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Bangladesh Population Projections

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Abstract

This analysis aims to undertake midterm and long-term population projection for Bangladesh. The projections years are 2040, 2060 and 2100 based on 2011 census population. At first, populations are projected by sex for 546 upazilas (sub-district); then the upazila projected populations are aggregated to obtain district wise and national population for the selected years, 2040, 2060 and 2100. Both the upazila and national populations are segregated by sex for different age groups. We found that in 2040 population is increasing pattern, 2060 also slightly increase but after 2060 population will be decrease because of achieving demographic pattern.

1. Introduction

Computation of future changes in population numbers given certain assumptions about future trends in the rate of fertility, mortality and migration. Demographers often use low, medium, and high variants of population projection based on different assumptions on how this rates will change over time.

Population projection is the technique of forecasting the demographic situation that may expect to uphold in future years, population projection may be considered as the age, sex, specified basis only vital registration is very much essential for population projection.

Population projections are useful for a variety of purposes, most commonly as a basis for planning. For example, assessing a nation's or region's needs for new jobs, teachers, schools, doctors, nurses, urban housing, or food requires knowledge of the number of people who will be requiring services. Thus, population projections serve as the starting point for most projections of future need. Population projections are also important for policy dialogue. A key aspect of the policy process is recognizing that a problem exists and placing that problem on the policy agenda. Since rapid population growth contributes too many of the major development problems, population projections are required to illustrate the future magnitude of the problems. For example, a population projection is required in order to illustrate the future threat to forests from excessive use of fuel wood. A discussion of the need for and impact of an

expanded program of immunization requires a population projection to show the number of children who will need vaccination in the future and the reduction in morbidity and mortality rates that could be achieved by the proposed program. Population projections are required also in areas of the policy process that involve proposals to solve problems. In this case, population projections are required to show the magnitude of the services that will be required for the proposed solution and the improvements in population-based indicators that will occur. Looking at future population composition and size usually requires producing several projections, for two reasons. First, projections are based on assumptions about future levels of fertility, mortality and migration. Since these are simply assumptions, it is often wise to consider low, medium and high variants of each assumption so that the range of plausible projections can be determined. Second, when population projections are used for policy dialogue, it is usually important to show how various rates of population growth would affect the projections. For example, an analysis of the impacts of population growth on education typically would include a high-growth projection to show the magnitude of the problem under current conditions, and a low-growth projection to show how a slower-growing population would put less pressure on the education system to meet national education goals.

1.1 Method and Rationale of the method

A large number of methods such as Cohort Component, Exponential, Geometric, Balancing Equation and Logistic are available in literature for population projection. Among them, Cohort Component method is considered the most effective and widely used method for population projection as it takes into account of age, sex and spatial distribution as well as fertility, mortality and migration condition of a particular population. In this analysis, we have used the Cohort Component method for projecting the population in Bangladesh, where components refer to fertility, mortality and migration. The method considers that each cohort survives forward to the next age group according to assumed age specific mortality rates (or survival rates).

The projections are carried out by using demographic software Spectrum (Stover and Kirneyer 1997). The customized version of Spectrum requires the following information that are estimated or collected from various published sources for upzilla wise population projection by using Cohort Component method (Table 1).

- Upzilla wise age-sex specific population for the base year (base population)
- Total fertility rate (TFR) for the projection years
- Life expectancy at birth for both males and females
- A model life table by sex.
- Net upzilla wise migration rate
- Sex ratio at birth, male& female

First, upzilla wise population projections are made and then district wise and national populations are calculated through aggregation for the projection years.

2. Sources of data used for projections

The following sources of data were used for projections:

Data	Source
Upzilla wise age-sex specific population for the base year 2011(base population)	Population and Housing census 2011 conducted by BBS.
TFR is assumed as 2.1 in 2016 (Medium variant) and for subsequent years.	Based on BDHS 2011 report and BBS (1994).
Life expectancy at birth for males and females 70 years and 71 years respectively in and beyond 2016 years.	Based on United Nations (2011)
South Asian Life Table Model by sex is used as the model life table	Generated by the software (Spectrum) internally.
Upzilla wise net migration rates	Estimating Migration for upazila (Islam et al 2015), Dhaka.
Sex ratio at birth (Male: Female:: 100:100.3)	Population and housing census 2011 conducted by BBS.

Upzilla wise age specific male and female populations obtained from Census 2011 by Bangladesh Bureau of Statistics (BBS) are used as the base population.

