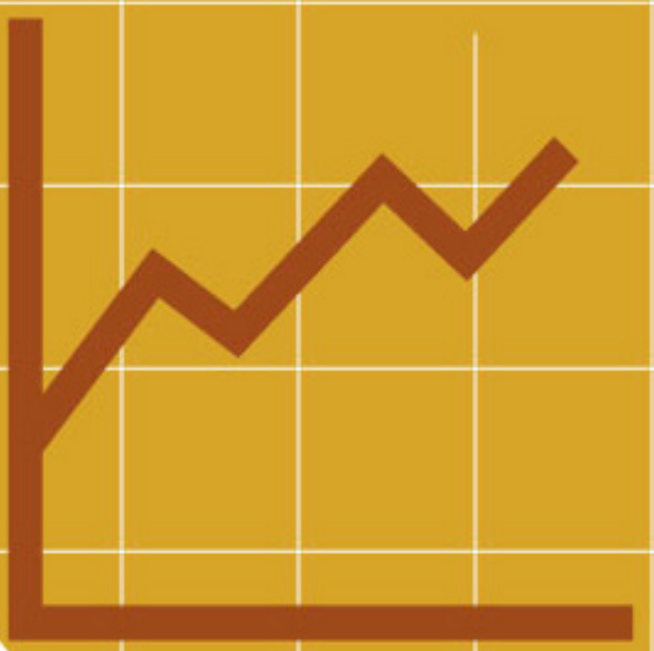
POPULATION MONOGRAPH OF BANGLADESH

FERTILITY DIFFERENTIALS IN BANGLADESH: TRENDS AND DETERMINANTS

Population Monograph: Volume-14



Bangladesh Bureau of Statistics
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COMPLIMENTARY

POPULATION MONOGRAPH OF BANGLADESH

FERTILITY DIFFERENTIALS IN BANGLADESH: TRENDS AND DETERMINANTS

November 2015

BANGLADESH BUREAU OF STATISTICS (BBS)
STATISTICS AND INFORMATICS DIVISION (SID)
MINISTRY OF PLANNING
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Minister
Ministry of Planning
Government of the People's Republic of Bangladesh

Message

I am delighted to know that Population and Housing Census 2011 Project of Bangladesh Bureau of Statistics (BBS), Statistics and Informatics Division (SID) has prepared fourteen Population Monographs using the census data of different years. This is the first time BBS is publishing population monographs with in- depth analysis of the population census data. The present monograph on 'Fertility Differentials in Bangladesh: Trends and Determinants' is one of such monograph series.

Each monograph deals in a particular issue related to population and housing where census data have been used in multidimensional approaches. In addition, cross country comparison and in country comparison have also been made to oversee the representativeness of data with other national sources. It is expected that the monographs will useful in national planning and policy making particularly in the field of population and development.

I would like to thank concerned officials of SID and BBS and also authors of the monographs for their relentless effort in preparing these monographs and publication thereof. Special thanks to European Union (EU) and United Nations Population Fund (UNFPA) for their generous support in conducting 5th decennial census of Bangladesh and preparing the population monographs.

AHM Mustafa Kamal, FCA, MP

Dhaka
November, 2015

State Minister
Ministry of Finance
and
Ministry of Planning
Government of the People's Republic of Bangladesh

Message

I have come to learn that Population and Housing Census 2011 Project of Bangladesh Bureau of Statistics, Statistics and Informatics Division has prepared fourteen Population Monographs using census data of different years. Population is the main ingredient for national planning and policy making. Therefore, Population Monographs are of vital importance in the field of population planning of the country.

Each monograph has been prepared with a particular issue related to population and housing. To prepare these Monographs census data have been used widely in multidimensional way where secondary data from other sources have also been used. The monographs are a new dimension in the wide use of data generated through national censuses of the country.

My sincere thanks and gratitude to the Honorable Minister, Ministry of Planning for his dynamic leadership and active guidance in implementing all our activities including census undertaking. I would like to thank Secretary, Statistics and Informatics Division, Director General, BBS for their relentless effort in preparing these monographs and publication thereof. Special thanks to European Union (EU) and United Nations Population Fund (UNFPA) for their generous support in conducting 5th decennial census of Bangladesh and preparing the population monographs.

M.A. Mannan, MP

Dhaka
November, 2015

Secretary
Statistics and Informatics Division (SID)
Ministry of Planning
Government of the People's Republic of Bangladesh

Foreword

Population Census is the single most important statistical undertaking in any country. Bangladesh Bureau of Statistics of the Statistics and Informatics Division has conducted the 5th decennial census of the country during 15-19 March, 2011. In order to supplement the main census a large scale sample survey was conducted in October 2011 which covered detailed information on Population & Housing. The Monograph on 'Fertility Differentials in Bangladesh: Trends and Determinants' is mainly based on the findings of the sample census conducted during 2011. Data from other secondary sources have also been used to prepare the Monographs.

