women's educational status and work status in the country. Although average level of education is very low, still it has a positive relationship with age at first marriage.

Wives whose husbands are engaged in white collar occupations have the highest age at marriage, within the agricultural sector, there is no difference in age at marriage between land-owning cultivators and share-croppers. All evermarried women in Bangladesh, spend most of their reproductive lives in marital state. Therefore, it may be inferred indirectly that marital disruption does not have much effect on fertility reduction in Bangladesh.

Influences of religion and education on marriage breakdown and remarriage are highly noticeable. Non-Muslim's, Predominantly Hindus, have very low proportions of marriage dissolution and remarriage, probably due to the fact that Hindu marriages are based on an eternal union which cannot be terminated at will. Muslims have the highest proportion of dissolution's and remarriages.

Divorce in both rural and urban areas of Bangladesh is characterized by low economic status, Muslim religion, low education of both husband and wife, and low age at first marriage. The trend in divorce may be examined by comparing the divorce experiences of the oldest and the youngest marriage cohorts. This comparison is not considered ideal since the oldest marriage cohort experienced the longest exposure to married life and therefore is likely to experience a higher divorce rate. Similarly the youngest cohort has just entered the marital state for a few years and therefore the proportion of divorce in this marriage cohort is likely to be biased downward. Yet a comparison of divorce experiences between the oldest and the youngest marriage cohorts may give some clue to the changes in divorce pattern over years.

In a high fertility country like Bangladesh differential nuptiality patterns have great impact on population growth. The effects of marriage pattern on the overall fertility of Bangladesh is influenced by the marriage pattern. The present study has demonstrated that differentials like education, urbanization and occupation have substantial impact on age at marriage. But the prospect of rapid urbanization is not bright. The prospect of spreading formal education within a short period of time cannot also be foreseen. Non-formal education can probably be spread out within a reasonable time period. Roles of women outside the home should also be strengthened and they should be allowed to work outside the home to earn their own livelihood. More legal action toward increasing age at

marriage may not produce changes required for the lowering of fertility in the absence of social and economic supports. Sri Lanka and Malaysia have increased their mean age at marriage without any legal action. This was made possible by increasing the rate of literacy. China and Tunisia have raised their age at marriage through legal action and their socio-economic programmes (Duza and Baldwin, 1977).

Traditionally, Bangladesh has been characterized by exceptionally early marriage for females and large age difference between husbands and wives. This situation is changing steadily. Female age at marriage has risen from about 16 years in the mid - 1970s to about 18 years in 1989. The difference between husbands and wives have narrowed slightly but still remains 7.5 years on average.

CHAPTER-VII

DEMOGRAPHIC TRANSITION

7.1 Introduction

In the works of A.J. Coale(1984), demographic transition is a set of changes in reproductive behaviour that are experienced as a society is transformed from a traditional pre-industrial state to a highly developed, modernized structure. The demographic transition theory, the major weakness of which is that it lacks specificity, is an effort to explain the behaviour of birth, death and growth rates in process of transition from uncontrolled fertility to controlled fertility with reference to the process of development.

Demography is a science short on theory, but rich in quantification. In spite of this it has produced one of the best-documented generalizations in the social sciences: the demographic transition. The demographic transition theory was formulated by office of population research in Princeton as a culmination of or abstraction from previous work on “The future population of Europe and the Soviet Union, which was published in 1944 on behalf of the League of Nations” (Notestein et al., 1944). Though he was by no means the first to state the essentials of the theory of the demographic transition, Notestein’s early formulation is conventionally accepted as classic. He was apparently unaware of Landry’s work, and perhaps also of Thompson’s. Perhaps, like Thompson himself, he did not initially think of his formulation as a theory. He stated that his discussion owed much to Carr-Saunders’s compilation of data and his discussion on demographic processes. Though not completely original, Notestein’s statements are lucid and sharply focused. In his initial article (1945), he presented a typology of populations as an introduction to a review of the prospects for world population growth. His three types are closely parallel to those of Thompson (1929), and Landry (1934).

As Coale has noted, despite many objections, qualifications, and doubts about the demographic transition the force of the generalization remains (Coale, 1973). Its greatest strength is the prediction that the transition will occur in every society which is experiencing modernization; its greatest weakness is its inability to forecast the precise threshold required for fertility to fall. Efforts to determine this threshold have only been successful in a limited number of cases (Oechsli et al., 1975). As Coale pointed out in his classic statement, the problem in determining a well-defined threshold may be that there is more than one pre-condition for a decline in marital fertility. In abbreviated terms these are:-

- (i) Fertility must be within the calculus of conscious choice;
- (ii) Reduced fertility must be advantageous;
- (iii) Effective techniques of fertility reduction must be available (Coale, 1973).

The aging in human population has been a recent phenomenon during the later stages of the present century. Population aging is the result of demographic transition caused by reduction in fertility and prolongation of life due to reduction in mortality. Through this process the relative size of the young age population decreases and the relative size of the old age population increases causing a change in the age composition of national populations. Such change in age structure has significant consequences not only in demographic terms but also on the entire social and economic fabric of the society. Since individual's level and nature of need vary from one another depending on age, the demand for social and material services of the aged deserves special attention (Abedin, 1998). The interaction between birth and death rates and its consequences for the population structure of a society are summarized in the theory of demographic transition. According to this theory populations pass through some well-defined "stages" or "phases" in their growth. The theory distinguishes between three major phases:-

- (a) The pre-transitional phase or pre-industrial phase is characterized by very high and almost matching birth and death rates resulting in a stationary population;
- (b) The transition, during which death rates decline while birth rates remain high or decline very slowly and with a time lag, results a very rapid growth of population, often referred to as the "population explosion";

(c) Post-transitional phase or modern transitional phase, when the birth rate and the death rate are in a state of near balance at low levels, leads to either zero or very low growth.

The pre-industrial society will be a young society, with many babies born each year but with low life expectancy. The transition and society is beginning to age, especially since the decline in the death rate will increase the number of older people. Also since birth rate remains high, the older people may not greatly increase as a proportion of the entire society. The modern society is an aging society, for while the reduced death rate allows the number of older people to increase, the decline in the birth rate allows the older people to become an increasingly larger proportion of the total society.

Population aging in Bangladesh is viewed as natural outcome of demographic transition from high fertility and mortality to low fertility and mortality. It represents the years of successful family planning and public health programs that have changed the population growth of the country. The demographic transition that has occurred, is enviably the outcome of socio-economic transformations through the process of development underway in the country. Development process not only has changed the demographic phenomena but also has changed (whatever it may be) inter-alia life style, values and outlook of the young population, and roles and functions of the family and community- thus society as a whole(Strong, 1992).

Bangladesh is a young society but in demographic terms it is an aging society to indicate how the age structure of Bangladesh society is changing and it is possible to show the aging process by looking at the changes in its birth and death rates over the last century.

Projections of the United Nations indicate wide variations in population aging in countries of Asia . Currently Japan , China , Hong Kong and Singapore have a large elderly population . In South Asia , Sri Lanka is the only country which has considerable proportion of elderly population followed by India (Abedin, 1995).

From the perspective of historical development each of the world's population appears to be called upon to undergo a dynamic process usually known as demographic transition in which mortality level is first found to be lowered through the triumph of medical

measures and secondly fertility level is then adjusted to come down to avoid the consequences of unmanageable population size and structure.

Bangladesh is probably passing the second phase of its demographic transition. It is apprehended that population aging is gradually emerging as a problem in the country. Research on population aging is getting gradual momentum (Satter and Rahman, 1993; Kabir, 1987, 1992 and 1993; Rahman, 1991; Misbah,1984; Abedin 1996). Recently under the auspices of ESCAP a series of surveys have been conducted in six countries including Bangladesh for the purpose of local level policy development to deal with the consequences of population aging of the country (ESCAP, 1994). The study addressed several issues related to the aged population but not amenable for generalization. There is a further need to investigate the aging situation and its consequences in perspectives of overall development process in the country (Abedin,1998).

In Bangladesh, every year nearly 80 thousands elderly population on the average are added to this segment of population (UN, 1994). During the period ending in 1991 population growth in Bangladesh was largely the result of a more rapid decline in mortality than in fertility. Both immigration and emigration were incipient and secondary to natural increase in this growth. A sustained high fertility level, rather than further mortality reduction , has given us a large population increase. The 1961 census of population in Bangladesh showed a count of more than 50 million people. This marked the highest population since the census count in 1872 (Chapter-4, table-4.2). According to medium variant projections by the UN the population is estimated to increase to a total of around 234 million by 2025(UN 1991). Viewed in a longer perspective the population increase of more than 2 doubling is in sight for the period from 1961 to 2025, which approximates the length of two generations.

7.2 Global Picture of the Demographic Transition

First, given a modicum of domestic and international peace, mortality has fallen in every country and has been a part of socio-economic progress. The mortality transition has spread through out most of the world. Life expectancy in industrial high-income countries is now between 75 and 80 years and may be approaching a ceiling, but, at best any further increases will be slow. Infant mortality in these countries is less than 10 per 1000

births, and further progress can only be slow and its impact minimized. The lowest infant mortality has been reached in Japan with a rate of 5 per 1,000, which must be close to the biological minimum.

These countries have presumably reached the end of the mortality transition. The rest of the world is on a moving escalator of declining mortality. Only in sub-Saharan Africa do pre-modern levels of mortality persist, but even in that region, there is progress.

Secondly, the fertility transition has reached every major region. It has affected every country in Latin America and the Caribbean, with the possible exception of Haiti. In Asia, the transition has begun in all major countries, most strikingly in China, where fertility has now been low for more than a decade. Apparent exceptions are marginal: Afghanistan, Bhutan, most of the Arab Muslim countries in Asia Minor, and war-torn Cambodia and Laos. Vietnam have clearly entered the transition.

Countries with the Muslim traditions have been slower to enter the transition than others. But in the largest Muslim country, Indonesia, TF was 3.0 in 1991 well on the way to replacement level. The North African Arab countries are well advanced in the transition. In Pakistan, and more remarkably in Bangladesh, there is movement. In the latter, a very poor country, fertility decline has been astonishing. Not many years ago, TF was 6 and 7 children per woman. By 1990-91 the figure was 4.3 and only three years later it reached 3.4.

Results from the 1992-93 National Health Survey in India based on some 90,000 respondents showed national TF to be 3.39, with one State-Kerala -below replacement level with a figure of 1.8.

The fertility transition has even reached in parts of Muslim Asia Minor. Fertility has clearly fallen in Bahrain and Qatar (TF 4.2 and 4.5 respectively), and to some extent in Kuwait and the Arab Emirates. In Saudi Arabia, and especially in Oman, TF remains high at 6.5 and 7.8 respectively (IFPP, 1994).

In other parts of the region, the most dramatic evidence of fertility decline comes from Kenya. From a situation where the TF exceeded 8 fertility has apparently fallen precipitously. Thirdly, once the fertility transition has begun it is inescapable. In every country in the world, given a modicum of peace and prosperity, mortality continues to

decline. Once a country has started firmly on the path of fertility decline, it has been successful in reducing it to low levels.

Fourthly, contrary to the views of a number of noted observers, fertility decline in the less developed countries (except china) did not really slow down during the 1980s. It did slow in absolute terms, but not in terms of percentage declines required to reach replacement ($TF=2.11$). The less developed countries appear to have experienced as great a reduction in fertility during the 1980s as they did earlier. This anomaly is due to the fact that less developed countries as a whole were further along the path of transition in the 1980s, so that while quantitative declines were smaller, the percentage declines were equivalent (Freedman et. al., 1992).

Fifthly, the timing of decline in countries with non-European traditions conformed to the forecasts by the original authors of transition theory.

Sixthly, in Europe fertility has declined to well below replacement level, and in a few areas, population actually declined, though the effect has been tampered by immigration in some cases.

Seventhly, the new balance of births and deaths forecast by the early proponents of transition theory has not materialized. Except for a few outliers, like Iceland, Ireland, and Albania, fertility has been below replacement in all European countries. Most striking is the situation in Southern Europe (Italy, Spain, Portugal, and Greece) where TF at present is between 1.3. and 1.4, two-thirds of replacement level.

Eighthly, the transition is now beginning at increasingly lower levels of socio-economic development. This is most striking in Bangladesh, one of the poorest nations in the world.

7.3 Changes in Size and Growth of Population

A systematic analysis of the trends in size and growth of the population of Bangladesh is seriously handicapped by a lack of reliable time series data. The country has had a tradition of census taking and vital registration extending over a century. However, the data from these two sources are subject to serious deficiencies. The demographic development has also been affected by a succession of manmade and natural calamities, such as famines, refugee movements, devastating floods, cyclones and wars.

7.4 Population in the Modern Period

The modern period coincides with the period of modern comprehensive censuses starting in 1881. Since then, the count has been made regularly and with increasing effectiveness and 10 year intervals.

It will be noted that, during the period 1872-1941, population censuses in respect of the area that is now Bangladesh were taken as part of the undivided province of Bengal. The population of Bangladesh at the various censuses taken during this period was therefore estimated from the undivided Indian census counts by adjusting for territorial changes at the time of partition. The censuses of 1951 and 1961 were taken as part of the census of Pakistan, of which Bangladesh then formed the eastern wing. The first census of independent Bangladesh was taken in 1974.

The total population of Bangladesh as estimated from the censuses of 1872 to 1941 and as recorded at the censuses since 1951, together with the intercensal increase and the growth rates is shown in table-4.2(Chapter-4). It will be noted that in 1872 there were about 23 million people in the area. It is believed that the 1872 census of the Bengal province was not very accurate as there was public suspicion about the purpose of this census in the wake of antagonism towards British rule.

From 1872 to 1921 the population of Bangladesh grew at an average rate of 0.79 percent. Between 1921 to 1931 there appears to have been slight increase in the intercensal growth rate. As noted earlier, the censuses of 1951 and 1961 were taken as part of the census of Pakistan; Bangladesh was then East Pakistan. During the decade 1941-1951, nature had interfered with the growth of the population in more ways than one resulting in a slight increase in the total population at the end of the decade.

First, in the second World War with the fall of Burma in 1942 and Assam in 1943, hostilities came to the very borders of East Bengal and people were evacuated from many rural areas and towns. Secondly, the devastating famine of 1943 and the epidemics of cholera and smallpox took a huge toll of lives. Thirdly, large communal movements of the population also occurred during this decade as a result of the partition of the sub-continent in 1947. The 1961 census results gave a growth rate of 1.93 percent during the intercensal decade 1951-1961.

The first census of independent Bangladesh was held on 1 March 1974. There were three major catastrophes that occurred in the intercensal period 1961-1974. The 1971 war of independence is estimated to have resulted in about half a million deaths. The number of death due to the 1974 famine was officially estimated at 30,000. Despite these major catastrophes, the population account in 1974 of 76.3 million was remarkably high and resulted in an intercensal growth rate of 3.13 percent.

It may be noted that in 1872 there were about 23 million people in Bangladesh. Bangladesh had spanned the first phase of the demographic transition till 1931 i.e. high fertility and high mortality. Now Bangladesh stands in the second phase of demographic transition. Between 1872 and 1991, the population of Bangladesh increased by 88.9 million, or 393.3 percent in 119 years, i.e. the growth rate was 1.34 percent. However, the population did not grow at a uniform rate through this period of 120 years. Now-a-days increased agricultural productivity and improvements in the internal and international distribution of food have allowed to avoid deaths from famine. Moreover, improvements in transport facilities have softened the impact of local crop failures to a large extent.

7.5 Patterns of Growth by Former Division

Differential economic opportunities combined with geographical factors such as climate, terrain soils and natural resources account for the dispersal of the population. Percentage distribution of population by different divisions is shown in table-7.1. In 1901-1991 period, absolute increase for the divisions was around 20 million for Chittagong, 24 million for Dhaka, 14 million for Khulna and 18 million for Rajshahi.

Table-7.1
Percentage distribution of the population by the different division during 1901-1991

Division	1901	1911	1921	1931	1941	1951	1961	1974	1981	1991
Bangladesh	100	100	100	100	100	100	100	100	100	100
Chittagong	23.47	24.34	24.81	25.95	26.93	27.97	26.80	26.07	25.94	25.67
Dhaka	28.77	29.84	30.20	30.05	30.72	29.97	30.07	29.82	30.13	30.73
Khulna	21.72	20.4	20.12	20.17	19.94	19.81	19.8	19.87	19.68	18.45
Rajshahi	24.04	25.48	24.87	23.89	22.41	22.27	23.31	24.25	24.25	24.65

Source:- Bangladesh Population Census 1991, National Series, BBS, Dhaka, Bangladesh, P-45.

Most of the increases took place in the 1961-1974 interval. The city of Chittagong with its port and railway workshop attracted migrants from other districts. Since 1951, the

city's commerce and industry have grown greatly. To the South and West of the city are the commercial zone and harbour. The new industrial areas are devoted to oil refinery, grain silos, fertilizer factory, steel mills and fish harbour. (H. Rashid, 1977). Accessibility to Dhaka by virtue of its extensive transportation and river networks account for its being a high migration area. Commercial and wholesaling sites are along the river fronts. The University and administrative area are in the Southern part of the town and it is the seat of the Government. Another factor that could explain the relative decline of the population in certain areas is out migration of the Hindu population owing to the political changes.

7.6 Urban-Rural Patterns

A comparison of the population of rural and urban areas shows that urban areas of Bangladesh have much lower population than the rural population for all censuses. Migration of men from rural areas in search of employment, particularly to the more populous cities, which often necessitated leaving their families in their villages, is a well known feature of life in Bangladesh. As measured by the proportion of total population living in urban areas, increase from 2.3 percent in 1881 to 20.14 percent in 1991, shows an almost 12 percent increase over a period of 110 years. It is also clear that percentage of urban population has always been remarkably low (79.86% in 1991) than the percentage of rural areas as shown in table-7.2.

Table-7.2
Growth of Urban-Rural population 1881-1991

Year	% Rural population	% Urban population
1881	97.70	2.30
1891	97.82	2.18
1901	97.61	2.39
1911	97.80	2.20
1921	97.69	2.31
1931	96.94	3.06
1941	96.62	3.38
1951	95.66	4.34
1961	94.81	5.19
1974	91.26	8.74
1981	84.82	15.18
1991	79.86	20.14

Sources:- (a) 1980 Statistical Year Book of Bangladesh; Bangladesh Bureau of Statistics, Dhaka, p. 54 Table-2.26,
 (b) 1992 Statistical Year Book of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, p. 62-63, Table-2.36
 (c) Bangladesh Population Census, 1991, National Series, BBS, p-48, Table-4.1.

A consistent rising trend in the growth of urban population was found over the period 1881-1991 except in 1911-1921 and 1941-1951 decades which were largely due to plague epidemic and small pox that resulted in depopulation in the urban areas. Lower growth rate of urban population during 1941-1951 might be the effect of devastating Bengal famine, the Second World War and the partition of India in 1947.

7.7 Trend in Mortality and Fertility Level

The dynamic factors that influence population change both in size and composition, are basically mortality and fertility. In recent time Bangladesh has shown some changes in these dynamic factors.

The findings documented in demographic research that the aging of a population is more the result of declining fertility rather than in mortality. The decreases in mortality are the product of forces of modernization and these declining factors in mortality have generally been followed by decreases in fertility. The declines in fertility have been the concomitant product of increasing urbanization, industrialization and the changes in socio-cultural values, attitudes, behavior and economic conditions. The impact of fertility declines on population aging has been amply illustrated by the findings obtained from model populations prepared by Coale and Demeny in the following table-7.3.

Table-7.3 shows that as the birth rate (BR) declines, especially after the transitional stage, the three indices of aging- % 65+, median age, dependency ratio, sharply increase.

It is also found that as the downward trend of the death rate (DR) and upward trend of e_x continue uniformly, the three indices of aging are not found to be changing so uniformly. For the aging of population it is rather found that declines in fertility are more important than declines in mortality. For declines in the death rate (DR) are accompanied by substantial increases in e_x to produce an important impact on the proportion of young population to show an upward trend. On the other hand, the declines in fertility have the immediate effect of decreasing the proportion of young and of increasing the proportion of elderly. The population aging is thus more the product of declining fertility than declining mortality.

A UN publication (1954) observed "It is a common misconception that the aging of populations is or has been chiefly, if not entirely, the result of declines in mortality: this view is false..... Birth rates; and not death rates, are the major determining factor of population structure".

Table-7.3

Changes in vital Rates, Annual growth Rates and Indicators of population Aging, Model populations

Indices	Population Stages				
	Primitive stationary	Pre-modern	Transitional	Modern	Modern stationary
Birth rate	50.0	43.7	45.7	20.4	12.9
Death rate	50.0	33.7	15.7	10.4	12.9
Annual growth rate	0.0	1.0	3.0	1.0	0.0
% 65+	2.9	3.4	2.6	10.3	18.5
Median age	25.5	25.1	21.8	32.8	40.0
Dependency ratio	5.0	6.0	5.0	16.0	30.0
e_x	20.0	30.0	50.0	70.0	77.5

Source:- Binstock R.H. and Shanas E. 1976, Handbook of Aging and the social science, NewYork, Van Nostrand Reinhold.

The widespread declines in fertility with accompanying urbanization and industrialization occurred first in the 19th century in some European countries. France was the most advanced country as far as old age is concerned. Table-7.4 shows data on the aging of population of some selected European countries.

The CBR fluctuated around 50 per 1000 population throughout the period until the late 1960s. CBR took 95 years to come down from 53.8 in 1901-1911 to 25.6 in 1981-1996 shown in table-4.11. It is also comparable that the CBR of rural areas is always considerably higher than the urban areas shown in table-4.14 (Chapter-4).

There has been debate on whether economic or social and ideational factors are more important in initiating fertility decline. The dominance of economic factors was reflected in the early formulations of transition theory. A pervasive theme in these discussions was that modernization changes the economics of childbearings and makes it seem to be

economically disadvantageous. This has led to the formulation of economic theories of fertility decline.

Table-7.4
Data on the Aging of Population of Seven European Countries Around 1850

Country	Year (Census)	Percent at age 65+	Country	Year (Census)	Percent at age 65+
France	1851	6.45	Sweden	1850	4.78
Belgium	1846	5.87	Netherlands	1849	4.75
Norway	1855	5.75	Great Britain	1851	4.64
Denmark	1850	5.45			

Source:-The Age of population and its Economic and social implications, United Nations 1956, P-91-168.

In a highly sophisticated article, Pollak and Watkins (1993) called attention to the failure of the economist's 'rational actor' to deal with varying preferences and other aspects of culture.

