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SOCIO-DEMOGRAPHIC CHANGES IN BANGLADESH: A STUDY ON IMPACT

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ABSTRACT

The paper aims at examining the socio-demographic changes over years and their impact on the future age-sex structure of population in Bangladesh. The mechanisms of change in the population are reviewed and it is shown that success in reducing fertility will alter the profile of the dependent population potentially to the benefit of Bangladesh. The study demonstrates that a large portion of population is still under age of 15 years and this youth bulge will contribute to the country's future reproduction and that to accommodate this progress in economic development is a necessity. Finally, the paper briefly lays out some policy implications.

Key words: human development index, gross national product, socio-economic, demographic, determinants, ageing, labour market.

I. INTRODUCTION

Since its inception, a major priority of the Government of the People's Republic of Bangladesh and agencies such as the World Health Organisation (WHO) and other United Nations (UN) organisations has been to curb the growth of population. The view that Bangladesh is overpopulated and will become even more so and that this is inhibiting the economic and social prosperity of the country keeping Bangladesh one of the poorest countries in the world is incontestable. This has been a dominant consideration in political decision-making in Bangladesh and amongst international agencies. Bangladesh is indeed very poor measured by any demographic or economic criterion. For example, the human development index (HDI) is widely used to compare socio-demographic situation in many countries. This is a composite of literacy rates, gross national product (GNP) per capita and life expectancy at birth among other measures (UNDP, 2003). According to HDI, Bangladesh is ranked at position 145 out of 173. Norway is ranked first but countries like India and Pakistan are ranked 124 and 138 respectively. Bongaarts and Watkins (1996) demonstrated a strong negative correlation between HDI and total fertility rate (TFR).

Bangladesh is in a difficult position to improve its HDI status having a predominantely rural population of over 80% with little exporting capability. The country is one of the most densely populated countries in the world with 949 people per square kilometre and is the most densely populated of the developing nations whereas neighbouring India contains population density of

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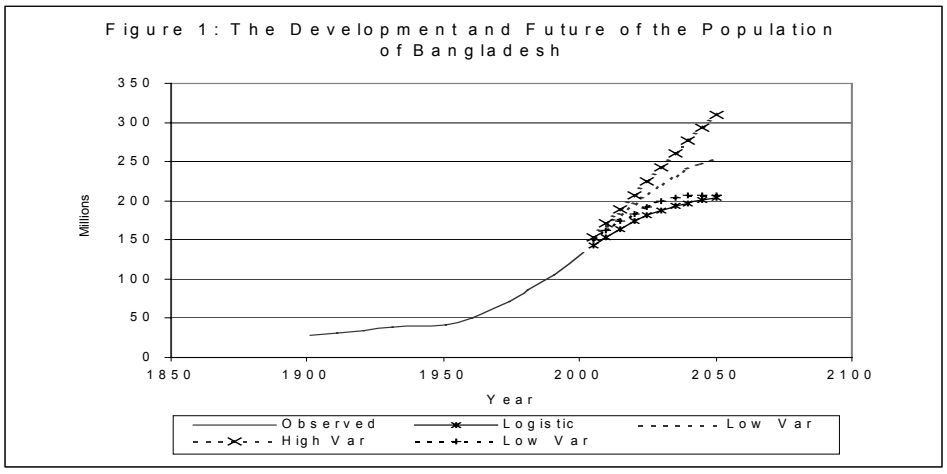
only 336 people per square kilometre. The population is assumed to be almost double by the year 2050 (Gayen, 2002). The development as well as forecasts of the population of Bangladesh are shown in figure 1.



