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**Titled**

**POPULATION DYNAMICS OF BANGLADESH; A STUDY ON KEY  
DEMOGRAPHIC TRENDS AND POPULATION PROJECTION OF BANGLADESH**

*Be accepted in partial fulfilment for the degree of MA in governance and Development under the  
program of BRAC Institute of Governance and Development – BRAC University, Dhaka*

.....

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## **DECLARATION**

I hereby declare that except where specific reference is made to the work of others, the contents of this paper are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other University. The data has been collected from different national and international sources with proper referencing and footnotes. This paper is the result of my own work and includes nothing which is the outcome of work done in collaboration, except where specifically indicated in the text. This is also to be cleared that the projections are based on assumptions and cannot be proven based on future events. This research paper or any portion thereof cannot be copied, microfilmed or reproduced for any commercial purpose. Data therein can, however, be used and published with acknowledgement of their sources.

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## ACKNOWLEDGEMENT

I would like to express my profound regards and deep sense of gratitude towards my supervisor **Dr. M. Millat-E-Mustafa**, Senior Monitoring and Evaluation Consultant, KSRelief, Saudi Arabia for the valuable suggestions, continuous guidance and all out support in smooth completion of this demographic research paper. It would be impossible for me to complete this research paper without his constant inspiration and guideline. Nevertheless, I express my gratitude to the Almighty Allah for giving me the strength to complete the research paper.

## Abstract

This study aims to analyze the demographic transition and the impact of these changes in the coming years to provide opportunities for more meaningful policymaking in Bangladesh. It analyzes the components of population structure from three perspectives: historical population trends, current demographic profile and population projection. Data are collected from different secondary sources.

Previous trends indicate that the population of Bangladesh has doubled in the period from 1971 to 2011. The growth rate has declined to 1.02% during the same period. The sex composition of Bangladesh is also symmetrical in recent years, the age specific fertility rate indicates higher adolescent fertility rate in the future. The current trend in age structure depicts a large number of people entering the working age group. The trend in the net migration rate continues to rise as employment opportunities in Bangladesh are insufficient and people tend to go abroad to improve their standard of living.

Future projections indicate that the population growth rate will be steadily reduced until 2020, after which there will be a sharp decline in the growth rate until 2050. Despite the low rate, the total population will increase and the population is estimated to reach 201 million by the end of 2050. The current structure of the sex age population is pyramid shaped and it will take the view of the barrel shape by 2050. By the end of the projection period, the size and share of the elderly population will increase (60 +).

The study also depicts emerging windows of opportunity as well as the challenges faced by Bangladesh. Furthermore, this study also focuses on policy recommendations that can help to meet the expected challenges of the future.

**Key Words:** Demographic transition, Population structure, Demographic profile, Population projection, Policy recommendations.

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## List of Abbreviations

| Symbol       | Description                                          |
|--------------|------------------------------------------------------|
| <b>UN</b>    | United Nations                                       |
| <b>UNDP</b>  | United Nations Development Program                   |
| <b>WHO</b>   | World Health Organization                            |
| <b>UNFPS</b> | United Nations Population Fund                       |
| <b>TFR</b>   | Total Fertility Rate                                 |
| <b>IMR</b>   | Infant Mortality Rate                                |
| <b>CBR</b>   | Crude Birth Rate                                     |
| <b>CDR</b>   | Crude Death Rate                                     |
| <b>NRR</b>   | Net Reproduction Rate                                |
| <b>NPP</b>   | National Population Policy                           |
| <b>FYP</b>   | Five-Year plan                                       |
| <b>ICPD</b>  | International Conference on Population & Development |



## 1.0 Introduction

### 1.1 Background of the Study

The world is going through fundamental changes and challenges with the drift of time. If we go back 200 years, there were less than a billion people living on earth. Today, according to the calculation of the United Nations (UN), there are over 7 billion of us, more accurately 7.6 billion people is breathing in world's atmosphere. The world's population has experienced continuous growth since 1400. Recent estimates advocate that today's population size is roughly equivalent to 6.9% of the total number of people ever born.<sup>1</sup>

The most noticeable fact about world population growth is, for thousands of years, the population grew slowly but in recent centuries, it has jumped dramatically. Looking back to early 9<sup>th</sup> century, it procured nearly seven centuries for the population to double from 0.25 to 0.5 billion in the middle of the 16<sup>th</sup> century. Effects speeded up in between 1900 and 2000. The world population has increased three times during this time frame, The estimated change was an increase from 1.5 to 6.1 billion in within the span of 100 years. The fastest doubling period of the world population happened between 1950 and 1987. Population doubled from 2.5 to 5 billion people in just 37 years.<sup>2</sup> This time population doubled within a little more than one generation. This period was marked by a crowning population growth of 2.1% in 1962. UN projections recommend that the world population is expected to reach 9 billion by 2050.<sup>3</sup> Indeed, for a long time the world population grew at an increasing rate, Current projections show a steady decline in the annual growth rate. Population growth along with the doubling time is slowing down. Population growth rate was emaciated at 2.2% in 1963, and declined to 1.1% by 2009.<sup>4</sup> The UN projection demonstrates that the doubling time is projected to change until the end of this century. A long chronological period of accelerated growth has thus come to a termination.

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<sup>1</sup> The World at Six Billion, World Population (Year 0 to near stabilization) - United Nations Population Division, 2017 revision.

<sup>2</sup> World Population Growth by Max Roser, Hannah Ritchie and Esteban Ortiz-Ospina, 2019 revision.

<sup>3</sup> United Nations News Portal (21 June 2017, New York): Department of Economic and Social Affairs.

<sup>4</sup> *World Population History, updated at 2019, World Bank Database.*

Six of the Earth's seven continents are permanently colonized on a large scale. The world population is expected to reach 9.8 billion by 2050 (UN projections 2017 revision). It is expected that the majority of the additional 2.3 billion people will be concentrated in developing countries by this period. Projections advocate that the population of the developing countries is likely to rise from 5.6 billion in 2009 to 7.9 billion in 2050 (United Nations, 2009).

China and India are the two most populated countries in the world. These two countries together constitute about 36% of the world's population. There are some notable findings about the new projection at the country level. China with 1.4 billion inhabitants and India with 1.3 billion inhabitants remain the two most populous countries of the world.<sup>5</sup> China and India comprise, respectively, 19% and 18% of the total global population. Within 2024 or in roughly seven years, the population of India is projected to surpass that of China. World population growth or world population dynamics are therefore of great importance to the impact of humankind on the Earth's natural environment.

## **1.2 Rationale of the Study**

With 4.54 billion inhabitants accountable for 60% of the world population, Asia is the most densely populated continent within the seven continents of earth. Statistically, Asia is likely to add about 1.5 billion population by 2050 (Haub, 2002). Among the various countries in Asia, Bangladesh is a developing country with a large population. It is the eighth largest country in terms of the world's population, and the population is the main problem in Bangladesh, which is responsible for creating many other social and economic phenomena. On the other hand, it is the most densely populated countries in the world excluding some handful of small island nations and city states like Singapore and Hong Kong. The population of Bangladesh, according to UNFPA, is about 167.8 million with a density of about 1252 people per square kilometer of land area and with a growth rate of 1.20% (Bangladesh Statistics 2017). During the second half of the last century, Bangladesh experienced rapid population growth. This population wave has caused the population to increase three times during that period. Since independence total fertility rate has

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<sup>5</sup> *World Population Growth by Max Roser, Hannah Ritchie and Esteban Ortiz-Ospina, 2019 revision.*

been reduced by more than two thirds.<sup>6</sup> The number of populations is growing but there is a decline in the rate of growth. So, our country is having a prospective future in shaping its population.

To keep pace with the changing world, each country needs to study its demographics as all the critical questions that we are facing these days are intertwined with population dynamics or more accurately demographic changes. Demography is the study of human populations. It concerns population size, composition and distribution across space and the process through which populations change. The ‘Big Three’ factors of demography; Births, deaths and migration are jointly producing population stability or change. Demographic factors are considered as important mechanisms for both the sources of and responses to future economic, environmental, and social change. Interdisciplinary studies of imminent worldwide revolution can draw on projected developments in population size and growth rate, age structure, urbanization, migration and many other variables. Demographics are convenient for understanding social and economic glitches and recognizing potential explanations and solutions. Demographic studies assist in social planning, market research, insurance forecasting, labor market analysis, economic development and so on. The breadth of this discipline is huge. It draws extensively from related other disciplines as well. They are:

- Fertility, Families and Households
- Ageing and Intergenerational Associations
- Internal Migration and Urbanization
- Development and Environment
- Mortality and Longevity
- Economics, Human Capital and Labor Markets
- Integration processes of migrant populations
- Health inequalities at older ages
- Population and the welfare state

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<sup>6</sup> *Demography of Bangladesh, Bangladesh Bureau of Statistics (BBS), 2017.*

- Population projections
- Religion and demographic behavior

The main focus of this study is on population dynamics. To understand the dynamics a brief knowledge of trends is required. Taking this need into account, an analysis of trends in significant demographic factors is conducted. The analysis of the demographic transition is intended to determine the variant for population projections. This study shows a general overview of population projection under only one variant - the demographic trend. Finally, the report concludes with few recommendations which can be used in the policy making process by the government agencies.

### **1.3 Objectives of the study**

The general objectives of this study are:

1. To analyze the current demographic trends of population in Bangladesh with respect to size, composition, organization and distribution.
2. To evaluate the current trends for future population projection.
3. To identify various methods of measuring population changes.

The specific objectives of this study are:

1. To record different aspects of birth rate and mortality rate of Bangladesh for a certain period of time.
2. To describe the past expansion, current distribution and projected changes in the population pattern for the coming years up to 2050.
3. To enquire about population trends and their relationships with different aspects of social organization in a particular area.
4. To know about the future demographic evaluation and probable consequences resulting from the evolution.

## 2.0 Literature Review

### 2.1 Literature Review Based on Different Aspects of the Research

There have been a number of researches done on the demographic aspects of Bangladesh. Both national and international level of researches has been carried out. Organizations like World Bank, United Nations Population Fund (UNFPA), The Census Bureau, Population Reference Bureau (PRB) and many other institutions or organizations maintain the world population database. These organizations generally do not focus on research at the country level, but focus on the global trend. At national level Bangladesh Bureau of Statistics (BBS), Bangladesh Demographic and Health Survey (BDHS), Household Income and Expenditure Survey (HIES), Demographic surveillance system (DSS), Sample Vital Registration System (SVRS) keep continuous surveillance on the demographic data of Bangladesh and updates the population database with facts and Figure on a regular basis. Again, Bangladesh Bank (the central bank of Bangladesh), Bangladesh Economic Review published by Bangladesh Bureau of Statistics, Bureau of Manpower Employment and Training, an institute of Ministry of Labor and Expatriate Welfare, Refugee and Migratory Movement Research Unit of the University of Dhaka also provide demographic data.

Khan (2014) aims at examining the socio-demographic changes over years and their projected impact on the imminent age-sex structure of population in Bangladesh. He reviewed mechanisms of change in the population. Success in fertility reduction is proving to be a change in shaping the dependent populations. While demonstrating age structure, he shows that a large portion of population is still under the age of 15 who will contribute to the country's future reproduction system. The study suggests that the decline in fertility and consequent slowing of population growth in Bangladesh may happen quicker than that projected by the UN. UN projections have suggested that replacement level fertility will occur ten years later. But it is postulated that the shifting will occur within 2016.<sup>7</sup> A substantial investment in education is required to appreciate this transformation. Bangladesh will need a shift away from subsistence agriculture to cash crops

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<sup>7</sup> *United nations Population Projection up to 2050.*

and development of manufacture and sustainable management of large urban areas and development of suitable infrastructure.

Farid et. al. (2011) explain the present facts and past trends in population dynamics. They have assessed various demographic data sources of last two decades reimbursing specific consideration to the major demographic variables of population, fertility, mortality, and migration profiles. The study provided a portrayal of basic demographic processes of Bangladesh on the basis of the available national and international demographic data sources. The study observes that the demographic indicators of Bangladesh have shown substantial progress during the last two decades. During this time the population amplified in size but growth showed a declining trend. Again, it only describes various demographic events. Therefore, further study is needed to explain the roots of changes in demographic events. This study also lacks evidence of interaction between demographic changes and socio-economic changes and vice versa. Furthermore, the quality of demographic data in Bangladesh is questionable, as are many other developing countries because of the prevalence of illiteracy among the population of the country, who in most cases provide misleading information.

Bangladesh Bureau of Statistics (2011 – 2061) attempted to project the population of the country and explored the distribution among various sectors. The projection has been made under three different variants; high, medium, low. In 2061, the population of Bangladesh is estimated to be 251,450 thousand under high variant fertility assumption (scenario I), 223,390 thousand under medium variant fertility assumption (scenario II) and 209,415 thousand under low variant fertility assumption (scenario III). The population has been fragmented into different segments like school going children, youth, labor force, dependents, etc. Different government and Non-governmental organizations can get benefits from these projections as these facts and Figures can help them to generate their policies. The most important use of population projections is that it can be a rational basis for decision-making. It provides a tool for analyzing the components of growth and the sensitivity of underlying assumptions. The curvature pattern of projected age structure indicates that at the age of 30-34 or onwards, population increases sharply. This indicates an increase towards old age group population. Therefore, our first priority should be to nurture this category of older people, otherwise it will create a formidable challenge for policymakers.

United Nations Population Fund (UNFPA) with the collaboration of national and international authors describe demographic transitions on socio-economic development in Bangladesh. This study used the 2011 census data as the baseline and offered an organized evaluation and policy recommendation on some of the significant topics contained in the International Conference on Population and Development Plan of Action - beyond 2014. The present report highlights some of the critical issues in Bangladesh, including the fact that the overall population density has reached an unprecedented level for any state in the world. Even as fertility rates continue to decline below replacement levels, the population cohort will continue to breed in absolute terms as the country adds at least 50 million more people to reach a staggering total population of at least 200 million by around 2041.<sup>8</sup> The report also provides evidence for the wisdom of accelerating investments in quality education, health services, family planning, sexual and reproductive health. Research carried out on this paper also confirms the seriousness of addressing the causes of gender inequality and gender-based violence. If we can ensure solutions to these problems, it will further unleash the potential of girls and women, who constitute 50 percent of the population. Thus, girls and women will potentially contribute more to national productivity.

Islam (2014) analyzed time series data from national level population surveys, census and the population projections by the UNFPA to examine the demographic transition of Bangladesh. The ongoing demographic transition brings changes in age, sex structure of the rapidly growing population of the country. The changes not only bring about economic and social challenges but also offer policy challenges. The study used the revision of the 2012 United Nations population estimates for most demographic variables. This study takes the previous estimates from 1950 to 2010, a time frame of 100 years. The study considered two estimates; projections of medium variables (1950 – 2010) and projections of low variables (1950 – 2050).

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<sup>8</sup> *Future population prospects and their policy implications, United Nations Population Fund (UNFPA), 2018.*

## 2.2 Research Gap

Several researches have been carried out on population dynamics and population projections from both national and international sources. The demographic data of a country is dynamic. So, the facts and figures need to be updated regularly. The 2011 census data is the latest available for Bangladesh. Most of the research works have been conducted based on the 2011 census data. Most of these research work focuses only on figures that ignore the facts that describe the impact of these changing figures. Few attempts have been taken to project population growth, but ignoring the relationship between different demographic evidences like fertility rate, mortality rate, crude birth rate, crude death rate and other parameters. In this study, most recent data have been collected from different national and international sources. In most cases, the 2017 data are used as the base year. This study will focus on the figures as well as discuss the transitions, analyze the suitable variant and would provide a basic projection for population growth, density of population, age group and net migration for upcoming years till 2050. The projection provided by the UN would also be discussed which was made on the basis of 2011 census data. Furthermore, recommendations on population policy has been made to complement the purpose of this paper.



### 3.0 Methodology

The report uses time series data from all available national and international data sources. The report is divided into three parts: present demographic profile, demographic transition and population projection. At first the demographic profile of Bangladesh has been discussed on the basis of most recent available data. It then takes a deeper look at past historical data, analyzes available literature and finally provides an analysis of demographic transition based on the latest data from reliable sources. In general, anticipating the numbers and characteristics of future population is very difficult. Above of that, there is a serious lack of data in Bangladesh. Available data are not always reliable because a large part of the population lives below the poverty line with little or no education. Approaching to this population group and filtering out the information is not an easy task. In the absence of recent data, the opportunity to elect a preferred projection method has become obsolete. The most used population projection method, cohort component method requires an immense amount of information which nullifies the use of this method due to the unavailability of current data. For this study arithmetic projection method will be used. It assumes the continuation of the amount of population change observed in what is defined as the base period; the period from which the projection is started, through successive equal intervals of time. This is the simplest form of population projection.

Like all other projection methods arithmetic projection is also having some limitations. Arithmetic projection does not consider the changing factors and non-demographic factors rather focus more on the value. The projection provided by the UN is also been summarized to this report to get a clear and comparative view on the future trends. The base year of this research paper is mostly 2019 except for some components where no data for 2019 was available. An estimation Figure was used in 2019 in these cases.