This rather fragmentary exposition does not perhaps do justice to the sophisticated nature of economic theories. Later formulations were more sophisticated, but according to Hirschman 'the approach remains too narrow to be a significant challenge to demographic transition theory' (Hirschman 1994). As Robinson somewhat unkindly put it: 'the proposition (the micro-economic theory of fertility) has not been proven, only asserted often enough to gain a certain credibility and force through repetition (Robinson, 1992). In a land-mark article, Cleland and Wilson challenged the economic approach. For them, the evidence suggests that in traditional societies conscious fertility control within marriage was largely absent. This absence does not necessarily imply a demand for large families. The timing of the transition is strongly influenced by linguistic and cultural boundaries, less strongly by modernization factors, among which indicators of social development, such as women's education and status are more important than economic ones. The link with cultural factors suggests that the transition was more closely connected with the diffusion of new ideas than with changes in micro-economic forces (Cleland and Wilson, 1987). Caldwell's argument is supported by the fertility declines which have occurred at very low levels of modernization, as in Bangladesh and more recently in Southern Africa. In his view an important export of Westernization is the predominance of the nuclear family with its concentration on expenditure for one's

children, e.g. on education. This view has been challenged by Cain, who asserts that the nuclear family is no more prone to decline fertility than the extended family, since the latter provides an alternative to children as insurance for security in old age (Cain, 1982). As Caldwell admits, his restatement does not clarify the nature of the specific appeal of Westernized values and family systems. Why does Westernization proceed more rapidly and reach ever lower levels of socio-economic development, as in Bangladesh and sub-Saharan Africa? While Callwell's theory is very appealing it is, as he himself admits, not readily testable. One serious attempt to test it did not result in confirmation of the theory (Dow, et al., 1994).

In the demographic literature transition theory has often come to mean the fertility transition alone, rather than joined to the other important transitions, that of mortality. The reason is simple. Motives for the reduction of mortality are much easier to explain, and causes are more easily identified.

Three stages of historical mortality decline in the modern world may be distinguished:

(i) Though some reduction of mortality may well have occurred earlier in Western Europe, it is most clearly identified in the latter part of the eighteenth and the first half of the nineteenth centuries. During the early stages, rising incomes presumably contributed to reductions in mortality. But the development of the modern state was a decisive influence. In general, the establishment of public order directly reduced deaths from local wars, tribal and clan feuds, and random violence. Probably even more important was the indirect effect of the establishment of an infrastructure in transport and commerce in the modern state that brought about a reduction in famines, and perhaps also in epidemics. Stability probably also contributed to improvement in agriculture.

There has been dispute about the causes of mortality decline during this early period. Some have argued that the early decline was primarily due to improvement in agriculture, reflected in improved nutrition and resistance to infectious diseases independently of medical intervention, improved hygiene, etc. This view has been effectively challenged by others who ascribe mortality reductions to improvement in hygiene, as measured by the increasing consumption of soap and of washable cotton clothing (McKeown, et al., 1972, Razzell, 1974).

(ii) During the last third of the nineteenth century upto World War I, there was a revolution in medicine induced by the discoveries of Pasteur, Koch, and others. The resulting reductions in child mortality, and some what later in infant mortality, were responsible for much of the decline in mortality, particularly in mortality from diseases such as diarrhoea and tuberculosis (Schofield, et al., 1971). During the inter-war period solid gains were achieved in medicine, health education etc. , stimulated by progress made during and after World War I.

(iii) During World War II and the following period there has been an explosion in the use of antibiotics, initiated by Fleming's discovery of penicillin and its synthesis in 1943.

The cumulative effect of these developments has been a dramatic reduction in epidemic and contagious diseases. Much more difficult to reduce has been the mortality from organic diseases, such as diseases of the circulatory system, and cancers, although important gains have been achieved in reducing mortality from circulatory disease; and particularly in increasing the longevity of older adults. However, adoption of modern lifestyles has not been responsible for increased mortality from degenerative diseases. They were simply less evident earlier, because of the high incidence of contagious diseases. Current trends in mortality go much further back than is usually supposed (Gage, 1993).

Perhaps psychological effects are as significant, or even more so. Reductions in mortality and morbidity strengthen the belief that humans can control and modify their environment and destinies. Members of modern societies take a less fatalistic and passive view of life than members of pre-industrial populations did. Some economists e.g. Kuznets, sees reduced mortality as an absolute prerequisites of modernization (Simon Kuznets, 1975).

Nevertheless, mortality reduction should be given greater attention as one cause of fertility decline, notably by promoting economic productivity, especially in a more productive labour force. The major focus of the World Bank's *World Development Report for 1993* is 'Investing in Health', and includes an exhaustive study of the burden of disease. The concept of the 'disability life year' (DALY) has been used as a measure

that combines healthy life-years lost because of premature mortality with those lost because of disability.

Mortality decline has however been the important factor in triggering rapid growth of population in Bangladesh, as in many developing countries. In 1881-1891, the CDR was 41.3, and it fluctuated during the 1940s because of the famine of 1943 and the effect of partition in 1947 (Robinson, 1967).

The CDR dropped gradually from around 41, a level which prevailed at the turn of the century, to about 30 in the 1951 decade. The pace of the decline accelerated after 1950 and the CDR was around 8 in 1996 shown in table-7.5.

The total fertility rate may serve as an indicator for trend analysis. In 1961 to 1996 TFR slowly declined and reached from 6.78 to 3.41 per women (Chapter-4, Table-4.12). The high level of fertility also appears to have been fairly homogeneous across the country and between different social groups. The reasons for the persistence of such high and homogeneous fertility could be poverty, increasing land shortage, the dominance of the family size in the social structure, and the inferior status of women, all of which predispose towards larger families and a preference for as many male children as possible. Contributory factors would be the high rates of infant mortality and childhood mortality, and the very early marriage schedules for women. In 1991 half of all girls were married by age 16, and only about 11 percent of all women aged 20-25 years still remained single.

Table-7.5
Some Measures of Fertility and Mortality of Bangladesh population, 1901-1996

Period	CBR	CDR	e: (M)	e: (F)
1901-1911	53.8	45.6	23.6	23.9
1911-1921	52.9	46.3	22.6	23.3
1921-1931	50.4	41.7	19.4	20.9
1931-1941	52.7	37.8	26.9	26.6
1941-1951	49.4	40.7	32.1	31.4
1951-1961	51.3	29.7	49.2	46.9
1961-1974	50.0	18.5	51.6	49.7
1974-1981	47.4	19.4	54.5	54.8
1981-1991	34.6	11.2	56.5	55.6
1991-1996	25.6	8.1	59.1	58.6

Sources:- (i) 1978 Statistical pocketbook of Bangladesh, BBS, p-75.

(ii) 1990, 1992, 1997 Statistical yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, p-52,58.

Life expectancy at birth was 20 years in 1921, and that it rose to 48 years in 1951. Between 1961 and 1974, the life expectation did not improve markedly and has declined because of the civil war, natural catastrophe and famine. It increased during 1974 - 1996.. In 1996, life expectancy at birth was 58.9 (Chapter -5, Table-5.12).

As mentioned before, aging process has set in Bangladesh recently. Viewing the two processes- reduction in fertility level and reduction in mortality level to be involved in aging of a population it is dichotomized as (i) aging at the base due to fertility reduction- the result of a slow-down of growth in the number of persons at bottom of the age pyramid and (ii) aging at the apex due to reduction in mortality - the result of an acceleration of growth at the top(UN, 1956, Myer 1990). As a result expectation of life has increased and more and more persons have a chance to survive into their advanced ages of life. These demographic findings support that Bangladesh population is aging at the apex.

To understand how aging has progressed in the SAARC countries and also to know the possible impact of the relatively faster rate of decline in fertility and mortality as compared to that envisaged in the United Nations medium projections. Table-7.6 has been showing the two indicators total fertility rate and life expectancy at birth(e^0_0) for different countries during 1950-2020.

Table-7.6
Total fertility rate and life expectancy at birth for SAARC countries, 1950-2020

Country	1950-55	1960-65	1970-75	1980-85	1990-95	2000-05	2010-2015	2020-2025
	TFR e^0_0	TFR e^0_0	TFR e^0_0	TFR e^0_0	TFR e^0_0	TFR e^0_0	TFR e^0_0	TFR e^0_0
Bangladesh	6.66 36.6	6.68 40.6	7.02 44.9	6.15 48.6	4.72 52.8	3.97 57.1	3.22 61.3	2.45 65.6
Bhutan	6.05 35.2	5.95 38.0	5.95 40.7	5.89 44.3	5.89 48.5	5.47 53.7	4.62 57.7	3.78 61.6
India	5.97 38.7	5.81 45.4	5.43 50.3	4.73 55.4	3.85 60.4	3.15 65.1	2.45 69.0	2.10 71.5
Maldives	7.00 38.9	7.00 45.1	7.00 51.4	6.75 57.5	6.17 63.3	5.01 68.0	3.84 71.7	2.68 74.5
Nepal	5.64 36.3	5.86 39.1	6.52 43.3	6.25 48.2	5.47 53.5	4.51 58.8	3.54 63.6	2.58 67.5
Pakistan	6.50 38.9	7.00 44.4	7.00 49.0	7.00 54.0	6.17 59.0	5.01 63.8	3.84 67.7	2.68 70.7
Sri Lanka	5.74 56.6	5.16 63.5	4.00 65.0	3.25 68.9	2.48 71.6	2.10 73.7	2.10 75.6	2.10 77.3

Source: Same as in table-3.13.

It has been amply demonstrated by the classic writings of Coale(1956) that fertility and mortality change will have tremendous effect on age distribution and further fertility will have more significant effect relative to mortality. To examine the issue empirically an

analytical approach, though to some extent less rigorous, has been adopted here. Correlation coefficients, both simple and partial, between fertility/mortality indicators and three different measures of aging based on 56 pairs of observations have been calculated and presented in table-7.7 and 7.8.

Table-7.7

Correlation matrix between fertility/mortality indicators and measures of aging

Fertility/Mortality indicators	Measures of Aging		
	Median age	Dependency ratio	Index of aging
TFR	- 0.715	0.814	- 0.569
e_0^0	0.499	- 0.504	0.455

Note: All the correlation coefficients have signs in the expected directions and are significant at 1 percent level.

It is interesting to note that fertility will have negative effect on median age and index of aging and positive effect on dependency ratio. The simple correlation coefficients are all significant at 1 percent level. Mortality will also have negative effect on dependency ratio and positive effect on median age and index of aging. Here again the correlation coefficients are significant. A very interesting feature emerges from the analysis of partial correlation coefficients. When mortality is held constant, fertility has the same type of effect on aging, all the partial correlation coefficients have signs in the expected directions and all are significant. However, the effect of mortality, when fertility is kept constant, seems to be confound. Once again it shows that the impact of fertility on aging will be more significant in the SAARC countries at least during the first half in the 21st century.

Table-7.8

Partial correlation coefficients between (i) fertility and measures of aging (mortality constant) and (ii) mortality and measures of aging (fertility constant)

Fertility / mortality indicator	Measures of aging		
	Median age	Dependency ratio	Index of aging
TFR	-0.6233	0.8217	-0.3858
e_0^0	-0.2434	0.5301	-0.0384

7.8 Factors Affecting Aged Population and Expectation of Life at Birth in

Bangladesh

The following section have been developed to identify the contribution of the factors affecting aged population and expectation of life at birth in Bangladesh. The variables recorded were as follows:-

X_1 = Aged population of Bangladesh

X_2 = Crude birth rate

X_3 = Crude death rate

X_4 = Total fertility rate

X_5 = Mean age at marriage

X_6 = Expectation of life at birth

Assuming linear relations among the variables, stepwise regression methods have been used to identify the factors affecting the aged population (X_1) and expectation of life at birth (X_6). After identifying the factors (explanatory variables) affecting the response variables X_1 and X_6 separately, the impact of the explanatory variables have been estimated and they are tested using 't'-statistic for their significance. The individual and joint explanatory powers of explanatory variables have been estimated and tested for their significant using F-statistic within the frame work of ANOVA technique. For these purpose, SPSS/PC+ VERSION 7.5 (Windows base) soft ware programme has been used.

There are six variables are available for this study. These variable may be inter-related in different fashion (Linear, non-linear etc.). The pattern of relationship among the variables are not known to us. For simplicity of work, linearity among the variables has been assumed. To find out the relevant factors affecting the selected variables X_1 and X_6 , each of the variables has been regressed on the other five variables using SPSS/PC+ soft ware programme.

To find out the factors affecting the aged population (X_1), a stepwise regression technique is used. The estimated relation is as follows:-

$$X_1 = 9.758 - 0.0838 X_3 - 0.758 X_4, \quad R^2 = 0.862$$

(1.416) (0.067) (0.416)

This model indicates that crude death rate(X_3) and total fertility rate(X_4) are affecting aged population(X_1) and both of these have negative effect on X_1 . The panel-1 of table-7.9 shows that $R^2 = 0.862$, meaning that 86.2 percent variation of X_1 is explained by X_3 and X_4 . It is also found that joint effect of X_3 and X_4 on X_1 is significant at 1 percent level. Panel-1 of table-7.10 exhibits that X_3 alone explain 77.2 percent but in presence of X_4 it explains 4.3 percent variation of X_1 (panel-2). On the other hand, X_4 alone explains 81.3 percent (panel-1) but in presence of X_3 explains 9.0 percent variation of X_1 (panel-2). Both X_3 and X_4 are required in these model. We have to reduced crude death rate and total fertility rate to increased aged population.

To find out factors affecting the aged population (X_1), a stepwise regression technique is used. The estimated relation is as follows:-

$$X_1 = -3.784 + 0.184 X_5 + 0.0994 X_6, \quad R^2 = 0.965$$

(1.567) (0.057) (0.046)

This model indicates that factors X_5 and X_6 are affecting X_1 . It shows that both mean age at marriage (X_5) and expectation of life at birth (X_6) have positive effect on aged population (X_1). The panel -2 of table-7.9 shows that 96.2 percent variation of X_1 ($R^2 = 0.965$). Table-7.11 has been contributed to study the contribution of individual explanatory variables. The panel-1 of table-7.11 shows that regression of X_1 on X_5 and X_6 , regression of X_1 on X_5 and regression of X_1 on X_6 explain 98.2, 93.2 and 89.1 percent variation respectively of X_1 and they are significant at 1 percent level. The panel -2 of table-7.11 shows that the contribution X_5 given X_6 and X_6 given X_5 which are significant at 5 percent level. Observing table-7.11 it can be said that the aged population(X_1) of Bangladesh can be improved increasing mean age at marriage (X_5) and expectation of life at birth (X_6).

To find out factors affecting the aged population(X_1), again a stepwise regression technique is used. The estimated relation is as follows:-

$$X_1 = 1.900 - 0.0138 X_2 - 0.438 X_3 + 0.221 X_5, \quad R^2 = 0.947$$

(3.115) (0.045) (0.047) (0.087)

The model indicates that the factors X_2 , X_3 and X_5 are affecting X_1 . Of these, X_2 and X_3 have the negative effect while X_5 has the positive effect on X_1 . The panel-3, of table-7.9 shows that $R^2 = 0.947$, meaning that 94.7 percent variation of X_1 is explained by X_2 , X_3 and X_5 . Panel-1 of table-7.12 shows the different regression scheme using X_1 as a response variable. Panel-2 show the contributions of X_2 , X_3 and X_5 respectively in explaining X_1 in presence of one or more than one explanatory variables. The panel-1 of table-7.12 exhibits that X_2 alone explains 75.2 percent, X_2 and X_3 jointly explain 86.1 percent variation of X_1 and they are significant. The explanatory powers of the other combinations of X_2 , X_3 and X_5 are highly significant.

Panel-2 of table-7.12 shows that the contribution of X_2 , X_3 and X_5 in explaining X_1 . The contribution of X_3 given X_2 , X_5 , X_2 given X_3 , X_5 , X_5 given X_2 , X_3 , X_3 given X_2 , X_3 given X_5 , and X_2 given X_5 are insignificant but the contribution of X_2 given X_3 , X_3 given X_5 and X_5 given X_2 are significant at 5 percent level. Thus it may be suggested that the aged population can be increased both crude birth rate and crude death rate percentage should be reduced and increased mean age at marriage.

To find out the factors affecting the expectation of life at birth (X_6), a stepwise regression technique is used. The estimated relation is as follows:-

$$X_6 = 65.049 - 0.0292 X_2 - 0.0803 X_3, \quad R^2 = 0.931$$

(3.835) (0.141) (0.0159)

This model indicates that crude birth rate (X_2) and crude death rate (X_3) are affecting the expectation of life at birth (X_6) and both of these have negative effect on X_6 . The panel —4 of table-7.9 shows that $R^2 = 0.931$, meaning that 93.1 percent variation of X_6 is explained by X_2 and X_3 . It is also found that joint effect of X_2 and X_3 on X_6 is significant at 1 percent level. Panel-1 of table-7.13 exhibits that X_2 alone explain 57.7 percent but in presence of X_3 it explains 0.1 percent variation of X_6 (panel-2). On the other hand, X_3 alone explains 93.0 percent (panel-1) but in presence of X_2 explains 35.4 percent variation of X_6 (panel-2). Both X_2 and X_3 are required in these model. We have to reduced crude birth rate and crude death rate to increased expectation of life at birth.

To find out factors affecting the expectation of life at birth (X_6), a stepwise regression technique is used. The estimated relation is as follows:-

$$X_6 = 55.322 - 0.632 X_3 - 0.0202 X_4 + 0.337 X_5, \quad R^2 = 0.951$$

(11.084) (0.197) (1.343) (0.306)

The model indicates that crude death rate (X_3), total fertility rate (X_4) and mean age at marriage (X_5) are affecting the expectation of life at birth (X_6). Of those X_3 and X_4 have the negative effect while X_5 has the positive effect on X_6 . The panel-5 of table-7.9 shows that $R^2 = 0.951$, meaning that 95.1 percent variation of X_6 is explained by X_3 , X_4 and X_5 . Panel-1 of table-7.14 shows that the different regression scheme using X_6 as a response variable. Panel-2 shows that the contributions of X_3 , X_4 and X_5 respectively in explanatory variables. The panel-1 of table-7.14 exhibits that X_3 alone explains 93.0 percent, X_3 and X_4 jointly explains 93.6 percent variation of X_6 and they are highly significant. The explanatory powers of the other combinations of X_3 , X_4 and X_5 are also highly significant. Panel-2 of table-7.14 shows that the contribution of X_3 , X_4 and X_5 in explaining X_6 . The contribution of X_4 given X_3 , X_5 , X_3 given X_4 , X_5 , X_5 given X_3 , X_4 , X_4 given X_3 , X_4 given X_5 , and X_5 given X_3 are insignificant but the contribution of X_4 given X_5 , X_3 given X_5 and X_3 given X_4 are significant at 5 percent and 1 percent level. Thus it may be suggested that the expectation of life at birth can be increased both crude death rate and total fertility rate should be reduced and increased mean age at marriage.

Table-7.9
Estimated regression co-efficient, Standard error (S.E), and Calculated 't' and R^2 values

Panel	Regression line of	Regression co-efficient	Standard error	Calculated 't'	R^2 values
1	X_1 on X_3	-0.0838	0.067	1.254	0.862
	X_4	-0.754	0.416	1.810	
	constant	9.758	1.416	**6.890	
2	X_1 on X_5	0.184	0.057	**3.242	0.965
	X_6	0.099	0.046	2.154	
	constant	-3.784	1.567	2.414	
3	X_1 on X_2	-0.0138	0.045	0.306	0.947
	X_3	-0.438	0.047	0.941	
	X_5	0.221	0.087	*2.539	
	constant	1.900	3.165	0.600	
4	X_6 on X_2	-0.0292	0.141	0.207	0.931
	X_3	-0.0803	0.159	**5.053	
	constant	65.049	3.835	**16.361	
5	X_6 on X_3	-0.632	0.197	**3.200	0.951
	X_4	-0.020	1.343	0.015	
	X_5	0.337	0.306	1.102	
	constant	55.322	11.084	**4.991	

**Significant at 1 percent and *Significant at 5 percent

Table-7.10
ANOVA Table Showing the Impact of Crude Death Rate (X_3) and Total Fertility Rate (X_4) on Aged Population (X_1) of Bangladesh, 1961-1996

Panel	Source of Variation	Degrees of Freedom	Sum of Square	Mean Square	R ² -Values	Calculated F
1	Regression					
	$X_1 X_3 X_4$	2	12.199	6.099	0.862	**15.632
	$X_1 X_3$	1	10.921	10.921	0.772	**20.291
	$X_1 X_4$	1	11.585	11.585	0.813	**27.103
2	Contributions					
	$X_3 X_4$	1	0.614	0.614	0.043	0.11025
	$X_4 X_3$	1	1.278	1.278	0.090	0.23067

** Significant at 1 percent

Table-7.11
ANOVA Table Showing the Impact of Mean Age at Marriage (X_5) and Expectation of Life at Birth (X_6) on Aged Population (X_1) of Bangladesh, 1961-1996

Panel	Source of Variation	Degrees of Freedom	Sum of Square	Mean Square	R ² -Values	Calculated F
1	Regression					
	$X_1 X_5 X_6$	2	13.653	6.827	0.982	**68.769
	$X_1 X_5$	1	13.193	13.193	0.932	**82.708
	$X_1 X_6$	1	12.610	12.610	0.891	**49.857
2	Contributions					
	$X_5 X_6$	1	1.043	1.043	0.091	*10.507
	$X_6 X_5$	1	0.460	0.460	0.050	*4.6338

** Significant at 1 percent and * Significant at 5 percent

Table-7.12
ANOVA Table Showing the Impact of Crude Birth rate (X_2), Crude Death Rate (X_3) and Mean Age at Marriage (X_5) on Aged Population (X_1) of Bangladesh, 1961-1996

Panel	Source of Variation	Degrees of Freedom	Sum of Square	Mean Square	R ² -Values	Calculated F
1	Regression					
	$X_1 X_2 X_3 X_5$	3	13.394	4.465	0.947	**23.626
	$X_1 X_2 X_3$	2	12.176	6.088	0.861	**15.423
	$X_1 X_2 X_5$	2	13.227	6.613	0.935	**35.819
	$X_1 X_3 X_5$	2	13.376	6.688	0.945	**43.229
	$X_1 X_2$	1	10.644	10.644	0.752	**18.214
	$X_1 X_3$	1	10.921	10.921	0.772	**20.191
	$X_1 X_5$	1	13.193	13.193	0.932	**82.708
2	Contributions					
	$X_3 X_2 X_5$	2	0.167	0.0835	0.012	0.4418
	$X_2 X_3 X_5$	2	0.018	0.009	0.002	0.0476
	$X_5 X_2 X_3$	2	1.218	0.609	0.086	3.2220
	$X_3 X_2$	1	1.532	1.532	0.109	3.8785
	$X_2 X_3$	1	2.455	2.455	0.173	*12.9894
	$X_5 X_3$	1	0.183	0.183	0.013	0.9683
	$X_3 X_5$	1	1.255	1.255	0.089	*6.6402
	$X_5 X_2$	1	2.583	2.583	0.183	*13.6667
	$X_2 X_5$	1	0.034	0.034	0.003	0.17989

** Significant at 1 percent and * Significant at 5 percent

Table-7.13

ANOVA Table Showing the Impact of Crude Birth Rate (X_2) and Crude Death Rate (X_3) on Expectation of Life at Birth (X_6) of Bangladesh, 1961-1996

Panel	Source of Variation	Degrees of Freedom	Sum of Square	Mean Square	R ² -Values	Calculated F
1	Regression					
	$X_6 X_2 X_3$	2	215.794	107.897	0.931	**33.580
	$X_6 X_2$	1	133.764	133.764	0.577	*8.182
	$X_6 X_3$	1	215.657	215.657	0.930	**79.860
2	Contributions					
	$X_2 X_3$	1	0.137	0.137	0.001	0.000312
	$X_3 X_2$	1	82.03	82.03	0.354	0.110177

** Significant at 1 percent and * Significant at 5 percent

Table-7.14

ANOVA Table Showing the Impact of Crude Death Rate (X_3), Total Fertility Rate (X_4) and Mean Age at Marriage (X_5) on Expectation of Life at Birth (X_6) of Bangladesh, 1961-1996

Panel	Source of Variation	Degrees of Freedom	Sum of Square	Mean Square	R ² -Values	Calculated F
1	Regression					
	$X_6 X_3 X_4 X_5$	3	220.513	73.504	0.951	**25.911
	$X_6 X_3 X_4$	2	217.067	108.534	0.936	**36.684
	$X_6 X_3 X_5$	2	220.312	110.256	0.951	**48.580
	$X_6 X_4 X_5$	2	191.471	95.735	0.826	**11.852
	$X_6 X_3$	1	215.657	215.657	0.930	**79.860
	$X_6 X_4$	1	171.634	171.634	0.740	**17.099
	$X_6 X_5$	1	185.271	185.271	0.799	**23.860
2	Contributions					
	$X_4 X_3 X_5$	2	0.001	0.0005	0.000	0.00018
	$X_3 X_4 X_5$	2	29.042	14.5210	0.125	5.1184
	$X_5 X_3 X_4$	2	3.446	1.7230	0.015	0.60733
	$X_4 X_3$	1	1.410	1.4100	0.006	0.4970
	$X_3 X_4$	1	19.837	19.837	0.086	*6.9922
	$X_5 X_4$	1	6.200	6.200	0.027	2.1854
	$X_4 X_5$	1	45.433	45.433	0.196	**16.015
	$X_5 X_3$	1	4.855	4.855	0.021	1.7113
	$X_3 X_5$	1	35.241	35.241	0.152	*12.4219

** Significant at 1 percent and * Significant at 5 percent

7.9 Socio-Economic Progress

In 1969 the per capita income was \$ US 100 and it remained the same for three years, after 1971 it had fallen down and stood at \$ US 80 in 1973. The per capita income of Bangladesh stood at \$ US 210 in 1991 which showed an improved tendency (World Tables 1991, pp.112-113, GOB, 1994, p.2).