The forecasts are the UN set of projections and fitting a logistic model of the form

$$P_t = \frac{P_\infty}{1 + \left(\frac{P_\infty}{P_0} - 1 \right) e^{-\gamma t^*}} + \mathrm{d}$$

where P_∞+d is the maximum level that the population will grow under the current socio-technical system, P_0+d is the initial population level, γ is a growth rate parameter and t^* is the year – 1971 which Raeside (1988) showed to be a good predictor for populations undergoing fertility transition. Fitting the model using a Newton Raphson algorithm to minimise the sum of squares of the error gave coefficients of the model which are tabulated in table 1. The mean absolute percentage error of the fit of the model was 5.4% and the *pseudo* R^2 value is 0.997.

Table 1: Coefficients of the Logistic Model.

Parameter	Coefficient	Confidence Interval
P_∞	181.97	83.50 – 280.45
P_0	0.92	-0.36 – 2.22
γ	0.055	0.036 – 0.075
d	30.21	25.81 – 34.62

Thus, there is a fair amount of uncertainty to which the population of Bangladesh will grow to and thereafter become stationary, the expected value is 212 million with a 95% confidence interval of 110 to 315 million (Raeside, 1988).

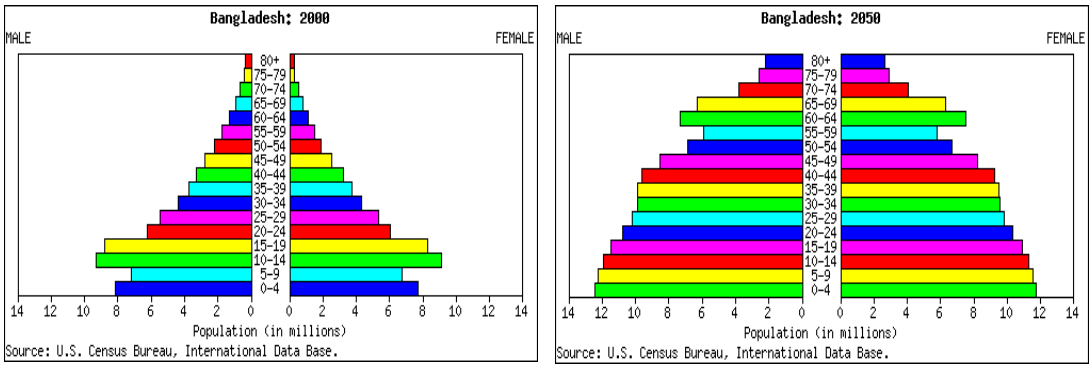
From figure 1, one can observe that extrapolating the trend by the logistic model gives very low forecasts compared to the UN projections. It is possible that the logistic model may be pointing to the correct direction as projection accuracy evaluated by Gayen (2002) and by Keilman (1998). The UN projections were made in 1996 and the medium projection for 2000 was 137.95 million but it appears that the actual population was around 128.2 million. So, the UN may be erring on the side of over prediction. (If 137.95 was used as the 2000 population estimate to fit the logistic model then the forecasts are virtually coincident with the median projections of the UN and an upper level of the population is estimated to be 270 million with a 95% confidence interval of 47 million to 501 million).

The predicted population growth will create a terrible strain on agricultural resources and life for many at subsistence levels; indeed, UNDP (2003) lists that in 2000 over 42% of the population of Bangladesh lived in poverty. Added to this, much of the land is low-lying and prone to catastrophic flooding - a situation that may well become even more serious if the global warming occurs and the

sea level rises. Thus the prospects of Bangladesh do not appear to be favourable and they are worsened by political instability and prevalence of widespread corruption (Transparency International, 2002). Yet despite all this, the people and Government have shown a remarkable ability to face up the population issue and the total fertility rate is currently 3.3 compared to 6.3 in 1975 and the UN predicts that the TFR will fall below replacement by the year 2030 and the UN's medium projection of the TFR in 2050 is 1.85. Rahman et al. (2002) support the UN's medium variant project but draw attention to the fact that there is a huge disparity amongst different groups in Bangladesh and attainment of fertility reduction is crucially dependent on access to and uptake of education.