Since Bangladesh is passing though fertility transition from medium to low in recent years (decreased to 2.3 from 3.3 during last 10 years), to project TFR, we assumed

medium variant with NRR=1 by 2016 (BBS 1994) which corresponds to TFR 2.1 in 2016 (NRR~0.488*TFR) with an initial value 2.3 in 2011 (BDHS 2011). National TFR rate of 2.1 is applied for all upazilas over the projection periods.

Long term life expectancies at birth for Least Developed Countries are available in (*World Population Prospects, 2010 Revision, Volume II: Demographic profiles)*. The report asserted life expectancy remaining low in LDCs, at just 57 years in 2005-2010. The study projected it to reach 69 years in 2045-2050 and 77 years in 2095-2100, recognizing "such increase is contingent on reducing spread of HIV and combating successfully other infectious diseases". Bangladesh has been one of the country's most vulnerable to climate change and related environmental hazards (e.g., floods, storm, tidal surges, droughts and diseases), expected more so in the coming decades. Following this, we considered average life expectancies as 70 and 71 years for male and female respectively for the projection period.

The South Asian Life Table is used as the model life table for the projection which is generated by the software Spectrum internally.

Estimated upazilla wise net migration rates for districts using both indirect (residual) and direct (vital statistics) methods. The International net migration rates are embedded within the estimated rates[1]. For upazilla population projections we used corresponding estimated upazilla migration rates[2]. Since upazilla wise net migration rates were not readily available we applied district wise net migration rates as a proxy.

[1]**While projecting national population in Bangladesh we often use net international migration rate (**difference between the number of persons entering and leaving a country) per 1,000 persons. The available source (CIA World Fact book) shows net international migration rate for male in 2011 is -1.57 per 1000 people in Bangladesh while no records of female net migration is available anywhere.

[2]Various documents suggest that climate refugees are already pouring into urban areas including capital city (currently urbanization rate is around 4%). Apart from that, it is feared that a significant part of coastal areas will be under water in the coming decades due to climate change-induced hazards. Following all these, while some upazilas might experience higher net migration rates, some might also be subject to lower rates so that we used the current migration rates as average during the population projection.

Sex ratio refers to the ratio of number of male and number of female population which is recorded as 100.3 for national level in the census 2011 conducted by BBS. National level sex ratio is used in upazilla wise projections.

3. Empirical Result

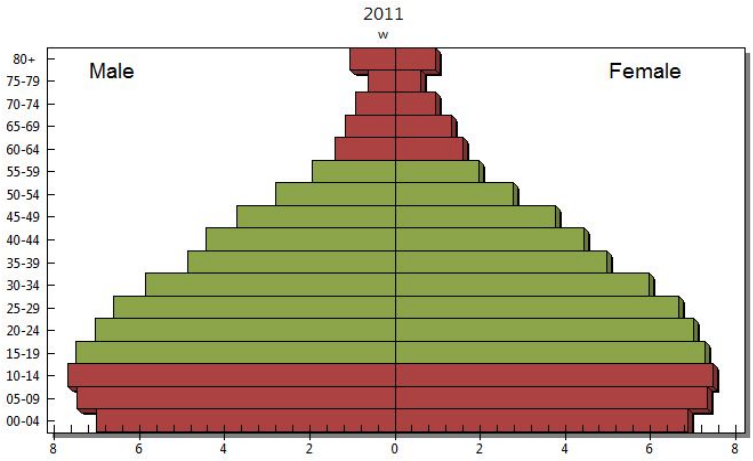

Figure 1: Population Pyramid for the year 2011 (5 Year Age Group, Population Figures Given in Millions)

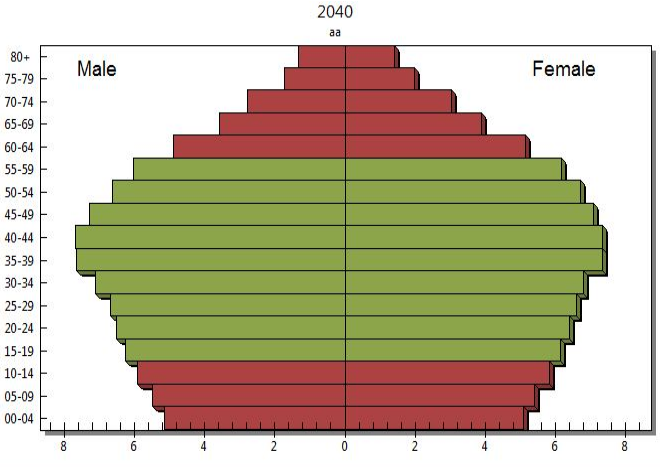

Figure 2: Population Pyramid for the Year 2040 (5 Year Age Group, Population Figures Given in Millions)