Economically active population or the labour force of a country comprises persons who are actually engaged or desirous of engaging themselves in the production of economic goods and services. Economically active population, therefore comprises employed as

well as unemployed population who are seeking job. On the other hand, housewives, students and other inactive person are treated as not being economically active.

The total population as well as the economically active population as obtained from 1961, 1974, 1981 and 1991 census are shown in table-7.15. It will be noticed from the table that during the period 1961-91 while the total population increased by 119.5 percent, the total employed person increased by 72.3 percent. The decadal growth were 40.7% and 15.6% in 1974 and 21.8% and 18.0% in 1981 and 22.0% and 26.3% in 1991 census respectively. This shows an increased trend of labour force participation rate over the decades. The labour force participation rate has superceded the population growth rate in 1991.

Table-7.15

Numerical distribution of population by economic category, sex and residence 1961-1991

Economic category	National (in million)											
	1961			1974			1981			1991		
	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female
Total population	50.8	26.3	24.5	71.5	37.1	34.4	89.9	46.3	43.6	100.5	57.3	54.1
Civilian labour force	17.4	14.8	2.6	20.5	19.7	0.9	23.6	22.6	1.2	52.0	30.2	21.8
Urban												
Total population	2.6	1.6	1.1	6.3	3.5	2.7	13.2	7.4	5.8	20.9	11.3	9.6
Civilian labour force	0.9	0.9	0.1	2.0	1.9	0.1	4.1	3.8	0.3	10.3	6.8	4.0
Rural												
Total population	48.2	24.8	23.4	65.2	33.5	31.7	73.9	37.5	36.5	85.4	43.4	42.4
Civilian labour force	16.5	13.9	2.6	18.5	17.5	0.8	19.6	18.6	1.0	41.9	23.6	17.8

Source:- Bangladesh Population Census 1991, BBS, Dhaka, pp. 143-144.

For urban area the total population increased by 703.8 percent during the period of 1961-1991 while the employed person increased by 644.4 percent. The same was 142.3 and 111.1 in 1974, 109.5 and 115.8 percent in 1981 and 58.3 and 63.4 percent in 1991 censuses respectively. For rural area the population increased by 77.2 percent during the period 1961-1991 while the employed persons increased by 40.9 percent. The same was 35.3 and 10.4 in 1974, 13.3 and 8.3 in 1981 and 15.6 and 17.9 in 1991 censuses respectively. It is noticed that for both rural and urban areas the labour force participation rate has an increasing trend.

In 1991 census, the civilian labour force was 52.0 million. It was 17.4 million in 1961 census. Here we observe that the increase of civilian labour force is 34.6 million in 30

years. It is also remarkable that female civilian labour force increased by 19.2 million in 30 years. On the other hand, rural civilian labour force was always higher than urban labour force for males and females also. The data on literacy levels and trends are of crucial significance to the policy makers, researches and planners for socioeconomic and educational planning of a country.

Table-7.16 shows the literacy rate of population of all ages by sex and residence for different censuses. It is seen that literacy rate relating to both sexes were lower in 1981 as compared to 1974 census because of adoption of stricter definition in 1981. But it is clear that literacy level increased in 1991. The rate of literacy is far higher for men than for women in all censuses. During the period 1961-1991 female literacy level has gone up over time.

The literacy percentage for urban area was always higher than that of the rural area. Literacy rate for females in rural areas has improved to the level 16.3 which is low, but increasing rate is more than that of male.

According to the 1921 and 1991 censuses, 7.6 and 24.9 percent populations were literate respectively (UN 1981, p-145).

Government efforts to recruit more women as well as efforts by NGOs to involve women in more income generating activities have borne fruit. Activities like the loan programmes of the Grameen Bank, about 75 percent of whose small loans to landless people have been to women, have increased the scope for self-employment in the villages. The dramatic growth of Government industry in the mid-1980s has opened up many jobs for women, estimates range as high as 200,000. The Government of Bangladesh recognizes that women have an important role to play in the development effort. It has established a Ministry of social welfare and women's Affairs and various advisory councils on the problem of women. In practice, Government efforts to integrate women into the development effort have been given more concrete expression in the family planning area than in other parts of the Government programme. Women, especially those in rural areas, are also an important focus of the Government's social welfare programme, which tries to reorient away from relief toward a more self-sufficient

income generation approach. This has led it, for example, to stress the establishment of training centres and women's co-operatives.

Table-7.16
Literacy rate for persons of all ages by sex and residence in census years, 1961-1991

Sex	National			
	1961	1974	1981	1991
Both sex	17.0	20.2	19.7	24.9
Male	26.0	27.6	25.8	30.0
Female	8.6	12.2	13.2	19.5
Sex	Urban			
	1961	1974	1981	1991
Both sex	38.7	37.7	34.8	40.3
Male	47.7	45.3	42.3	46.2
Female	26.1	27.9	25.5	33.3
Sex	Rural			
	1961	1974	1981	1991
Both sex	16.5	18.5	17.0	21.2
Male	24.5	25.7	22.6	25.8
Female	7.8	10.8	11.2	16.3

Source:- Bangladesh Population Census 1991, BBS, Dhaka p.123, Table-8.2 and 8.3.

During the demographic transition, there is a marked tendency toward urbanization, industrialization, and commercial occupations of the population and with a falling birth rate, the size of the family tends to decline. The population by sex and residence is shown in table-7.17.

Table-7.17
Population by sex and residence, 1981-1991

Sex	1981			1991		
	Total	Urban	Rural	Total	Urban	Rural
Both sex	89.91	14.09	75.82	111.45	22.45	89.00
Male	46.29	7.86	38.43	57.31	12.20	45.11
Female	43.62	6.23	37.39	54.14	10.25	43.89

Source:- Bangladesh Population Census 1991, BBS, Dhaka p.43, Table-3.1.

In 1981, 6.23 percent female population lived in urban areas and in 1991, 10.25 percent female population lived in urban areas. In the mean time, transition theory appears to offer a reasonably accurate model of the major population changes taking place in recent centuries. Under conditions of industrialization and urbanization, given the technology of birth control and death control, there is a marked tendency for the technology of death control to be applied earlier and more extensively resulting in rapid population growth and extensive structural changes in the population. Later, and less predictably, cultural values permitting, the technology of birth control may be employed to reduce the rate of growth and bring about a new condition of equilibrium. Hence while the general birth and death rates are falling, there will be marked differentials between the social classes. In this way, with female status increasing, the use of contraceptives will be high and the growth rate will be remarkably low.

7.10 Projection Pattern

It is relevant to point out here that growth in the coming years is really worrying. The population may be 235 million in 2025 by reducing death rate to 7.0 and birth rate to 20.0 under medium fertility assumption. At the same time, the natural increase will be 1.3 percent and the total fertility rate will be approximately 2 children per woman. The sex ratio would be 105 in 2025, and the expectation of life will become 65.1 and 66.1 for the males and the females and for both sex it will be 65.6 in 2020-2025 (UN 1990, pp.318-319).

7.11 The Role of Government

The role played by government is of great importance in the decline of both mortality and fertility. With increasingly active governments and the rise of the nation state came public services that reduced mortality- the provision of pure water, vaccination, control of epidemics and famines as well as other public health measures.

Governmental influence on fertility decline is, of course, equally apparent. Compulsory schooling increased the cost of children, as did measures to outlaw child labour and child exploitation. The changing structure of the economy created jobs suitable for women, least in government itself.

The most conspicuous aspect of intervention, however, is the attitude taken by government and political leaders on population policy. Perhaps most striking is the experience of China, where the government launched a comprehensive and rigidly enforced family planning policy during the late 1960s which brought about a remarkable drop in fertility in the 1970s, when the policies were relaxed and fertility reached a plateau. This was followed more recently by a return to the old policy and a new decline of fertility which brought it down to replacement level, with a total fertility of 2.0 to 2.1.

The experience in Pakistan and Bangladesh illustrates the limitations of government intervention, when conditions are not ripe for it. During the 1960s, President Ayub Khan introduced a crash programme for Pakistan. It was a complete failure and fertility in Pakistan has only begun to fall very recently.

In Bangladesh, the government initiated a cautious family-planning programme which was progressively strengthened. By 1992, total fertility had fallen from 7.0 to 3.7. The

difference, with Pakistan, is that by the later date, Bangladesh had been affected by westernization and extreme poverty had spurred on public and government support.

Aboveall, there is, as expected, a clear correlation between the strength of the programme effort and rate of fertility decline (Mauldin and Ross, 1994). Also, the degree of success is correlated with readiness to adopt contraception, as measured by level of socio-economic development, desired family size etc.

While direct implementation of family planning programmes is undertaken by nation states, international guidelines and targets have had some influence, as, for instance, the World Plan of Action adopted at the Population Conference in Bucharest or Mexico in 1984. The World Population Conference held in Cairo in September 1994 established a more comprehensive plan. The Cairo conference (formerly the International Conference on Population and Development) produced a programme of action, a 20-year blueprint for stabilizing world population and fostering economic and social development. This programme called on governments to provide 'universal access to a full range of safe and reliable family planning methods and to related reproductive health services by the year 2015'. In a dramatic departure from previous manifestos; it states that raising the status of women is a prerequisite for further reductions in birth rates. Such international agreements are bound to have an effect on the adoption of national family-planning programmes.

An additional strategy is needed to reduce population growth, which would emphasize 'human development', particularly education, raising woman's status,, and improving child health. Of course, such policy courses are valued in their own right, but education, particularly of girls, has been shown to be the factor most closely related to fertility decline, by delaying marriage and first births. Increasing equality between the sexes in legal, economic, and social affairs raises the cost of children by making roles other than childbearing more feasible and attractive to women. Reducing child mortality and measures to improve child welfare have everywhere been associated with fertility reduction.

It is possible that the European and Japanese experience will be repeated in some countries in the contemporary underdeveloped areas of the world. Fertility has already

fallen below replacement level in Hong Kong, Singapore, South Korea, and Taiwan. In China, total fertility at 2.0 is at replacement level. In some European countries reductions in fertility have already resulted in zero natural increase, or even the beginning of a decline, though in some cases the effects have been weakened by immigration.

7.12 Conclusion

Regarding the time component of the transition theory, it will be noted that in Bangladesh, as in most of the developing countries around the world, decline in mortality was achieved during a comparatively short time span.

By contrast, in Bangladesh and other developing countries, substantial decline in the death rate during the early part of the twentieth century was accomplished within a decade or two and was the result of increasingly effective public health measures and improved medical knowledge. Many scholars have pointed out that even among these Western countries, there was no uniformity in the demographic trends. There cannot be any typical lengths of time which could trigger a fall in death rates or birth rates and usher in the various phases of transition in a sequential fashion (Hauser, et al., 1959).

The position of population of Bangladesh stands in the second stage, i.e. low mortality and higher fertility. We observe a remarkable change in the crude birth rate and crude death rate at various periods of Bangladesh. In the period 1881-1891 the CDR was found to be 41.3 and in 1996 it was 8.1, also we observe that the CBR was 53.8 in 1901-1911 and 25.6 in 1996. If we projected the data to 2025 then we see that the CBR and CDR will be 20.0 and 7.0 in 2020-2025 from 40.6 and 13.8 in 1990-1995 respectively. For these reasons, as noted earlier, the TFR will be low and the birth rate will decline after the present century and it will be nearly equal to the death rate. Then the demographic transition will enter the third stage i.e. both fertility and mortality level will be low. In the CENTO SYMPOSIUM on Demographic Statistics, Chowdhury et al., (1968) discussed the possible limitations of the family planning programme (FPP) on population growth of East Pakistan (Now Bangladesh) and identified the following constraints under which the couples desire a high number of children from the socio-economic point of view and inhibit progress of FPP to a large extent:

- (i) Child Labour

- (ii) Economic security of the family in old age
- (iii) Sense of continuity of the generation
- (iv) Social stigma against childlessness
- (v) Preference of particular sex
- (vi) High mortality in infancy and childhood.

The gradual advance of medical measures, formal as well as informal education, utilization of technology, transport systems, industrialization, urbanization, modernization and other socio-economic development programmes have weakened the above factors, But to what extent?

According to the theory of demographic transition the new technique on mortality reduction like medical measures, sanitary measures are invented as a process of modernization and these processes are easily accepted to lead to a rapid natural increase. On the other hand the new techniques on fertility reduction are less likely to be invented rather late or slowly accepted and thus fertility takes longer time to decline and then growth of population becomes slow gradually (Ford et al., 1970).

As noted above CDR has declined from 41.3 in 1881-1891 to 11.0 in 1991 and expectation of life at birth has increased from 23.7 in 1901 to 55.8 in 1991 indicating remarkable progress of medical measures. The infant mortality rate in Bangladesh is among the highest in the world -125 to 135 per thousand live births but welfare measures on water, sanitation, hygiene and child health (EPI) are expected to cause radical decline in levels of infant and childhood mortality (UNICEF, 1987).

The factors crude death rate and total fertility rate have significant negative effect on the aged population. It may be suggested that decrease in both crude death rate and total fertility rate increase aged population in Bangladesh. The factors mean age at marriage and expectation of life at birth have significant positive effect on the aged population. It may be suggested that increase in both mean age at marriage and expectation of life at birth increase aged population in Bangladesh. The impacts of crude birth rate, crude death rate, and mean age at marriage on aged population is highly significant. To increase aged population in Bangladesh crude birth rate and crude death rate should be reduced and at that time mean age at marriage should be increased. If a planner is interested to

increase aged population manipulating a single factor may be suggested to reduce crude death rate of Bangladesh.

Again crude birth rate and crude death rate have significant effect on expectation of life at birth. To increase expectation of life at birth in Bangladesh crude birth rate and crude death rate should be reduced. The effects of crude death rate, total fertility rate and mean age at marriage on expectation of life at birth are statistically significant. If a planner is interested to increase expectation of life at birth in Bangladesh crude death rate and total fertility rate should be reduced and at that time mean age at marriage should be increased. Again if a planner is interested to manipulate single variable to increase expectation of life at birth it can be suggested to reduced crude death rate of Bangladesh

The desire for many children as an old age security and continuation of the generation has lost its validity now, as both sons and even daughters are leaving their parents and grandparents to seek employment's in cities and foreign countries. Very few of them can remit their parents the required money.

In traditional systems parents support their dependents mostly sons and use them at work as early and as long as possible and in return, those dependents support their parents in their old age. In modern societies these trends on the parent-child bond have been lost at least economically due to various types of socioeconomic crisis. Consequently the economic sacrifice of the parent for their young children is not rewarded back by their adult sons (Davis, 1970).

Female employment depresses fertility level under some specific conditions in which woman leave their home for work. These conditions have emerged in Bangladesh in the process of cottage industries, garment factories, special opportunities in bank, school and services in other sectors. In order to achieve the objectives of population policy major endeavour is to reduce the rate of population growth to 1.5% by 1995 and 1.4% by the year 2000. To achieve these targets improvement in the status of women has been given a high emphasis. Several measures have been undertaken for this and chief among these is raising the legal age of marriage. The government is committed to increase the quota of women employment. The government is also encouraging female education in an effort to improve their status (UN 1987). International Women's Year (1975) plays important

role to serve as a catalyst for upholding the actual and potential performances accomplished by the women in socio-economic development in their communities as well as in the national and international arena. Integration of women into development activities has been the routine topics for international, governmental and non-governmental agencies to formulate programmes that would encourage participation of women folks. Increasingly there is almost unanimous agreement that government can no longer afford to ignore the role the women play and that socio-economic, political and cultural targets cannot be met unless the women's needs, opportunities and progress are properly assessed (DFR, 1980).

Though many communities in Bangladesh have traditionally disapproved of women's outdoor activities and vast majorities of women are not economically active in the labour force but this traditional values had eroded to a large extent owing to rapid modernization and urbanization . The recent study which attempts to measure all income-earning activities shows 18-32 percents of women in the economically active population. The participation rate for women has been found to be about half the participation rate for men (BBS 1988, UNICEF, 1987). These findings are clear evidence to bear the testimony to support the strong view of dramatic changes in traditional values like son-preference , age at marriage to lead the country as a whole to reduce fertility level and to overall development and prosperity by giving an effective check to population growth .

The determinants of family size is displayed by the positive co-efficients for child labour force participation indicating that where opportunities exist for children to help provide support for the family, the couple, desire a larger family (Kasarda, 1971). Instituting compulsory free primary education for which the Bangladesh Government has taken the encouraging programmes and improvements in mechanised agriculture may free children by decreasing their relative importance in labour.

The main substantive and methodological reason why the theory of demographic transition cannot be applied to Bangladesh and other developing countries is that while scientific truths and technology have universal validity; historical processes involving demographic, economic and cultural change cannot have an all-pervasive validity. For instance, as noted earlier, in the industrialized West, the decline in death rates was

protracted over a period of 100 years and this decline took place during a period of continued economic advance and did not depend during early stages on progress in medical technology. By contrast, substantial decline in the death rate in Bangladesh and other developing countries was accomplished within a very short period and under the impact of modern preventive medicine.

Similarly quite different forces are likely to operate in the area of fertility reduction in developing countries like Bangladesh. First, the whole experience of the Western world in reducing fertility through family planning, late marriage etc., is available to Bangladesh and other developing countries. This itself will greatly shorten the process of fertility reduction. Secondly, methods of contraception, which were then unknown to the Western world, are being developed and will be developed which could be cheaper, easier and more readily acceptable to the people. Thirdly, quite novel and effective means of mass communication (like radio, television, satellite etc.) have brought to the people, both in urban and rural areas the necessary information and knowledge concerning family planning. Fourthly, Westernization (as against industrialization) has already exported to the third world ideas which promote practices leading to fertility reduction (like, late marriage, abortion etc.). Finally, Governments in most of the countries have developed suitable policies to tackle their respective population problems. All these developments are likely to bring down fertility level more effectively and in less time than was experienced during the population cycles of the Western countries.

In most Asian countries, high fertility and extended family forms serve as sources of income and wealth and of insurance against various risks of life including unemployment, infirmities, old age etc. Since literacy and education are at low levels among the masses; children become an economic asset, contributing to family fund even before they attain adulthood. Thus, under the present family set-up and value system, high fertility becomes a perfectly rational choice. Change from this rationality of high fertility to a rationality of low fertility may not be brought about fundamentally by industrialization as in the West, but rather by transformation of the family system from the extended form to the nuclear form and by the mass education of all children. This would turn the tide and reverse the flow of wealth from parents to the children. The child so far has been an asset from an

early age; in the new circumstance, that child would represent a potential factor of production in whom investment in terms of nutrition, education, etc., would be of paramount significance. This would necessarily motivate parents to have less children. The crucial factor in fertility reduction in Bangladesh would then be the assured availability of information and means of family planning on a large scale.

The problems associated with the emerging issues of aging may however surface within the early years of the 21st century. The present national policies and programmes to build infrastructure on bolstering the national Family Planning Programme (FPP) claim that fertility level in Bangladesh has shown a trend of considerable decline. Moreover, decades of experience of working for promoting progress in achieving the objectives of various socio-economic welfare activities and FPP by different national and international voluntary organizations indicate that a favourable climate for wide adoption of contraceptive methods has been generated to bring down fertility level (BBS 1995, UNICEF, 1991 and 1995).

In Bangladesh there has been a rapid socio-economic and cultural transformation, with major decline in mortality, very rapid increases in school enrollment, government and non-government family planning programmes with clinics that can offer modern and effective contraception supported by information and educational activities. These transformations are most likely to bring the transition to low mortality and fertility.

In the doldrums the activities on executing population programmes are required to obtain a fresh impetus in the direction of real progress to overcome the worst aspects of achieving the objectives. It is considered that the limited resources are the most powerful impeding factors to achieve the desired goal. But the crucial factor is that resources have improved now considerably. What makes that improvement possible is the new knowledge, new technology, new system of mass communication, new system on motivation aspects and hard-won experience which have been built over the last few decades. This improvement is today one of the most valuable resources and it is high time it was fully exploited.