The dramatic change in fertility will have major ramifications on the age structure of the population of Bangladesh. This will be compounded when one reflects that there has been a major improvement in life expectancy. In 1975, life expectancy at birth was estimated to be 44.9 years and this rose to 58.1 in the year 2000 and the UN predicts a growth to 70.5 years in 2025. This will result in a change of the population pyramid from the youthful wide based pyramid to the more rectangular mature pyramid by the year 2050 as illustrated in figure 2.

Figure 2: Future Population Pyramids of Bangladesh



These age structural changes lead to changes in the dependent population. The changes have not came as a result of the typical demographic transition model of fertility but as a response to increasing affluence as pointed out by Cleland and Streatfield (1992); Caldwell and Caldwell (1992) and Caldwell et al., (1999) as there has been growing economic development. The fertility reduction has been termed the "reproductive revolution" and appears to be due to the country's successful family planning programme, (see Robey et al., 1993, Amin et al., 1993 and Celeland et al., 1994). According to the US Bureau of Census International Data Base, the prevalence of contraceptive use has risen from 7.9% in 1975 to 53.8% in 1999 and Hossain and Khan (2000) show that the use of modern contraceptive methods displays an even steeper uptake. Caldwell et al., (1999) and Bairagi and Datta (2001) drawing upon the work of Pritchett (1994), agree with the view that much of fertility reduction is due to family planning programmes and argue that these are a means to achieve a desired end. Bairagi and Datta (2001) show that there has been a reduction in the desired number of children per family by over 45% since 1975. Thus fertility reduction is a manifestation of societal change in Bangladesh and a change in the aspirations and values of that society. In addition, education and communication programmes have contributed to delaying age at marriage and reducing infant, child and maternal mortality (see for example Hossain et al., 1999 and Hossain and Khan 2000). Generally, mortality has reduced in Bangladesh with the crude death rate falling by almost 40% since 1987 and life expectancy at birth has increased from 44.9 years in 1970-1975 to 58.1 in 1995-2000 (UNDP, 2003). This compares well with the mean of other less developed countries of 52.2 years although there is scope for improvement and the UN projects that in 2020-2025 life expectancy at birth will be 68.9 years in Bangladesh. Thus with the gradual improvements in education, infrastructure and medical facilities, it is likely that fall in mortality

could further check population growth in Bangladesh.

It is not thought that migration will have a major impact on the growth of population in Bangladesh. There is little likelihood of significant in-migration. However, there is a small out-flow of skilled workers to India, the South East Asian countries, the Middle East and to some developed countries (Khan, 2004). Coleman (1995) also mentions about migration to the United Kingdom.

It is the contention of this paper that there is currently perhaps too much focus on ensuring fertility reduction and there has been insufficient focus on the consequence of success in fertility reduction. An argument is made that there needs to be greater focus on changes in age structure and the consequences of these changes on the society of Bangladesh. The purpose of the present study is to analyse the consequences of socio-demographic changes in Bangladesh.

The paper is organised into different sections. First, the likelihood of the continuation of fertility decline and ageing trends will be considered followed by a discussion on the consequences of the UN predictions on Bangladesh population. The paper ends with a discussion and conclusion.