It may be mentioned that Bangladesh Bureau of Statistics (BBS) has been publishing a number of Population Monograph series and Population Monograph on 'Fertility Differentials in Bangladesh: Trends and Determinants' which is one of the fourteen monographs being published by BBS using Population Census Data. Monographs are the in depth analysis of a particular topic of interest. It is worth mentioning that Bangladesh is now in demographic transition where population growth has been reduced substantially due to decline in fertility.

In light of that, population monograph on 'Fertility Differentials in Bangladesh: Trends and Determinants' will be useful for proper population planning in Bangladesh. This monograph has covered detailed information on trends and determinants of fertility.

I like to express my sincere thanks to Director General, Deputy Director General of BBS, Project Director of Population and Housings Census 2011 Project and his team for preparing this Monograph. I acknowledge with gratitude the support of European Union (EU) and United Nations Population Fund (UNFPA) for successful completion of the Population and Housing Census 2011 and preparing the Monographs.

Kaniz Fatema ndc

Dhaka
November, 2015

Director General
Bangladesh Bureau of Statistics (BBS)
Statistics and Informatics Division (SID)
Ministry of Planning
Government of the People's Republic of Bangladesh

Preface

The fifth population and housing census of Bangladesh was conducted during 15th March to 19th March, 2011. The main objective of the census was to collect information on the basic characteristics related to housing, households and population for developing a comprehensive database for development planning and human resource development programmes as well as economic management.

Population and Housing Census 2011 were conducted in three phases. In the First Phase, basic data about all households and individual members of the households were collected through ICR formatted questionnaire during 15th March to 19th March, 2011. In the Second Phase, quality and coverage of the main count were verified through a Post Enumeration Check (PEC) survey during 10th April to 14th April, 2011. For the first time in the census history of Bangladesh, PEC was conducted by an independent organization, namely Bangladesh Institute of Development Studies (BIDS). In the Third Phase, detailed socio-economic information was collected by administering a long machine readable questionnaire in a sample survey held during 15th October to 25th October, 2011.

One of the objectives of the Population and Housing Census 2011 Project was in-depth analysis of census data and preparation of Population Monograph series. Monographs are useful to the users to know the detailed information about the related area for taking appropriate policy measures and further research.

The Population Monograph on 'Fertility Differentials in Bangladesh: Trends and Determinants' is one of the 14 monograph series which discussed the fertility situation in Bangladesh.

I express my heartfelt gratitude to the Honorable Minister for Planning for his effective guidance and significant cooperation in making the census a success. I express my deepest gratitude to Secretary, Statistics and Informatics Division (SID) for her whole-hearted support and cooperation to the census. Moreover, members of 'Steering Committee', 'Standing Technical Committee', Consultants and the participants of the Seminar-cum-Expert Consultation deserve special thanks for their valuable contributions for finalizing the questionnaire and the census programme. I am thankful to the researchers of the Department of Population Sciences, University of Dhaka for preparing this monograph. Thanks to European Union (EU) and United Nations Population Fund (UNFPA) for their technical and financial support to the Population and Housing Census 2011 Project.

Finally, I like to thank Deputy Director General, BBS, Project Director, Population and Housing Census 2011 Project, members of the Technical Committee and other officers & staff members of BBS for bringing out this monograph.

Mohammad Abdul Wazed

Dhaka
November, 2015

Representative
UNFPA Bangladesh

Message

This report is part of a series of 14 monographs developed by the Bangladesh Bureau of Statistics (BBS) with support from the United Nations Population Fund (UNFPA). UNFPA has supported the BBS since the very first census in 1974, a cooperation that has grown stronger with each census. Through the "Support to 2011 Bangladesh Population and Housing Census" project UNFPA has been working closely with the BBS to ensure that best use is made out of the resources invested in the census. The project has put a major emphasis on in-depth analysis of census data and the production of thematic reports in the form of these monographs. This series will provide its readers a better and clearer understanding of the trends, the current country scenarios and the gaps indicating where targeted interventions are necessary.

The availability of quality, reliable and timely data, as well as a thorough, methodologically sound and user-friendly analysis of data is more important than ever before. The information generated by population and housing census, the numbers of people, their distribution, their living conditions, are all critical for development. Without accurate data, policymakers do not know where to invest in schools, hospitals or roads and the most in need remain invisible. The implementation and monitoring of the Sustainable Development Goals, the guiding framework for the development agenda 2030, will require the production and analysis of a large amount of data, big data, requiring strong and independent National Statistics Offices, which UNFPA will continue to support.