Perhaps, most promising for transition theory is our equilibrium or homeostatic framework. There are other possible social adoptions to population size, particularly rules

which govern the extent and timing of marriage, sexual abstinence, length of breast-feeding, rules relating to the remarriage of widows, migration and infanticide (either direct, or by neglect). However, as Hirschmann has said: 'conscious patterns of fertility control are an important part of the process, but the theoretical frame work of transition should be built on a broader base' (Hirschmann, 1994).

Decades of experience of working for real progress are now vested in organizations like the UNDP, WHO, ILO, FAO, UNFPA, UNESCO, UNICEF, World Bank, FPPB, BRAC, IPPF and it provides an effectively solid base for making accelerated progress possible during the decades ahead. Moreover, all voluntary organizations working in Bangladesh and also all Ministries and particularly those which maintain regular public contact, viz. Ministries of Health and Family planning, social welfare, information and Broad casting, Agriculture, Rural Development, Education are continuously launching major drive to make successful climate for wide adoption of contraceptive methods.

Fertility in Bangladesh is declining, yet the growth rate of the population is still high and its consequences have adverse effects in various development efforts. One significant consequence of high fertility and the declining mortality trend is a built in "population momentum", which will continue to generate population increases well into the future, even in the face of rapid fertility decline.

In 1991, Bangladesh had around 22 million married women in the reproductive age group, by the year 2001, this number is projected to rise to 31 million (GOB, 1994:8). The government has set a goal of reaching replacement level fertility by the year 2005 (GOB, 1994:6). Even if this occurs, the population will continue to grow for the next 40 to 60 years after 2005. One projection suggests that the population of Bangladesh may stabilize at 211 million by 2056. By the year 2010, Bangladesh is likely to have a population of about 15 million. The demographic goal is difficult but not impossible to achieve, in view of the trends already established by the success of family planning, maternal and child health; and other socio-economic development programmes.

CHAPTER-VIII

POPULATION ESTIMATES AND PROJECTIONS

8.1 Introduction

Population is a resource if it can be planned and utilized properly. Both under-population and over-population hamper the overall national development and are problems to the countries in question. Under-population fails to supply the necessary labour force for the national development, whereas over-populated countries are facing acute problems to feed their hungry mouths. Hence, every nation of the day is to maintain an optimum population balance between the two. To maintain an optimum population it is necessary to mould the trend of present population growth to the desired one, consistent with the available resources. To achieve the desired objective, present trend of population and its important differentials must be thoroughly studied so that it is possible to plan a definite population with time.

Perhaps the most valuable aspects of the demographic study of human population are the past, present and future population growths by age. National censuses, the most important source of data on the size, structure, and distribution of population are usually carried out at decennial interval of time. They involve a great deal of planning, enumeration, compilation, analysis, publication and require tremendous expenditure in terms of money and manpower. Also, they require considerable time to make available the details of information collected at a certain point of time. The national government need the most upto-date information about the size and structure of population so as to make reasonable plans of development for the present and the future. Moreover, records of fertility, mortality, nuptiality and morbidity which are collected on yearly basis, also require the current estimates of denominator data to compute the rates of these events and to analyze

their differentials and trends. The governments and demographers are not the only groups of users of population estimates; trade unions, social service organizations, university and other social research centres, market research analysts and business organizations often need these estimates. Estimates of future population and more specifically projections help the planners by providing magnified image of the consequences of current trends, to guide them to take appropriate actions.

In our planned economy, both the short term estimates and long ranged projections are important in making important decisions. In all our efforts for development, population serves as the denominator. Not only the utility of these projections are important at the national level but they also serve equally useful purposes at the state and lower levels. For instance, city planners need to know how many people would be there in 5 years from now or 10 years from now or 20 years hence so that transport facilities, housing and other facilities could be generated to cope up with the increase in population.

Estimates or projections are usually based on some factual information and assumptions. The accuracy of estimates, therefore depends on the accuracy of the available data and assumptions. Furthermore, when estimates/ projections of population are made for some future date, they are based on certain assumptions as to the likely course of vital events. The components of population, viz. fertility, mortality and migration are likely to follow a certain course. Similarly, the initial data which are used as the base to make these projections has to be error free as far as possible. Usually demographers make projections using a set of assumptions and come out with high, medium, and low estimates of projection figures. The sets of projections provide the range in which the future population is expected to fall. Assumptions and the quality of data should be clearly made known with the population projections.

Perhaps the most important fact bearing on the future of a population is its rate of increase, and yet for most countries of the world that rate is not known with acceptable precision. Only about one third of the world's population is covered by registration systems that provide usable birth and death figures (Brass, 1971).

The task of installing a modern registration system is harder than it looks in developing countries because birth certificates only come to be important under modern conditions.

Proof of date of birth and of citizenship is not required by immobile peasants, either for themselves or for their children. So peasants do not always respond to a law from a distant capital requiring them to go to the town or village registrar each time a child is born. If we had to depend on complete vital statistics the problems of rapid population increase might well be solved before it could be measured.

The current estimates make use of actual postcensal data from the recent past in the form of vital statistics, tabulations from population registers, or statistics that are merely correlated with population change. Where there are no such data, the current estimate reduces methodologically to a short-range projection; but even here account could be taken of qualitative information concerning, for example, a natural disaster, war, famine, epidemic, or mass migration. Conventionally, projections into the future make no attempt to speculate about such possibilities because they are essentially unforeseeable.

Although we think of projections as applying to future population, the projection may also be into the past. There is sometimes interest in historical figures for dates preceding the first census. One way to making such a “precensal” estimate is to project the population backward by essentially the same techniques that are used to make forward projections.

The distinction should be made between projections and forecasts (John, 1959). When the author or the subsequent user of a projection is willing to describe it as indicating the most likely population at a given date, he has made a forecast. At the other extreme, a model worked out to illustrate certain analytical relationships, on assumptions that are described as highly unlikely, would not be regarded as constituting a forecast of future population growth. It is apparent that, in this usage, all forecasts are projections but not all projections are forecasts.

Population projections, then, are essentially concerned with future growth. They may be prepared for the total population of nations, their principal geographic subdivisions, or specific localities within them. Projections may also be prepared for residence classes, such as urban and rural population and size of locality classes. The principal characteristics for which projections need to be made are age and sex (Hossain, 1999).

8.2 Different Types of Estimates

There are three types of population estimates differing from one another with reference to the time to which they relate. These are as follows:-

(1) **Inter-Censal Estimates:-** Inter-censal estimates for the years between any two consecutive censuses are based on data from both the censuses. Thus, an estimate of the population of Bangladesh in 1987, given the census counts of 1981 and 1991, is an inter-censal estimate of population. Inter-censal estimates may also use data from other sources.

(2) **Post-Censal Estimates:-** Post-censal estimates for the years following a census, may also be based on other sources(not including any subsequent census). Thus an estimate of the population of Bangladesh for the year 1993, based on the data of the last census of 1991 and the records of births, deaths and migration from 1991 to 1993 is essentially a post-censal estimate.

(3) **Future Estimates and Projections for any future date:-** These are in general less accurate than the post-censal estimates for which some type of related up to date information is available. These are always based on some assumptions of the trends of population growth or of its components. Both postcensal estimates and projections can be regarded as extrapolations, and intercensal estimates as interpolations, taking these terms in their more general sense.

Estimates vary in several other respects. They may be made for a variety of types of areas, such as a whole country, or broad classes of areas within the country. Estimates may be made of the population of an area or of particular classes of the population in the area distinguished by age, sex, colour, race, nativity, family and marital status, educational attainment, employment status, etc. An important aspect of the type of population estimates to be made relates to the definition of population employed for the estimate. Estimates, like census counts, can vary as to whether they refer to the *de jure* (usual resident) population or the *de facto* (physically present) population. In planning a national population estimates program, the responsible agency in the national government determines which estimates it will make according to the demand or need for various kinds of figures, the availability and quality of basic data, the amount of work necessary

to produce the estimates and the resources available. On this basis, as a general guide, we suggest that estimates of the total population and of the population classified according to age and sex, for a nation, are most important; then come estimates for its primary political subdivisions, first total population, then age and sex.

8.3 Methods of Estimations

Methods of preparing national projections of total population fall very simply into two classes, mathematical methods and component methods. Mathematical methods are simplest conceptually, as they usually require relatively little time to apply, and historically antedated the use of component methods. The mathematical methods involve application of some mathematical formula directly to the total population from one or more censuses, to derive projections of total population. The mathematical equations useful for preparing projections correspond to those for measuring population change. The component method is usually the method of choice, but there are many variations of the component method and results may differ substantially from one method to another. Mathematical and component methods may also be employed as principal methods of preparing projections of age-sex distribution for countries. The component method is also the method of choice for preparing projections of age-sex distribution; this is so even when very limited historical data on component or component data of doubtful quality are available.

Enough is known about the population of the newly emerged state of Bangladesh to establish its importance in the field of demography. Though the decennial census of 1971 could not be held because of the war, a census was held after independence in March 1974, and the results confirmed previous impressions. In this study, population figures for 1971 is my own estimate. Population of 1971 was estimated by the exponential formula

$$P_t = P_0 e^{rt} \quad \text{where } P_t \text{ is the population at time } t.$$

Proclamation of British Imperial Rule in 1857 portend the modern times in India. From this time, preventive measures against natural calamities like flood, draught, cyclone, famine, etc. along with western medical devices began to develop. As a result, death rate began to decline but birth rate remained unaltered causing a slow but steady growth rate (Percival Spear, 1967, pp.5-8). Difference in the population figures of 1855 and 1867 for Bangladesh indicates this (Statistical Abstract, 1870, p.12). The famine of 1869 over Cooch Bihar and Orissa affected the northern districts of Bangladesh causing a remarkable decrease in the population figures (Hunter, 1870, pp.53-54). Between 1941 and 1945, as part of undivided India and its eastern border province, Bangladesh came

nearest to the theatre of war in the east, and suffered the major impact of the ensuing Great Bengal Famine of 1943. On partition in 1947, riots and the movements of millions of refugees across the Indian and East Pakistan border took a heavy toll of the population. Bangladesh(then East Pakistan) was further ravaged by some of the worst cyclones and floods, and by military action during the beginning of the 1970s. Table-8.1 represents the population growth of Bangladesh, 1901-1991. It shows that in 1901 the population of the territory now under Bangladesh was 28.92 million, which rose to 44.17 million in 1951. This means an increase of 0.90 percent per annum during 1901-51. In 1961, 1974, 1981 and 1991 the population size was 55.22 million, 76.39 million, 89.91 million and 111.45 million respectively. The annual increments remained 0.50% during 1951-1941, 2.26% during 1961-1951, 2.48 % during 1974-1961, 2.35 % during 1981-1974 and 2.17 % during 1991-1981 respectively. In 1995 the population size of Bangladesh was estimated to be about 119.96 million. If the present rate of population growth of about 2.13 % percent per annum continues, the estimated population will be 150 million at the end of the century (BBS, 1995).

Table-8.1
Population growth of Bangladesh, 1911-1991

Year	Total population (in million)	% Annual Increase
1901	28.92	---
1911	31.56	0.94
1921	33.25	0.60
1931	35.61	0.74
1941	41.99	1.70
1951	44.17	0.50
1961	55.22	2.26
1974	76.39	2.48
1981	89.91	2.35
1991	111.45	2.17

Source: Bangladesh population census 1991, BBS, Dhaka, Bangladesh, P.43.

Table-8.2 shows population of Bangladesh by broad age groups from 1911 to 1991. It reveals that the number of aged population is increasing rapidly since 1941.

Table-8.2
Population of Bangladesh by broad age group, 1911-1991
(Population in thousand)

Year	0-14	15-59	60+
1911	13348	16819	1387
1921	14067	17824	1364
1931	14918	19547	1139
1941	17387	23141	1470
1951	18638	23585	1845
1961	25458	26893	2644
1974	33212	31900	4074
1981	41899	42978	5034
1991	50378	55059	6021

Source: Same as Table-8.1.

The aged population of Bangladesh are plotted in Figure-8.1. It indicates a nonlinear relationship between time and aged population of Bangladesh. The following models viz. Exponential growth model, Modified exponential growth model, Geometric growth model, Makeham's model, Logistic model seem to be a possibility for fitting the data. These methods are described below:-

8.3.1 Exponential Growth Function

Exponential functions are the class of mathematical equations useful in interpolation and extrapolation of series of data. This class of curves is important in connection with the measurement and analysis of population growth. Exponential equations are used for many other demographic purposes. An exponential function is one in which one or more of the variables are expressed as a power of some parameter or constant in the formula. Exponential functions take many forms.

The exponential growth function is

$$P_t = P_0 e^{rt} \quad (1)$$

Where P_0 is the initial population

t is the period of time over which growth occurs

r is the growth rate per unit of time

e is the base of the system of natural logarithms

P_t is the population at time t .

From this formula,

$$r = \frac{1}{t} \left(\log_{10} \frac{P_t}{P_0} \right) \frac{1}{\log_{10} e} \quad (2)$$

Exponential function fitted to the aged population of Bangladesh enumerated at censuses from 1911-1991 gave

$$P_t = 5034 e^{0.0179 t}$$

8.3.2 Modified Exponential Growth Function

Modified exponential growth function is

$$P_t = P_0 e^{rt} + c \quad (3)$$

$$\text{or } P_t - c = P_0 e^{rt}$$

Taking log on both sides we get

$$\ln(P_t - c) = \ln P_0 + r t$$

Now the linearized form is

$$P_t' = P_0' + r t \quad (4)$$

$$\text{where } P_t' = \ln(P_t - c)$$

$$P_0' = \ln P_0$$

Since the three points (t_1, P_1) , (t_2, P_2) , and (t_3, P_3) fall on the curve,

$$P_1 = P_0 e^{rt_1} + c, \quad P_2 = P_0 e^{rt_2} + c, \quad \text{and} \quad P_3 = P_0 e^{rt_3} + c$$

$$\text{and } \log \frac{P_1 - c}{P_0} = (r \log e)t_1, \quad \log \frac{P_2 - c}{P_0} = (r \log e)t_2 \quad \text{and} \quad \log \frac{P_3 - c}{P_0} = (r \log e)t_3$$

$$\text{Since } t_3 = \frac{t_1 + t_2}{2}$$

$$\Rightarrow (r \log e) t_3 = 1/2[(r \log e)t_1 + (r \log e)t_2]$$

and thus

$$\begin{aligned} \log \left(\frac{P_3 - c}{P_0} \right) &= \frac{1}{2} \left[\log \left(\frac{P_1 - c}{P_0} \right) + \log \left(\frac{P_2 - c}{P_0} \right) \right] \\ &= \log \sqrt{\left(\frac{P_1 - c}{P_0} \right) \left(\frac{P_2 - c}{P_0} \right)} \\ \frac{P_3 - c}{P_0} &= \sqrt{\left(\frac{P_1 - c}{P_0} \right) \left(\frac{P_2 - c}{P_0} \right)} \\ P_3 - c &= \sqrt{(P_1 - c)(P_2 - c)} \end{aligned}$$

$$\text{or } (P_3 - c)^2 = (P_1 - c)(P_2 - c)$$

$$\text{or } P_3^2 - 2P_3c + c^2 = P_1P_2 - cP_2 - cP_1 + c^2$$

$$\text{or } c = \frac{P_1P_2 - P_3^2}{P_1 + P_2 - 2P_3}$$

$$r = \frac{n \sum t_i P'_i - (\sum t_i)(\sum P'_i)}{n \sum t_i^2 - (\sum t_i)^2}$$

$$P'_0 = \frac{\sum P'_i - r \sum t_i}{n}$$

$$P_0 = \text{antilog } P'_0$$

Thus the modified exponential growth function fitted to the aged population of Bangladesh enumerated at censuses from 1911-1991 gave

$$P_t = (1796.349) e^{(0.14495)t} + (1229.52)$$

8.3.3 Geometric Growth Function

The simple geometric curve is a special case of the power function. In the geometric curve the given P_t values form a geometric progression while the corresponding t values form an arithmetic progression. The geometric growth function is

$$P_t = P_0 (1 + r)^t \quad (5)$$

$$\text{where } r = \left[\text{anti log} \left(\frac{1}{t} \log \frac{P_t}{P_0} \right) - 1 \right]$$

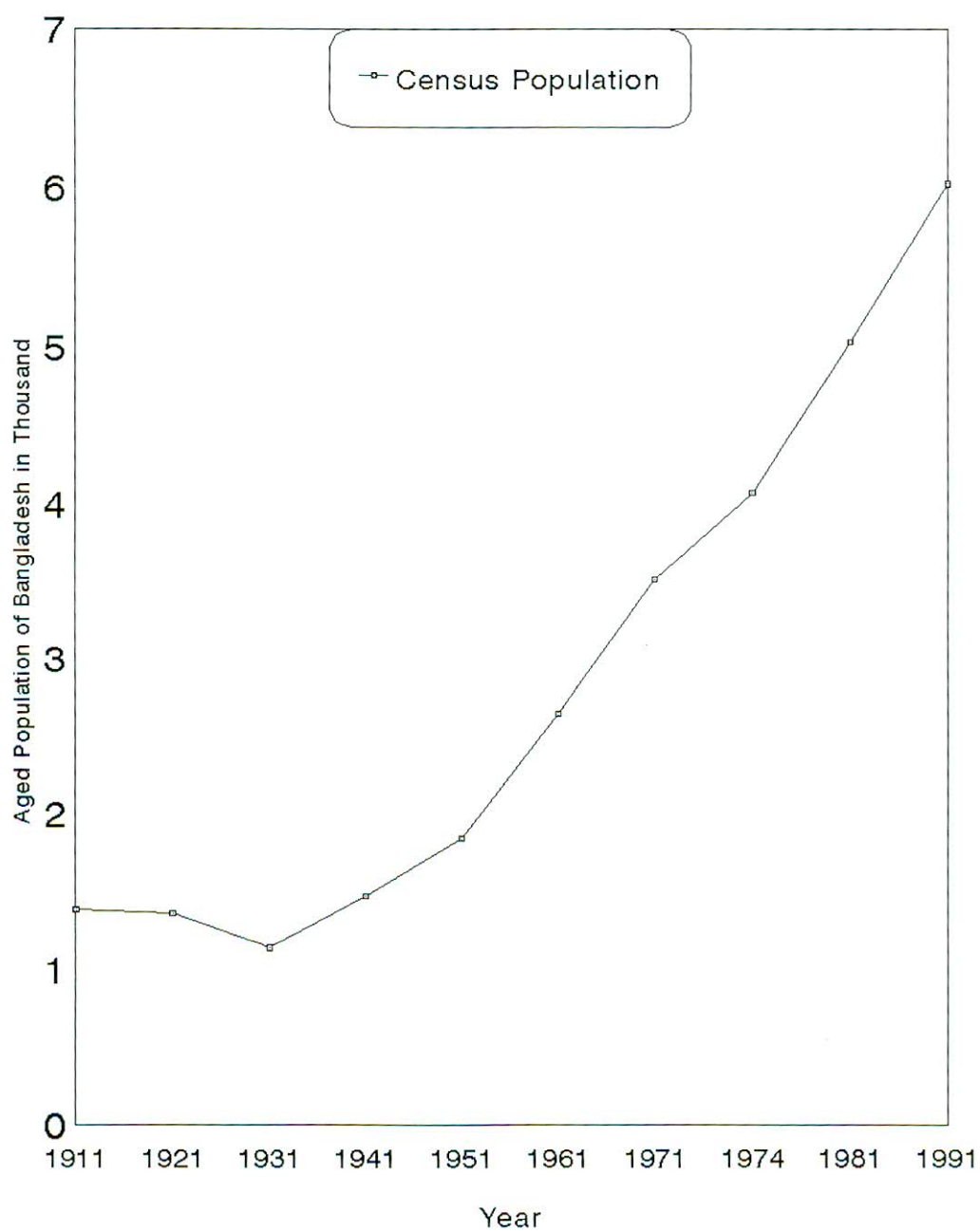


Figure-8.1: Aged Population of Bangladesh, 1911-1991

Thus the geometric growth function fitted to the aged population of Bangladesh enumerated at censuses from 1911-1991 gave

$$P_t = 5034 (1 + 0.018)^t \quad (6)$$

8.3.4 Makeham's Model

This classical model of population growth reproduces the observed population more or less well. Consider the model

$$P_t = a + bc^t \quad (7)$$

Fitting of the Makeham's model is a complicated task. It involves the estimation of three parameters a , b and c . The method utilizes the entire data provided the number of observations N is a multiple of 3. Let $N=3m$ and $t = 0, 1, 2, \dots, (N-1)$ are N points of observation. Let $S_1 = \sum_{t=0}^{m-1} P_t$, $S_2 = \sum_{t=m}^{2m-1} P_t$, and $S_3 = \sum_{t=2m}^{3m-1} P_t$

Further suppose

$$d_1 = S_2 - S_1$$

$$d_2 = S_3 - S_2$$

Then a , b , and c are estimated from the following equations.

$$c^m = \frac{d_2}{d_1} \quad (8)$$

$$\Rightarrow c = \left(\frac{d_2}{d_1} \right)^{\frac{1}{m}}$$

$$ma = S_1 - \frac{d_1}{c^m - 1} \quad (9)$$

$$b = \frac{d_1(c-1)}{(c^m - 1)^2} \quad (10)$$

Where m is one-third of the total number of observations. In case of Bangladesh data $m=3$. Therefore the Makeham's model fitted to the aged population of Bangladesh enumerated at censuses from 1911-1991 gave

$$P_t = (1618.0247) + (125.8335) (1.60879)^t \quad (11)$$

8.3.5 Logistic Model

This popular model fits the past population more closely than Makeham's model. Fitting a logistic curve is a more complicated procedure and requires a greater number of observations covering a longer period. At the same time, it is useful for projection over a greater period of years than simple geometric procedures, particularly if the past series has reached the point of inflection. This form of projection overcomes a principal weakness in the use of the geometric rate, namely, the possibility of obtaining extremely large population figures after a short period. The logistic model is :

$$P_t = \frac{K}{1 + be^{-at}}$$

$$\frac{1}{P_t} = \frac{1 + be^{-at}}{K} = \frac{1}{K} + \frac{b}{K}e^{-at}$$

$$Y_t = A + BC^t \quad (12)$$

Where t is the number of years, a and b are constants, e is the base of the natural system of logarithms, and K is the upper asymptote and $Y_t = \frac{1}{P_t}$, $A = \frac{1}{K}$, $B = \frac{b}{K}$, $C = e^{-a}$

The method utilizes the entire data provided the number of observations N is a multiple of 3. Let $N=3m$ and $t = 0, 1, 2, \dots, (N-1)$ are N points of observations. Let

$$S_1 = \sum_{t=0}^{m-1} \frac{1}{P_t}, S_2 = \sum_{t=m}^{2m-1} \frac{1}{P_t}, \text{ and } S_3 = \sum_{t=2m}^{3m-1} \frac{1}{P_t}$$

Now we can fit modified function to the reciprocal of the population and then it can be converted to Logistic Curve of the population growth.