### 3.1 Data Sources

In general, demographic data can be found both from national and international data sources. Both national and international data sources that has been used in this research paper is described below:

#### National Data Sources

- **Census**

Census is considered as the official count of population of a country at a given period of time. In our country Bangladesh Bureau of Statistics (BBS) is responsible for the nationwide census. Among 8 wings of BBS, one is Census Wing, which is responsible for conducting three decennial censuses: The Population and Housing Census, the Agriculture Census, and the Economic Census. After the liberation in 1971, the first Population and Housing Census was carried out in 1974, the first Agriculture Census in 1977 and the first Economic Census in 1986. Since Independence there have been five Population and Housing Censuses with the last one completed in 2011, which is the last official census in Bangladesh. As censuses are conducted in every 10 years in Bangladesh like many other countries, it lacks from continuous data on births, deaths and other vital data on population.

- **Sample survey**

Sample survey is one of the important sources of demographic data in Bangladesh. Different surveys like demographic and health surveys, household and expenditure survey are conducted under the sample surveys. Sample surveys provide a wide variety of data which includes data like age, sex, residence, education, income level etc. Sample survey can provide misleading information or faulty interpretation of data due to lack of proper representativeness.

- **Demographic surveillance system:** Demographic surveillance system (DSS) was started in the 1960s for collecting a wide range of data on family planning, child nutrition, epidemiology, child and maternal health etc. This system provides demographic data in a narrow basis and the data provided are not regular.

## International Data Sources

- **United Nations**

The United Nations population and statistics division compile and circulate global population data including Bangladesh. The population division of the United Nations, namely United Nations Population Fund (UNFPA), publishes World Population Prospects which includes population data from all over the world. The most recent publication is the 2017 Revision which contains demographic data from 1950 with a projection until 2050. The database includes number of populations, population density, population by five-year age group and sex, sex ratio, sex ratio at birth, population growth rate, number of births and deaths and other demographic data. This data source is mostly used in this study. The UN Demographic Year Book also collects, compiles and disseminates some population data in coordination with Bangladesh Bureau of Statistics providing information on population size, composition, births, deaths etc. on an annual basis.

- **Demographic and Health surveys:** Demographic and Health Surveys (DHS) are nationally representative household surveys. DHS provides data for wide range indicators in the areas of population, health, and nutrition. Since 1994 DHS offers reliable demographic data for Bangladesh. The survey obtained detailed information on fertility levels, marriage, fertility preferences, awareness and use of family planning methods, breastfeeding practices, nutritional status of women and young children, childhood mortality, maternal and child health and circulating the information reliably.
- **US Census bureau- International database:** The international database of US Census Bureau provides estimates of population, births, deaths and migration data of all over the country. It provides trend on population progressions and associates demographic status of Bangladesh with global average. It provides data on population size, fertility measures and indicators, mortality and migration
- **World Bank-Open Database:** The mission of the World Bank's Data Group is to provide high quality national and international statistics within and outside the Bank and to improve the capacity of member countries to produce and practice statistical information. The World Bank produces a collection of data publications in various formats including print and electronic that covers a wide range of development issues. These publications reflect the scope of the data work and the wide range of user interests. They also make the

data more available and accessible, especially through the use of maps, charts and graphs. The World Bank is also working hard to help developing countries improve the capacity, efficiency and effectiveness of national statistical systems.

### **3.2 Limitations of the study**

The limitations of the study are discussed below:

1. The paper does not use primary data, rather it entirely depends on secondary data.
2. Due to the unavailability of 2019 demographic data, some statistics are presented in this report using national and international estimations with references.
3. This paper used the arithmetic projection method, which is not the best projection methods.
4. Projections have been made on the basis of assumptions and do not attempt to predict whether these assumptions will actually be true in the future.
5. This paper ignores the non-demographic factors that influence population growth.

## 4.0 Findings and Analysis

### 4.1 Demographic profile of Bangladesh

People's Republic of Bangladesh is located in the northeastern part of the south Asia covering an area of 147570 square kilometers. Bangladesh shares land borders mostly with India except short south eastern frontier with Myanmar and a southern coastline on the Bay of Bengal. Bangladesh is largely ethnically homogeneous where majority of the population is comprised with Bengali ethno-linguistic group. Almost 98% of the population is ethnic Bengalis with the remaining 2% made up from Bihari's and other ethnic tribes. The Chittagong Hill Tracts, Sylhet, Mymensingh and North Bengal divisions are home to diverse native peoples, which have 11 ethnic tribal groups. While North Bengal has a large population of aboriginal Santals, the Mymensingh region is home to a large Garo population. There are many dialects of Bengali spoken throughout the region. Bangladesh is largely an Islamic country with about 86% of the population being Muslims, followed by Hindus (12%), Buddhists (1%) and Christians (0.5%) and others (0.5%).<sup>9</sup>

Bangladesh is predominantly rich fertile, flat, low-lying, mainly riverine country with alluvial soil. The tropical monsoon climate with low regional climate differences makes the country friendly for agriculture. Agriculture is contributing about 22% of the GDP, being the single largest producing sector of the economy. Again, 48% of the total labor force is being served by this sector. But the number of populations is increasing drastically notwithstanding the land area. Since independence, the land under cultivation (net cropped area) has declined by about 7 percent.<sup>10</sup> If this scenario continues there would be no 'Land Frontier' remaining to allow the supply of cultivable land.

The demographic profile of our country indicates that Bangladesh is undergoing a demographic transition period. The last official census in the country was carried out in 2011 when the population of our country was about 142 million. As of 1<sup>st</sup> March 2019, the population of Bangladesh is approximately 168,249,536 people which is an increase of 1.20% (1,990,408

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<sup>9</sup> *Demography of Bangladesh, Bangladesh Bureau of Statistics (BBS).*

<sup>10</sup> *Crop Statistics in Bangladesh, Bangladesh Bureau of Statistics (BBS).*

people) compared to the population of the year before.<sup>11</sup> Looking back at the 1960s and seventies, the birth rate in Bangladesh was among the highest in the world, but this began to decelerate considerably in the 1980s. The fertility rate is now at 2.4 children born per woman. The number of populations is increasing but there is a considerably decline in the growth rate. A basic demographic profile of our country is given below:<sup>12</sup>

| <b>Demographic profile</b>                           |                                                               |
|------------------------------------------------------|---------------------------------------------------------------|
| Current population (as of March 2019)                | 168,249,536                                                   |
| Population rank                                      | 8 (2.19% of world population)                                 |
| Total area                                           | 144,000 km <sup>2</sup> (55,599 mi <sup>2</sup> )             |
| Population density                                   | 1,168.4 per km <sup>2</sup> (3,026.1 people/mi <sup>2</sup> ) |
| Growth rate                                          | 1.02% (2019)                                                  |
| Births per day                                       | 8,294 (As of March 2019)                                      |
| Deaths Per Day                                       | 2,414 (As of March 2019)                                      |
| Net Migrations Per Day                               | -1,194 (As of March 2019)                                     |
| Net Change Per Day (Births - Deaths + Net migration) | 4,686 (As of March 2019)                                      |
| <b>Sex ratio</b>                                     |                                                               |
| Sex ratio                                            | 1.02                                                          |
| Male                                                 | 85,143,087                                                    |
| Female                                               | 83,111,022                                                    |
| <b>Life expectancy</b>                               |                                                               |
| Male                                                 | 67.9 years                                                    |
| Female                                               | 71.7 years                                                    |
| Total life expectancy (both sexes)                   | 69.8 years at birth                                           |
| Median age                                           | 25.6 years                                                    |

<sup>11</sup> *Demography of Bangladesh, Bangladesh Bureau of Statistics (BBS).*

<sup>12</sup> *Population figures are estimated by United Nations population fund (UNFPA), 2017 revision.*

|                                |                              |
|--------------------------------|------------------------------|
| Fertility rate                 | 2.4 children per women       |
| <b>Median age</b>              |                              |
| Total                          | 26.6 Years                   |
| Male                           | 26 Years                     |
| Female                         | 27.3 Years (2017 estimation) |
| <b>Age structure</b>           |                              |
| Under 15 years                 | 34.3%                        |
| Between 15 and 64 years        | 61.1%                        |
| Above 64 years                 | 4.7%                         |
| <b>Literacy of population</b>  |                              |
| Literacy (both sex)            | 61.5%                        |
| adult male                     | 64.57%                       |
| adult female                   | 58.49%                       |
| Youth literacy rates (overall) | 83.18%                       |
| <b>Age dependency ratio</b>    |                              |
| Total dependency ratio         | 63.7%                        |
| Child dependency ratio         | 56.1%                        |
| Aged dependency ratio (65+)    | 7.6%                         |

*Table 1: Demographic profile of Bangladesh*

#### **4.1.1 Density of Population**

As of March 2019, population density per square kilometer (3,019.1/mi<sup>2</sup>) is 116,577 people, which ranks 10<sup>th</sup> in the world.<sup>13</sup> Population is not evenly distributed along the districts or cities. Bangladesh is called an urban country based on their population density. The top 20 cities according to population concentration are provided in the next page:<sup>14</sup>

<sup>13</sup> Population Density Report 2019, World Bank Database

<sup>14</sup>World Population Review: Bangladesh Population Dynamics 2019

| <b>Name</b> | <b>Population</b> |
|-------------|-------------------|
| Dhaka       | 10,356,500        |
| Chittagong  | 3,920,222         |
| Khulna      | 1,342,339         |
| Rajshahi    | 700,133           |
| Comilla     | 389,411           |
| Shibganj    | 378,701           |
| Natore      | 369,138           |
| Rangpur     | 343,122           |
| Tungi       | 337,579           |
| Narsingdi   | 281,080           |
| Bagerhat    | 266,388           |
| Cox's Bazar | 253,788           |
| Jessore     | 243,987           |
| Nagarpur    | 238,422           |
| Sylhet      | 237,000           |
| Mymensingh  | 225,126           |
| Narayanganj | 223,622           |
| Bogra       | 210,000           |
| Dinajpur    | 206,234           |
| Barisal     | 202,242           |

*Table 2: Top 20 cities by population*



The administrative geography of Bangladesh is divided into eight divisions; Barisal, Chittagong, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur and Sylhet. These divisions play a vital role while policy making and governance system. For the purpose of the local government, these divisions are subdivided into 64 districts, each further divided into 493 subdistrict or upazila.



*Figure 1: Administrative Geography of Bangladesh.*

Population density across the administrative divisions is provided in the table 3.<sup>15</sup>

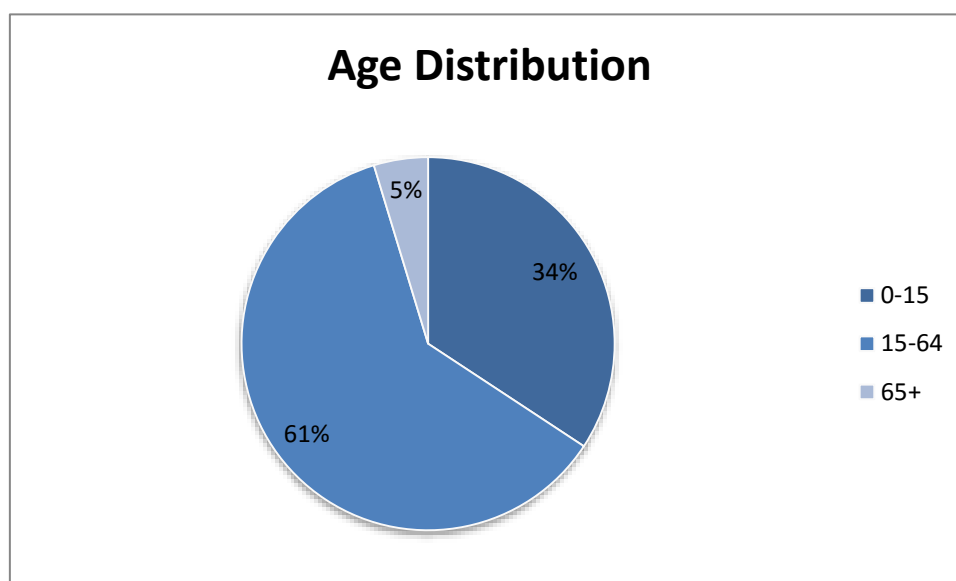
| <b>Division</b>     | <b>Established</b> | <b>Area (km<sup>2</sup>)</b> | <b>Population</b> | <b>Density</b> |
|---------------------|--------------------|------------------------------|-------------------|----------------|
| Barisal Division    | 1 January 1993     | 13,297                       | 8,325,666         | 626            |
| Chittagong Division | 1 January 1829     | 33,771                       | 28,423,019        | 841            |
| Dhaka Division      | 1 January 1829     | 20,593                       | 36,054,418        | 1,751          |
| Khulna Division     | 1 October 1960     | 22,272                       | 15,687,759        | 704            |
| Mymensingh Division | 14 September 2015  | 10,584                       | 11,370,000        | 1,074          |
| Rajshahi Division   | 1 January 1829     | 18,197                       | 18,484,858        | 1,015          |
| Rangpur Division    | 25 January 2010    | 16,317                       | 15,787,758        | 960            |
| Sylhet Division     | 1 August 1995      | 12,596                       | 9,910,219         | 780            |

*Table 3: Administrative Divisions of Bangladesh*

<sup>15</sup> 2011 Population and Housing Census: Preliminary Results

#### 4.1.2 Age-Sex Structure of Current Population

Age-sex structure is a very important component of population dynamics as it contributes the most to shape the structure of a population. The age structure of a population affects a nation's key socio-economic issues. Countries with young populations (high percentage under age 15) need to invest more in schools, while countries with older populations (high percentage ages 65 and over) need to invest more in the health sector. The age structure can also be used to aid predicting potential political, socio-cultural, economic questions. For example, the rapid growth of a young adult population incapable of finding employment can be disastrous. As of the beginning of 2019, the estimated age distribution of the population is:



*Figure 2: Age distribution of people of Bangladesh*

According to United Nations World Population Prospects 50.39% of the population is male and 49.61% is female. In absolute figures estimated young people under 15 years old is 57,509,73 with 29,165,278 being males and 28,344,454 females.<sup>16</sup> Between 15 and 64 years old there are 102,520,778 persons with 48,648,523 male and 53,872,255 female. Above 64 years old there are estimated 7,827,205 persons with 3,828,834 males and 4,000,049 females.

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<sup>16</sup> latest demographic and social statistics by United Nations Statistics Division, 2019.

Like most other developing countries Bangladesh is having an expanding type population pyramid. This type of pyramid indicates a high birth and death rate with relatively shorter life expectancy. Expanding type age distribution model also indicates low level of education and poor health care system which leads to increasing death rate and poor family planning. The pie chart in figure 2 represents that a huge portion of Bangladeshi population is at young age. So ensuring quality education, employment facilities should be the first priority for the policy makers of Bangladesh. The proportion of the working-age population is increasing rapidly, thus opening up new horizons of opportunity if we are able to prudently manage this group with sustainable policies.