I would like to take this opportunity to congratulate and thank the Statistics and Informatics Division and the Bangladesh Bureau of Statistics' authority and the project team for their efforts to produce this series, as well as the experts who contributed to the development of the monographs. My special gratitude goes to the Delegation of European Union in Bangladesh for their generous support and co-operation in implementing the "Support to Bangladesh Population and Housing Census 2011" project and in the preparation of these monographs.

Dhaka
November, 2015

Argentina Matavel Piccin
Representative
UNFPA Bangladesh

Project Director
Population and Housing Census 2011 Project
Bangladesh Bureau of Statistics
Statistics and Informatics Division
Ministry of Planning

Acknowledgements

It is my great pleasure to acknowledge the contributors who were engaged in preparing the fourteen Population Monographs of Bangladesh under Population and Housing Census 2011 Project of Bangladesh Bureau of Statistics (BBS). This initiative of BBS is a new dimension with regard to the wide use of census data in the country and the abroad.

Monographs have been prepared by the BBS in collaboration with public universities, research organizations and a local consultant of this project. A series of review meetings were organized to finalize the draft monographs.

I would like to express my profound regards and deep sense of gratitude to the Secretary, Statistics and Informatics Division (SID) and Director General, Bangladesh Bureau of Statistics for their valuable suggestions, continuous guidance and all out support in smooth completion of all the activities of this project and bringing out the population monographs.

It is worth mentioning that European Union (EU) has provided generous support in the implementation of the Population and Housing Census 2011 Project. I take the opportunity to express my indebtedness to United Nations Population Fund (UNFPA) for the partnership of this project of BBS.

I am extremely grateful to the institutions and the authors who were engaged in preparing the monographs. My sincere thanks to Mr. Nicholas Jhon Mcturk, Technical Expert on Population Development, Asia and the Pacific Regional Office, Dr. Chrisophe Lefrance, Technical Advisor, Population and Development, UNFPA Regional Office and the local consultant of this project Mr. Md. Shamsul Alam for their whole hearted co-operation in the preparation of monographs.

Thanks are also due to Mr. Iori Kato, Deputy Representative, Dr. Shantana R. Halder, Chief PPR and Mr. Mahboob-E-Alam, NPO, UNFPA for their kind support and help. I am grateful to Mr. Md. Mostafa Ashrafuzzaman, Deputy Director, Mr. Md. Khorshed Alam, Assistant Statistical Officer, Mr. Mohammad Abdullah, Assistant Statistical Officer and all other officials of Population and Housing Census 2011 project of BBS who worked hard to conduct the census and to prepare the monographs.

Md. Mashud Alam

Dhaka
November, 2015

EXECUTIVE SUMMARY

Fertility is the most important determinant of population change. Bangladesh has achieved remarkable success in reducing fertility rate during last three decades. The objectives of this research monograph were to examine trends and determinants of fertility differentials in Bangladesh. These objectives have been achieved using data from the 2011 census of Bangladesh and Sample Vital registration System (SVRS) and Bangladesh Demographic and Health Surveys (BDHS) through the application of bivariate analysis and multivariate regression analysis.

Based on census data, in general, it was found that the total fertility rate in Bangladesh has declined consistently during the period of 1981 to 2011 and Bangladesh has achieved replacement level fertility (i.e., on average 2.1 children per woman) in 2011. This is also true when we are using data from the SVRS. However, by using data from the BDHS we notice that although the TFR has decline substantial from 6.3 children in 1975, the total fertility rate in Bangladesh was above the replacement level in 2011 (i.e., 2.3 children per woman). This pattern is also true in the case of age-specific fertility rates in younger age groups (15-19 and 20-24).

Women married before age 18 are more likely to have higher number of children than women married after age 18. Women with all girls at the time of census are more likely to have higher TFR and higher number of children than those who either have all boys or both boys and girls. This finding clearly indicates the existence of son preference in our society. Women with lower socioeconomic status (lower education, not employed and lower wealth index) were more likely to have higher fertility even after adjusting for other characteristic of women.

It is evident in this study that access to media has significant positive impact on reducing fertility. Another important finding in this study is the divisional variations in fertility. Chittagong and Sylhet have consistently higher current and cumulative fertility than other divisions even after adjusting for socioeconomic, cultural and demographic characteristics suggesting that these regions should get higher preference in allocating budget and resources for family planning programs. This is also true in the case of rural areas in relation to urban areas.

Prevent child marriage through strict implementation of laws and creating awareness about the negative consequences of child marriage. Ensure higher than secondary education and higher labour force participation for women at all levels. Increase access to media for all and introduce new awareness programs related to family planning to make those more effective. Design need-based intervention programs for control of population growth by giving priority in allocation of budget and resources in high-fertility prone divisions, for example Sylhet and Chittagong.