Further suppose

$$d_1 = S_2 - S_1$$

$$d_2 = S_3 - S_2$$

Then A , B , and C are estimated from the following equations.

$$C^m = \frac{d_2}{d_1} \quad (13)$$

$$\Rightarrow C = \left(\frac{d_2}{d_1} \right)^{\frac{1}{m}}$$

$$mA = S_1 - \frac{d_1}{C^m - 1} \quad (14)$$

$$B = \frac{d_1(C-1)}{(C^m - 1)^2} \quad (15)$$

The values of the parameter of Logistic curve (K, a and b) can be found from the parameter of the modified exponential function (A, B and C) with the help of the following equation.

$$\begin{aligned} K &= \frac{1}{A}, \\ B &= \frac{b}{K} \\ \Rightarrow b &= BK \end{aligned}$$

$$\begin{aligned} C &= e^{-a} \\ \Rightarrow a &= -\frac{\log_{10} C}{\log e} \end{aligned}$$

The equation of the Logistic curve fitted to the aged population of Bangladesh enumerated at censuses from 1911-1991 gave

$$P_t = \frac{629.83}{1 + (-0.4668)e^{0.08725t}} \quad (16)$$

The estimated values of aged population of Bangladesh applying various mathematical methods are summarized in table-8.3. From the table, it is observed that the use of different growth functions yields quite different estimates of the aged population of Bangladesh.

Now observed and estimated aged population of Bangladesh using various methods are plotted in Figure-8.2. From this figure it is difficult to say which of the techniques used could provide the best estimates, as the same indicates that the exponential growth function or the geometric growth function may be the suitable fit for the aged population of Bangladesh.

Table-8.3
Aged population(60+) of Bangladesh, 1911-1991

Year	Census population (000)	Estimated population (000)				
		Exponential model	Modified exponential	Geometric model	Logistic model	Makeham's model
1911	1387	1202	1490	1208	630	1744
1921	1364	1438	1750	1444	631	1821
1931	1139	1720	2011	1726	632	1944
1941	1470	2057	2271	2063	634	2142
1951	1845	2460	2531	2466	639	2461
1961	2644	2943	2792	2948	652	2974
1971	3519*	3519	2874	3523	685	3800
1974	4074	3713	3052	3717	704	4134
1981	5034	4209	3313	4212	782	5128
1991	6021	5125	3573	5125	1284	7265

*our estimate

As the said figure could not suggest specifically which technique is the best, mean deviation and Chi-square statistic have been used (in table-8.4) to examine which one is the best model for aged population of Bangladesh.

Table-8.4
Calculated Mean deviation and Chi-square statistic

Methods	Mean deviation	Chi-square statistic
Exponential	491.444	933.628
Modified exponential	909.667	3860.125
Geometric	493.222	940.132
Makeham's	515.000	1138.349
Logistic	2043.333	68359.790

The table reveals that both the mean deviation and the Chi-square statistic are minimum for exponential growth function. Thus it appears that the exponential growth function is more appropriate than others for modeling aged population of Bangladesh. However, since we are dealing with time series data, there is a strong possibility that the errors might be autocorrelated (Koutsoyiannis 1977, p.202).

Table-8.5 summarizes the results of projections through various suitable mathematical models of the aged population growth of Bangladesh, 1911-2051 and Figure-8.3 presents their graphical view .

Table-8.5
Projected aged population(60+) of Bangladesh,
2001-2051 (population in thousand)

Year	Exponential model	Geomatic model	Makeham's model
2001	7201	7197	10702
2011	8613	8603	16233
2021	10301	10283	25130
2031	12321	12291	39444
2041	14735	14691	62472
2051	17624	17561	99519

From the table, it is evident that use of different growth functions may yield quite different estimates of the aged population of Bangladesh. Projections of the aged population for the year 2051 vary from a minimum of 17561 thousands, using geometric fuction, to a maximum of 99519 thousands, estimated by Makeham's model. The most appropriate model as mentioned above for modeling the aged population in Bangladesh, the exponential growth model project 17624 thousands 60+ population in 2051. The estimates vary because they implicitly use different assumptions regarding the trend of population growth at present and in future. Further, it is assumed that the growth of aged population in future is fairly regular and any effect of irregular factor is excluded.

A point to be noted is that in case of the logistic model, the limitation of the model with respect to available data is that its point of inflection is found to be imaginary. This model provides negative estimates of the aged population of Bangladesh. Hence, the model is also not suitable for distant predictions of aged population of Bangladesh.

8.4 Projection Methods

So far we have discussed only projection, defined as the numerical elaboration of a set of assumptions made in order to illuminate data referring to the present or past. The contrast with prediction or forecasting, assertion of what will occur in the concrete future, seems sharp. At the worst the population projection strikes technical difficulties and most of these are easily superables; time enters only as a variable, the techniques for handling are

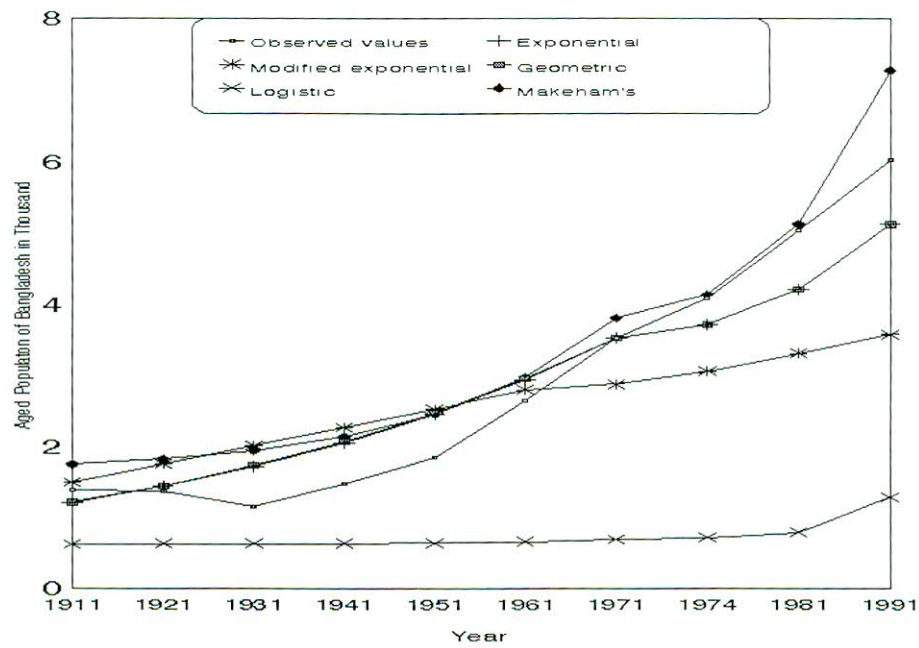


Figure-2: Observed and estimated Aged Population of Bangladesh, 1911-1991

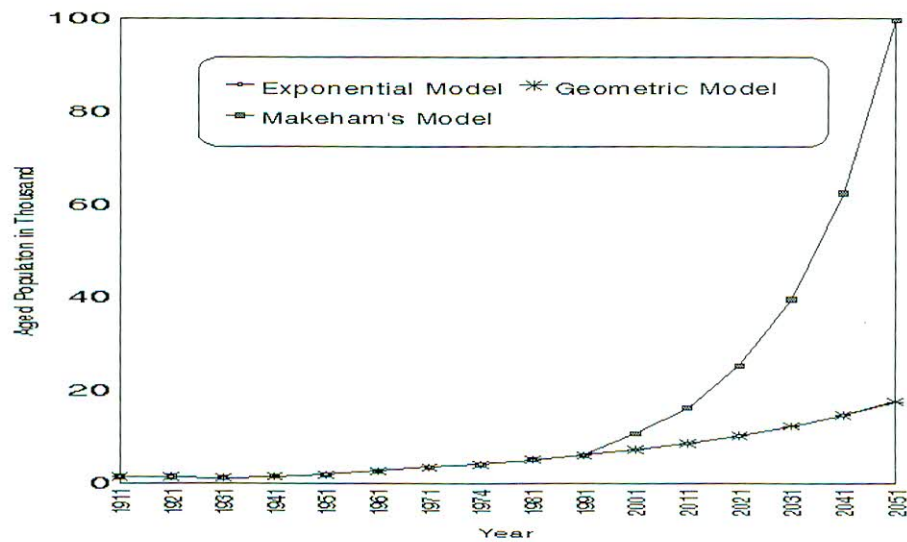


Figure-8.3: Aged Population of Bangladesh, 1911-2051

readily available, and error is virtually impossible. But forecasting refers to real time, and here we encounter the much deeper difficulties associated with the variability of human behavior, error is practically certain. The difference between elaboration of arbitrary sets of assumptions and prediction of what will really happen in the future is great enough, it would seem, to leave no ground for confusion. Projections would hardly be made and published if no one used them as guides to the future. A demographer makes a projection, and his reader uses it as a forecast; if projection was merely working out the numerical implications of arbitrary assumptions, then one projection would be good as another, provided arithmetic errors were avoided.

Projection of population implies forecasting of the population in the years to come, on the basis of suitable assumptions on the determinants of population growth such as future patterns in (i) Fertility (ii) Mortality and (iii) Migration. The success of projection lies not only in the technique of population projection but also in how far realistic are the assumptions relating to the demographic factors affecting the size and the growth of population in the future years to come. Needless to mention is the fact that projection process takes a vital role in the national planning, as no planning of resources is complete without a knowledge of the size of the population growing over time. The technique of population projection can be divided into the following classes:-

(i) Projections by using a single mathematical model such as projections by Logistic, Gompertz curve or any other deterministic models.

These have been believed by demographers to describe the natural growth of population. However, experience showed that a single equation model however realistic to the promises of the same in building the model, is hardly successful in forecasting even the long term trend of the population over time. Although we have given due importance to mathematical models in respect of the same for making population projection their validities are always to be taken with a degree of reservation. However, for short term projections it has been observed that the performances of the latter is more or less fair.

(ii) Population projections by taking into consideration of the components of population growth.

These are known as, component method of population projection. These techniques are understandable and empirically valid since these take account of each component of growth individually; but again success in projection depends on the reality of the assumption techniques in the years to come.

(iii) Population projections by employing the techniques of stable or Quasistable population techniques.

These techniques are restrictively valid to stable population or population which shows departure from stability because of departure of assumptions in respect of one of the fertility or mortality parameters only.

Of these three methods, the most realistic and therefore most applicable method is of course the component method of population projection as mentioned in (ii).

Below, we outline the technique of the component method of population projection which is employed in all national population projections. More widely this method is known as Thomas Frejka's component method of population projection.

The component method of projection provides forecasts once its assumptions are reinterpreted as representing the real state of affairs. Its several components then receive quite different emphasis. For small areas migration becomes the key variable, for a country as a whole migration is both a smaller fraction of population and better recorded. Deaths have been the key variable for poor countries in the past, and births for rich countries. In any particular projection one of the three- migration, death and birth - is likely to demand special attention.

8.4.1 Frejka's Component Method

Factors affecting change in the future population are governed by the following:-

- (a) Survivors of the present population in the year of projection say at every T th year where $T = 0, t, 2t, \dots$
- (b) The number of births which will occur from the current period $T = 0$ (the base of year of projection) to a period $T = t$ and their survivors at $T = t$ and so on.

(c) Adjustment of migratory disturbances i.e. estimating emigrants over the immigrants for natural projection, or immigrants over emigrants to project the actual population.

The population projection at which we have arrived at has long been an important instrument of the working demographer (Cannan, 1895 ; Bowley, 1924 ; Whelpton, 1936). The matrix form was suggested by Bernardelli (1941) and Lewis (1942) and thoroughly investigated by Leslie (1945, 1948) and Keyfitz (1968) respectively.

8.4.2 Representation of the Component Method by the Use of Leslie Matrix (L. Matrix):-

Let us translate the foregoing ideas of component method of projection illustrated in (a) and (b) in a set of linear equations assuming the adjustment due to migration to be nil i.e. assuming a perfect balance in emigration and immigration. Further, let us make the following assumptions.

- (1) Projection is made every fifth year i.e. $t = 5$.
- (2) Representation of the component method in the form of a series of equations is made with respect to female population only. The population is also taken as stable with birth and death parameters independent of time.
- (3) Child bearing age is taken from 15 to 45 for the sake of convenience. We also denote by
 - (i) ${}_nP_x$ = Female population in the age sector ($x, x + n$) at time t .
 - (ii) ${}_nF_x$ = Age specific fertility rate in the age x to $x+n$ independent of time t .
 and l_x = the number of persons living at the beginning of the indicated age interval (x).

${}_nL_x$ = The number of person- years lived in the age group ($x, x+n$) by the survivors upto age x .

With the above assumptions, the component method of population projection leads to the following equation

$$\begin{aligned} & \frac{1}{2} \left\{ {}_5P_{15}^{(t)} + {}_5P_{15}^{(t+5)} \right\} {}_5F_{15} \left(\frac{{}_5L_0}{l_0} \right) + \frac{1}{2} \left\{ {}_5P_{20}^{(t)} + {}_5P_{20}^{(t+5)} \right\} {}_5F_{20} \left(\frac{{}_5L_0}{l_0} \right) + \dots \dots \dots \\ & \dots \dots + \frac{1}{2} \left\{ {}_5P_{40}^{(t)} + {}_5P_{40}^{(t+5)} \right\} {}_5F_{40} \left(\frac{{}_5L_0}{l_0} \right) = {}_5P_0^{(t+5)} \end{aligned} \quad (17)$$

$${}_5P_0^{(t)} \left(\frac{{}_5L_5}{{}_5L_0} \right) = {}_5P_5^{(t+5)} \quad (18)$$

$${}_5P_5^{(t)} \left(\frac{{}_5L_{10}}{{}_5L_5} \right) = {}_5P_{10}^{(t+5)} \quad (19)$$

$$\begin{array}{cccc} \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots \end{array}$$

$${}_5P_{75}^{(t)} \left(\frac{{}_5L_{80}}{{}_5L_{75}} \right) = {}_5P_{80}^{(t+5)} \quad (20)$$

$${}_5P_{80}^{(t)} \left(\frac{{}_5L_{85}}{{}_5L_{80}} \right) = {}_5P_{85}^{(t+5)} \quad (21)$$

Equation (17) can be written in the following way

$$\begin{aligned} & \frac{1}{2} \left\{ {}_5P_{15}^{(t)} + {}_5P_{10}^{(t)} \frac{{}_5L_{15}}{{}_5L_{10}} \right\} {}_5F_{15} \left(\frac{{}_5L_0}{l_0} \right) + \frac{1}{2} \left\{ {}_5P_{20}^{(t)} + {}_5P_{15}^{(t)} \frac{{}_5L_{20}}{{}_5L_{15}} \right\} {}_5F_{20} \left(\frac{{}_5L_0}{l_0} \right) + \dots \\ & \dots + \frac{1}{2} \left\{ {}_5P_{40}^{(t)} + {}_5P_{35}^{(t)} \frac{{}_5L_{40}}{{}_5L_{35}} \right\} {}_5F_{40} \left(\frac{{}_5L_0}{l_0} \right) = {}_5P_0^{(t+5)} \end{aligned} \quad (22)$$

and equation (22) can be rewritten as

$$\begin{aligned} & \frac{1}{2} \left(\frac{{}_5L_{15}}{{}_5L_{10}} {}_5F_{15} \right) \left(\frac{{}_5L_0}{l_0} \right) {}_5P_{10}^{(t)} + \left({}_5F_{15} + \frac{{}_5L_{20}}{{}_5L_{15}} {}_5F_{20} \right) \left(\frac{{}_5L_0}{2l_0} \right) {}_5P_{15}^{(t)} + \left({}_5F_{20} + \frac{{}_5L_{25}}{{}_5L_{20}} {}_5F_{25} \right) \left(\frac{{}_5L_0}{2l_0} \right) {}_5P_{20}^{(t)} + \\ & \dots + \left({}_5F_{35} + \frac{{}_5L_{40}}{{}_5L_{35}} {}_5F_{40} \right) \left(\frac{{}_5L_0}{2l_0} \right) {}_5P_{35}^{(t)} + \left(\frac{1}{2} \frac{{}_5L_0}{l_0} {}_5F_{40} \right) {}_5P_{40}^{(t)} = {}_5P_0^{(t+5)} \end{aligned} \quad (23)$$

Putting the equations (17), (18), (19), (20), (21) in the matrix form, we have

$$\begin{bmatrix} {}_5P_0^{(t+5)} \\ {}_5P_5^{(t+5)} \\ \dots \\ {}_5P_{85}^{(t+5)} \end{bmatrix} = \begin{bmatrix} 0 & 0 & \frac{{}_5L_0}{2l_0} \left(\frac{{}_5L_{15}}{{}_5L_{10}} {}_5F_{15} \right) & \frac{{}_5L_0}{2l_0} \left({}_5F_{15} + \frac{{}_5L_{20}}{{}_5L_{15}} {}_5F_{20} \right) & \dots & \left(\frac{{}_5L_0}{2l_0} \right) {}_5F_{40} & \dots & 0 & 0 \\ \frac{{}_5L_5}{{}_5L_0} & 0 & 0 & 0 & \dots & 0 & \dots & 0 & 0 \\ 0 & \frac{{}_5L_{10}}{{}_5L_5} & 0 & 0 & \dots & 0 & \dots & 0 & 0 \\ 0 & 0 & \frac{{}_5L_{15}}{{}_5L_{10}} & 0 & \dots & 0 & \dots & 0 & 0 \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ 0 & 0 & 0 & 0 & 0 & \frac{{}_5L_{85}}{{}_5L_{80}} & 0 & 0 \end{bmatrix} \begin{bmatrix} {}_5P_0^{(t)} \\ {}_5P_5^{(t)} \\ \dots \\ {}_5P_{80}^{(t)} \end{bmatrix} \quad (24)$$

$$\text{or } P^{(t+5)} = L P^{(t)} \quad (25)$$

Where $P^{(t+5)}$ and $P^{(t)}$ represent the population age vector in the year $(t+5)$ and t respectively and L is the Leslie Matrix consisting of elements which are function of fertility and mortality parameters, independent of time. Thus with time independent Leslie matrix

$$\begin{aligned} P^{(t+5)} &= L P^{(t)} \\ P^{(t+10)} &= L P^{(t+5)} = L \cdot L P^{(t)} = L^2 P^{(t)} \\ P^{(t+15)} &= L \cdot P^{(t+10)} = L \cdot L^2 P^{(t)} = L^3 P^{(t)} \\ &\dots \\ &\dots \end{aligned}$$

$$\text{For integer } k, \quad P^{(t+5k)} = L^k P^{(t)} \quad (26)$$

We first describe the projection process for a closed population with time independent fertility and mortality parameters. The population transition matrix is a convenient means of representing the conventional operation of moving a population subject to given mortality and fertility through successive time periods. The non-zero elements are merely the birth and survival probabilities. However, their arrangement into matrix form allows theorems of matrix algebra to be brought to bear upon demographic processes, and it

provides a means of summarizing the fertility and mortality characteristics of a population.

Consider then the following matrices L and P_0 , where L is an 18×18 matrix and P_0 is an 18×1 matrix.

$$L = \begin{bmatrix} 0 & 0 & {}_5m_{10} & {}_5m_{15} & \cdots & {}_5m_{40} & 0 \cdots & 0 & 0 \\ {}_5S_0 & 0 & 0 & 0 & \cdots & 0 & 0 \cdots & 0 & 0 \\ 0 & {}_5S_5 & 0 & 0 & \cdots & 0 & 0 \cdots & 0 & 0 \\ 0 & 0 & {}_5S_{10} & 0 & \cdots & 0 & 0 \cdots & 0 & 0 \\ 0 & 0 & 0 & {}_5S_{15} & \cdots & 0 & 0 \cdots & 0 & 0 \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & 0 & 0 & \cdots & 0 & 0 \cdots & {}_5S_{80} & 0 \end{bmatrix}$$

$$P_0 = \begin{bmatrix} {}_5K_0 \\ {}_5K_5 \\ {}_5K_{10} \\ \cdots \\ \cdots \\ \cdots \\ {}_5K_{85} \end{bmatrix}$$

Here ${}_n m_x$ and ${}_n S_x$ are respectively the birth and survival probabilities of the cohort survival projection method and ${}_n K_x$ are the age distribution of population at time 0.

By multiplication, the product L and P_0 will have the following matrix.

$$\begin{bmatrix}
 0 & 0 & {}_5m_{10} & {}_5m_{15} & \cdots & {}_5m_{40} & 0 & \cdots & 0 & 0 \\
 {}_5S_0 & 0 & 0 & 0 & \cdots & 0 & 0 & 0 & 0 & 0 \\
 0 & {}_5S_5 & 0 & 0 & \cdots & 0 & 0 & 0 & 0 & 0 \\
 0 & 0 & {}_5S_{10} & 0 & \cdots & 0 & 0 & 0 & 0 & 0 \\
 0 & 0 & 0 & {}_5S_{15} & \cdots & 0 & 0 & 0 & 0 & 0 \\
 \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\
 \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\
 0 & 0 & 0 & 0 & \cdots & 0 & 0 & {}_5S_{80} & 0 & 0
 \end{bmatrix}
 \begin{bmatrix}
 {}_5K_0 \\
 {}_5K_5 \\
 {}_5K_{10} \\
 \cdots \\
 \cdots \\
 \cdots \\
 {}_5K_{85}
 \end{bmatrix}
 =
 \begin{bmatrix}
 {}_5K_{10} {}_5m_{10} + {}_5K_{15} {}_5m_{15} + \cdots + {}_5K_{40} {}_5m_{40} \\
 {}_5K_0 {}_5S_0 \\
 {}_5K_5 {}_5S_5 \\
 \cdots \\
 \cdots \\
 \cdots \\
 {}_5K_{80} {}_5S_{80}
 \end{bmatrix}$$

$$\text{or } L P_0 = P_1,$$

Where L is called a projection matrix or Leslie matrix.

Thus P_1 will be the age distribution of the population as projection forward 5 years by the component method.

By arranging the projection in this fashion we can apply the properties of matrix algebra to population projections. Here we are using the associative law, that is

$$a(bc) = (ab)c.$$

To project the population forward for two 5-year periods or cycles, one would normally find P_1 as product LP_0 and then find P_2 as $P_2 = LP_1$, but making use of the associative law, we can write:

$$P_2 = LP_1 = L.L P_0 = L^2 P_0$$

$$P_3 = LP_2 = L.L^2 P_0 = L^3 P_0$$

and more generally:

$$P_t = L^t P_0.$$

Table-8.6 presents 1991's age specific fertility rate and survival probabilities for Bangladesh. The mid-year female population of Bangladesh by age group during 1991-2021 has been projected in table-8.7 by applying component method to the data in table-8.6.