## 4.2 Demographic Trend in Bangladesh

### 4.2.1 Trends in population size and compositions

If we look over the historical population data, we can see that less than 30 million people lived in the country at the beginning of 20<sup>th</sup> century. After 1971, the population of our country started to get doubled in size. The population gets doubled in every 40 years<sup>17</sup>. A drastic change in population pattern happened during 1970s due to the libaretion war, femine cyclone and other natural calamities. According to the 2011 population census the population of our country enumerated at 150 million which is exactly double of the population of 1971.<sup>18</sup>

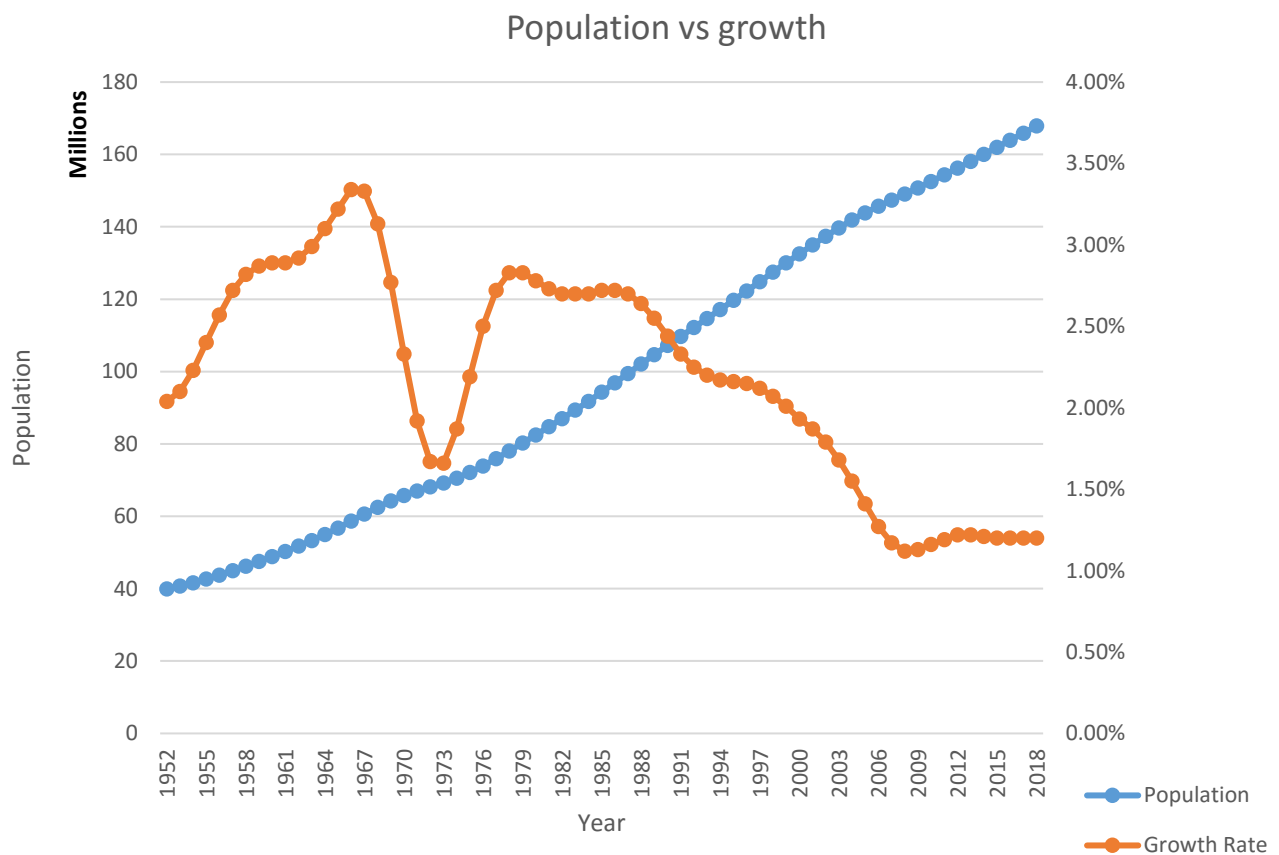
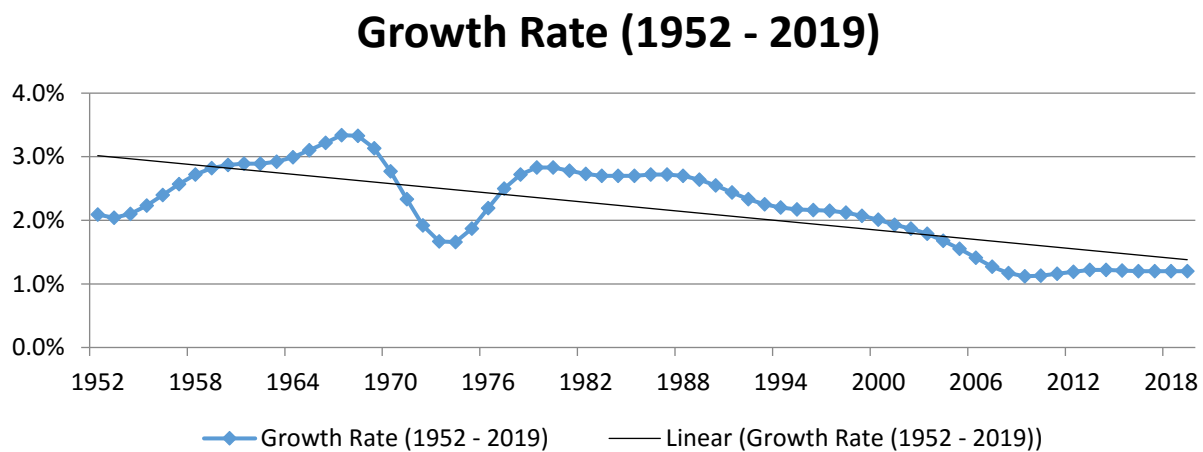


Figure 3: Historical Population of Bangladesh and Growth Rate

<sup>17</sup> Statistical Year Book 2012, Bangladesh Bureau of Statistics (BBS)

<sup>18</sup> Data Source: Population Census 2011

The graphical representation in figure 3 clearly represents that the total number of population is increasing with every passing year. But the growth rate is not seasonal rather there is ups and downs in growth rate. From 1960s to 1970s Bangladesh had the highest growth rate. During the time of liberation war, the growth rate declined but immediately after the war, the growth rate continued to increase dramatically.. Since then there is a remarkable decline in the fertility rate. Over a period of three decades the rate dropped from 7 to 2.4 in 2005 - 2010.<sup>19</sup> At the current millennium the growth rate is declining slowly as the total fertility rate is also reducing.



*Figure 4: Trend in growth rate*

Figure 4 provides a more clear representation of the declining nature of the growth rate. From 2.05% in the time span of (1990 -1995) the growth rate peaked at 3.34% in 1967 and after that started to decline after the liberation war. Currently according to United Nations projection data the growth rate for 2019 is 1.02%.<sup>20</sup> This marked decline in the growth rate was made possible by the Government's ongoing effort. Many investments in population projects and the campaigns have helped to achieve this benchmark.

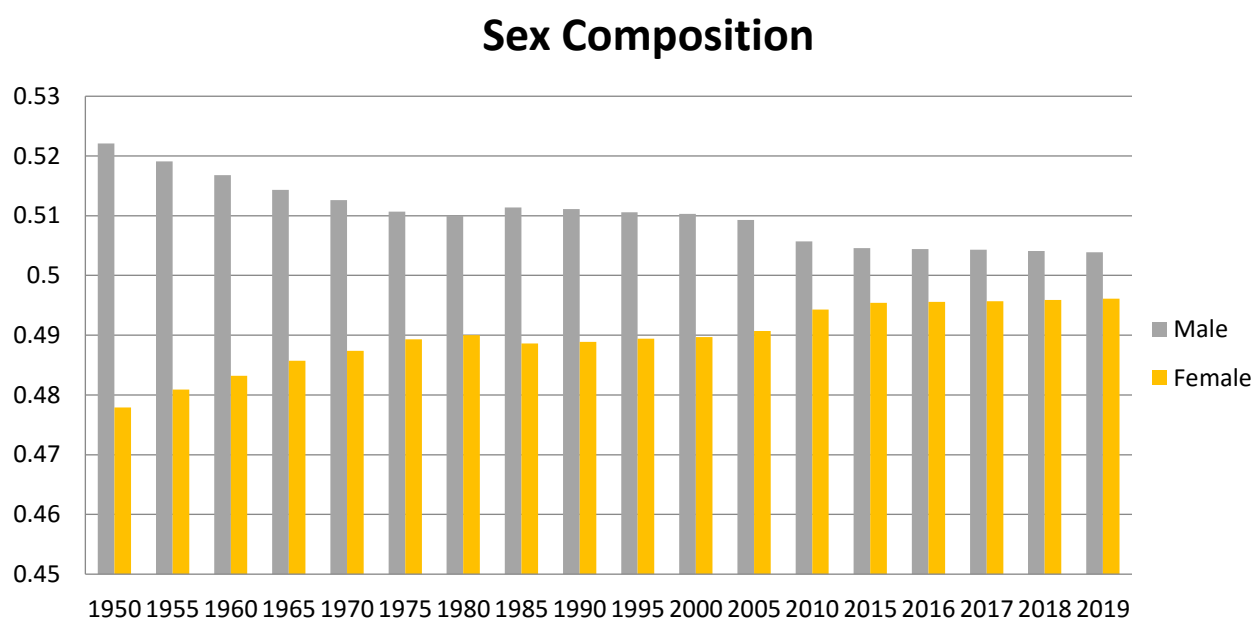
Another important component in population structure is sex composition of the population. A structured population must have a symmetry between the number of male and female population. The under developed and developing countries are most likely to have asymmetrical sex

<sup>19</sup> *World population Prospects 2017.*

<sup>20</sup> *United Nations Population Projection, 2017 revision.*

composition in their population structure. Being a developing country, Bangladesh has shown considerable improvement by shaping the sex composition and has brought almost an equilibrium situation in the the population structure.

The column chart shows the transition in the population size by sex in last two decades. In the period of 1950s, we can see an enormous asymmetry between the male and female population.<sup>21</sup> Illiteracy, superstitions, poor healthcare system are mainly responsible for this asymmetry in the population structure.



*Figure 5: Male-Female composition in percentages.*

Back in the 90s era people were encouraged more to keep male child as the superstition goes like ‘A male child will secure the future of the parents while the female child will only add burden’. Situation started to get better from 2005 as the government gave more focus in bringing symmetry to the population. Enormous steps were taken to encourage and develop the female population by ensuring basic healthcare system, primary education, and also by force stopping the culture of early marriage. Ministry of Health and Family Welfare worked dedicatedly in this sector by introducing different population and family control programs. ছেলে হোক মেয়ে হোক, দু’টি সন্তানই যথেষ্ট (Either boy or girl, two children is enough) was one of the most popular campaigns by the Ministry

<sup>21</sup> Bangladesh Demographic and Health Survey, United Nation Population Prospect 2017 Revision.

of Health and Family Welfare. For the year 2019, 50.39% of the total population is male and 49.61% is female.

#### 4.2.2 Trend in Fertility Rate

The estimates on fertility rate is crucially important as it is directly interrelated with the growth of the population. The total fertility rate for 2019 is estimated to be 2.01 children per women which was 2.17 children per women in 2017.<sup>22</sup>

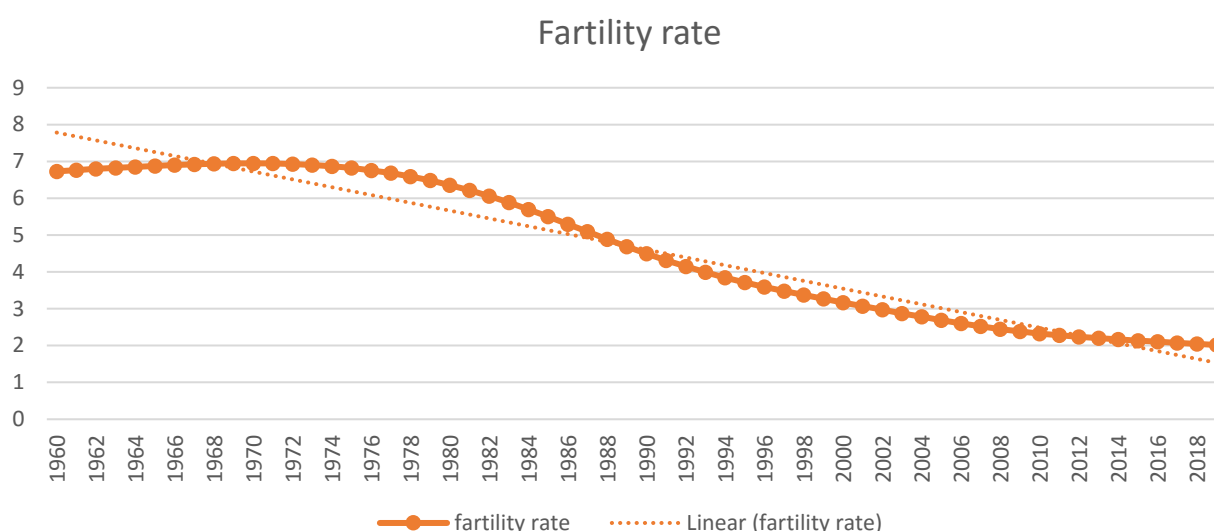


Figure 6: Trend in TFR over the decades.

Figure 6 represents a decreasing pattern in fertility rate within a short period of two decades which is a very good sign for Bangladesh as the country is suffering from high population pressure. However, during 1990s the TFR was static at 3 births per women. After a decade long stagnation in the trend line, the TFR started to decline again in 2000s and still the line is going downwards.

Despite of the decreasing nature in TFR, Bangladesh still remains a country with high adolescent fertility rate. In Bangladesh, the law is governing the age of marriage and the legal minimum age of marriage is 18 for girls and 21 for boys. However, despite the law, early teenage marriages/child

<sup>22</sup> Bangladesh Demographic Profile 2018; Fertility data, World Bank database.



marriages are common and the average age for a girl at first marriage has reduced from 16 years in 2003 to 15 in 2007.<sup>23</sup>

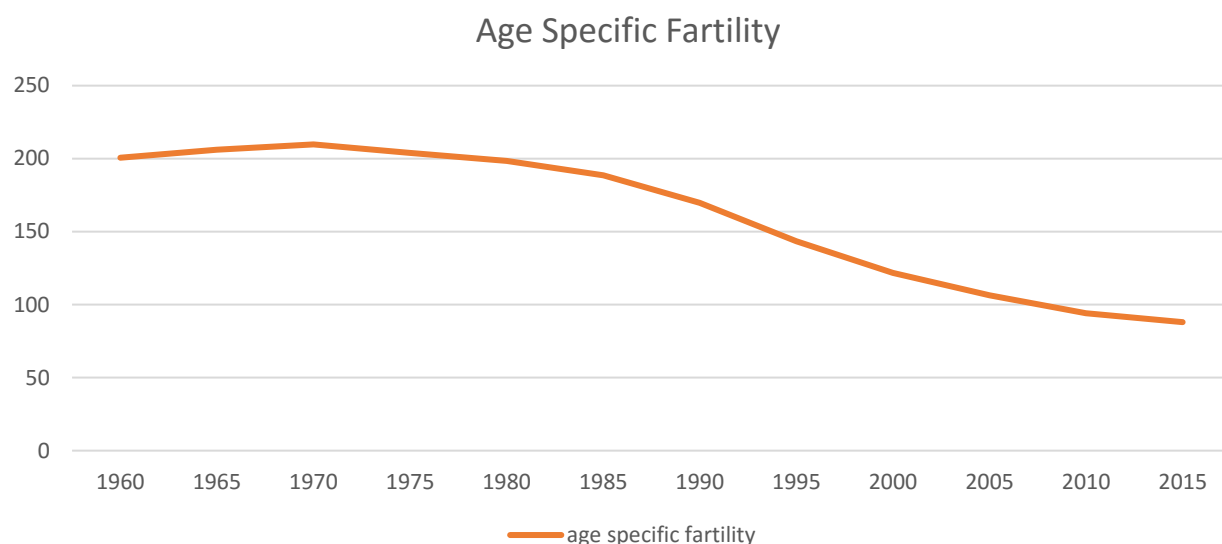


Figure 7: Trend in Age-Specific TFR (15-19)

In 2015, fertility rates at age 15-19 years for Bangladesh was 88.01 births per 1,000 women.<sup>24</sup> In 1970 the age specific fertility rate of Bangladesh fell gradually from 209.74 births per 1,000 women in to 88.01 births per 1,000 women in 2015 (figure 7). Fertility rate at age 20-24 years is 146.42 births per 1000 women.<sup>25</sup> In spite of the declining rate, the fertility rate for 15-19 years needs to be checked as the age range is very unsafe for giving birth. The future projections predict the adolescent fertility rate for 2019 is 118 births for women which no longer shows a declining trend. If we are unable to hold the fertility rate among this group of population, it will be really an ordeal and challenge to make substantial development in maternal health and family planning.

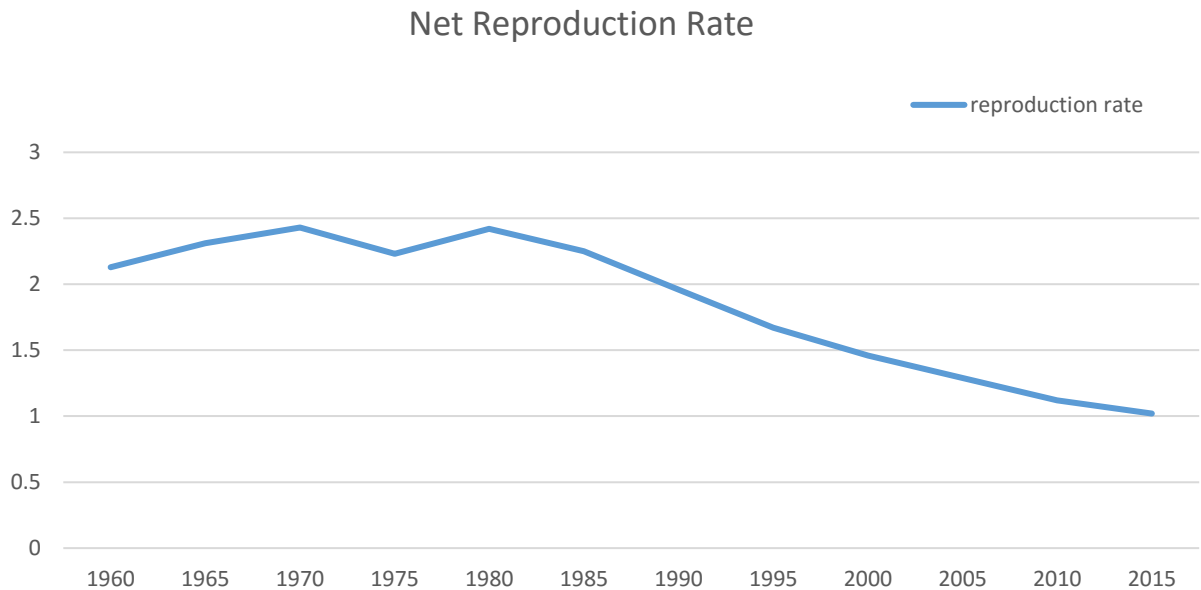
While observing TFR, another important component that comes into light is reproduction rate. The average number of daughters that would be born to a hypothetical cohort of women and would have passed through her lifetime conforming to the age-specific fertility and mortality rates

<sup>23</sup> Bangladesh Demographic Health Survey 2011, Census reports and other statistical publications from national statistical offices

<sup>24</sup> Bangladesh Demographic Health Survey 2011, "Age-Specific Fertility Rate", Census reports and other statistical publications from national statistical offices

<sup>25</sup> Bangladesh Urban Health Survey, 2014

of a given year, can be termed as net reproduction rate.<sup>26</sup> An  $NRR=1$  depicts that each cohort of mothers is having exactly enough daughters to substitute themselves in the population. On the other hand, the  $NRR<1$  indicates a reproductive performance of a particular population below replacement level.