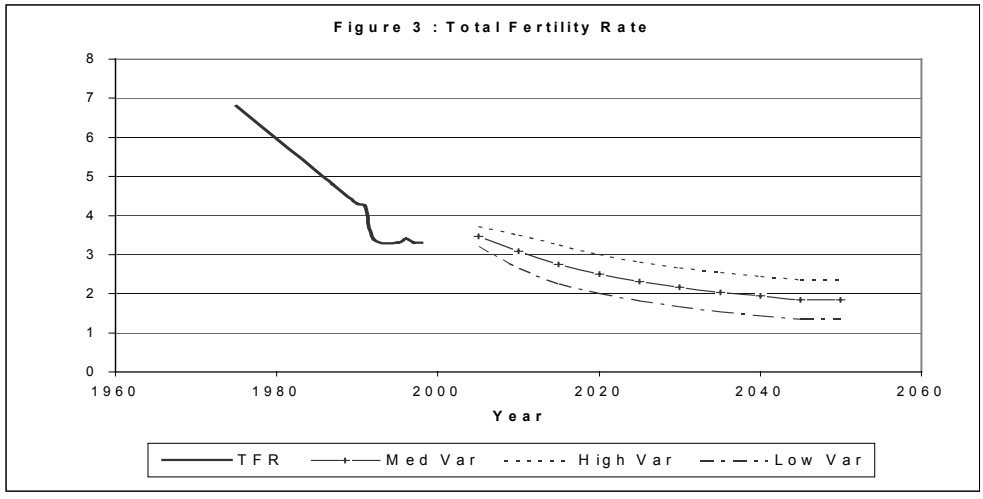
II. METHODOLOGY

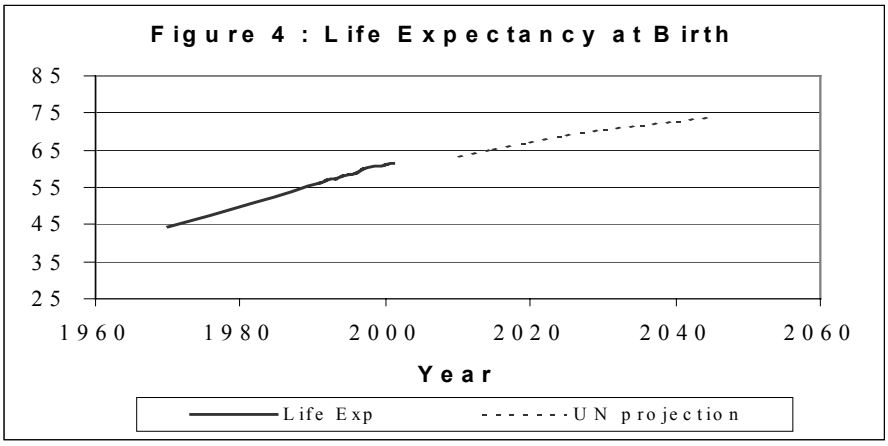
The present paper uses relevant information from secondary sources for the study. Some important demographic variables such as total fertility rate, life expectancy at birth, age at marriage, infant and child mortality, and some socio-economic variables such as gross national product, urbanisation, status of women and education were examined in order to conclude the scenario analysis for Bangladesh. In the paper, analysis has also been carried out using Excel and SPSS softwares.

III. RESULTS AND DISCUSSION

Are predictions of continued reduction in fertility and increased life expectancy likely to be realised?

It has now been accepted that changes in fertility and life expectancy at birth are consequences of change in affluence. Important variables which are used to explain fertility changes in Bangladesh are socio-economic status, age at marriage, child mortality, son preference, women's status, place of residence, duration of breast feeding, acceptance of modern methods of contraception and of course, education. Islam and Khan (1991) demonstrate that it is not simply the variables on their own that are important but also the interaction between them. Education is also an important variable in explaining changes in life expectancy as is child mortality, socio-economic status and degree of urbanisation. The future influence of many of these variables have been discussed by Bairagi and Datta (2001). Changes in each of these variables will be reviewed in this section, with the exception of duration of breast feeding and son preference which are not considered to change except as a consequence of other variables such as increasing female autonomy and education. First, the total fertility rate and life expectancy at birth time series are charted in figure 3 and figure 4 along with predictions to 2050.





Thus from figure 3 the total fertility rate is projected to decline but the decline has not been as steep as observed lately.

From figure 4, UN projections indicate a steady growth in life expectancy at birth reaching 69 years for males and almost 72 years for females.