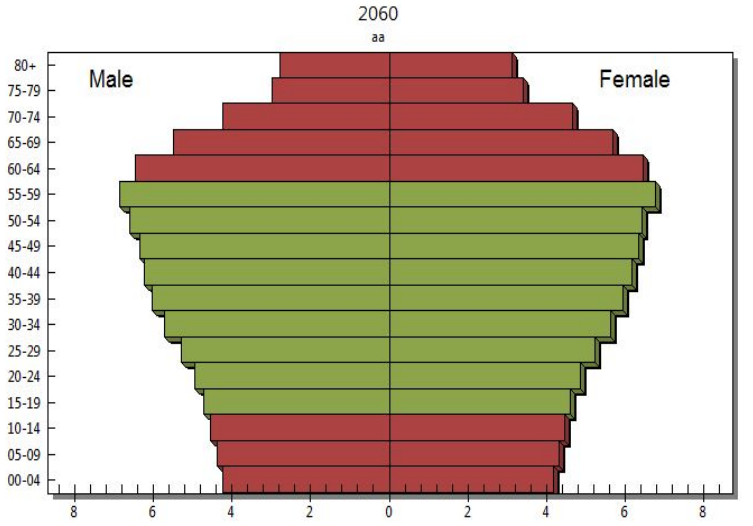

Figure 3: Population Pyramid for the Year 2060 (5 Year Age Group, Population Figures Given in Millions)

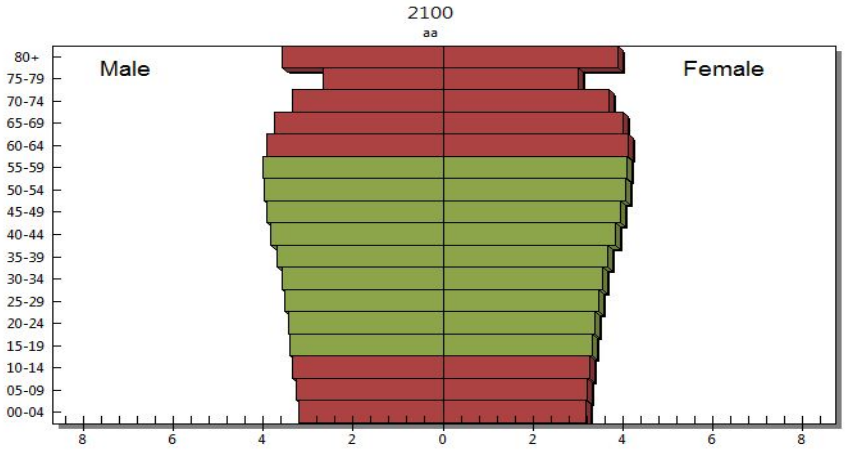

Figure 4: Population Pyramid for the Year 2100 (5 Year Age Group, Population Figures Given in Millions)

The population pyramids above illustrate that in 2011, the proportion of population under 14 years is enormously high while that of elderly people is relatively much low. With the span of years, the proportion of young and older people will gradually become lower and higher respectively.

Table 1 depicts sex wise projected national population for the years 2020-2100 which are obtained through aggregation of upazilla wise projected populations in respective years.

Table 1: Projected Populations by Sex: Bangladesh

Year	Both (Millions)		
	Total	**Male**	**Female**
2011	150.96 (Actual)	75.57 (Actual)	75.39 (Actual)
2020	168.14	83.67	84.47
2030	182.65	90.44	92.21
2040	191.41	94.19	97.22
2050	194.23	95.01	99.22
2060	192.18	94.37	97.81
2070	185.45	89.80	95.65
2080	176.58	85.19	91.39
2090	167.49	80.61	86.68
2100	158.62	76.85	81.77