*Figure 8: Trend in Net Reproduction Rate*

Starting from 2.13 net reproduction rate, currently the reproduction rate of Bangladesh is 1.02 (Figure 8). It means that the country is now at the replacement level. Holding all other variables constant, if the rate remains same, the population of our country will be neither shrinking nor expanding as we will be having the exact number of people to replace in the future.

<sup>26</sup> "Reproductivity" David Swanson, 2009

### 4.2.3 Trend in Contraceptive Prevalence Rate

The trend of using contraceptive for birth control is quite new for Bangladesh comparing to other developed and developing nations. Contraceptive prevalence rate indicates the percentage of women or their sexual partners who is practicing any form of contraception.<sup>27</sup> The use of contraceptive and unmet need for family planning are key to understanding profound changes in fertility and to improving reproductive health of the population. Contraceptive prevalence rate for women in Bangladesh was reported at 62.4 % in 2014 for the age group of 15-49 years, according to the World Bank collection of development indicators, compiled from officially recognized sources.

In the coming years, a significant segment of the population aged 15-24 year, constituting about 19% of the total population and a large cohort of youth population will be entering their reproductive age. At present adolescent fertility rate in Bangladesh is 118 births per 1000 women which has not decreased as per the expectations for the last several decades. Despite the legal bodies governing the age of marriage, Bangladesh is still having one of the highest rates of child marriage in the world. According to a survey by UNICEF, 64% of women currently aged 20–24 were married before the age of 18. Furthermore, sexual relationship among adolescents is not limited to marital bondage only rather 5% of the respondents reported they had premarital/extramarital relationship from the same survey.<sup>28</sup> Therefore, a large part of the population enters reproductive age and lacks knowledge of sexual and reproductive health. This group is at risk of unwanted pregnancy and sexually transmitted diseases including HIV. So, they must be aware about the use of contraceptives so that they can ensure a healthy adolescent reproductive health and offer the country with higher contraceptive prevalence rate. The use of contraceptives helps with family planning which lowers the birthrates leaving more resources for education and boost women's participation in the labor force and to help breaking the cycles of poverty.

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<sup>27</sup> *Human reproduction program, World Health Organization, 2017.*

<sup>28</sup> *Adolescents Health Report, World Health Organization, 2017.*

#### 4.2.4 Trend in Birth and Death rates

The numbers in table 4 represents the historical birth and death data of Bangladesh.<sup>29</sup> Total number of birth and death per year was asymmetrical during the 1900s period due to war, famine and cyclone attack (Figure 3). After 2000s the natural change of the population started being more regular. Development in medical sector, increased life standard has helped to downcast the number of deaths per year.

| Period    | Live births per year | Deaths per year | Natural change per year | CBR <sup>1</sup> | CDR <sup>1</sup> | NC <sup>1</sup> | TFR <sup>1</sup> | IMR <sup>1</sup> |
|-----------|----------------------|-----------------|-------------------------|------------------|------------------|-----------------|------------------|------------------|
| 1950-1955 | 1963000              | 852000          | 1111000                 | 48.3             | 20.9             | 27.4            | 6.36             | 165              |
| 1955-1960 | 2252000              | 921000          | 1331000                 | 48.2             | 19.7             | 28.5            | 6.62             | 156.5            |
| 1960-1965 | 2560000              | 994000          | 1566000                 | 47.5             | 18.4             | 29.1            | 6.8              | 151.2            |
| 1965-1970 | 2950000              | 1090000         | 1860000                 | 47.3             | 17.5             | 29.8            | 6.92             | 144.4            |
| 1970-1975 | 3193000              | 1847000         | 1346000                 | 46.5             | 26.9             | 19.6            | 6.91             | 175.6            |
| 1975-1980 | 3381000              | 1165000         | 2216000                 | 44.7             | 15.2             | 29.5            | 6.63             | 138.3            |
| 1980-1985 | 3670000              | 1181000         | 2489000                 | 42.4             | 13.3             | 29.1            | 5.98             | 122.5            |
| 1985-1990 | 3773000              | 1131000         | 2642000                 | 38.1             | 11.3             | 26.8            | 4.98             | 104.4            |
| 1990-1995 | 3711000              | 1047000         | 2664000                 | 33.3             | 9.5              | 23.8            | 4.06             | 90.6             |
| 1995-2000 | 3669000              | 942000          | 2727000                 | 29.1             | 8                | 21.1            | 3.43             | 73.8             |
| 2000-2005 | 3575000              | 896000          | 2679000                 | 25.4             | 6.9              | 18.5            | 2.94             | 59.3             |
| 2005-2010 | 3327000              | 869000          | 2458000                 | 21.5             | 6.3              | 15.2            | 2.48             | 49               |
| 2010-2015 | 3166000              | 850000          | 2316000                 | 21.5             | 6.3              | 15.2            | 2.22             | 49               |
| 2015-2020 | 3057000              | 872000          | 2185000                 | 21.5             | 6.3              | 15.2            | 2.07             | 49               |

Table 4: Birth and Death data

Table 3: CBR = crude birth rate (per 1000); CDR = crude death rate (per 1000); NC = natural change (per 1000); TFR = total fertility rate (number of children per woman); IMR = infant mortality rate per 1000 births

The crude birth rate (CBR) is the number of live births occurring among the population during a given year, in per 1,000 mid-year total population. Similarly, the number of live deaths occurring among the population during a given year, in per 1000 mid-year population, is termed as crude death rate (CDR). The crude birth and death rate are generally considered under medium fertility

<sup>29</sup> Sample Vital Registration System, World Population Prospects 2017.

variant. Again, Infant mortality rate (IMR) is the number of deaths per 1,000 live births of children under one year of age.

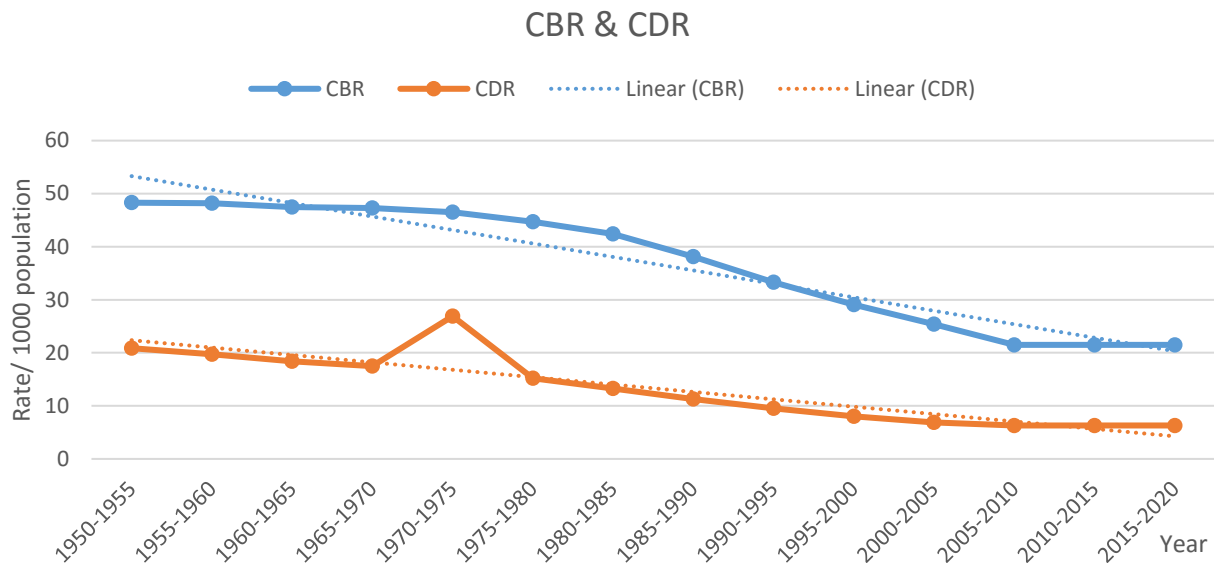


Figure 9: Trend in crude birth & death rate.

Under medium fertility variant, crude birth rate for 2018 was 18.3 births per thousand population where the death rate is 5.3 death per thousand people and infant mortality rate is 29.5 deaths per 1000 live births.<sup>30</sup> Figure 9 shows a slow but steady declining nature in birth rate and the death rate is declining at a moderated rate after the 1980s period. The birth and death rates demonstrate neither shrinking nor expanding since 2005. Now, further decline in the fertility and mortality rate will reshape the age structure of the population as TFR has almost reached to the replacement level. So, to attain a static condition of the population, we need to keep a constant check on the fertility and mortality rate of our population.

<sup>30</sup> UN projections 2017 revise; "Under-Five Mortality". UNICEF. Retrieved

#### 4.2.5 Trend in Net Migration

Net migration rate is the difference between the number of immigrants (people coming into an area) and the number of emigrants (people leaving an area) throughout the year.<sup>31</sup> Bangladesh lacks data in migration statistics of its population. Though different data sources like World Bank, provides with international out-migration data, data on internal migration is scanty. The net migration rate of Bangladesh shows negative figure which is very common for developing countries like ours. After the liberation war since 1976 to June 2010, about 72 million people migrated overseas in search for employment.<sup>32</sup> In 2010 between 10% to 16% of total workforce were working abroad on contract-based labor migration. In 2013, the reported remittance from international labor migrants was equivalent were 60% of the earning from garment exports and 11% of total GDP. Therefore, the contribution of labor migrants is very significant for Bangladesh.

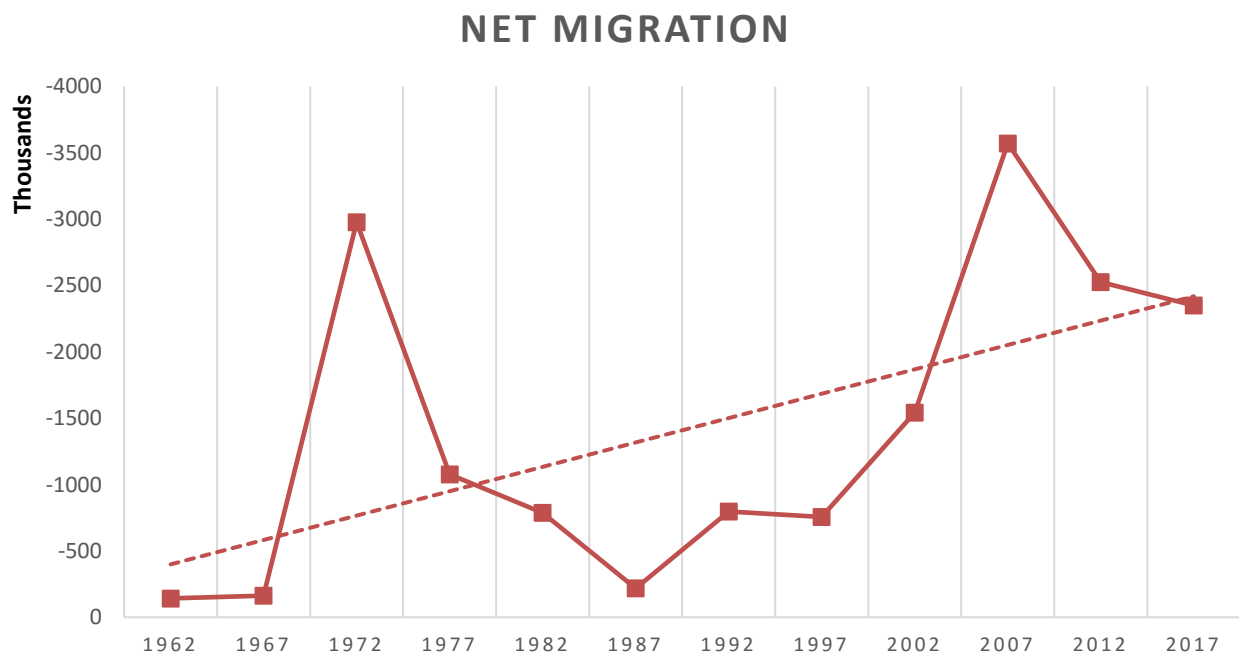


Figure 10: Trend in International Out-Migrations.

Data source: world bank open-data; World Bank Group, International Migration Stock by UN; United Nations population prospect 2017 revision

<sup>31</sup> Differential Net Migration Rates and the Quality of Life, Liu, Ben-chieh, 1975

<sup>32</sup> Bangladesh Bank Database, 2010

During the period of 1981 to 1987 the net migration rate keeps on falling dramatically (Figure 10) because of changes in the migration policy of the country. In 1981 government imposed a ban on the migration of all categories of female workers other than professionals. In 1987 it was replaced by the imposition of restrictions on the migration of unskilled and semi-skilled categories of female workers. A ban was again in action in 1997 on all categories of women worker which was later on replaced by restrictions other than the professionals. Since 2003, the restrictions only prevail on the unskilled and semi-skilled women workers under the age of 35. These restrictions are liable for the ups and downs in the growth rate and is also responsible for a low number of female migrants. Only 2.27% of total migrants are constitute of women workers which makes the number of Bangladeshi workers predominantly men.<sup>33</sup> Nevertheless, the restrictions on the female workers increases the outflow of female migrants through unofficial channels and this number of unofficial migrants are dreadful to track down.

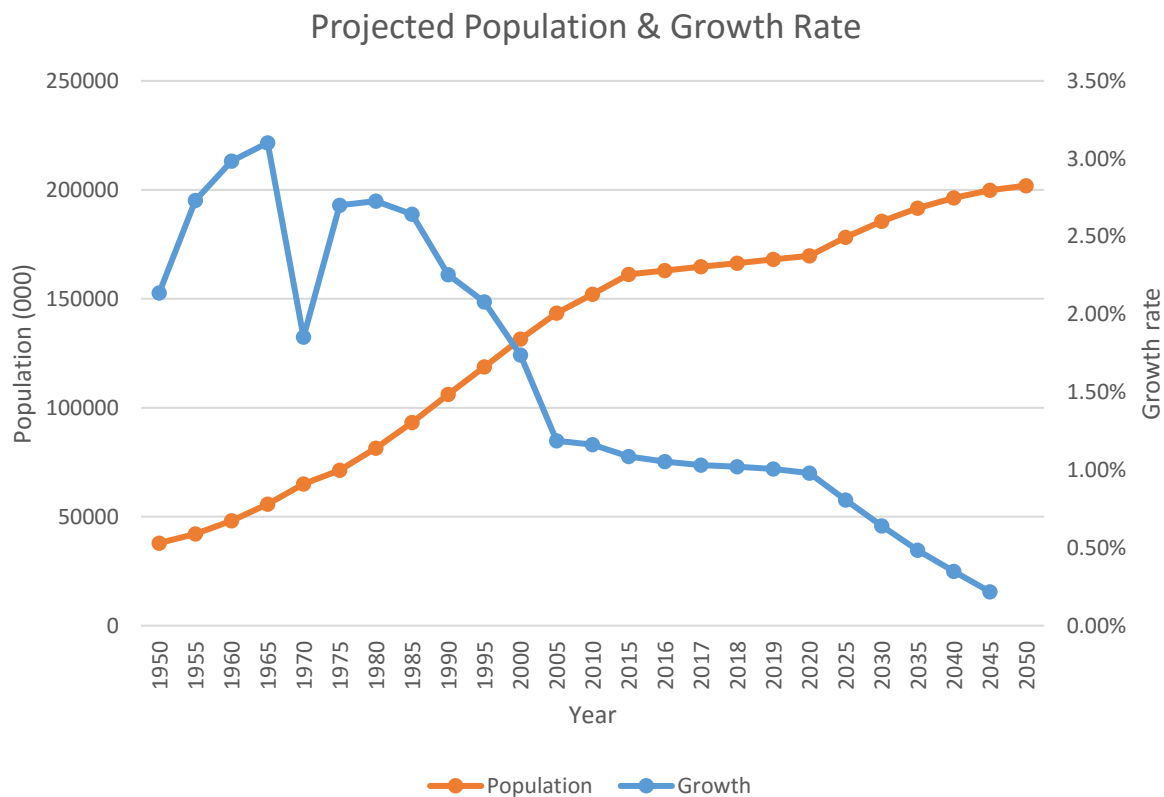
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<sup>33</sup> *International Migration Stock by United Nations, 2014*

## 4.3 Population Projection

### 4.3.1 Projected growth of population

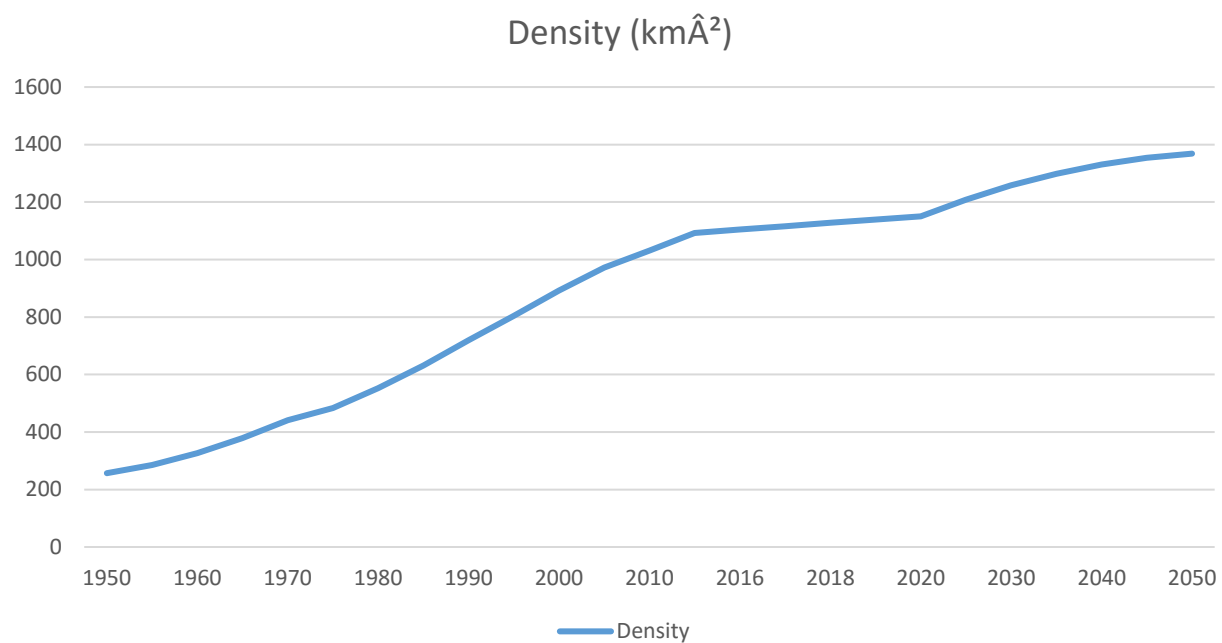
Almost immediately after the war of independence in 1971, Henry Kissinger, former US Secretary of State, declared Bangladesh as a “perpetual economic basket case” reviewing the economic condition of Bangladesh at that period. But Bangladesh has already proved Kissinger wrong. In the last 48 years, Bangladesh has undergone an amazing transformation with challenges, progress, advancement and anticipates to carry this development into the forthcoming years. The current fact, figures and data indicates towards a better future ahead. Nevertheless, forecasting the future is always a difficult business as there are always assumptions and the future is not forceable. Therefore, instead of making any predictions depending on the assumptions only, lets analyze the available statistics, facts and s and speculate how the current developments will affect our life in the upcoming years till 2050.