Gross National Product (GNP)

Perhaps Bongaarts and Watkins (1996) give the clearest link between fertility reduction and human resource development; others demonstrate the positive association of GNP with child mortality reduction and improved life expectancy. Over the period 1975 to 2000, the GNP of Bangladesh has grown by 2.2% and currently the purchasing power parity (PPP) of GNP is $1,602. This compares well with other countries classed as low human development. The average of these countries is a growth rate of GNP of 0.5% over the period 1975 to 2000 and a PPP of $1,251. Since independence in 1971, the economic development of Bangladesh has been very poor (World Bank, 1996). Yet at an individual level, Bairagi and Datta (2001) demonstrate that the standard of living as measured by the possession of durable goods such as radio and watch has greatly improved. There has been around a four-fold increase in ownership of these items over the period 1974 to 1996. It is perhaps at the individual level where improvements in standards of living have most impact on reducing the desire for large families.

Age at Marriage

Islam et al. (1998) found age at marriage as one of the most important determinants of fertility transition in Bangladesh. According to Islam et al. (1998) age at marriage among women has risen on average from 14 to 17 years over the last 20 years. With trends towards greater urbanisation, greater female participation in paid work and education, it is envisaged that this trend will continue exerting a downward pressure on the TFR.

Infant and Child Mortality

Mortality under age five has declined steadily from above 150 deaths per thousand in the period 1985-1989 to 94 per thousand over the period 1995-1999. Infant mortality has declined from 104.6 to 66.3 per thousand over the same period. Although this reduction is appreciable, mortality for infants and children is very high compared to comparator countries whose infant and child mortality per 1,000 live births in the year 2000 was 25 and 29 respectively. Thus there is scope for further advancement which, if improved water supply and medical treatment can be given, will act as a further depressant on fertility (Khan and Raeside, 1994) and will contribute to increased life expectancy. The UN median projection indicates that the infant and child mortality will fall to 26.9 per 1,000 live births. Conditions for children seem to be better in urban areas as their mortality is lower and so further urbanisation should hopefully lead to increased reduction in these rates. Johnson and Sufian (1992) point out that reduction in son mortality will have a positive effect on the propensity to use contraception.

Urbanisation

Generally, populations with a high urban proportion have a higher HDI and their

demographic profiles tend to be associated with lower fertility and lower child mortality and higher life expectancy than population such as in Bangladesh which is predominantly rural. The population of Bangladesh is becoming increasingly urban. In 1975 only 9.9% of the population were classed as urban and this rose to 25.0% by the year 2000 and UNDP (2003) projects that this will rise to 34.4% by 2015. The World Bank projects that by 2020 the urban population will be almost the same proportion as the rural population and much of it will be in the megacities of Dhaka and Chittagong. It is pointed out clearly in the World Bank report (1996) that "that transformation can bring either prosperity or decline, depending largely on the degree to which the two megacities, Dhaka and Chittagong, the existing metropolitan areas of Rajshahi and Khulna and roughly a score of small towns that are due to mushroom manage a host of monumental challenges". Thus there is a huge need for investment in civil engineering projects and creation of work which is not tied to land. Given the current situation of Bangladesh, it is difficult to assume how the demand for skills and resources of the scale required can be met.

Status of Women

Although the UNDP ranks Bangladesh lowest in terms of empowerment of women, this marks the rise in status of Bangladeshi women, and occurs largely through failure to include many nations in the ranking. Studies such as Jejeebhoy (1995) and Barkat et al. (1997) have shown that increasing empowerment and autonomy of women have been important in reducing fertility and increasing contraceptive prevalence. However, on other measures such as gender development index, Bangladesh ranks at 121 and the life expectancy at birth of Bangladeshi women remains low at 59.5 years. In terms of literacy, women of Bangladesh do not compare well with other countries classed as low human development (LHD) with only 29.9% of adult women and 39.8% of those in the 15 to 24 year age group classed as literate compared to the average of LHD countries of 38.5% and 56.7% respectively.