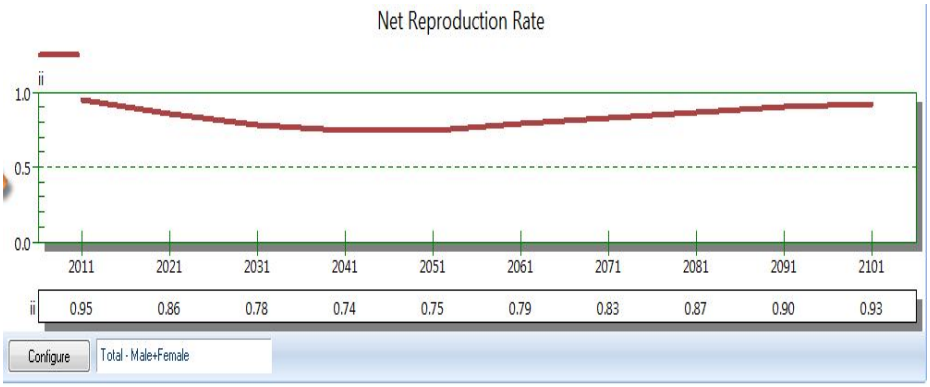

Figure 1: Net Reproduction Rate

It is evident from the above figure that the net reproduction rate is decreasing over the years 2011-2050. Therefore population will be decrease.

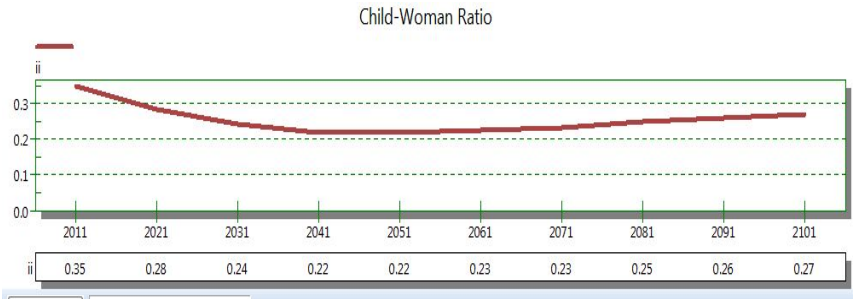

Figure 2: Child Woman Ratio

It is followed from this figure child-woman ratio at first is decreasing then slightly increasing that is the ratio of living children aged 0-4 years and women aged 15-49 years first is decreasing then slightly increasing.

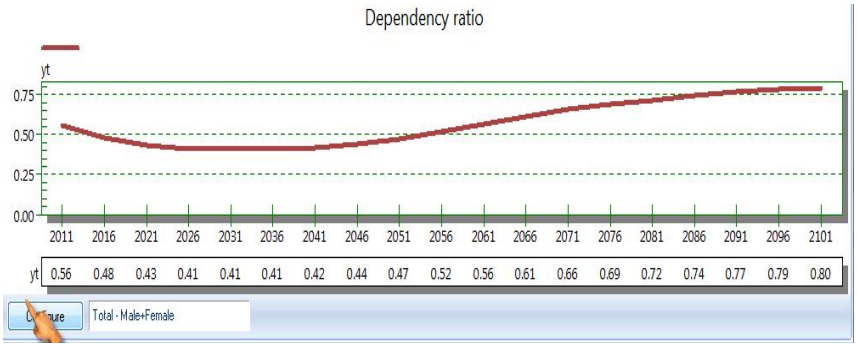

Figure 4: Dependency Ratio

From this figure we have seen that the dependency ratio is gradually increase so there may be an increased burden on the productive part of the population to maintain the upbringing and pensions of the economically dependent. This results in direct impacts on financial expenditures on things like social security, as well as many indirect consequences.

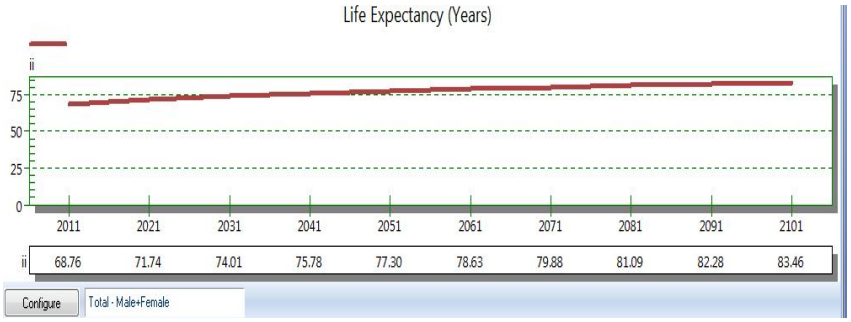

Figure 5: Life Expectancy

This figure shows that life expectancy of male and female are increasing while the life expectation is increased people is not interested to take too much child therefore population will decrease.