*Figure 11: Projected growth trend*



From the trend analysis portrayed in figure 3 we already know that population growth rate of Bangladesh is declining over the years. The projected growth trend (Figure 11) also represents that the downward slopping of population growth will be continuing in the projected period. Till 2020, the growth rate of population will be declining in a steady manner and after that there will be a sharp decline in the growth rate till 2050. Though there will be a decline in the growth rate, the number of populations will be increasing in absolute term. Currently, Bangladesh is adding 2.0 million people to the national population per annum.<sup>34</sup> This trend is expected to continue throughout the projection period and the population of Bangladesh is estimated to reach almost 201 million.



*Figure 12: Projected density of population*

The number of populations of Bangladesh tends to increase in absolute term but the land area of Bangladesh cannot be distended rather we can distribute the land area evenly. Presently, the country is adding 2.0 million people annually to the national population and with each year we are losing 1% of our agricultural land. There are roughly 8.774 million hectares of cultivable land available, out of which 88 percent is cultivated. So, there is a limited scope to expand the cultivated

<sup>34</sup> United Nations Development Program (UNDP)

area.<sup>35</sup> The density of population tends to grow higher in a stable rate that would not make a huge difference till 2020. But right after that, there will be an almost sharp upsurge in the growth line till 2050. Another important fact, that is intensifying the density of our population is unplanned urbanization. According to the statistics 35.7% of the country's total population lives in urban areas. It is undeniable that urbanization is the foreseeable calling of the human evolution. But the cities are growing in an unsustainable manner. Parks, open spaces, rivers, canals and water bodies are gradually disappearing. The rivers and waterways are gradually shrinking and drying up due to the huge depositions of silt and waste.<sup>36</sup> If our government fails to redesign the urban areas, our cities will be unlivable due to the man-made pollution and intense density of population.

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<sup>35</sup> World Economic Forum's Global Competitiveness Report 2016-2017

<sup>36</sup> Bangladesh Water Development Board (BWDB)

### 4.3.2 Age structural transition

Age-structural transition is an essential consequence of demographic transition across the country. The projection data (appendix) has been collected from the UN census data and the World Bank database. The historical data set and future projection reveals a number of changes in the age structure. The reduction in mortality rate and steady-declining fertility rate caused a rapid transition in the age structure between 2000 and 2010. The sharp fall in fertility during this period reduced the children under 5 years age group. The future projections represent that the population of 5-9 and 10-14 will also be declining (Figure 13). So, it will increase the number of working age (15-59) and older population. This momentum is generally seen in the countries with higher life expectancy, lower birth and death rates. So, the projections indicate that the population under the age of 15 years will shrink and we will get more working age population who can decline the dependent population and improve the human capital.

Since 1980, Bangladesh is having a bulge portion of youth (15-24) in its population. The projection data shows that this will continue until 2020 and after that the percentage of youths will be shrinking. However, the absolute number will be increasing until it stabilizes (Figure 11). The relative share of working age people (25-29) is increasing since 1980s and this share is expected to increase until 2040. Within 2040 to 2050 the share of effective working age population will be almost half of the total population. This will open the door to new opportunities, as well as create a great deal of challenges for the government to allocate limited resources to this group.

The size and share of old age population (60+) is also increasing since 1980 and it is expected to increase till 2050 (figure 13). The size and share of the population will continue to increase in a slow but steady manner. Given the increase in life expectancy, the rate of growth will be rapid and significant until 2020 and will slow down after this period. According to the United Nations projection, the percentage of old age population will increase from 5.7% in 1980 to 22.3% in 2050.

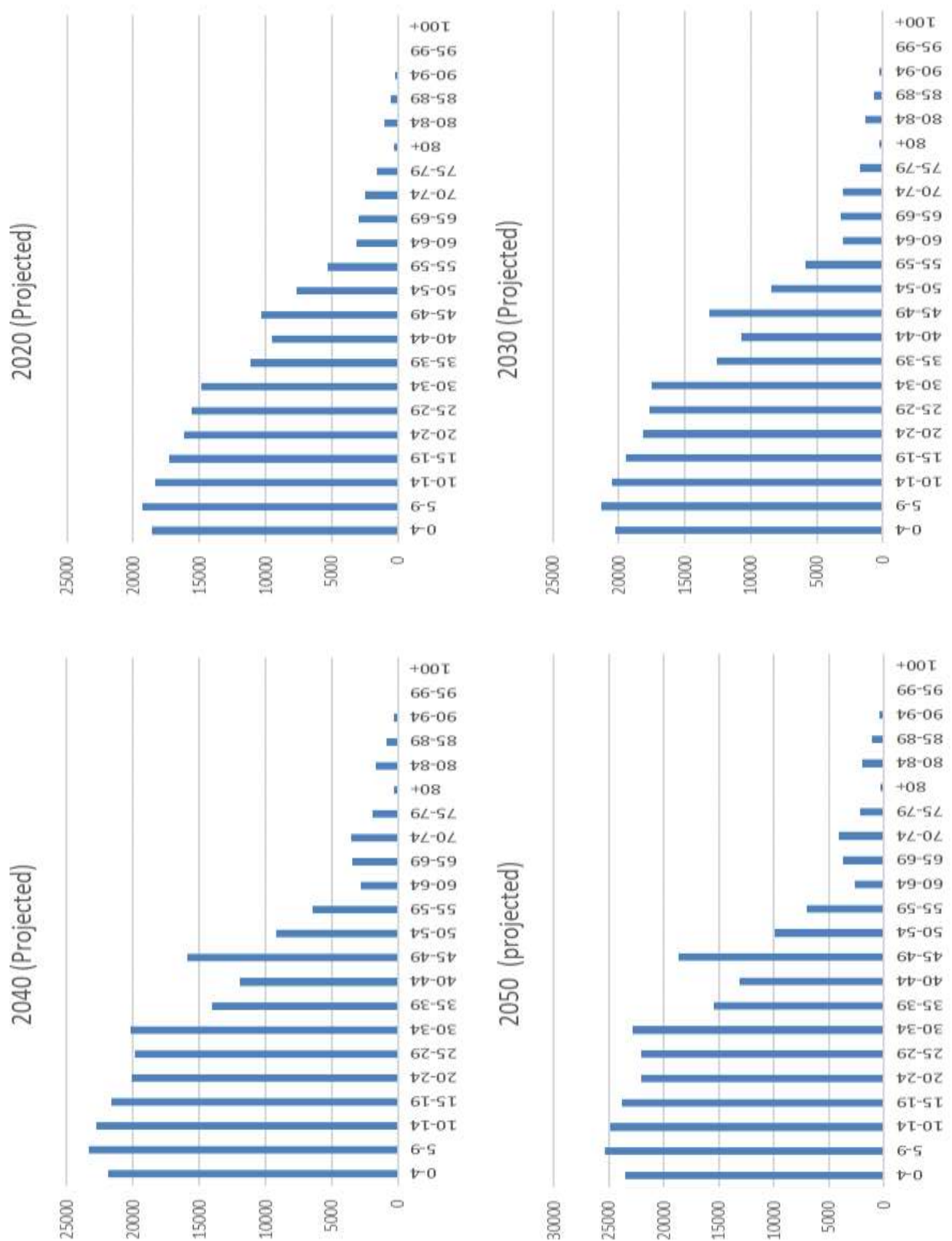


Figure 13: Projected Age-group (2020-2050)

Figure 14 represents the age sex structure for the population of 2050.<sup>37</sup> Since 1980s Bangladesh was having a broad base triangular-shaped population. During this period until 2050 the base of the population pyramid is supposed to narrow down because of the changed patten in age structure discussed above. From the figure we can visualize that the typical age structure will be changed to a barrel shaped age-sex structure.

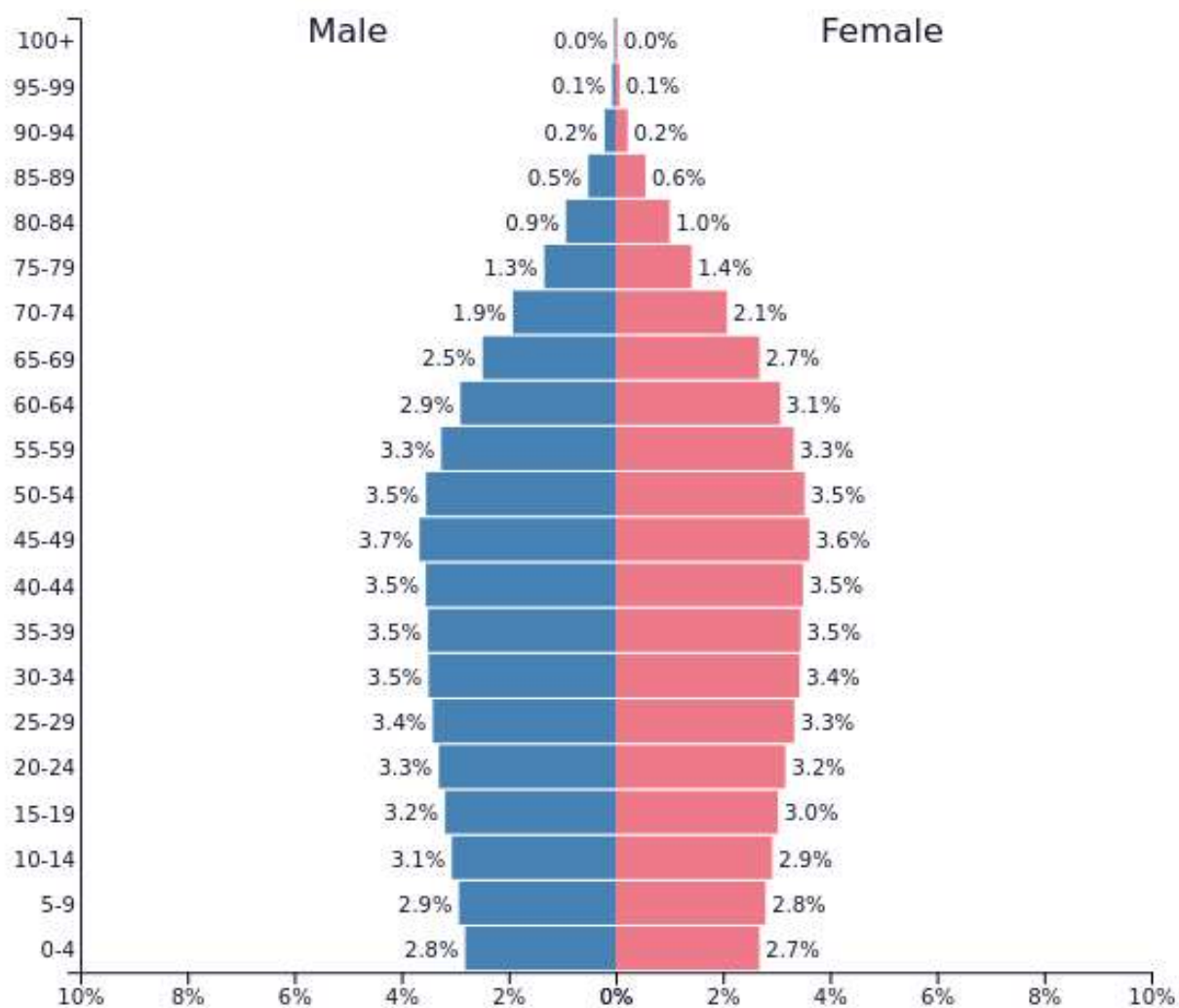


Figure 14: Projected Age-Sex structure for 2050

<sup>37</sup> Data Source: UNFPA database (2050 projection data).

### 4.3.3 Projection for fertility rate

The projection in figure 15 shows that the declining trend of fertility rate will be continuing till 2050. There will be a slow but steady decline in the fertility rate. Currently we are at the replacement level fertility rate which is estimated 2.02 for 2019. The past trends discussed above regarding rates like crude birth and death rates, contraceptive prevalence rate and age-specific fertility rate indicates that Bangladesh falls under medium to low fertility assumptions. In this report, we have considered medium variant for fertility assumptions and the projections are calculated using arithmetic mean method.

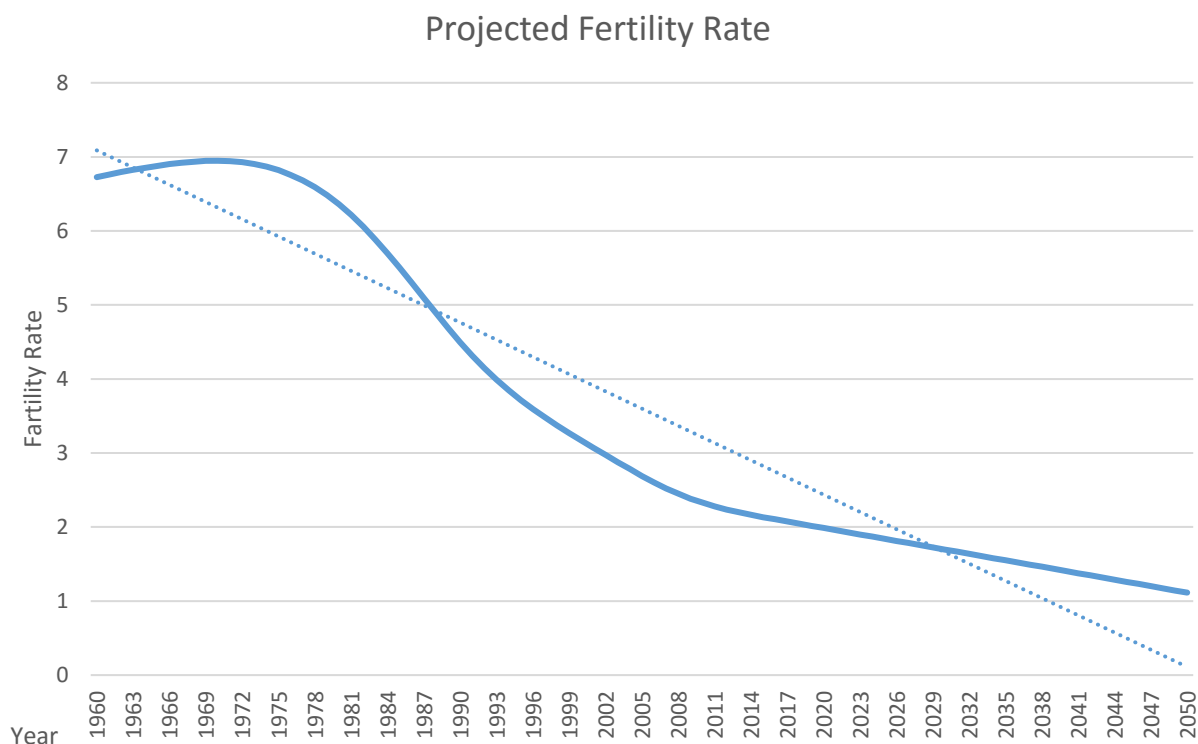


Figure 15: Projected trend in fertility rate

According to the projection, the fertility rate is expected to keep declining and go under the replacement level by the end of the projection period. By 2050 the fertility rate will reach at 1.1 which means women will have 1.1 child on average in their lifetime holding all other variables constant. This trend can be considered as a decent indication since other neighboring south Asian countries are also reaching towards this bench mark.