Education

Many researchers have demonstrated the link between fertility reduction, reduced child mortality and increased life expectancy and education, particularly education of women (Cleland et al., 1994). It is directly related with choice of family size, use of contraception, method of delivery, child care, nutrition and so on. But education also works indirectly by delaying age at marriage, rearing children more expensive and making children more valued. (See for example, Caldwell 1980, Tan and Haines 1984, Freedman 1987, Mahmood et al. 1993, Dasgupta 1994, Khan and Raeside 1994, and Jejeebhoy 1995).

Trends in education in Bangladesh are positive; yet, only a small percentage progress to tertiary education (3% of women in 2000). All trends, however, show growth in the number of students, teachers and institutions (see key educational indicators in the BANBEIS, 2003) and the increased number of universities after 1994. In 1985-7, only around 54% were enrolled in primary school – at present primary school enrolment is universal. In 1985-7, only 19% were enrolled in secondary education; this has now risen to a gross enrolment rate of 55.7% in junior secondary school shooting up to 19.9% in higher secondary school. There is also a persistent fall in the high drop-out rate which was noted by Lovell and Fatema (1989).

Another enduring trend is that more children, especially females attend school in urban areas than in rural areas, for example, in 1974 about 30.2% of urban females aged 5 to 24 attended school while only 13.0% of their rural counterparts did. By 1991, 40.55 of urban females aged 5 to 24 years had enrolled in education compared to 30.2% of rural females. Although the gap between urban and rural women has narrowed, however, it is still significant. As the Bangladeshi population becomes more urban, one can speculate that engagement in education will increase.

In order to develop Bangladesh, skills required to develop an economy to support the projected population will be increasingly reliant on the manufacturing sector. The continued expansion of education especially at post-secondary level, therefore, is vital. There is also a huge unmet demand for education amongst the people of Bangladesh. Thus spending on education must rise from its present 2.3% share of GNP which is very low compared even with less developed countries. There is also the need for expansion of science and technology education in higher study – currently the emphasis is too much on liberal arts. From the above brief review, the situation is seen to be

clearly improving for Bangladesh but perhaps not as fast as will be necessary for the nation to avoid catastrophe due to the pressure of the growing population and the difficulties of ensuring sustainability in a mainly agrarian economy which is so dependent on the vagaries of nature.

The World Bank (1996), however, indicates that it is possible for Bangladesh to meet this challenge but this will require increasing GDP growth rate by seven to eight percent and finding employment for over 50 million people in the next 25 years. To do this, the World Bank argues, will require a shift away from subsistence agriculture to the introduction of high-yielding cash crops and a growth of employment in manufacturing industries such as garments and the like. Although Bangladeshi workers are praised as hard-working, flexible and loyal, there will be the need for huge investment in productive sector. Emphasis should be given on the reform of education as well as on health services. National and local governance will also need to be reformed and made more effective and there needs to be encouragement of private rather than state-owned enterprises. Added to this, the need to preserve environmental sustainability and improvement of the transport and power infrastructure are challenges involving huge cost. However, the demographic trend through reducing the dependent young population may work to make this feasible. The projected changes in age structure and their consequences are reviewed in the next section.

The Consequences of Changes in Age Structure

Reducing fertility and increased longevity will mean that the proportion of the young will fall while that of the old will increase. The implications of this on the dependency ratio can be seen from the charts of the UN dependency ratios which appear in figures 5a, 5b and 5c.