Table 3: Projected Population by the Exponential Growth Rate

Years	2011	2040	2060	2100
Total	150958036	220082371	285431449	480103589

It is evident from the above table by the exponential growth rate of the population of Bangladesh is rapidly increasing over the years.

Table 3: Projected Population by the Cohort Component Methods

Years	2011	2040	2060	2100
Total	150958036	191410000	192180000	158620000

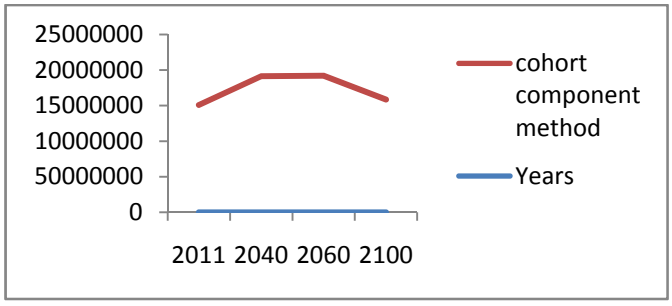

Figure 6: Diagram Projected Population by the Cohort Component Method

It is evident from the above figure that there is an increasing trend in size of the projected populations until 2050, and thereafter depicting a declining trend. In 2100, the population estimates as roughly similar to back in 2011.

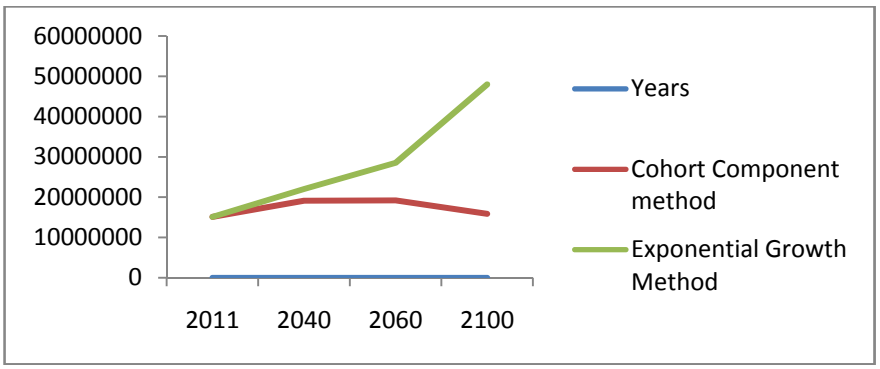

Figure 7: Projected Population by Cohort Component Method and Exponential Growth Rate Method

The figure 7 shows that in exponential growth rate method population is increasing pattern there is no migration effect but in cohort component method is firstly increase then decrease because of net migration.

4. Comparison with other projections

A number of short-term, medium term and long-term projections of Bangladesh population are available in literature. BBS (1994) and BIDS (2012) projected the population for the year 2021. The projected populations for 2021 estimate as 171.2 million and 174.0 million (made by BIDS and BBS respectively). Mahsin et. Al. (2012) projected the total population as 198.9 million for 2051 by using Bayesian methodology. Using logistic model, Minarul Haque et. al (2012) estimated the projected populations for 2020, 2030 and 2035 as 169.8 million, 193.3 million and 205.9 million respectively. United Nations (2011), in the study of World Population Prospects reported long-term projected population in Bangladesh for the years up to 2100 (Table 17). Very insignificant difference can be observed between UN and our results. The UN projections reveal that the change of population is + 29.14 percent during 2011-2050 and -19.06 percent during 2050-2100 which are almost similar to those of our projections (Table 17).

5. Conclusions

In this study, an attempt has been made to project the population in Bangladesh for male and female. We have done our work in medium variants (NRR=0.488*TFR). In 2040, the population of Bangladesh is estimated to be 191410 thousand, in 2060 it is to be 192180 thousand and in 2100 it is estimated to be 158620 thousand. The obtained population has been split into different age group. The figures there can help government and non-government agencies in formulating their policies. The population pyramid is also presented in different age group to make it suitable to different stakeholders. The age structure of projected population shows an increasing and decreasing pattern for all age groups, there are ups and downs in total numbers and proportion changes. A sharp increase of urbanization has been depicted in all projection if we see the district wise population. The age-specific projected values show that at the age of 30-34 and onwards, population increases sharply. This indicates movement of the population towards the older age groups, the increase in the old age population will pose a formidable challenge to the policy makers if necessary measures to take care of the old age population are not considered with top priority. This increased projected population could create implementation and institutional challenges.

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