#### 4.3.4 Projection for net migration

The projection represented in (Figure 16) shows only international out-migration as we lack internal migration data. The past trends (Figure 10) in net migration showed ups and downs in the trend line but in recent years there was a slight decline in the migration rate. Within the projection period the rate is estimated to go upwards assuming no change in the existing international migration rules and regulations.

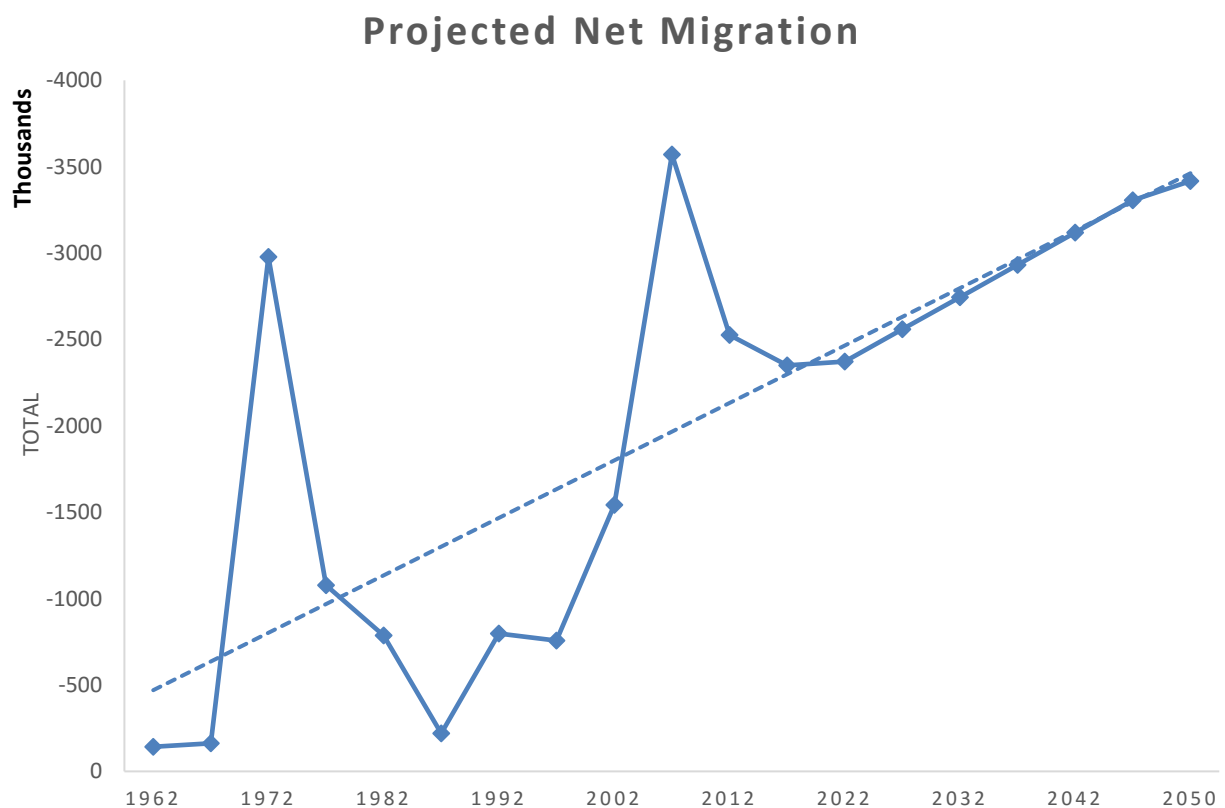


Figure 16: Projected trend in net migration

From age-specific population projection we have already seen that the number of working age population tends to go higher. So, it can be predicted that net migration will increase as people tend to go abroad for better life standard and employment opportunities. Bangladesh already lacks employment facilities required for its existing work force. In the future, when there will be a bulge in the working age people, the migration rate is justified to be negative as more people will be leaving the country in search of employment facilities.

From previous trends, it is already justified that the contribution of international migrant workers is very crucial to our gross domestic product. As we see the projection showing an upward trend in the migration rate, the Government's primary concern should be to invest in developing the skills of this workforce. A group of skilled manpower can contribute more to GDP because the demand for skilled workers and professionals is always higher. With the increase in the number of migrants, this number will intensify opportunities for further gaps in informal data and cash transfers. Therefore, governing agencies should provide ongoing supervision of human trafficking and transfer of cash through informal channels.



#### **4.4 Projection by United Nations**

The Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat produces and circulates projections covering all countries of the world. These projections are published in the World Population Prospects series on a routine basis. The World Population Prospects: The 2012 Revision is one such latest series and covers a prospect of 150-year time horizon which can be subdivided into; past estimates (1950-2010) and future projections (2010-2100). The 2017 revision of UN report lacks country level intraoperation and focuses on world population prospects.

The fertility assumptions that are made in this projection includes high, medium, low, constant and instant replacement level fertility. In 2012, Revision a probabilistic method for projecting total fertility rate has been used. Under the high variant, fertility is projected to remain 0.5 children above the fertility in the medium variant over most of the projection period. By 2020-2025, fertility in the high variant is therefore half a child higher than that of the medium variant. Under the low variant, fertility is projected to remain 0.5 children below the fertility in the medium variant over most of the projection period. Assumptions regarding mortality are made in terms of life expectancy at birth by sex. Mortality is assumed to be either normal or constant. The international migration is assumed as either normal or zero. The 2012 Revision includes eight different projection variants. Five of those variants differ only with respect to the level of fertility. All these make normal mortality and normal international migration assumptions.

In all three scenarios a sharp increase of urbanization has been depicted. The age-specific projected values indicate the number of populations tend to increase sharply at the age of 30-34 and onwards. This indicates a change in the age structure of population which would eventually create formidable challenge to the policymakers. The UN projections refers to a shift in the population ranking and a huge transitional period for Bangladesh.

## 5.0 Conclusion

In this paper an attempt has been made to observe the basic demographic transition in population structure over the years. It aims to make a projection on the basis of available historical data which can let us assume about the future trends and transition in population structure. Firstly, a number of literatures have been reviewed in order to achieve the objectives of this study. The national and international data sources have been used for collecting reliable data. However, there was not enough data to put a better projection, so a simple arithmetic method of population projections was used until the year 2050.

The paper is divided into three sections; past trends in population structure, current demographic profile of Bangladesh (as of 2019) and population projection up to the year 2050. The past trends indicate that the number of populations of Bangladesh is increasing with the passing year. According to the 2011 population census the population of Bangladesh enumerated at 150 million which is exactly double of the population of 1971. But the matter of hope is that the growth rate is declining and currently the growth rate is at 1.02%. The sex composition of Bangladesh is also being symmetrical in recent years. Increasing contraceptive prevalence rate, widespread literacy, extensive acceptance of family planning concepts is serving in lowering the total fertility rate of our population. Currently the reproduction rate of Bangladesh stands at 1.02 which lets us enter into replacement level from where the population of Bangladesh will be neither shrinking nor expanding. The concerning matter is that the age specific fertility rate indicates higher adolescent fertility rate in coming years. As our TFR has almost reached to the replacement level, continuous declining trend of crude birth and death rate will help reshaping the age structure of current population. The current trend in age structure depicts a huge number of populations is entering in the working age group. This working group of people is boosting the human resources and at the same time creating a huge challenge for the government to ensure the employment for this huge group of people. Another important component of population structure is net migration rate which is difficult to determine for Bangladesh because of the continuous change in the migration law and unavailability of reliable data. However, the trendline in net migration rate keeps on going upward as the employment opportunity in Bangladesh is not sufficient and people tends to go overseas for better living standard.

The future projections portray that till 2020 the population growth rate will be declining in a steady manner and after that there will be a sharp decline in the growth rate till 2050. In spite of the declining rate, the total population will be increasing and it is estimated that the population will reach almost to 201 million by the end of the projection period. This added population will further increase the density rate of population and also the rate of urbanization. Currently Bangladesh is ranked among the countries with highest population density. So, it can be easily assumed that further increase in the density will leave the urban areas with man-made pollution and incompetent living. Another important fact is the change in the age-sex structure of population. Like most of the under developed and developing countries, Bangladesh was having a pyramid-shaped structure which is going to take a barrel shape view. This happens when a country is having a huge transformational period. Currently Bangladesh is having a boost in working age people and this will continue approximately till 2020. By the end of the projection period the lower portion of age-sex structure will be shrinking because of the lower birth and fertility rate. So, by the end of the projection period the size and share of old age population (60+) will increase. This indicates the current focus of the government should be on the youth population. Government should invest more in the skill development of the youth to transform them into human capital. The increasing migration rate indicates that more working age people will be going overseas as our homeland is incapable of providing this huge working-class populations with their basic needs. Here, government should put focus on the skill development of the workers so that they can bring more foreign currencies for Bangladesh. For the long-term purpose, the government should work on the development of old-age people or else a large portion of population will be turning into a dependent population. We are already having population policy for Bangladesh to keep a constant check on the population structure. However, updating the policies according to the latest trends can make the policies more reliable and sustainable for coming years.

## **6.0 Policy Recommendations**

The objective of National Population Policy is to ensure the well-being of people by keeping a constant check on the components of population. The success of the policies is concealed with implementations. The history of the population policy of Bangladesh indicates that the program has developed and expanded on the basis of a trials and errors. The population policy of Bangladesh as documented in the Five-Year Plans (FYP) of Bangladesh mainly revolves around much family planning programs in order to keep the size of the family small. The programs were marked as birth control programs as well. In other words, the population growth rate was intended to be reduced through controlling births through family planning methods. The Bangladesh population program has made substantial progress over the last thirty-seven years. The fertility transition is already proceeding in a smooth manner and the success of the immunization program is also impressive. Nevertheless, A few recommendations in accordance with the existing policies is described below:

- **Human Resource Development**

More work-oriented education, vocational training, entrepreneurship opportunities should be introduced so that people can get encouraged to be self-employed and create working opportunities for others as well. Education and income generating activities of the population should always be the integral part of both the development strategies and population dynamics.

- **Scarce Natural Resources**

The government needs to search for alternative sources of income generating activities other than the agriculture. If alternative sources are not explored, both the development and population sector strategies will be severely affected. Investment and encouragement in rural non-farming activities like fishing can help improving this situation.

- **Adolescent Fertility Rate**

The age specific fertility rate shows that the fertility rate for 15-19 years is getting higher. This age is very vulnerable for carrying child and enhances the risk of child death at birth, unsafe motherhood and malnutrition. To face this challenge, we need more adolescent friendly program

focused on puberty, safe sexual behavior and how to avoid health risk including STD / HIV / AIDS, proper nutrition and hygiene. Apparently, promoting the adoption of appropriate and comprehensive legislation can be a strategy for dealing with these issues.

- **Unmet Contraceptive Needs**

Decreasing contraceptive discontinuation rates should be a priority. Even if considerable progress is made in increasing the CPR and ensuring supplies of contraceptives, these advances will have incomplete influence unless the discontinuation levels also drop.

- **Unstructured Urbanization**

A redesign of the urban areas is the demand of time as already we rank in the most densely populated country and Dhaka is one of the unlivable cities. The small enterprises in rural areas should get an investment boost so that the businesses can expand and employ more people. For cities, the commercial and residential areas should be separated. Unplanned structures that destroy free space, parks, rivers or pollute the environment should be banned.

- **Migration Policy and Data Transparency**

The biggest hindrance in migration policy making is the unavailability and unreliable data for in/out migration of Bangladesh. Thousands of male and female workers are going overseas through unofficial channels. This affects both the economy and population structure.

- **Changing Population Structure**

The impact of population momentum on the number of rapidly growing elderly population has not been addressed adequately in the proposed strategies of the population policy. Government needs to give focus on the improvement of the people of the older age-group from now so that they can contribute more in the economy rather than increasing the dependency ratio of the country.

## References

Bangladesh Bureau of Statistics (BBS). 2013c. 2012 Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Dhaka.

Bangladesh Bureau of Statistics (BBS). 2011. Bangladesh National Population Census Report 2011, Dhaka: BBS.

Ahmed, M.S., 2010. “Migrant Workers Remittance and Economic Growth: Evidence from Bangladesh”, ASA University Review, Vol.4, No. 1, Dhaka.

Arthur, W.B., and McNicoll, G. 1978. “An analytical survey of population and development in Bangladesh”, Population and Development Review, 4(1): 23-80.

Bangladesh. Ministry of Planning, Planning Commission. 2011. Sixth Five Year Plan: FY2011-FY2015, Dhaka: Planning Commission.

Bongaarts, J. et al. 2012. Family Planning Programs for the 21st Century: Rationale and Design. New York: The Population Council.

Dewan, A. and Corner, R. (eds), 2018. Dhaka Megacity: Geospatial Perspectives on Urbanization, Environment and Health, Springer.

Mason, A. 2005. Demographic Transition and Demographic Dividends in Developed and Developing Countries. United Nations Expert Group Meeting on Social and Economic Implications of Changing Population Age Structure. New York: United Nations.

Population Reference Bureau (PRB). 2012. Word Population Data Sheet. [www.prb.org/pdf/2017-population-data-sheet\\_eng.pdf](http://www.prb.org/pdf/2017-population-data-sheet_eng.pdf).

United Nations. 2018. The Millennium Development Goals Report 2018, New York.

UNICEF. 2011. A Perspective on gender equality in Bangladesh – From young girl to adolescent: What is lost in Transition? Dhaka: UNICEF.

United Nations Population Fund (UNFPA), 2012. Marrying too young, End Child Marriage, New York: UNFPA.

UNFPA. 2010. Revitalizing the National Family Planning Program in Bangladesh: Towards Replacement Level Fertility and the Achievement of MDGs 4 and 5 by 2015, Dhaka: UNFPA.

World Bank 2017. World Development Indicators, 2017, Washington, DC.

World Bank, 2017a. World Development Indicators 2017, Washington, DC.

World Health Organization, UNICEF, UNFPA, the World Bank and the United Nations Population Division. 2017. Trends in Mortality and Fertility: 1990 to 2017. Geneva: World Health Organization.

Bongaarts J. and B. Cohen (1998). Adolescent Reproductive Behavior in the Developing World. Introduction and Overview. *Studies in Family Planning* 29(2): 99-105.

BPP (2012): Bangladesh Population Policy. Ministry of Health and Family Welfare. Government of the People's Republic of Bangladesh.

Campbell, P. R. (1996). Population Projections for States by Age, Sex, Race, and Hispanic Origin: 1995 to 2025, U.S. Bureau of the Census, Population Division, PPL-47.

Keilman, N. (1998). How accurate are the United Nations world population projections? In Lutz, W., Vaupel, J. W., and Ahlburg, D. A. (eds) *Frontiers of Population Forecasting*, supplement to *Population and Development Review*, 24, 15-41.

UNFPA (2014a). Future Population Prospects and Their Policy Implications.

UNFPA (2014b). State of World Population: The Power of 1.8 Billion.

GOB, 2000. Draft National Population Policy 2000. Ministry of Health and Family Welfare, GOB, Dhaka.

UN (2017). World Population Prospects: The 2017 Revision. Department of Economic and Social Affairs, Population Division, New York: United Nations.