Figure 5a: Total Dependency Ratio

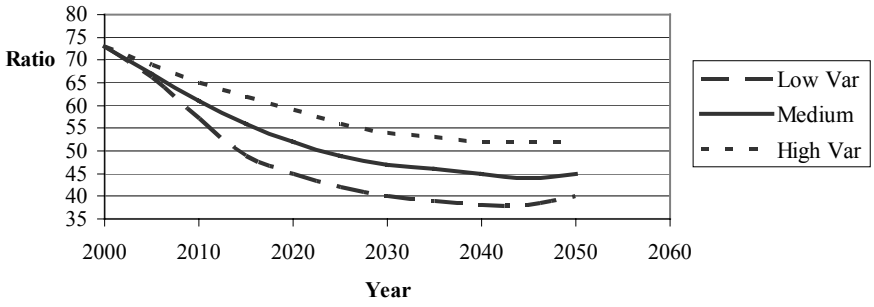


Figure 5b: Child Dependency Ratio

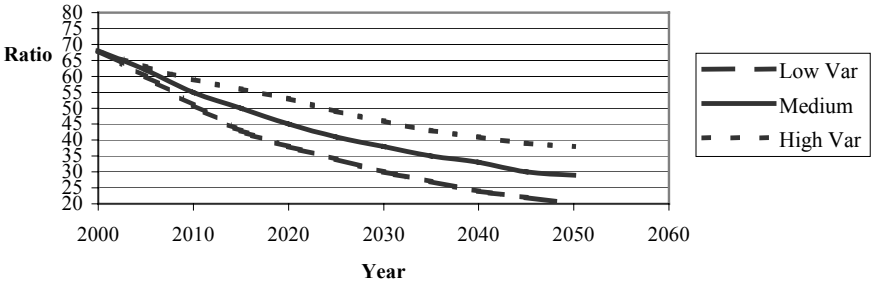
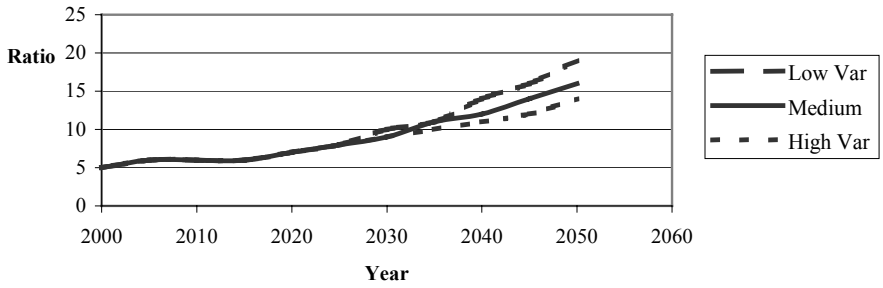


Figure 5c: Elderly Dependency Ratio



From figure 5a it is clear that there will be a large fall in the dependent population of Bangladesh. Indeed by 2030, it is projected that there will be a fall of over 35%. From figure 5b one can observe that there will be a continuous fall of the child dependent population falling by over 35% by the year 2030. But the dependency ratio of the elderly is rising gradually. This is consistent with the situation in developed countries (Raeside and Khan, 2003) The effect of ageing will become important for Bangladesh after 2030. Thus perhaps Bangladesh should be seen as a mine of labour supply for the next 30 years. This may well be exploited to an extent by the developed nations who face the prospect of labour shortage as a result of rapidly ageing population.

The government and people of Bangladesh need to exploit this situation and capture wealth from the developed nations. But to do this, people need to be freed from land, there need to be more investment in human capital to upskill, the infrastructure of the country need to be improved and to attract foreign investment, Bangladesh must improve its governance and international reputation. If the reduction in fertility occurs quicker than projected by the UN and predicted by the logistic model then these changes will become manifest sooner and so planning on how to maximise the benefit of a lower dependent population is now required.

To capitalise on this potential population advantage, there will be the need for planned investment that is linked to the age structure of the population in that those of school age should be prioritised for investment, then training programme established to target those of post school age to improve their literacy and equip them with skills suited for basic manufacturing. Then after 2030, any surplus left need to be channelled into old age support especially as the next twenty to thirty years may well see the collapse and dismantlement of traditional family based support mechanisms.