Table-8.6

Age-Specific fertility rate and Survival probabilities: Bangladesh, 1991

Age-specific fertility rate		Age-specific survival probabilities	
Age group	1991	Age group	1991
15-19	0.1910	0-4	0.856
20-24	0.2350	5-9	0.979
25-29	0.2030	10-14	0.992
30-34	0.1500	15-19	0.987
35-39	0.0890	20-24	0.984
40-44	0.0500	25-29	0.981
45-49	0.0100	30-34	0.984
		35-39	0.974
		40-44	0.970
		45-49	0.943
		50-54	0.936
		55-59	0.902
		60-64	0.885
		65-69	0.805
		70-74	0.741
		75+	0.708

Source: Statistical Yearbook of Bangladesh 1993, BBS, Dhaka.

Table-8.7

Projected mid-year population for female of Bangladesh by age group, 1991-2021

Age group	1991	1996	2001	2006	2011	2016	2021
0-4	9266454	6466011	6771781	6377928	6480386	68982585	6445925
5-9	8937413	8532085	8894906	7827845	8403507	8654811	85782853
10-14	6303715	9649727	9965511	9323613	9547460	9856833	9895510
15-19	4708452	6253285	8679729	7703387	3297024	3717480	4470779
20-24	5037627	4647242	6171992	8566892	7603243	3254163	3669153
25-29	4962900	4957025	4572887	6073241	8429822	7481592	3202097
30-34	3321030	4868605	4862842	4486002	5957850	8269656	7339442
35-39	2798413	3267894	4790708	4785037	4414226	5862525	8137342
40-44	2227789	2725654	3182929	4666150	4660626	4299456	5710099
45-49	1678304	2160956	2643885	3087441	4526166	4520808	4170473
50-54	1545796	1582641	2037782	2493184	2911457	4268175	4263122
55-59	903343	1446865	1481352	1907364	2333620	2725124	3995012
60-64	1134812	814815	1305072	1336180	1720442	2104925	2458062
65-69	517570	1004309	721111	1154989	1182519	1522591	1862859
70-74	552629	416643	808468	580494	929766	951927	1225686
75-79	191508	409498	308733	599075	430147	688957	705379
80+	367238	135588	289925	218583	424146	304548	487781
Total	54454992	55479079	62473975	68084588	73252410	75282150	76617570

For further calculation, table-8.8 has been constructed with the figures of table-8.7. In shaping the result, the age group categorizes into three broad age groups, namely, 0-14, 15-59 and 60+ according to the projected female population totals of Bangladesh. Population size variations have been observed in the following years but the size shows increasing tendency in the first category of the age group 0-14. Again in the year 2006, the projected mid-year total female population has downward movements, however, upwards trends observed from the year 2011, except in the year 2021.

Table-8.8
Projected mid-year population for female of Bangladesh
by broad age group, 1991-2021(million)

Year	Age group		
	0-14	15-59	60+
1991	24.51	27.50	2.76
1996	24.65	31.91	2.78
2001	25.63	38.42	3.43
2006	22.53	43.77	3.88
2011	24.43	44.14	4.69
2016	25.41	44.40	5.57
2021	24.99	44.96	6.74

In the age group 15-59 and 60+ there are uninterrupted increasing trends. In the age group 15-59, the population was 27.50 million in 1991 while the same will be increasing to 44.96 million (or 1.65 times) by the year 2021. In case of age group 60+ it is observed that the female population was 2.74 million in 1991 and the same will increase to 6.74 million(or 2.46 times) by the end of 2021.

In both cases, female population will increase but the increase is more pronounced in case of 60+ group. The increase of the aged group is due to reduction in the mortality rate of infant population. The reduction in the infant mortality rate is due to medical, health care facilities, improvement in sanitation system, and improvement of the level of education in the country. Furthermore, the aged population is now getting modern medical facilities and that is why their rate of mortality has been decreasing.

Table-8.9 has been prepared using population census of 1991 and in this table BBS projected mid-year female population for the country. by broad age groups has been shown during the period 1991-2021.

Table-8.9
BBS projected mid-year population for female of Bangladesh
by broad age group, 1991-2021(million)

Year	Age group		
	0-14	15-59	60+
1991	24.51	27.50	2.76
1996	25.56	31.74	2.78
2001	24.38	38.10	3.30
2006	23.80	44.26	3.75
2011	24.92	48.49	4.47
2016	25.35	52.44	5.40
2021	24.31	56.48	6.45

Source: Bangladesh population census 1991, National series, BBS, Dhaka.

Table-8.10 also shows the United Nations(UN) projected female population of Bangladesh during the same period. In this table, figures have been estimated by the

researcher based on UN projected figures in 1990, 1995, 2000, 2005, 2010, 2015, 2020.

The period has been changed for comparison with the data of BBS.

Table-8.10

United Nations estimated projected population(000) for females of Bangladesh , 1991-2021

Age group	1991	1996	2001	2006	2011	2016	2021
0-4	9366	10583	11484	12109	11240	10528	10275
5-9	8181	8794	10019	10956	11639	10878	10250
10-14	7415	8070	8690	9918	10864	11558	10816
15-19	6558	7343	8002	8628	9861	10811	11513
20-24	5395	6473	7262	7928	8562	9796	10756
25-29	4465	5314	6390	7183	7856	8497	9737
30-34	3832	4388	5237	6311	7107	7786	8436
35-39	2715	3753	4311	5157	6227	7028	7713
40-44	2231	2646	3670	4227	5069	6136	6939
45-49	1906	2160	2572	3575	4129	4964	6025
50-54	1582	1817	2070	2474	3450	3999	4826
55-59	1255	1470	1698	1943	2335	3275	3816
60-64	963	1117	1317	1533	1769	2142	3027
65-69	669	803	941	1122	1320	1540	1885
70-74	438	507	616	734	887	1060	1255
75-79	292	286	338	419	510	629	768
80+	201	216	236	275	340	425	540
Total	57464	65740	74853	84492	93165	101052	108577

Table-8.11 has been made using table-8.10 and in this table UN projected mid-year population for female of Bangladesh has been shown by broad age groups during 1991-2021.

Table-8.11

**UN projected mid-year female population of Bangladesh
by broad age groups, 1991-2021(million)**

Year	Age group		
	0-14	15-59	60+
1991	24.96	29.94	2.56
1996	27.45	35.36	2.93
2001	30.19	41.21	3.45
2006	32.98	47.43	4.09
2011	33.74	54.60	4.83
2016	32.96	62.29	5.80
2021	31.34	69.76	7.48

In table-8.12, researcher's estimate, BBS estimate and UN estimate have been shown in broad age groups for female of Bangladesh during 1991-2021. The table indicates that the female population size of Bangladesh increases alarmingly in the age structure 0-14. Also, smaller variations have are there in that age limit. On the other hand, decreasing tendency along the years have been observed in case of BBS estimate. However, the resulting rate is lower as compared to the researcher's estimate. It seems, due to different assumptions and base years. In our study the base year is 1991, while BBS considered different assumptions with separate base year. The UN estimates, show population is increasing. The increase seems to be due to the estimate that has been done using the base year figure of 1950. In 1950s medical, health care, sanitation and other facilities were limited. But all these facilities have been increasing afterwards.

Table-8.12
Projected mid-year population for female of Bangladesh by broad age group, 1991-2021(Population in million)

Year	Age group								
	0-14			15-59			60+		
	Our estimate	BBS estimate	UN estimate	Our estimate	BBS estimate	UN estimate	Our estimate	BBS estimate	UN estimate
1991	24.51	24.51	24.96	27.50	27.50	29.94	2.76	2.76	2.56
1996	20.65	25.56	27.45	31.91	31.74	35.36	2.78	2.78	2.93
2001	15.63	24.38	30.19	38.42	38.10	41.21	3.43	3.30	3.45
2006	12.53	23.80	32.98	43.77	44.26	47.43	3.88	3.75	4.09
2011	14.43	24.92	33.74	44.14	48.49	54.60	4.69	4.47	4.83
2016	15.41	25.35	32.96	44.40	52.44	62.29	5.57	5.40	5.80
2021	14.99	24.31	31.34	44.69	56.48	69.76	6.74	6.45	7.48

Further Table-8.12 shows that in the age group 15-59, population sizes among our estimates and BBS estimates are very much similar, except the year 2011-2021. But in case of UN estimate the population size increase rapidly than the other two estimates. It was 29.94 million in 1991 while 69.76 million (or 2.33 times) in 2021. Thus higher increasing tendency has been shown by the UN estimates and this rate is noticeable and welcome.

In case of aged population(60+), the table demonstrates the same situation. Our estimate and BBS estimate are all most same during the whole period of study. While UN estimates show highest growth rate than the other two estimates. It was 2.56 million in 1991 and would be 7.48 million by the year 2021 which is 2.92 times than the base year population size.

Tables-8.13 and 8.14 reveal age specific fertility and survival probabilities respectively for different years. Using table-8.13 and 8.14 and applying component method estimates have been made for mid-year population in Bangladesh. These are shown in table-8.15.

Table-8.13
Fertility assumptions used in the population projections(ASFRs per women)

Age group	1991	1996	2001	2006	2011	2016	2021
14-19	0.1910	0.0738	0.0674	0.0609	0.0545	0.0481	0.0416
20-24	0.2350	0.2242	0.2047	0.1851	0.1656	0.1461	0.1265
25-29	0.2030	0.2175	0.1986	0.1796	0.1606	0.1417	0.1227
30-34	0.1500	0.1467	0.1338	0.1211	0.1083	0.0955	0.0827
35-39	0.0890	0.1016	0.0927	0.0839	0.0750	0.0662	0.0173
40-44	0.0500	0.0316	0.0289	0.0261	0.0234	0.0206	0.0179
45-49	0.0100	0.0115	0.0105	0.0095	0.0085	0.0075	0.0065

Table-8.14
Survivorship ratios assumed in the population projections, Bangladesh (Females)

Age group	1991	1996	2001	2006	2011	2016	2021
0-4	0.856	0.962	0.964	0.967	0.972	0.978	0.978
5-9	0.979	0.988	0.988	0.989	0.990	0.992	0.992
10-14	0.992	0.986	0.986	0.987	0.989	0.991	0.991
15-19	0.987	0.981	0.982	0.983	0.984	0.987	0.986
20-24	0.984	0.977	0.978	0.979	0.981	0.984	0.983
25-29	0.981	0.973	0.974	0.976	0.979	0.982	0.981
30-34	0.984	0.970	0.971	0.972	0.975	0.979	0.978
35-39	0.974	0.965	0.966	0.968	0.971	0.975	0.972
40-44	0.970	0.959	0.960	0.962	0.965	0.969	0.962
45-49	0.943	0.948	0.949	0.951	0.954	0.958	0.947
50-54	0.936	0.929	0.931	0.933	0.937	0.942	0.923
55-59	0.902	0.899	0.901	0.904	0.909	0.915	0.888
60-64	0.885	0.852	0.854	0.858	0.864	0.872	0.838
65-69	0.805	0.783	0.785	0.789	0.796	0.805	0.765
70-74	0.741	0.675	0.677	0.6822	0.690	0.700	0.658
75+	0.708	0.540	0.542	0.548	0.556	0.567	0.522

It is to be mentioned that with the same assumptions, BBS applied component method, however, we have used component method in matrix form. In the last phase, UN estimate provides an increasing tendency, which is quite different from the past two estimates. They have taken 1950 as the base year, which may be the reason behind the reverse result.

Table-8.15
Projected mid-year population(BBS assumption) for female of Bangladesh by age group, 1991-2021

Age group	1991	1996	2001	2006	2011	2016	2021
0-4	9266454	8367608	7581053	6898759	6898567	7889488	7402160
5-9	8937413	9006993	8141683	8383946	8844290	8783700	7842559
10-14	6303715	8856976	8925930	8068408	8644875	9892480	9004471
15-19	4708452	6234375	8759549	8836671	7987724	7251627	6612428
20-24	5037627	4633117	6134625	8628156	8704121	7867909	7150104
25-29	4962900	4936875	4545088	6018067	8472849	8547447	7734155
30-34	3321030	4853716	4833201	4454187	5897706	8311865	8385046
35-39	2798413	3234683	4732373	4717204	4351741	5762059	8129004
40-44	2227789	2706066	3131173	4585670	4575688	4225541	5600722
45-49	1678304	2131994	2592411	3002795	4402243	4397237	4064971
50-54	1545796	1579284	2008338	2444644	2834639	4164522	4164184
55-59	903343	1417495	1449783	1845663	2251517	2613537	3843854
60-64	1134812	795845	1250231	1281608	1633412	1997096	2320821
65-69	517570	940759	661347	1040192	1068861	1365533	1673567
70-74	552629	391283	713095	502624	791586	815540	1044633
75-79	191508	357551	253943	464225	328213	519281	536626
80+	367238	97477	183066	130527	240005	170343	271064
Total	54454992	60542100	65896900	71303350	77890040	84575210	85780370

Using table-8.15, we have prepared table-8.16 for the projection of mid-year female population by considering broad age groups during 1991-2021.

Table-8.16
Projected mid-year population(BBS assumption) for female of Bangladesh
by broad age group, 1991-2021(million)

Year	Age group		
	0-14	15-59	60+
1991	24.51	27.50	2.76
1996	26.23	31.73	2.58
2001	24.65	38.19	3.06
2006	23.35	44.53	3.42
2011	24.35	49.48	4.06
2016	26.60	53.14	4.87
2021	24.05	55.68	5.85

Table-8.17 summarizes the results obtained from table-8.16, table-8.9 and table-8.11 respectively. It is clear from table-8.17 that in the age group 0-14, our estimate and BBS estimate are closer than that of the estimated governed in table-8.12. Perhaps, the same assumptions are there in both the cases. In case of UN estimate, the base year is different than the others. The same situation is also observed between our estimate and BBS estimate in the age group of 15-59 and 60+.

Table-8.17
Projected mid-year population for female of Bangladesh by broad age
group, 1991-2021(Population in million)

Year	Age group								
	0-14			15-59			60+		
	Our estimate	BBS estimate	UN estimate	Our estimate	BBS estimate	UN estimate	Our estimate	BBS estimate	UN estimate
1991	24.51	24.51	24.96	27.50	27.50	29.94	2.76	2.76	2.56
1996	26.23	25.56	27.45	31.73	31.74	35.36	2.58	2.78	2.93
2001	24.65	24.38	30.19	38.19	38.10	41.21	3.06	3.30	3.45
2006	23.35	23.80	32.98	44.53	44.26	47.43	3.42	3.75	4.09
2011	24.35	24.92	33.74	49.48	48.49	54.60	4.06	4.47	4.83
2016	26.60	25.35	32.96	53.14	52.44	62.29	4.87	5.40	5.80
2021	24.05	24.31	31.34	55.68	56.48	69.76	5.85	6.45	7.48

Finally, Mean deviation and Chi-square statistic are shown in table-8.18. It is remarkable to note that in all broad age groups, our estimate provides smaller mean deviation as well as Chi-square statistic values than the UN estimated results. we may claim that our estimated population size would be more acceptable than the population size estimated by the UN.

Table-8.18
Calculated mean deviation and Chi-square statistic

Methods	Mean deviation			Chi-square statistic		
	0-14	15-59	60+	0-14	15-59	60+
Our estimate	0.496	3.594	0.134	0.104	4.618	0.037
UN estimate	5.697	5.940	0.376	12.633	5.786	0.254

8.5 Cohort Component Method

The cohort-component method is now the most widely used of the analytic methods for preparing projection. The general outline of the method is the same as indicated for national projections, but the component of internal migration must be incorporated into the procedure. This method is especially appropriate if projections by age and sex are wanted in addition to totals. The cohort component method may be applied with various degrees of refinement and complexity, from a variation in which mortality and migration are handled jointly and a single assumption is made for this joint component, to one in which migration is treated as three components; namely, net migration, gross in-migration and gross out-migration, and several assumptions are made with respect to each component of change.

In the formula of Hamilton and Perry (1962) cohort-change rates for a given area between the two censuses are assumed to remain constant in future years:-

$$nP_{a+k}^{t+k} = \frac{nP_{a+k}^t}{nP_a^{t-k}} \times nP_a^t$$

Where P is population, a is the initial age of the age interval at the second census, n is the size of the age interval, t is the year of the second census and k is the intercensal interval in years (a multiple of n, usually 5 or 10 years).

For the ages under 10 in projected year; we have employed the following ratios:-

$$P_{0-4}^p = \frac{P_{0-4}^{1991}}{P_{15-59}^{1991}} \times P_{15-59}^p$$

$$P_{5-9}^p = \frac{P_{5-9}^{1991}}{P_{20-59}^{1991}} \times P_{20-59}^p$$

Where p is the projected year.

The population of Bangladesh by age group during 1981-2051 have been projected in table-8.19 by applying cohort component method.

Table-8.19
Projected population of Bangladesh by age group, 1981-2051(in thousand)

Age group	1981	1991	2001	2011	2021	2031	2041	2051
0-4	15333	18695	23389	29026	35838	43977	54403	67205
5-9	14544	18391	22957	28455	35103	43025	53331	65833
10-14	11872	13443	16391	20507	25449	31422	38558	47699
15-19	8739	9500	12013	14996	18587	22930	28105	34837
20-24	7074	9364	10603	12928	16174	20072	24783	30411
25-29	6332	9472	10297	13021	16254	20146	24853	30462
30-34	5282	6797	8997	10187	12421	15540	19285	23811
35-39	4458	6149	9198	9999	12644	15783	19562	24133
40-44	3743	4734	6092	8064	9131	11133	13929	17286
45-49	3069	3626	5002	7482	8134	10286	12840	15914
50-54	2500	3224	4078	5248	6947	7866	9591	11999
55-59	1971	2015	2381	3285	4914	5342	6755	8432
60-64	1913	2316	3068	3881	4995	6612	7487	9129
65+	3082	3666	4437	5507	6889	8721	11252	13752

For further calculation table-8.20 has been constructed with the figure of table-8.19. In shaping the result, the age group categorizes into three broad age groups, namely, 0-14, 15-59, and 60+ according to the projected population of Bangladesh. Population size variations have been observed in the following years but the size shows increasing tendency in the first category of the age group 0-14. In the age group 15-59 and 60+ there are uninterrupted increasing trends. In the age group 15-59 the population was 43.17 million in 1981 while the same will be increased to 197.29 million (or 4.57 times) by the year 2051. In case of age group 60+ it is observed that the population was 4.99million in 1981 and the same will increase to 22.88 million (or 4.59 times) by the end of 2051. This shows that the old population of Bangladesh is going to increase gradually upto year 2021 and thereafter remarkably increase between the decades 2021 to 2031, 2031 to 2041 and 2041 to 2051. In both the cases, the population will increase but the increase is more pronounced incase of 60+ group.

Table-8.20
Projected population of Bangladesh by broad age group, 1981-2051 (in million)

Year	Age group		
	0-14	15-59	60+
1981	41.75	43.17	4.99
1991	50.74	54.88	6.05
2001	62.74	68.66	7.51
2011	77.99	85.21	9.39
2021	96.39	105.21	11.89
2031	118.42	129.10	15.33
2041	146.29	159.70	18.74
2051	180.74	197.29	22.88

Table-8.21, our estimate, BBS estimate and UN estimate have been shown in broad age groups of Bangladesh during 1981-2021. The table indicates that the population size of Bangladesh increases alarmingly in the age group 0-14. On the other hand, slightly increasing tendency observed in the same age group in case of BBS estimate. Again the UN estimate also increases in the same pattern. Again table shows that in the age group 15-59, population sizes among our estimates and BBS estimates are increasing in the same way. But in case of UN estimate the population size increase rapidly than other two estimates. In case of aged population (60+), they demonstrate the same situation. Our estimate and BBS estimate all most same during the whole period of study. While UN estimates show highest growth rate than other two estimates.

Table-8.21
Projected mid-year population of Bangladesh by broad age groups, 1981-2021(Population in million)

Year	Age group								
	0-14			15-59			60+		
	Our estimate	BBS estimate	UN estimate	Our estimate	BBS estimate	UN estimate	Our estimate	BBS estimate	UN estimate
1981	41.75	40.60	40.73	43.17	41.61	42.92	4.99	4.91	4.57
1991	50.53	50.82	50.73	54.88	55.19	59.53	6.05	6.08	5.33
2001	62.74	50.37	61.13	68.66	79.63	82.57	7.51	6.95	6.89
2011	77.93	51.69	68.05	85.21	101.31	109.84	9.39	9.28	9.31
2021	96.39	52.35	69.09	105.21	119.15	137.13	11.89	13.29	17.90

Finally, mean deviation and chi-square statistic are shown in table-8.22. It is to be noted that in the age groups 0-14 and 15-59, UN estimate provides smaller mean deviation as well as chi-square statistic value than our estimated results. However, in the age group 60 and above, our estimate provides smaller mean deviation as well as chi-square statistic value than UN estimate.

Table-8.22
Calculated mean deviation and Chi-square statistic

Methods	Mean deviation			Chi-square statistic		
	0-14	15-59	60+	0-14	15-59	60+
Our estimate	16.82	8.58	0.44	31.46	6.69	0.21
UN estimate	8.82	7.02	1.16	9.88	3.48	0.94

8.6 Conclusion

That the future is important to every one, that many good minds have worked to produce a methodology for foretelling it, that many hundreds of professionals are working to produce numbers saying what future population might be, all of these do not add up to any great degree of certainty even for short-term projections let alone for long term ones (Davis, 1961, Dorn, 1950, Hajnal, 1955).

The projections of various socio-economic characteristics of the population and their use in the development and implementation of national plans have grown considerably during recent decades. We are also observing increasing use of the more analytic approaches to projections, i.e., which take account of specific variables affecting the structure of the population. We have noted, for example, a tendency to get national projections of socio-economic characteristics on the basis of separate projections of these characteristics for the urban and rural sectors of the country; this has permitted making allowance for both the differences in the characteristics of the two sectors and expected shifts in the urban-rural redistribution of the population. The preparation of adequate projections has been hampered in many countries, however, by the lack of a reliable demographic information for the present and the past. Progress in projections has been delayed also by the lack of evaluation studies indicating the relative reliability of alternative methods.

If the past and the future were one homogeneous series, the calculation of future population would be subject to the laws of sampling, and forecasting would be a routine

application of statistical inference. If the future is wholly different from the past, no amount of data and experience can assist prediction. The population forecaster can only suppose that reality falls between these extremes. He is invited to devise appropriate models and apply available statistical methods, but nothing can prevent recurrent challenges to his knowledge in the form of departures of the population realized from that forecast.

The study of population growth is important to predict the population in connection with the national planning but such predictions are crude practices. The study is based on subjective judgement of certain major issues affecting the population growth. The trend in population growth is found slow but steadily increasing in modern times. Observed growth rates upto 1951 are low being affected by epidemics, famines, war and migration. Growth rates during the period 1961-74 are found to be extremely high compared to those of 1901-1951. Of course, it is not unexpected for a population of high fertility and low declining mortality. Growth rate during 1981-1991 is found to be lower than that during 1974-1981 but it is still higher than the past.