## Appendix

**Appendix 1:** Historical demographic data of Bangladesh (1955-2019) collected from national and international data sources.

| <i>Year</i> | <i>Population</i>  | <i>Yearly % Change</i> | <i>Yearly Change</i> | <i>Migrant (net)</i> | <i>Median Age</i> | <i>Fertility Rate</i> | <i>Density (P/Km<sup>2</sup>)</i> | <i>Urban Pop %</i> | <i>Urban Population</i> | <i>Country's Share of World Pop</i> |
|-------------|--------------------|------------------------|----------------------|----------------------|-------------------|-----------------------|-----------------------------------|--------------------|-------------------------|-------------------------------------|
| 1955        | <b>42,121,524</b>  | 2.14                   | 845,369              | -1,101               | 19.40             | 6.36                  | 324                               | 4.80%              | 2,020,726               | 1.52%                               |
| 1960        | <b>48,199,747</b>  | 2.73                   | 1,215,645            | 297                  | 19.10             | 6.62                  | 370                               | 5.30%              | 2,543,661               | 1.59%                               |
| 1965        | <b>55,834,038</b>  | 2.98                   | 1,526,858            | -11,019              | 19.40             | 6.36                  | 429                               | 6.40%              | 3,552,536               | 1.67%                               |
| 1970        | <b>65,047,770</b>  | 3.1                    | 1,842,746            | -32,364              | 17.80             | 6.92                  | 500                               | 7.70%              | 5,034,728               | 1.76%                               |
| 1975        | <b>71,305,923</b>  | 1.85                   | 1,251,631            | -595,571             | 17.60             | 6.91                  | 548                               | 10.00%             | 7,107,810               | 1.75%                               |
| 1980        | <b>81,470,860</b>  | 2.7                    | 2,032,987            | -215,346             | 17.30             | 6.63                  | 626                               | 15.00%             | 12,251,656              | 1.83%                               |
| 1985        | <b>93,199,865</b>  | 2.73                   | 2,345,801            | -157,493             | 17.70             | 5.98                  | 716                               | 17.70%             | 16,496,299              | 1.91%                               |
| 1990        | <b>106,188,642</b> | 2.64                   | 2,597,755            | -43,873              | 18.60             | 4.98                  | 816                               | 20.00%             | 21,274,633              | 1.99%                               |
| 1995        | <b>118,706,871</b> | 2.25                   | 2,503,646            | -159,632             | 19.50             | 4.06                  | 912                               | 21.90%             | 26,003,685              | 2.06%                               |
| 2000        | <b>131,581,243</b> | 2.08                   | 2,574,874            | -151,224             | 20.90             | 3.43                  | 1,011                             | 23.70%             | 31,229,852              | 2.14%                               |
| 2005        | <b>143,431,101</b> | 1.74                   | 2,369,972            | -308,291             | 22.40             | 2.94                  | 1,102                             | 26.80%             | 38,373,642              | 2.19%                               |
| 2010        | <b>152,149,102</b> | 1.19                   | 1,743,600            | -714,191             | 23.90             | 2.48                  | 1,169                             | 30.30%             | 46,035,276              | 2.19%                               |
| 2015        | <b>161,200,886</b> | 1.16                   | 1,810,357            | -505,297             | 25.60             | 2.22                  | 1,238                             | 34.10%             | 54,983,919              | 2.18%                               |
| 2016        | <b>162,951,560</b> | 1.09                   | 1,750,674            | -470,000             | 26.00             | 2.19                  | 1,252                             | 34.90%             | 56,856,665              | 2.18%                               |
| 2017        | <b>164,669,751</b> | 1.05                   | 1,718,191            | -470,000             | 26.00             | 2.19                  | 1,265                             | 35.70%             | 58,746,319              | 2.18%                               |
| 2018        | <b>166,368,149</b> | 1.03                   | 1,698,398            | -470,000             | 26.00             | 2.19                  | 1,278                             | 36.50%             | 60,649,009              | 2.18%                               |
| 2019        | <b>168,065,920</b> | 1.02                   | 1,697,771            | -470,000             | 26.00             | 2.19                  | 1,291                             | 37.20%             | 62,561,286              | 2.18%                               |

## Appendix 2: Projected male-female percentage of population, density and growth rate.

| <i>Year</i> | <i>Population</i> | <i>% Male</i> | <i>% Female</i> | <i>Density (km<sup>2</sup>)</i> | <i>Growth Rate</i> |
|-------------|-------------------|---------------|-----------------|---------------------------------|--------------------|
| 1950        | 37894.681         | 52.21%        | 47.79%          | 256.79                          | 0.00%              |
| 1955        | 42121.524         | 51.91%        | 48.09%          | 285.43                          | 2.14%              |
| 1960        | 48199.747         | 51.68%        | 48.32%          | 326.62                          | 2.73%              |
| 1965        | 55834.038         | 51.43%        | 48.57%          | 378.36                          | 2.98%              |
| 1970        | 65047.77          | 51.26%        | 48.74%          | 440.79                          | 3.10%              |
| 1975        | 71305.923         | 51.07%        | 48.93%          | 483.2                           | 1.85%              |
| 1980        | 81470.86          | 51.00%        | 49.00%          | 552.08                          | 2.70%              |
| 1985        | 93199.865         | 51.14%        | 48.86%          | 631.56                          | 2.73%              |
| 1990        | 106188.642        | 51.11%        | 48.89%          | 719.58                          | 2.64%              |
| 1995        | 118706.871        | 51.06%        | 48.94%          | 804.41                          | 2.25%              |
| 2000        | 131581.243        | 51.03%        | 48.97%          | 891.65                          | 2.08%              |
| 2005        | 143431.101        | 50.93%        | 49.07%          | 971.95                          | 1.74%              |
| 2010        | 152149.102        | 50.57%        | 49.43%          | 1031.03                         | 1.19%              |
| 2015        | 161200.886        | 50.46%        | 49.54%          | 1092.37                         | 1.16%              |
| 2016        | 162951.56         | 50.44%        | 49.56%          | 1104.23                         | 1.09%              |
| 2017        | 164669.751        | 50.43%        | 49.57%          | 1115.88                         | 1.05%              |
| 2018        | 166368.149        | 50.41%        | 49.59%          | 1127.38                         | 1.03%              |
| 2019        | 168065.92         | 50.39%        | 49.61%          | 1138.89                         | 1.02%              |
| 2020        | 169775.309        | 50.37%        | 49.63%          | 1150.47                         | 1.01%              |
| 2025        | 178262.909        | 50.29%        | 49.71%          | 1207.99                         | 0.98%              |
| 2030        | 185584.811        | 50.21%        | 49.79%          | 1257.61                         | 0.81%              |
| 2035        | 191600.525        | 50.13%        | 49.87%          | 1298.37                         | 0.64%              |
| 2040        | 196294.312        | 50.05%        | 49.95%          | 1330.18                         | 0.49%              |
| 2045        | 199743.52         | 49.98%        | 50.02%          | 1353.55                         | 0.35%              |
| 2050        | 201926.816        | 49.92%        | 50.08%          | 1368.35                         | 0.22%              |

**Appendix 3:** Total population, both sexes combined, by five-year age group (thousands)

| Age Group | 1950  | 1955  | 1960  | 1965   | 1970   | 1975   | 1980   | 1985   | 1990   | 1995   | 2000   | 2005   | 2010   | 2015   |
|-----------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0-4       | 6 238 | 6 822 | 8 480 | 10 234 | 11 998 | 12 377 | 14 272 | 15 724 | 16 461 | 16 608 | 16 814 | 16 744 | 15 836 | 15 254 |
| 5-9       | 5 015 | 5 589 | 6 224 | 7 838  | 9 534  | 10 731 | 11 682 | 13 580 | 15 063 | 15 924 | 16 213 | 16 541 | 16 563 | 15 716 |
| 10-14     | 4 377 | 4 892 | 5 468 | 6 087  | 7 680  | 9 049  | 10 574 | 11 532 | 13 429 | 14 863 | 15 737 | 16 113 | 16 462 | 16 458 |
| 15-19     | 3 830 | 4 300 | 4 828 | 5 366  | 5 977  | 6 633  | 8 967  | 10 487 | 11 447 | 13 162 | 14 663 | 15 499 | 15 690 | 16 116 |
| 20-24     | 3 300 | 3 747 | 4 231 | 4 715  | 5 247  | 4 784  | 6 525  | 8 836  | 10 386 | 11 159 | 12 945 | 14 315 | 14 810 | 15 204 |
| 25-29     | 2 864 | 3 220 | 3 675 | 4 130  | 4 611  | 4 862  | 4 505  | 6 396  | 8 694  | 10 163 | 10 943 | 12 704 | 13 848 | 14 475 |
| 30-34     | 2 460 | 2 791 | 3 151 | 3 591  | 4 046  | 4 538  | 4 511  | 4 447  | 6 281  | 8 525  | 9 977  | 10 694 | 12 238 | 13 502 |
| 35-39     | 2 110 | 2 386 | 2 718 | 3 073  | 3 511  | 3 969  | 4 406  | 4 516  | 4 394  | 6 173  | 8 345  | 9 712  | 10 223 | 11 874 |
| 40-44     | 1 786 | 2 030 | 2 305 | 2 633  | 2 986  | 3 421  | 3 844  | 4 257  | 4 420  | 4 306  | 6 030  | 8 111  | 9 331  | 9 926  |
| 45-49     | 1 517 | 1 698 | 1 939 | 2 211  | 2 535  | 2 879  | 3 176  | 3 523  | 4 106  | 4 274  | 4 185  | 5 759  | 7 642  | 8 969  |
| 50-54     | 1 225 | 1 420 | 1 600 | 1 837  | 2 104  | 2 414  | 2 643  | 2 877  | 3 361  | 3 922  | 4 089  | 3 955  | 5 371  | 7 282  |
| 55-59     | 973   | 1 125 | 1 314 | 1 489  | 1 719  | 1 968  | 2 188  | 2 365  | 2 702  | 3 167  | 3 700  | 3 842  | 3 643  | 5 050  |
| 60-64     | 717   | 831   | 973   | 1 149  | 1 315  | 1 527  | 1 693  | 1 863  | 2 130  | 2 461  | 2 900  | 3 330  | 3 357  | 3 253  |
| 65-69     | 577   | 537   | 637   | 761    | 915    | 1 067  | 1 199  | 1 320  | 1 553  | 1 817  | 2 150  | 2 480  | 2 765  | 2 864  |
| 70-74     | 480   | 370   | 355   | 432    | 530    | 653    | 744    | 835    | 984    | 1 198  | 1 475  | 1 719  | 1 944  | 2 220  |
| 75-79     | 300   | 238   | 191   | 190    | 241    | 306    | 376    | 432    | 517    | 641    | 872    | 1 090  | 1 277  | 1 477  |
| 80+       | 127   | 127   | 111   | 96     | 98     | 127    | 166    | 211    | ...    | ...    | ...    | ...    | ...    | ...    |
| 80-84     | ...   | ...   | ...   | ...    | ...    | ...    | ...    | ...    | 202    | 261    | 397    | 568    | 734    | 908    |
| 85-89     | ...   | ...   | ...   | ...    | ...    | ...    | ...    | ...    | 52     | 70     | 121    | 200    | 308    | 450    |
| 90-94     | ...   | ...   | ...   | ...    | ...    | ...    | ...    | ...    | 7      | 11     | 21     | 45     | 85     | 160    |
| 95-99     | ...   | ...   | ...   | ...    | ...    | ...    | ...    | ...    | 1      | 1      | 3      | 8      | 18     | 36     |
| 100+      | ...   | ...   | ...   | ...    | ...    | ...    | ...    | ...    | 0      | 0      | 0      | 1      | 4      | 7      |

**Appendix 4:** Projected total population, both sexes combined, by five-year age group (thousands)

| <i>Age Group</i> | <i>2020</i> | <i>2025</i> | <i>2030</i> | <i>2035</i> | <i>2040</i> | <i>2045</i> | <i>2050</i> |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>0-4</i>       | 18600       | 19424       | 20249       | 21073       | 21897       | 22721       | 23545       |
| <i>5-9</i>       | 19318       | 20327       | 21336       | 22344       | 23353       | 24362       | 25370       |
| <i>10-14</i>     | 18363       | 19454       | 20546       | 21637       | 22728       | 23819       | 24910       |
| <i>15-19</i>     | 17285       | 18377       | 19470       | 20562       | 21655       | 22747       | 23840       |
| <i>20-24</i>     | 16188       | 17172       | 18155       | 19139       | 20123       | 21106       | 22090       |
| <i>25-29</i>     | 15554       | 16632       | 17711       | 18789       | 19867       | 20946       | 22024       |
| <i>30-34</i>     | 14845       | 16185       | 17524       | 18863       | 20203       | 21542       | 22881       |
| <i>35-39</i>     | 11168       | 11881       | 12593       | 13306       | 14019       | 14731       | 15444       |
| <i>40-44</i>     | 9523        | 10119       | 10715       | 11310       | 11906       | 12502       | 13098       |
| <i>45-49</i>     | 10350       | 11730       | 13110       | 14490       | 15870       | 17250       | 18630       |
| <i>50-54</i>     | 7659        | 8035        | 8412        | 8788        | 9165        | 9541        | 9918        |
| <i>55-59</i>     | 5333        | 5615        | 5898        | 6180        | 6463        | 6745        | 7028        |
| <i>60-64</i>     | 3166        | 3078        | 2991        | 2904        | 2816        | 2729        | 2641        |
| <i>65-69</i>     | 2983        | 3101        | 3219        | 3338        | 3456        | 3574        | 3692        |
| <i>70-74</i>     | 2491        | 2762        | 3033        | 3304        | 3574        | 3845        | 4116        |
| <i>75-79</i>     | 1558        | 1651        | 1744        | 1837        | 1929        | 2022        | 2115        |
| <i>80+</i>       | 280         | 290         | 300         | 310         | 320         | 330         | 340         |
| <i>80-84</i>     | 1058        | 1210        | 1363        | 1515        | 1667        | 1819        | 1972        |
| <i>85-89</i>     | 529         | 614         | 699         | 783         | 868         | 953         | 1038        |
| <i>90-94</i>     | 187         | 218         | 249         | 281         | 312         | 343         | 375         |
| <i>95-99</i>     | 43          | 50          | 57          | 65          | 72          | 79          | 87          |
| <i>100+</i>      | 8           | 10          | 11          | 12          | 14          | 15          | 17          |
| <i>total</i>     | 176 488     | 187 936     | 199 383     | 210 830     | 222 277     | 233 724     | 245 172     |

## Appendix 5: Growth trend analysis (1951-2019)

| <i>Year</i> | <i>Population</i> | <i>Growth Rate</i> | <i>Trend</i> |
|-------------|-------------------|--------------------|--------------|
| 1951        | 38,300,804        | N/A %              | 27351299.4   |
| 1952        | 39,100,127        | 2.09%              | 29398496.86  |
| 1953        | 39,897,796        | 2.04%              | 31445694.31  |
| 1954        | 40,736,286        | 2.10%              | 33492891.77  |
| 1955        | 41,646,239        | 2.23%              | 35540089.22  |
| 1956        | 42,646,216        | 2.40%              | 37587286.68  |
| 1957        | 43,742,703        | 2.57%              | 39634484.13  |
| 1958        | 44,931,091        | 2.72%              | 41681681.59  |
| 1959        | 46,197,654        | 2.82%              | 43728879.04  |
| 1960        | 47,524,486        | 2.87%              | 45776076.5   |
| 1961        | 48,897,156        | 2.89%              | 47823273.95  |
| 1962        | 50,312,107        | 2.89%              | 49870471.41  |
| 1963        | 51,781,600        | 2.92%              | 51917668.86  |
| 1964        | 53,330,993        | 2.99%              | 53964866.32  |
| 1965        | 54,982,205        | 3.10%              | 56012063.77  |
| 1966        | 56,755,275        | 3.22%              | 58059261.23  |
| 1967        | 58,650,412        | 3.34%              | 60106458.68  |
| 1968        | 60,605,407        | 3.33%              | 62153656.14  |
| 1969        | 62,504,045        | 3.13%              | 64200853.59  |
| 1970        | 64,235,636        | 2.77%              | 66248051.05  |
| 1971        | 65,733,076        | 2.33%              | 68295248.5   |
| 1972        | 66,997,968        | 1.92%              | 70342445.96  |
| 1973        | 68,118,479        | 1.67%              | 72389643.41  |
| 1974        | 69,248,216        | 1.66%              | 74436840.87  |
| 1975        | 70,542,557        | 1.87%              | 76484038.32  |

|      |             |       |             |
|------|-------------|-------|-------------|
| 1976 | 72,088,680  | 2.19% | 78531235.78 |
| 1977 | 73,889,336  | 2.50% | 80578433.23 |
| 1978 | 75,898,422  | 2.72% | 82625630.69 |
| 1979 | 78,045,163  | 2.83% | 84672828.14 |
| 1980 | 80,253,062  | 2.83% | 86720025.6  |
| 1981 | 82,481,879  | 2.78% | 88767223.05 |
| 1982 | 84,733,905  | 2.73% | 90814420.5  |
| 1983 | 87,024,720  | 2.70% | 92861617.96 |
| 1984 | 89,370,376  | 2.70% | 94908815.41 |
| 1985 | 91,787,361  | 2.70% | 96956012.87 |
| 1986 | 94,282,990  | 2.72% | 99003210.32 |
| 1987 | 96,850,030  | 2.72% | 101050407.8 |
| 1988 | 99,464,407  | 2.70% | 103097605.2 |
| 1989 | 102,090,061 | 2.64% | 105144802.7 |
| 1990 | 104,691,854 | 2.55% | 107192000.1 |
| 1991 | 107,246,408 | 2.44% | 109239197.6 |
| 1992 | 109,748,569 | 2.33% | 111286395.1 |
| 1993 | 112,214,907 | 2.25% | 113333592.5 |
| 1994 | 114,678,032 | 2.20% | 115380790   |
| 1995 | 117,170,739 | 2.17% | 117427987.4 |
| 1996 | 119,707,446 | 2.16% | 119475184.9 |
| 1997 | 122,280,616 | 2.15% | 121522382.3 |
| 1998 | 124,871,845 | 2.12% | 123569579.8 |
| 1999 | 127,457,928 | 2.07% | 125616777.2 |
| 2000 | 130,013,506 | 2.01% | 127663974.7 |
| 2001 | 132,528,402 | 1.93% | 129711172.1 |
| 2002 | 135,002,260 | 1.87% | 131758369.6 |
| 2003 | 137,414,315 | 1.79% | 133805567.1 |
| 2004 | 139,721,980 | 1.68% | 135852764.5 |

|      |             |       |             |
|------|-------------|-------|-------------|
| 2005 | 141,886,883 | 1.55% | 137899962   |
| 2006 | 143,884,609 | 1.41% | 139947159.4 |
| 2007 | 145,715,963 | 1.27% | 141994356.9 |
| 2008 | 147,422,580 | 1.17% | 144041554.3 |
| 2009 | 149,079,155 | 1.12% | 146088751.8 |
| 2010 | 150,761,307 | 1.13% | 148135949.2 |
| 2011 | 152,511,195 | 1.16% | 150183146.7 |
| 2012 | 154,331,500 | 1.19% | 152230344.2 |
| 2013 | 156,207,391 | 1.22% | 154277541.6 |
| 2014 | 158,117,454 | 1.22% | 156324739.1 |
| 2015 | 160,036,578 | 1.21% | 158371936.5 |
| 2016 | 161,957,017 | 1.20% | 160419134   |
| 2017 | 163,900,501 | 1.20% | 162466331.4 |
| 2018 | 165,867,307 | 1.20% | 164513528.9 |
| 2019 | 167,857,715 | 1.20% | 166560726.3 |