This is going to need careful management and will require detailed forecasts on how the age structure of particular groups will change in order that investments can be targeted most effectively and to ascertain which groups will create economic surplus. To address this, a suitable methodology of forecasting preferably a "multi-state population forecasting" is suggested. In Bangladesh two methods have normally been used such as i) component method using balance equations, and ii) Age sex cohort-component methods. Cohort-component method is widely used for population forecasting purposes even in the UN projections. These methods certainly have their own advantages and disadvantages and details of these can be found in some demographic texts, for example, Shryock et al. (1975) and Alhberg (1992). Multi-state cohort-component method is relatively a new concept and the prime advantage of the multi-state population projection is that it allows accommodating other important features such as education or place of residence (Cao, 2000).

IV. CONCLUSION

The present study attempts to examine the socio-demographic changes and their impact on the economic development of Bangladesh. This study reviews the literature and confirms that

Bangladesh has undergone rapid fertility decline and moderate mortality decline, although the net migration flow will remain unchanged. It is suggested that the decline in fertility and consequent slowing of population growth in Bangladesh may occur quicker than that projected by the UN. It is postulated that replacement level fertility may occur close to the year 2016 rather than ten years later as suggested by the UN projections. But to realise this requires a substantial investment in education, a shift away from subsistence agriculture to cash crops and development of manufacture and sustainable management of large urban areas and development of suitable infrastructure. As a consequence of demographic change, there will be a youth bulge of employable age. The reduction in the dependent population will give Bangladesh a potential competitive advantage to attract low skilled manufacturing private companies of the developed nations who require dependable but low wage employees to compete in global markets. As aging is becoming a problem with the developed nations, developing countries with youth bulge may become increasingly attractive for investment. To make this happen, again, there needs to be investment in education to develop skills in science and technology and reform of the practice of governance in Bangladesh administration.

To use resources most efficiently and attain suitable returns, sectors should be targeted with relation to the population age structure, residence and educational needs. Thus government requires reliable and sound age-structure-based forecasts of the population. To obtain these, it is suggested that knowledge of the period-cohort transitions of the population adjusted by the age-specific survival rates be used. This should be incorporated into a multi-state methodology (Cao, 2000).

The Government of Bangladesh is trying to remove illiteracy from society and as a result, the recent enrolment rate has much increased. The Government is committed to continue these efforts in the future. Thus, it is anticipated that educational level will increase in near future. The huge youth bulge generation needs education, housing and employment opportunities. This needs proper attention and is very important for policy makers to plan for the future. Based on the findings of the present study, the policy implications are as follows:

- In the near future there will be an increased demand for jobs. Development will be concentrated in the rural areas of the country as the vast majority of the country's active-age population live in rural areas. Therefore, government should decentralize the administrative offices in various parts of the country preferably near the rural or urban-rural boarder areas and create job opportunities.

- Government should try to manage the urban expansion by investing in civil engineering works and creating urban jobs.

- Government should utilize the youth generation in right direction in order to develop the country. Otherwise, it will create a huge burden on the society. One example is that the country is earning foreign money from the garments sector by employing female workers and most of them are young girls. This young generation should have the opportunity to involve themselves in many prospective cash crop agriculture, small industries and information technology.

- Larger investment in education with more focus on science and technology should be continued. There is also a need for post-school vocational education to develop a workforce which could be freed from the land to acquire skills to engage in manufacturing industries.

All these are well known but raising a surplus for investment seems impossible given the state of poverty in Bangladesh. Bangladesh should court foreign multi-national help to provide the necessary infrastructure and investment in education and training. As global competition and wage rates increase, Bangladesh will be perceived as being increasingly attractive for investment. The country must develop surpluses to escape the branding of a low wage economy. To facilitate this, Bangladesh must improve its international reputation and no longer be perceived as a corrupt country. If Bangladesh does not rise to the challenge of the growth of those of working age, then poverty will persist and in 30 or so years a major demographic problem may emerge - a population with a large dependent and infirm elders.

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