However, owing to various social, economic and political factors the aged population of Bangladesh has notably increased through a steady growth of aged population, estimated in 1991 as the base year the phenomenon of aged population has been further studied and projection has been done adapting three popularly used models viz. Exponential, Geometric and Makeham's models. From table-8.5 it is observed that by the year 2001, the aged population of Bangladesh will increase to 7201, 7197 and 10702 thousands respectively according to the above three models. Again as per projections the aged population will reach 10301, 10283 and 25130 thousands respectively by the year 2021 A.D. In other words, within the next 20 years the number of aged population will exceed one crore turning the whole situation into a severe socio-economic problem. Similarly, by the mid of the next century (2051 A. D) the projected aged population would be a unimaginably huge one ranging from a minimum of 17561 thousands to a maximum of 99519 thousands. Hence, the aged population is expected to increase upto 2.5 times approximately than today. And thus the magnitude of the problem of supporting and management of such a huge aged persons can be easily perceived.

CHAPTER-IX

SUMMARY AND CONCLUSION

9.1 Summary of Findings

Gerontology though relatively a new discipline has become a subject of great importance all over the world. The sudden interest in gerontology has become the phenomena of increased longevity all over world. In Scandinavian countries and Japan, the expectancy of life at birth is over 75 years. Almost all European countries and Americas are very near to this group. Even the developing countries are not far behind. That is to say, from a world of children, a status a century back, it is becoming a world of old. And this transition has taken place in a short span of only a few decades. The population of the world has been growing alarmingly throughout the last century and the same will continue to grow older in the near future. It is evident from the development of science and medicare that disease control will improve especially in those countries which currently have relatively high rates of infant and childhood mortality. Contrarily there will be increased use of contraceptive techniques which will tend to reduce the world birth rate. Consequently, median age of the world population will certainly increase in the twenty first century.

The total world population would be increasing at an annual rate of 1.5 percent, while the elderly the population aged 60 and over would be growing at a rate 2.5 percent per year. The increase of elderly population is more pronounced in the developed countries where the growth rate in the elderly is 3 time greater than in the most developed countries. Bangladesh is not an exception to this global phenomenon of aging. The projections employed by the United Nations imply that the less developed countries like Bangladesh would succeed in moving into the final phase of the demographic transition to attain a

level of low mortality and low fertility. In Bangladesh there were only 1.39 million people above the age of 60 year in 1911 and even in 1951 it remain around 1.86 million. In next forty years time period (1951-1991) the aged population was more than doubled registering 5.35 million by 1991 census. The size of the elderly population will continue to increase from nearly 6.02 million in 1996 to 7.78 million in 2006. Again the same will increase from nearly 14.4 million in 2021 to 22.9 million in 2031. Thus the absolute number of the elderly population will increase almost 3 times during the next 35 years. It is a matter of great concern to deserve due attention of the government authorities, policy planners, researchers and the academics.

But so far known to the researcher there is hardly any in-depth and extensive research on this important issue till date. To fill up this gap the present study has been under taken. The study is based on historical as well as projected data. The secondary information were collected from Bangladesh Bureau of Statistics and United Nations publications. The main finding of the study are appended below:-

The expected trend in aging population of Bangladesh according to two indicators such as Conventional aging index and Improved index reveals a clear increasing trend in aging population both in case of males and females. While using general index it is observed that the contribution of males towards the aging population is more than the female in Bangladesh. Thus men live longer than women. The factors like under age marriage, malnutrition, more births, social in advancement etc. might be related to the sex differential in aging pattern in Bangladesh.

As regards age structure it is observed that the elderly population i.e. 60 and over was increased by 1 percent during 1911 to 1991. It also observed that from 1951 to 1991 the changes in the proportion of the elderly population 60 and over has been rather small while the fertility remain at a high plane. It suggested that improvement in survivorship particularly in childhood, may increase the older population. The projected figure of elderly population in Bangladesh shows that the size of the elderly population will increase from nearly 6.02 million in 1996 to 7.78 million in 2006, in relative terms, the elderly population will increase 5.5 percent in 2006 from 4.9 percent in the year 1996. But the sex differential of elderly population is insignificant. It is also evident that a consistent increase in the proportion of aged 60+ compared to the population in those of

young and adult age groups. Thus old population of Bangladesh is going to increase remarkably between the next two decades from 2010 to 2030. As regards dependent segment (Young + old) of the total population in some Asian countries reveals that the same was highest in Bangladesh (47%) in 1990 than the others. Till 2025 the strength of young segment is much larger than the aged segment. While by 2050, the relative strength of the aged population will offset the strength of young population. With the change in age structure the care giving role of the working generation will have to change its direction, from downward to upward. Most of the elderly population of Bangladesh live in rural areas where health facilities and recreational facilities are limited. Most of them are illiterate. The economic facilities and job opportunities are also limited.

The median age of Bangladesh had increased till 1951 upwards, it declined and continued to decline till 1981 and there after raising trend has been noticed. The same situation was noticed in all the SAARC countries.

The distribution of elderly population according to residence shows that a large proportion of elderly population live in rural area of country in comparison to urban area. While the old age dependency ratio shows a progressive increase overtime. By 1996, 100 persons in the work force will have to maintain nearly 16 old persons besides themselves. The situation of the selected Asian countries are almost same. Another demographic important factor, such as marital status reveals that the proportion of aged men was higher than the aged women during 1961-1981, the same situation was also noticed in case of widow and divorced status of aged population in Bangladesh. Both in rural and urban areas of the country 95 percent of the male elderly are married contrarily 57 percent of the female elderly are not in marital union. This situation may be due to remarriage of the aged male population. While incase of sex ratio of the age group 60+ was highest during 1961-1991. This also indicates lower mortality in male and higher mortality in female population in the same age group. There were more older males than older females during 1950 to 2005. Population projections for the future anticipate that there will be more females than males in the over age 65 cohort with sex ratios ranging between 96 and 99 in 2010-2025.

The population of Bangladesh has been increasing rapidly due to faster change in demographic pattern. It is observed that the population of the country has increased from

10.0 million in 1965 to 111.5 million (or 11.15 times) in 1991. The exponential growth rate of elderly population in Bangladesh increased was 0.035 percent during 1990-2000 and the same will increase to 0.187 percent during the projection period of 2000 to 2050. It is also observed the exponential growth rate of elderly population in Bangladesh is lower than the other Asian countries. The most revealing feature of the growth of elderly population is that the same increased over 244.1 percent in urban area, while it was only 24 percent in rural Bangladesh during 1974-91. Thus the increase was more pronounced in urban area than in rural area. The main reasons for rapid growth of elderly population in urban areas were increasing industrialisation and the availability of better facilities like medicare, sanitation, job opportunities, etc. The problem of elderly is thus more serious in urban areas than in rural areas.

As regards crude birth rate, it is observed that it reduced gradually during 1901-1996 except during 1931-1941. The crude birth rate reduced to as low as 25.6 percent in 1996 from 53.8 percent in 1901. This situation was mainly due implimention of family planning programs in the country. The total fertility rate had also a declining trend with a narrow amplitude. It reduced from 6.78 in 1961 to 3.41 in 1996. While crude birth rate by residence shows that urban fertility tends to be lower than rural fertility. The growth rate of natural increase is a clear indicator of increasing aged population in Bangladesh.

Another important factors which can help reduce fertility levels in educational achievement. It is observed that there was insignificant difference in average number of children born in the no schooling category (3.9) and primary education category(3.4) of women. While there was significant difference in the secondary and above (2.6) with other categories. This was due to association between education and age at marriage, and between marriage duration and fertility in a non-contraceptive society.

Another most important factors which could contribute to the growth of population is religion. In Bangladesh, the majority of the population is Muslim and the second largest group is Hindu. Both groups place a high value on children. The age-standardized mean number of children everborn was 4.0 for Muslims in 1975 and the same reduced to 2.9 in 1989. On the other hand, the number of children everborn for non-Muslims was reduced to 2.7 from 3.9 during the same period. Thus the reduction of new born children was more noticed in case of non-Muslims than Muslims.

Husband occupation and education can also influence the population growth rate. The better educated males exhibit a smaller family size which is well marked for husbands with higher than secondary education.

As regards comparison between crude birth rate and aged population reveals that there was an inverse relationship between the variables. It is observed that with reduction of crude birth rate, the aged population would increase and the relationship is statistically significant. A comparison between aged population and total fertility has revealed that there was also negative relationship between the two variables. Thus with the decline of total fertility, the aged population would gradually increase and the relationship is statistically significant.

Crude death rate has also an uninterrupted declining trend over the period of study. Reduction of mortality has however been the important factor in triggering off the rapid growth population in Bangladesh, as in many developing countries. The declining trend in mortality is probably due to the health measures through control of communicable diseases like tuberculosis, cholera, smallpox, typhoid, malaria, plague etc and to some extent the improvement in living standards. In the past these diseases used to account for the highest proportion of deaths in Bangladesh.

A considerable decline in infant mortality was noticed in the second half of the twentieth century. Infant mortality reduced to 67 deaths per 1000 live births in 1996 as against 140 in 1960. While infant mortality rate in the rural areas is higher than the urban areas where the availability of health facilities is substantially more. It is also observed that male infant mortality rate has been consistently higher than female rate. Another most important point to be noted is that the infant mortality rate in Bangladesh is the highest among the Asian countries.

As regards crude death rate and expectation of life reveals that there is a close relationship between the two variables. Mortality level in developed countries such as Japan and United States are much lower than Bangladesh and this difference is more marked when value of expectation of life at birth are considered. It is also observed that female mortality is higher than the male in old age (60+) in Bangladesh. Again the average length of life has been more than double in this century. It has risen from 24 years in 1901 to 59 years in 1996 due to improvement in medical science. It may be noted

that declining mortality has more positive impact on the expectation of life at birth of male than female in Bangladesh.

Expectation of life at difference ages of life for male and female has an increasing trend during 1974-1996 except 1987. It is also evident that all people did not have shared the gain in longevity equally as the risk of mortality was different at different ages. The gain is very largely concentrated in the younger ages reflecting the substantial decrease in infant mortality rate. The steady improvement in the mortality of the younger sections of the population from very low level is also conformed. A remarkable point is that the improvement has been comparatively slower in case of female than male signifying the existence of greater risk of life even at that age.

As regards crude death rate with aged population reveals that about 77 percent variation in aged population is explained by crude death rate. The crude death rate has negative effect on aged population which is statistically significant. Contrarily, the expectation of life at birth has positive effect on aged population in Bangladesh. About 89 percent variation in aged population is explained by expectation of life at birth which is statistically significant.

As regards nuptiality, age at marriage has a significant effect on the rate of population growth in country. In a situation of limited control of fertility within marriage, negative association between age at marriage and family size considered almost inevitable. As such raising age at marriage is considered a policy intervention “beyond family planning”. Against this background it is observed that the proportion of never married female at age groups 10-14 and 15-19 has increased remarkably over the period 1951 to 1991. While among males, pace of decline in the proportion never-married has been relatively slow. In the age group 20-24, the percentage of married female is 90.9% and male 39.9% and it increased to 94.4% and 78.3% in the age 25-29 respectively. The marital status of both male and female in the age groups of 20-24 and 25-29 in Bangladesh is much higher than Japan, Sri-Lanka and Korea.

The marital composition of population for the last five consecutive censuses in Bangladesh depicts that both unmarried male and female in the age groups 15-19 and 20-24 has gradually increased. It also observed that in the age group 30-34, the percentage of female widowed/divorced has gradually reduced over time. However there was very large

difference between the proportions of widowed men and women. It was 68 among female these aged 60 and over. While it was only 8 percent among male aged 60 and over. There are two main reason for huge difference between male and female. First, there is generally a large age difference between most husbands and wives in Bangladesh and therefore, husbands usually die before their wives. Secondly, men are much more lively to remarry than women.

The mean age at marriage for women has increased remarkably over time. It increased so much, so that it was 20.1 years in 1996 as against 12.6 years in 1931. The same situation was also observed in case of men. It increased to 27.8 years from 19.0 years during the same period. The gap between men and women age at marriage has on the other hand increased from 6.4 years to 7.7 year during 1931 to 1996. Another important point is the mean age at marriage at any point of time is higher in urban area than in rural area. It is also observed that the mean age at first marriage of women has gradually increased over time. While child marriage in both the sex has reduced dramatically over the period. Even it has been zero percent since 1961 except 1974(negligible).

As regards dependence of mean age at marriage on aged population demonstrates that 96.7 percent of the variation in aged population is explained by mean age at marriage . There is a highly positive effect of mean age at marriage on aged population which is statistically significant.

As regards dependence of mean age at marriage on expectation of life at birth shows that 81.2% of the variation in expectation of life at birth is explained by mean aged marriage. It also shows that mean age at marriage has positive effect on expectation of life at birth, which is statistically significant.

Population aging is the result of demographic transition caused by reduction in fertility and prolongation of life due to reduction in mortality. Bangladesh is probably passing the second phase of its demographic transition. It is apprehended that population aging is gradually emerging as a problem in the country. Global picture shows that life expectancy in industrial high income countries is 75 to 80 years as against 59 years in Bangladesh. As a result of expectation of life has increased and more and more persons have a chance to survive into their advanced age of life. These demographic findings support that population of Bangladesh has become gradually aged. Using correlation

coefficients both simple and partial between fertility/mortality and measures of aging (median age, dependency ratio, and index of aging) in different SAARC countries during 1950-2025 it is observed that fertility will have negative effect on median age and index of aging, while positive effect on dependency ratio. All the simple correlation coefficient are statistically significant at 1 percent level. Mortality will also have negative effect on dependency ratio and positive effect on median age and index of aging, which are all significant at 1 percent level. In case of partial correlation coefficient, when mortality is kept constant then fertility has the same type of effect on aging. However, when fertility is kept constant then the effect of mortality seems to be confounded.

In case of Bangladesh, the factors crude death rate and total fertility rate have negative effect on aged population and the same is significant at 1 percent level. R^2 -reveals that 86.2 percent of the variation of aged population is explained by crude death rate and total fertility rate and the joint effect of both the independent variables is significant at 1 percent level. It is also observed that crude death rate alone explained 77.2 percent variation of aged population but in presence of total fertility rate it explained only 4.3 percent. On the other hand total fertility rate alone explained 81.3 percent of the variation of aged population but in presence of crude death rate it explained only 9.0 percent.

The factors mean age at marriage and expectation of life at birth also affecting aged population in Bangladesh. Both the factors have positive effects on aged population. Both the factors jointly explained 96.5 percent variation of aged population ($R^2 = 0.965$). While the contribution of mean age at marriage given expectation of life at birth and expectation of life at birth given mean age at marriage are significant at 5 percent level.

Again the factors crude birth rate, crude death rate and mean age at marriage are affecting aged population. Of those, crude birth rate and crude death rate have negative effect while mean age at marriage has the positive effect on aged population and the same is significant. The R^2 is 0.947, which suggests that 94.7 percent variation of aged population is explained by crude birth rate, crude death

rate and mean age at marriage. While crude birth rate alone explained 75.2 percent and crude birth rate and crude death rate jointly explained 86.1 percent of the variation of aged population and they are significant. Again the contribution of crude death rate given crude birth rate and mean age at marriage, crude birth rate given crude death rate and mean age at marriage, mean age at marriage given crude birth rate and crude death rate, crude death rate given crude birth rate, crude death rate given mean age at marriage, and crude birth rate given mean age at marriage are all insignificant but the contribution of mean age at marriage given crude death rate, crude birth rate given crude death rate and mean age at marriage given crude birth rate are significant at 5 percent level. The factors influencing, expectation of life at birth are crude birth rate, crude death rate. Both these factors have negative effects on expectation of life at birth. The R^2 is 0.931 which suggests that 93.1 percent of the variation of expectation of life at birth is explained by crude birth rate and crude death rate. The factor crude birth rate alone explained 57.7 percent but crude death rate alone explained 93.0 percent variation of expectation of life at birth.

Again the factors crude death rate, total fertility rate and mean age at marriage are affecting expectation of life at birth. Of those, crude death rate and total fertility rate have the negative effect while mean age at marriage has the positive effect on expectation of life at birth. The R^2 is 0.951 which suggests that 95.1 percent variation of expectation of life at births is explained by crude birth rate, total fertility rate and mean age at marriage. The contribution of crude death rate given total fertility rate, mean age at marriage, total fertility rate given crude death rate, total fertility rate, mean age at marriage given crude death rate, total fertility rate given mean age at marriage, and mean age at marriage given total fertility rate are insignificant but crude death rate given total fertility rate are significant at 5 percent and 1 percent level respectively.

The study of population growth can help predict the population in connection with the national planing but such predictions are crude practices. The study is based on subjective judgement of certain major issues affecting the population growth. The trend in population growth is found slow but steadily increasing in modern times. Observed growth rates up to 1951 are low being affected by epidemics, famines, war and migration. Growth rates during the period 1961-74 are found to be extremely high compared to those of 1901-1951. Of course, it is not unexpected for a population of high fertility and low decline mortality. Growth rate during 1981-1991 is found to be lower than the period 1974-1981 but it is still high than the past.

For aged population estimates and projections we have used five models such as Exponential growth model, Modified exponential growth model, Geometric growth model, Makeham's model, and Logistic model. It is observed that the use of different growth functions yields quite different estimates of the aged population of Bangladesh. But after plotted observed and estimated aged population of Bangladesh using various methods we could not suggest specifically which of the technique(s) could provide the best estimate. As such we have used mean division and chi-square statistic to examine which one is the best suited model for aged population of Bangladesh. It appears that exponential growth function is more appropriate than others for modeling aged population of Bangladesh. We have also used three popular models such as Exponential, Geometric and Makeham's models for projecting aged population of Bangladesh. From the projection, it is assumed that the growth of aged population in future is fairly regular and any effect if irregular factor is excluded. It is observed a point that within the next 20 years the number of aged population will exceed one crore and in the mid of the next century the aged population is expected as increase up to 2.5 time approximately than today. Turning the whole situation into a severe socio-economic problem is to note that in case of logistic models, the limitation of the model with respect to availability of data is that its point of inflection is found to be imaginary. This model has provided negative estimates of the aged population of Bangladesh. Hence, the model is not suitable for distance predictions of aged population of Bangladesh. Another model namely Modified exponential growth function revealed highly differential value than the other three

popular models and as such the model is not fit for prediction of the aged population of Bangladesh.

The mid-year female population of Bangladesh by age group during 1991-2021 have been projected by applying Frejka's component method in Leslie matrix form. There is uninterrupted increasing trend of aged female population in the age group 60+. It is also observed that aged female population will increase near about 2.5 times by the end of 2021. Such increase is due to reduction in mortality rate in infant population. Moreover, the aged population is now getting modern medical facilities and due to this the rate of mortality has been decreasing gradually.

We have compared our result with BBS estimates and United Nations estimates. It is observed that our estimates and the BBS estimate demonstrate same situation in case of growth in aged population, while UN estimate showed high growth rate than the other two estimates. Again, we have compared UN and our estimates taking BBS as standard to see which one is best suitable for estimation of female population in Bangladesh. Our estimate showed smaller mean deviation as well as chi-square statistic values than the UN estimate and as such we may claim that our estimated population size would be more acceptable than the population size estimated by the UN.

Finally, we have projected the mid year total population of Bangladesh by age group applying Cohort component method. The aged population of Bangladesh will increase gradually upto 2021 and thereafter it will increase remarkable between 2021 to 2051. In absolute term, the increase will be about 4.6 times by the end of 2051 from the figure of 1981. Again we have compared BBS, UN and our estimates to see the growth rates in broad age groups. In case of aged population(60+), our estimate and BBS estimates demonstrated almost same increasing trend. But, UN estimates showed highest growth rate among the three estimates. We have also tested UN and our estimates taking BBS estimates as standard.

It is observed that in the age group 0-14 and 15-59, UN estimates provided smaller mean deviation as well as chi-square statistic values than our estimate. However, in case of age group 60+, our estimate provided smaller mean deviation as well as chi-square statistic values than UN estimates.

9.2 Policy Implications

Aged population will encounter different socio-economic circumstances and rapid technological changes in the coming decades. Education is the best way to help develop themselves under the changing situation. As the number of aged people will increase dramatically in the future, support from family and government will be inadequate. They have to work in order to be more self-reliant and sustainable under the difficult circumstances of existing economic situation. Societal expectations about the aged need to be changed from negative to positive. In order to have more opportunities for them, they should provide with the scope to actively participate in economic and social activities at both family and community levels. Information on awareness and importance of aged population should be disseminated to the public through the mass media and other means.

Many of the aged regard work as an activity for the younger generation only. They also consider retirement as the end of working life, and the beginning of rest. Being unproductive, they become burden to family and society. Therefore, they should change their attitude in order to improve their self-image and self-esteem. They still are resources for development and as such they should feel proud of themselves.

One of the correlates of the problem of the aged may be thought of as physical distance between generations. Job market is mainly concentrated in urban centers. Cultivable land is inadequate to support the offsprings. Hence the offsprings are bound to move to urban centers for their livelihood leaving behind their old parents in village. For this reason, offsprings cannot look after their old parents. Creation of rural employment opportunity and planning of decentralized economy can minimize the physical distance between the old parents and their offsprings to a great extent and thus minimize the problem of the rural elders at least to some extent.

Health is an important aspect of human life. Elderly in Bangladesh mainly suffers, among others, from chronic diseases like arthritis, dysentery etc. Government should extend its health care services to the elderly, especially poor elderly, through primary health care centres or similar grass-root agencies with extension service for the elderly who are unable to move from their homes. Both government and non-government agencies could arrange counseling sessions for the elderly in order to teach them how to keep up their

health better. Government could create separate ward or place in hospitals and health care centres exclusively for the treatment of the elderly. Health education is also necessary for the elderly.

The rapidly growing number of elderly people in a community has profound consequences for the nation's economic, social and health services. As more elderly people live longer, chronic diseases emerge as major causes of death and disability. There are now many more persons suffering from these conditions that are managed or controlled rather than cured. These conditions also cause afflictions for years together to impair ability to function and to require much more medical care. Because these conditions are often of long duration, they create burdens for the individual and for society.

Chronic disease prevalence and disability will increase as life expectancy increases. Consequently, they may lead to a pandemic of mental disorders and chronic diseases. Over the past decade, population in the SAARC countries has experienced rapidly declining mortality rates at all ages and for both sexes. Reasons for such decline are not yet known with certainty but medical scientists believe that early diagnosis and early treatment of life-threatening diseases may be a major factor.

It is needless to point out that the elderly should be treated with sympathy and respect. They should be helped in every possible way and consulted in taking decisions about important matters, so that they do not feel isolated, ignored and neglected by the members of the family/community in which they live. While traveling in a crowded bus or train, the young should offer their seats to the elderly. In crossing busy roads/high ways, the young should help the frail elderly. While standing in a long queue for getting services in bus stands, railway stations, post offices or banks etc. the elderly should be given priorities over the young for which good wishes and blessings are expected to be received by the young from the elderly.