**Appendix 6:** Trend in crude birth and death rates, natural change per year, total fertility rate and infant mortality rate.

| Period    | Live births per year | Deaths per year | Natural change per year | CBR <sup>1</sup> | CDR <sup>1</sup> | NC <sup>1</sup> | TFR <sup>1</sup> | IMR <sup>1</sup> |
|-----------|----------------------|-----------------|-------------------------|------------------|------------------|-----------------|------------------|------------------|
| 1950-1955 | 1963000              | 852000          | 1111000                 | 48.3             | 20.9             | 27.4            | 6.36             | 165              |
| 1955-1960 | 2252000              | 921000          | 1331000                 | 48.2             | 19.7             | 28.5            | 6.62             | 156.5            |
| 1960-1965 | 2560000              | 994000          | 1566000                 | 47.5             | 18.4             | 29.1            | 6.8              | 151.2            |
| 1965-1970 | 2950000              | 1090000         | 1860000                 | 47.3             | 17.5             | 29.8            | 6.92             | 144.4            |
| 1970-1975 | 3193000              | 1847000         | 1346000                 | 46.5             | 26.9             | 19.6            | 6.91             | 175.6            |
| 1975-1980 | 3381000              | 1165000         | 2216000                 | 44.7             | 15.2             | 29.5            | 6.63             | 138.3            |
| 1980-1985 | 3670000              | 1181000         | 2489000                 | 42.4             | 13.3             | 29.1            | 5.98             | 122.5            |
| 1985-1990 | 3773000              | 1131000         | 2642000                 | 38.1             | 11.3             | 26.8            | 4.98             | 104.4            |
| 1990-1995 | 3711000              | 1047000         | 2664000                 | 33.3             | 9.5              | 23.8            | 4.06             | 90.6             |
| 1995-2000 | 3669000              | 942000          | 2727000                 | 29.1             | 8                | 21.1            | 3.43             | 73.8             |
| 2000-2005 | 3575000              | 896000          | 2679000                 | 25.4             | 6.9              | 18.5            | 2.94             | 59.3             |
| 2005-2010 | 3327000              | 869000          | 2458000                 | 21.5             | 6.3              | 15.2            | 2.48             | 49               |
| 2010-2015 | 3166000              | 850000          | 2316000                 | 21.5             | 6.3              | 15.2            | 2.22             | 49               |
| 2015-2020 | 3057000              | 872000          | 2185000                 | 21.5             | 6.3              | 15.2            | 2.07             | 49               |

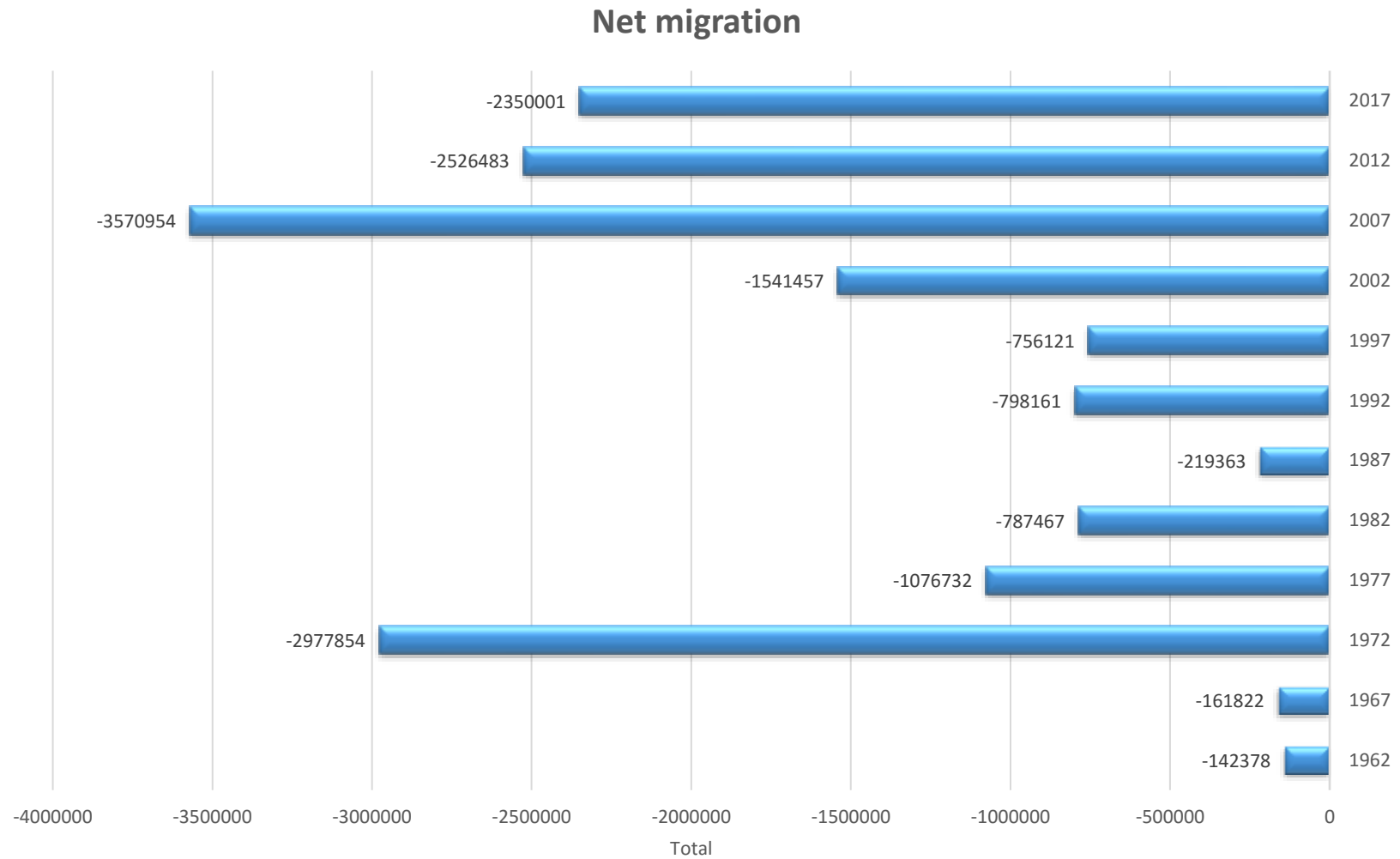
<sup>1</sup>CBR = crude birth rate (per 1000); CDR = crude death rate (per 1000); NC = natural change (per 1000); TFR = total fertility rate (number of children per woman); IMR = infant mortality rate per 1000 births.



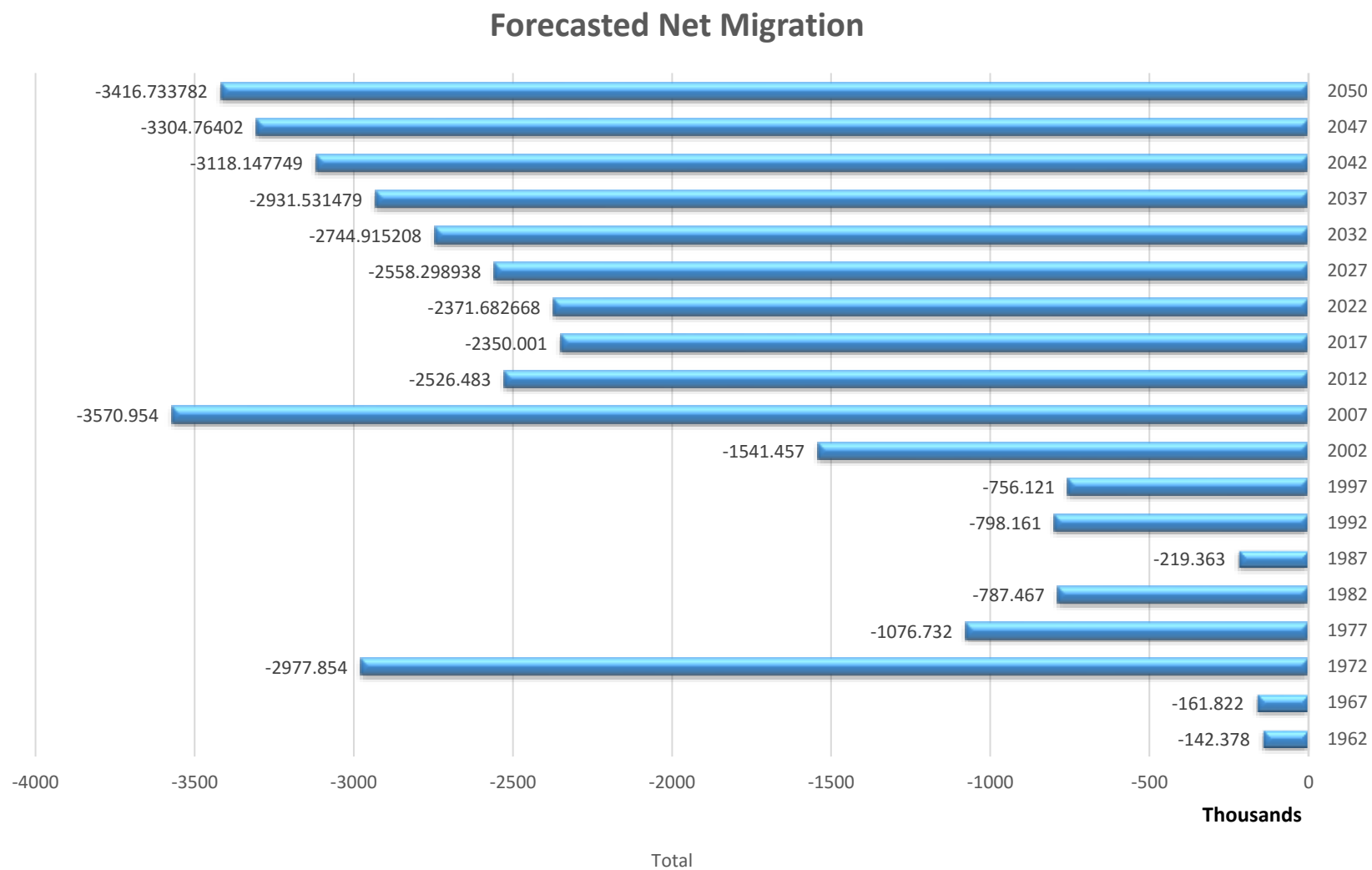
**Appendix 7:** Trend analysis in net migration data (1962-2050)

| <i><b>Year</b></i> | <i><b>Migration</b></i> |
|--------------------|-------------------------|
| 1962               | -142378                 |
| 1967               | -161822                 |
| 1972               | -2977854                |
| 1977               | -1076732                |
| 1982               | -787467                 |
| 1987               | -219363                 |
| 1992               | -798161                 |
| 1997               | -756121                 |
| 2002               | -1541457                |
| 2007               | -3570954                |
| 2012               | -2526483                |
| 2017               | -2350001                |
| 2022               | -2371683                |
| 2027               | -2558299                |
| 2032               | -2744915                |
| 2037               | -2931531                |
| 2042               | -3118148                |
| 2047               | -3304764                |
| 2050               | -3416734                |

**Appendix 8:** Graphical representation of current trend in net migration (1962-2017).



**Appendix 9:** Graphical representation of projected trend in net migration (1962-2050).



**Appendix 10:** Current transition in fertility rate (1960-2017)

| <i>Year</i> | <i>Fertility rate</i> |
|-------------|-----------------------|
| <i>1960</i> | 6.725                 |
| <i>1961</i> | 6.761                 |
| <i>1962</i> | 6.794                 |
| <i>1963</i> | 6.825                 |
| <i>1964</i> | 6.853                 |
| <i>1965</i> | 6.878                 |
| <i>1966</i> | 6.901                 |
| <i>1967</i> | 6.92                  |
| <i>1968</i> | 6.935                 |
| <i>1969</i> | 6.945                 |
| <i>1970</i> | 6.947                 |
| <i>1971</i> | 6.942                 |
| <i>1972</i> | 6.928                 |
| <i>1973</i> | 6.904                 |
| <i>1974</i> | 6.869                 |
| <i>1975</i> | 6.821                 |
| <i>1976</i> | 6.758                 |
| <i>1977</i> | 6.681                 |
| <i>1978</i> | 6.59                  |

|             |       |
|-------------|-------|
| <i>1979</i> | 6.483 |
| <i>1980</i> | 6.359 |
| <i>1981</i> | 6.217 |
| <i>1982</i> | 6.058 |
| <i>1983</i> | 5.884 |
| <i>1984</i> | 5.698 |
| <i>1985</i> | 5.501 |
| <i>1986</i> | 5.298 |
| <i>1987</i> | 5.092 |
| <i>1988</i> | 4.887 |
| <i>1989</i> | 4.686 |
| <i>1990</i> | 4.494 |
| <i>1991</i> | 4.314 |
| <i>1992</i> | 4.146 |
| <i>1993</i> | 3.99  |
| <i>1994</i> | 3.846 |
| <i>1995</i> | 3.713 |
| <i>1996</i> | 3.592 |
| <i>1997</i> | 3.479 |
| <i>1998</i> | 3.372 |
| <i>1999</i> | 3.27  |
| <i>2000</i> | 3.17  |
| <i>2001</i> | 3.071 |

|      |          |
|------|----------|
| 2002 | 2.973    |
| 2003 | 2.876    |
| 2004 | 2.782    |
| 2005 | 2.69     |
| 2006 | 2.603    |
| 2007 | 2.522    |
| 2008 | 2.449    |
| 2009 | 2.384    |
| 2010 | 2.328    |
| 2011 | 2.279    |
| 2012 | 2.236    |
| 2013 | 2.199    |
| 2014 | 2.165    |
| 2015 | 2.133    |
| 2016 | 2.104    |
| 2017 | 2.074594 |

**Appendix 11:** Projected fertility rate (2017-2050)

| Year | Fertility rate |
|------|----------------|
| 2019 | 2.016394       |
| 2020 | 1.987293       |
| 2021 | 1.958193       |
| 2022 | 1.929093       |
| 2023 | 1.899992       |
| 2024 | 1.870892       |
| 2025 | 1.841792       |
| 2026 | 1.812692       |
| 2027 | 1.783591       |
| 2028 | 1.754491       |
| 2029 | 1.725391       |
| 2030 | 1.69629        |
| 2031 | 1.66719        |
| 2032 | 1.63809        |
| 2033 | 1.608989       |
| 2034 | 1.579889       |
| 2035 | 1.550789       |
| 2036 | 1.521688       |
| 2037 | 1.492588       |
| 2038 | 1.463488       |
| 2039 | 1.434388       |

|      |          |
|------|----------|
| 2040 | 1.405287 |
| 2041 | 1.376187 |
| 2042 | 1.347087 |
| 2043 | 1.317986 |
| 2044 | 1.288886 |
| 2045 | 1.259786 |
| 2046 | 1.230685 |
| 2047 | 1.201585 |
| 2048 | 1.172485 |
| 2049 | 1.143384 |
| 2050 | 1.114284 |



**Appendix 12:** Trend in net reproduction rate (1960-2015).

| <i>Date</i> | <i>Reproduction Rate</i> | <i>Change, %</i> |
|-------------|--------------------------|------------------|
| 1960        | 2.13                     | -0.0899          |
| 1965        | 2.31                     | -0.1308          |
| 1970        | 2.43                     | -0.1163          |
| 1975        | 2.23                     | -0.1219          |
| 1980        | 2.42                     | -0.1501          |
| 1985        | 2.25                     | -0.1309          |
| 1990        | 1.96                     | -0.0671          |
| 1995        | 1.67                     | 0.0824           |
| 2000        | 1.46                     | -0.0815          |
| 2005        | 1.29                     | 0.0515           |
| 2010        | 1.12                     | 0.084            |
| 2015        | 1.02                     |                  |

**Appendix 13:** Trend in age-specific fertility rate (1960-2015).

| <i>Date</i> | <i>Age Specific Fertility</i> | <i>Change, %</i> |
|-------------|-------------------------------|------------------|
| 1960        | 200.7                         |                  |
| 1965        | 206.2                         | 0.0274           |
| 1970        | 209.74                        | 0.0171           |
| 1975        | 204.01                        | -0.0273          |
| 1980        | 198.44                        | -0.0273          |
| 1985        | 188.55                        | -0.0499          |
| 1990        | 169.7                         | -0.0999          |
| 1995        | 143.46                        | -0.1546          |
| 2000        | 121.65                        | -0.152           |
| 2005        | 106.46                        | -0.1249          |
| 2010        | 94.15                         | -0.1156          |
| 2015        | 88.01                         | -0.0653          |