In transitional societies the well-to-do people maintain tradition of respect for the elderly and it is rooted not only in religions and political ideology but in legal and financial reality. But still most of our aged population remain a needy group. We hope our aged people should not feel useless. In our society the elders preside over important ceremonial occasions as they have knowledge of socio-economic management system. In our transitional society the aged have an important role and their status increases with age and

that usually encourages old people to exaggerate their age. But this is not true in the poorer section of our people. It is also reported that the society with lower levels of industrial development have fewer older people. We do expect our retired/aged people will engage themselves in leisure activities as a legitimate life style.

The rapid aging process leads to the weakening of the traditional bonds between the young and old. In recent times, the problems have been aggravated by the erosive pattern of the joint family system which earlier provided not only psychological and physical strength for the elderly but security and social adjustment. Aging is thus a socio-cultural problem too. The socio-cultural consequences of the elderly include alienation from other members of the family, loss of status and the shifting of loyalties from the family of orientation to the family of procreation.

In the SAARC countries almost all religions, that is, Islam, Hinduism, Buddhism and Christianity have ordained to take care of the elderly for their security, health and other socio-cultural needs. Under the context, the young generations should have moral responsibility for carrying out duties to the elderly.

In view of growing number of elderly in Bangladesh, the aged population gradually emerges as a vulnerable group in society. In order to understand the problems, needs and demands of this vulnerable group, their status and function in the family and society, their living arrangement, support systems, economic activity, potentiality and so on need to be carefully studies so that in compliance with their problems and needs, proper policies and programmes can be formulated.

Aged population are the respected senior citizens of a country. They are capable of contributing for the benefit in their family and community. For this purpose, there is an increasing need for establishing organizations of the elderly. Illiteracy is widespread among the elderly. Therefore, they should have access to continue education and learning through formal and informal channels.

Aged citizens prefer to live in family atmosphere and kinship bonds but our family bonds are loosening up. Sometimes, in spite of the best efforts, it is not possible for family members to look after their old people properly. Hence old-age home have been thought of as a solution. But elderly people always like to be within the network of kinsmen, friends and neighbours. It is necessary to have clear understanding of the kinship

structure and informal support network in which they are in. Recognizing that the family continues to be the main source of social and economic support to the elderly, efforts should be made at the government, community and private levels to help both the elderly and their family members to continue their roles and activities so that they still can live in family. Joint family system should be encouraged.

Elderly needs economic support for their well being. Government should help them by providing funds in the form of small scale loan to the family in which elderly belong. Loan can also be given on co-operative basis. NGO should come forward to give economic support to the elderly. There should be provisions of free transport facilities, free medical care for the elderly. Community based social welfare programmes can be undertaken where the olds can engage in productive activities and pass time.

In the change circumstances, old notions that the old people will be looked after by their sons or other family members have changed. If not from young age, from middle age everybody should take preparation for their old age. Everybody should try to develop different hobbies to avoid loneliness and should be careful and try to lead a regulated life, so that one can have good health. Everybody should try to develop a scheme how he or she wants to pass his or her retired life.

Government could make arrangements that all people over the age of sixty should register their names in the local government agencies. All the people thus registered can have Identity Card. With that card one should get medical, travel and various other services and facilities of life gratis or at a subsidized rate according to the socio-economic and personal condition of the person concerned.

Women have more old age problems in terms of food, shelter, clothing, work, medical care etc. There should be special programmes for the old women.

Volunteerism is relatively low especially among the older persons in the country. However, older persons may play an important role in a number of community services such as welfare, religious, cultural, recreational, leisure and environmental related activities. They can form indigenous support group to help each other.

facilities as a senior citizen of the elderly.

Since approximately 80% of our population resides in the rural areas, high contribution to the aging comes from the rural population. Furthermore, a significant difference is

observed for sub-groups based on region in comparison to the grouping based on sex towards the contribution to total aging. So special care is to be taken for the rural elderly. The political slogan 'development of Bangladesh through development of our rural people' should come into reality. Our duty towards the elderly will be properly fulfilled if we take care of our elderly, who have bequeathed the most precious earnings of their youth and life for the well being and comfort of us. Finally, it is recommended not to go for institutional type of residence for the elderly but to build more institutional facilities for health care.

We may make the following suggestions :-

(i) Allowance or Honorarium

It was revealed that the family care-taker, it was revealed, carried out the tasks not for any economic gain or out of sympathy. They did not expect any payment for their work. Up to now due recognition was not given them as their devoted work was taken for granted. Some of these care-takers have sacrificed much to care for the elderly parents. Both male and female care-takers have in some cases postponed marriages and some others never married in order to look after the elderly. At present their number may be small but many more such persons may follow suit, because of economic constraints and the increasing number of elders. But for the family careers and their dedicated work the burden would have fallen on the hospitals and homes for elders where space is the greatest constraint and limiting factor.

Even though reward is not expected, the economic situation of the country demands that some incentives be given to the households that provide care to the aged. The high income groups may qualify for a tax rebate, but the majority of care providers do not fall into this category nor do the households from which the majority of elders come. Hence, a reasonable assistance scheme (in cash or kind or both) covering such a household, as an incentive, is suggested.

(ii) Strengthening the Family

The family is the most appropriate place for an old person to spend the last moment of life. Family provided harmony and continuity with the physical and social environment, including the network of relationships, even when this relationship was thin or under strain. Hence we suggest that the family should be motivated, strengthened and equipped

to enable it to accept and keep the old kin as a normal member of the family and to enable the old to live there as an honorable member.

(iii) Economic Support

This could take several forms: cash subventions and food subsidies to poor families having old persons, the amount/quantity increasing with increase in the number of elderly dependents. Pensions to all the poor old who are not covered by any statutory pension scheme. The pension should be adequate to meet the basic minimum needs of the recipient. Grants for hospital expenses and adhoc needs for persons in the above categories.

(iv) Non-Economic Support

Community-based supportive services for old persons and families taking care of them. These should include, among others, regular counselling service by social workers, basic health care service by public health nurse and free consultation service by a geriatric physician.

Community-based social welfare programmes, where the old can engage in productive activities and pastime both to keep themselves meaningfully engaged and to interact and communicate with people and integrate with society, should be promoted. Day care centres should be established where families with all members working can keep their old folks when they are away from home for work. These centres could be run by senior citizens themselves or women's club.

Community-based geriatric homes/short-stay homes may also be made for the chronically ill and functionally impaired old for whom the family is not equipped either in material or in human resource terms. They will also have outpatient facilities and home services for those who could afford to be cared at home but require supplementary services which their careers do not have or cannot easily provide.

(v) Elderly Abuse in the Family

Abuse of the elderly in the family is increasing and it takes several forms and ranges from psychological torture to physical torture including insults, humiliations, and partial or total denial of food, clothing, shelter and medical help and emotional support. It was found that there is a pattern in the abuse of the elderly. Abuse is more in the case of those who are dependent on the kin's for support, have nothing or very little to contribute to the

family either physically or materially, who are chronically ill and /or in constant need of care and who are widows. However, poverty, by no means, is the only cause of abuse though it is a major one. Old people are abused in affluent families as well. Abuse is also more from grand children and in-laws than from own children. The major remedy in all cases is to make the old less dependent on the family, empower them through monetary or material grants, provide facilities for medical help.

(vi) Health and Nutrition

Many of the diseases of the old age could be considerably mitigated if not totally eliminated if proper knowledge of health care was imparted and appropriate life styles were adopted in younger years. We note that education on these aspects is absent even for the present youths. School syllabus should take care of this and public health authorities should carry the message of healthy aging. The school should especially drive into the minds of its pupils the basic principles of nutrition and health care. The present old people also need education on health and nutrition. The camp approach is quite appropriate for this. Either the community or government and voluntary agencies could organize these camps. They should be supplemented/ reinforced by audio-visual publicity programmes.

Governments should subsidize the cost of medical services and medicines. Medical services should be geared to meet the special needs of elderly persons, in the context of general improvements in quality of care. Facilities and services should be made more accessible by providing more convenient infrastructure and administrative arrangements, for example, by designating special hours during off-peak periods for the care of the elderly so that they do not wait a long time for service. Medical services should be accompanied by appropriate information and counselling concerning the care provided.

Government should extend its health care services to the elderly, especially poor elderly, through primary health centres or similar grass-root agencies with extension service for the elderly who are unable to move out of their homes. There should be geriatrically trained nurses both for home services and for educating members of families with elderly even though they are sick or not.

(vii) Use of Time

There is need for national data on the use of time by the elderly. Demographers can play an important role by applying his/ her skills in the design of an appropriate sample survey which would secure a variety of relevant demographic data in addition to data on the use of time. The orientation on the concepts of major activity usually applied in censuses and surveys needs to be restructured for the elderly. The traditional classification on major activity includes working in schools and keeping house

(viii) Role of Elderly Persons

The role of the elderly is fast changing. They are capable of contributing to the benefit of others in their family, community and the nation. For this purpose, there is an increasing need for establishing organizations of the elderly, self help groups and cooperatives. Their skills, expertise and experience are an unexploited resource, which can be utilized even at their advanced age. The elderly should be encouraged to take more active role in the household activities including looking after grandchildren in the joint family. Most of the elderly persons currently live in rural areas and many of them would have to continue working to meet the needs of daily subsistence. Appropriate support should therefore, be provided to the rural elderly people. Females outnumber males among the elderly, and most of them are widows. Policies and programmes should, therefore, pay attention to the special needs of elderly women. Special policies need to be designed to develop work opportunities for them. Policy measures should also be devised in a comprehensive and systematic way for the society as a whole. The elderly are not a group isolated from the society.

(ix) Role of the Family

Recognizing that family continues to be the main source of social and economic support for the elderly, efforts should be made at the government, community and private levels, to help both the elderly and their family members to carry out income-generating work. These could include, among other incentives, tax concessions. The traditional role of family in caring for the aged should be maintained and strengthened through the development and implementation of appropriate support systems. Efforts are needed to maintain and strengthen the traditional role of family and community in looking after the female elderly, specially those who are widowed/divorced or lonely. Public, private and

community support should be arranged for such female elderly in order to make them economically active and less dependent on others.

(x) Older Women/Widows

Widowhood is the fate of many older women. We feel that women have more old age problems- in terms of food, shelter, clothing, work and medical care compared to men and since they seldom go out of the home and are generally subordinated; they interact less often with the outside world and have no one to share their woes. They suffer from all these as these are mostly culturally determined. The majority of the present generation of old women are illiterate and poor, having no savings since their previous work was not covered by any social security programmes. The following are the special features in the aging of women:-

- (a) Women live longer than men.
- (b) Most older women are widows.
- (c) Women are poor in most countries. Men have primacy over women in ownership and operation of property. Women's income from employment during pre-retirement period is generally merged with the general income pool, so they end up with no savings in old age.
- (d) In most developing countries, women have a subordinate status vis-à-vis men.

These require special government programmes for old women. Welfare and counseling agencies and women's organizations clubs/associations should be more alert in their home- and community based services in identifying women with problems and in solving them.

(xi) Care of Elderly

There is no any particular possible safety network for poor elderly people living in poor families, especially in rural areas. Most of the people in Bangladesh live in rural areas. Government should encourage the adult working generation in such a way which will enhance the ability of the families to take care of elderly within the family. This can be done:- (a) By giving fiscal incentives or special grants to the adult children who co-reside within their elderly parents. (b) By promoting the cultural values of traditional family system. In this respect problem of older persons outside the family should be portrayed in

the mass-media. (c) Finally government should develop an infrastructure for the self-reliance of elderly.

(xii) Migration

A fresh problem that has surfaced during the past decade is that of out-migration with distinct characteristics which are different from those of earlier outflows. Migration has adverse effects on the family, and the care of elderly. In comparison to migration associated with brain-drain, the majority of the present day migrants are semi-skilled or unskilled and move for employment in domestic services, construction sites and hotel services etc. A significant feature of this move is that females out-number males in the total flow of migrants. A comparatively recent development is the point of origin of the migrants. Rural-urban migration in Bangladesh is quite heavy. This points to the fact that locally oriented family and group ties are weakening and gradually breaking. More rural than urban youth leave the country for employment outside, thereby adversely affecting family care and support to the elderly.

Government should stop the unwanted rural-urban migration. This needs following actions:- (a) Overall rural development programmes (b) Public sector investment to build industries in the rural areas (c) Employment generation programme for the rural youth. (d) Financial support for the family based rural handicrafts (e) Establishment of rural housing board . These actions have multi-faced benefits. On one hand it may check the flow of urban- ward migration and consequent breaking of family structure. On the other hand rural development directly (by increasing family income) or indirectly (through the development of community) may enhance the standard of living of the rural elderly.

(xiii) Role of Non-Governmental Agencies/ Organizations

Governments should work together closely with NGOs in implementing programmes for the elderly. As the NGOs work at the grass-root level, they should be encouraged to collaborate with the local level organizations for better results. Furthermore, NGOs should be encouraged to mobilize funding from communities and other support groups, and not depend on the Government for all the activities. Committees at local levels should be encouraged to form voluntary organizations to provide support for the aged and their families. Broad-range information and educational programmes can be initiated to

create greater awareness and understanding of the issues of aging. These can be arranged through local institutions such as school/colleges and community centers.

(xiv) Role of International Agencies

It is important to have access to the latest information regarding schemes and techniques for the well-being of the elderly. A networking for the exchange of information through sub-regional, regional and other international agencies such as SAARC, ASEAN, ESCAP, WHO, UNESCO, ILO, and such as NGOs Asian Forum of Parliamentarians on Population and Development(AFPPD), International Federation on Aging, Banyan Foundation, HelpAge, etc., should be encouraged. Because aging is recognized as a population issue, and has been emphasized by the 1994 International Conference on Population and Development, the United Nations Population Fund (UNFPA) is urged to continue and to strengthen its assistance to governmental and non-governmental organizations responsible for international population assistance in the field of aging. Regional organizations, in particular the ESCAP are called upon to play a central role in effective exchange of data, information and experience with relevant organizations that are actively engaged in the field of aging.

(xv) Research and Evaluation

With rapid increase in the number and the proportion of elderly population, there is a growing social concern about the problems of the elderly, their support and the opportunity for their contribution. There is an urgent need for better understanding of the complexities of those problems. Appropriate steps should be taken to promote policies and programmes on research, and provide facilities for further analysis of the consequences of population aging.

Efforts should be made to collect and analyze data in both urban and rural areas to ascertain the extent to which the most needed health related social services are available and accessible to the geographically distributed older population also desegregated by gender. It is also important to assess the economic potentials of the elderly, especially the young-olds by gathering information on the nature of economic activities that the elderly have engaged in, the types of skills and expertise they possess and the potential of employment in the local area. Monitoring and evaluation need to be carried out to assess the achievements and identify bottlenecks, if there are any, so that remedial actions can

be undertaken in time. Efforts should be made to bridge the gaps between researchers and policy makers through publications and dissemination of research findings.

Sample surveys at national levels, supplemented by regional studies and focus group studies should be carried out periodically to assess health conditions of the elderly, including the prevalence of morbidity and other health-related problems among them.

Here we make a few broad recommendations and suggestions related to the problems of the old in general in the context of our social and economic structures.

- (1) Capable old persons should be provided with jobs suitable to their health, age, experience and skill.
- (2) Retired persons should get 100% of the pay last drawn as pensions, instead of 80% as now in practice.
- (3) Efforts should be made in the direction of employing aged persons as part-time workers.
- (4) Special passes should be given to elderly persons, entitling them to reduce fares on public transportation, movies and other entertainment organizations. These passes will also serve as identification cards in Banks and the postal services etc.
- (5) Day-care centres and facilities for immediate and long-term care should be provided to the aged. We are glad to note here that a Day-care centre is already working since 1960 in the Geriatric - Attention should be given to pre-retirement preparations with a view to providing short courses before retirement to ease the transition and to examine conditions of work that may influence one's physical and psychological health after retirement.
- (6) A social organization may be formed to raise funds with the purpose of helping the poor old destitutes.

Furthermore, it is highly recommended that a national programme should be formulated as a part of the nation's long-term overall strategy for socio-economic development to deal with population aging, especially productive aging in the coming decades.

Finally, there should be political commitment and legislation for the welfare of the elderly. Political leaders, social workers and above all, government should think over the matter with due attention.

9.3 Concluding Remarks

First of all it may be mentioned that the aged are not an homogeneous category. Heterogeneity persists not only in age and sex, but also in terms of education, living arrangement, social class, urban-rural location, region and so on. The social and personal needs and aspirations are naturally not similar. However, without going into these details, it can be stated that the most urgent need which the elderly in Bangladesh face today and is likely to witness soon is the provision of health and medical care. The elderly population of Bangladesh are facing a variety of problems today. A few of them are economic insolvency, loss of authority, social insecurity, lack of recreation facilities etc.

The old age is characterized by loss in vitality and a return to the state of dependency. For them various social security measures are needed. In our country the main responsibility to take care of the elderly persons is vested upon the joint family system where they get all sorts of support in kinship network relations. But with modernization the traditional joint family system is declining with a tendency towards nuclear family. Such changes lead to insecurity of the aged person in our country.

The elderly people need security in their remaining life. This can be done through the social security system and by taking community based activities. The social security system should ensure greater intragenerational and intergenerational equity and solidarity. They should be given the opportunity of providing community based services with their active involvement in their care and in the effective utilization of their potentials in development.

The qualified elderly may be absorbed in jobs as advisors and consultants to serve the dual objectives of looking after them and sharing their technical experience and expertise with their younger colleagues. Time has come to look into such under takings.

The aged should not be taken as a liability or burden in the family or in the society. In the words of Davis(1970):- “one has to remember that an individual’s chronological age affords no sure judgement as to either his organic condition or his social and economic capacity. A healthy man of 65 is likely to have more capacity for work than a sick man of 40. An outstanding man of science, though he may not be at his best at 70, may still be

better than the run of the mill younger men in his field. To adopt a position of hopeless demographic determinism in this matter of aging populations would therefore be scientifically erroneous”.

The Elderly problem in Bangladesh deserve immediate attention of the policy planners because there will be a steep rise aged population in coming years. The majority of them are living with their children and in joint families. However, economically, they are among the poorest in the population and almost all of them depend on children for their living. With the change of time, there is a need to change the prevailing view about older people. They are taking part in increase the productivity of factors of production and also positive role in nation building.

Elderly population is an integral part of our national life. As such we should take care of them and show respect to them. In the light of our existing moral, family and religious code, the elderly people are respectable. They built their family by working hard in their active life. They also brought up their children and in doing all these, they contributed to a great extent to the society. In our traditional joint family the elderly lived with respect and security. Basically they play the main role in managing the family. But with the passage of time and with increase economic complexities, the institution of traditional joint family systems and age-old social values are rapidly disappearing and in most cases old persons are considered a burden in the family as well as in the society. All these changes in the socio-economic conditions have got some negative impacts particularly on the poor elderly persons in the country. They should get rid of these painful experience and deserve help from the nation to enjoy the rest of their life. Besides, we should promote the traditional values and thus help the poor elderly in keeping with the traditional social process.

As mentioned earlier, the elderly is a respected class of our society. Moreover, they are our assets because we can use their vast experience, knowledge, and skill for the betterment of our country / society. They are not an homogeneous category-rather heterogeneity persists in various social parameters, living arrangements, rural-urban location and so on. The need and aspirations naturally not similar for all elderly belonging to the same group. Various social security measures are needed for them. In our country the main responsibility to take all sorts of care of the elderly population vested upon the joint family system from where they get support in kinship network relation. The traditional joint family system will be at stake due to modernization and will

begin to break with a tendency to form nuclear family. Such tendency has already began. This perhaps, creates insecurity of the aged persons in the country. We should be aware of this fact.

Due to improvement of modern technology and the medical science, the life expectancy of people has increased remarkably. Consequently, the number of elderly people has been increasing rapidly all over the world. In the developed countries, there are so many programmes for the benefit of the elderly people and day by day all these facilities have been increasing. We should also take various steps for the benefit of our elderly people. It is a point of hope that the consciousness regarding the welfare of the elderly people has been increasing.

Government of Bangladesh for the first time has made a noble provision for elderly people offering benefit by way of some grants for the deserving men and women. The beginning has been made and hopefully this will be expanded for greater number of people in near future. There has been awareness that the senior citizens of the country deserve better treatment and their expertise can be utilized duly. The International Conference on Population and Development has adequately addressed the issue of elderly people and adopted some action programmes. United Nations Population Fund (UNFPA) will join hands with the Government, NGOs, and private sectors, to enhance support through appropriate mechanisms, for the self reliance of elderly people, and to create conditions that promote quality of life and enable them to work and live with dignity in their own communities.

From the foregoing analysis of the sex differentials in aging in Bangladesh it is concluded that more care is to be taken specially for female so that socio-economic deprivation in any respect can be removed for females. Hence recent steps that have been taken by the government of Bangladesh can play an important role for the upliftment of the socio-economic condition of the female. These steps should be properly channelled, specially through free education upto secondary level, pensions for the widows till death, involvement of the destitute in food for work etc. It can be pointed out that the retired persons face many financial, social and psychological problems for which the society or the government seem to have no ready-made answers. If we look at the amount of pension received by retired persons, it becomes obvious that this is so meagre that it cannot make the both ends meet. Under the circumstances, the greater part of the retired persons are forced to seek some employment's to add to their pensions. But jobs are

difficult to get in Bangladesh, where unemployment of thousand of young people is already a serious problem.

Research on aging issues in Bangladesh has yet to be given high priority. Formulation of policies and programmes especially for the elderly require adequate data on all aspects of life of the aged persons. There is a need to create data bank. Large scale surveys should be undertaken with appropriate methodology and research design. There is a need to explore the potential contribution and future implication of the elderly with more research.

Policy makers and planners may think of long run programmes for the welfare of the elderly in terms of social security, economic benefits, employment, health and nutrition facilities, family and individual assistance etc. The occurrence of physical disabilities is another aspect of the aging process. Measures should be taken to help the disabled elderly.

In the context of planning one point of caution is that these should be done by looking at not only proportions and percentages of elderly persons but also their absolute number should be given due importance for obvious reasons.

In developed countries there are various kinds of old age pensions, insurance or support from many philanthropic organizations to help the old. But we lack such arrangements in our country today. Thus, interested quarters and philanthropic organizations should come forward with the same objectives to stand beside the elderly persons.

It has been observed from the present study that proportion of aged population in Bangladesh will be increasing in the following decades. Naturally, it will diverse impact on our agrarian society. Truely, Bangladesh is quite behind the situation prevailing in the advanced countries today. Time is ripe now to arrest the situation in favour of the old persons. Undoubtedly, the issue of the elderly persons has enough merit to be studied continuously and in the light of the findings of such researches appropriate measures should be taken by the relevant authorities for the welfare of the elderly population in future.

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