Emphasis should be given in collecting quality data on the important demographic issues in future censuses of Bangladesh. Examining parity-specific analysis is important because it had substantial implication on health and empowerment of women since women can decide the extent to which they will either postpone or advance their childbearing. Future research should explore these aspects in greater detail. Finally, in-depth analysis should be carried out in future research on the poverty-fertility nexus in the context of Bangladesh.

1. BACKGROUND

1.1 Introduction

Fertility is the most important determinant of population change (Becker, 1965; Caldwell, 1982; Easterlin, 1975). For this reason, compared to migration and mortality, fertility has received huge attention among policy makers. Fertility is not only responsible for population growth but also the main factor determining the change in age composition of a population (Khuda and Hossain, 1996; Rabbi, 2015). Although inherently a biological process, human fertility is strongly influenced by societal and cultural factors that make it a collective as well as individual matter. A society's continuation depends on its fertility, and for this reason all societies possess elements of culture that promote and encourage some level of reproduction. Thus a population's fertility is the product of biological, social, and behavioural factors (Dougall et al., 2012; Trovato, 2010). Therefore, any research on fertility should be considered as multi-dimensional in nature in order take all those factors into account which will obviously pave the way for generating effective policy recommendations for bringing desired change in the levels of fertility.

Few decades ago, Bangladesh was characterized by high birth and high death rates. However, over the decades, the country has made noteworthy progress in population, health and development indicators. A range of factors, particularly health and family planning programs which began in early fifties, have played critical role for these achievements. The rate of total fertility has declined from 6.3 in 1975 to 2.3 per women in 2014 with increasing contraceptive prevalence rate from 7.7% in 1975 to 62.4% in 2014 (BFS 1975 and BDHS 2014). The 2014 Bangladesh Demographic and Health Survey data shows that the total fertility rate (TFR) in Bangladesh has become stagnant since 2011. In addition, the rate of progress is not uniform all over the country though Bangladesh government has initiated several programs to ensure equity in access to health and family planning. On the other hand, Bangladesh is expected to add around 17 million more population, due to the effects of population momentum in spite of having low birth and low death rates as well as achieving replacement level fertility (Jones, 2015). Under these circumstances, it is important to identify the trends and determinants of fertility differentials in Bangladesh. In most of the cases, previous researches conducted in most developing countries have initiated to identify the determinants of fertility by using sample survey data. In these contexts, using Census data from Bangladesh Bureau of Statistics (BBS) to assess the trends and determinants of fertility differentials in Bangladesh will capture the overall country situation which will ultimately contribute to the national policy.

Earlier research on fertility in Bangladesh has looked at wider range of issues such as patterns and determinants of fertility transition (Adnan, 1998; Bairagi and Datta, 2001; Barkat and Hossain, 1996; Begum, 2003; Kabir, 1987), relationship between age at marriage and fertility

(Ahmed et al., 2007; Kamal et al., 2003; Nahar et al., 2013); impact of education on fertility (Akram, 2002; Hossain and Karim, 2013; Mahjaben and Khan, 2011), role of employment in reducing fertility (Caldwell et al., 1984; Hossain and Karim, 2013), association between contraceptive prevalence and fertility (Kamal, 2009; Saha and Bairagi, 2007; Uddin and Rahman, 2006; Streatfield, 2008) and role of cultural factors in determining fertility size (Maloney et al., 2003; Morad, 2014; Rabbi et al., 2012; Rizvi, 2014). In general, the findings of these studies suggest that Bangladesh has undergone rapid fertility decline except for the period 1994 and 2000. The rapid decline of fertility in Bangladesh has been attributed to overall socioeconomic development, urbanization, increasing female education, women empowerment, improved access to contraception, increased access to mass media; and declines in infant and child mortality.

However, there are several limitations of the earlier research on fertility in Bangladesh. First, most of the previous research on fertility in Bangladesh is based on small scale survey data (Akram, 2012; Ahmed et al., 2007; Islam, Rob, & Chakraborti, 2003; Rabbi, 2012). Second, these studies have in general looked at the determinants of fertility (measured as the total number of children). None of the earlier studies has done separate analysis to identify determinants of low fertility (less than 2.0 children), replacement level fertility (2.0 children) and high fertility (more than two children). Third, none of the earlier research has looked at the cohort completed fertility. Finally, although census is the largest source of demographic data and works as denominator to measure population change none of the earlier research has used individual level census data to examine differential determinants of fertility in Bangladesh.

Thus, the broader objective of this monograph is to examine the trends and patterns of fertility across different attributes such as division, residence (rural-urban; slum-non slum), ethnicity, education, wealth quintile and other socioeconomic characteristics using data from the 2011 Censuses of Bangladesh. Specific objectives of the monograph are to:

- describe trends of current fertility by women's background characteristics
- describe trends of cumulative fertility by women's background characteristics
- identify the demographic, socioeconomic, cultural, and spatial determinants of fertility in Bangladesh;
- explore changing patterns of cohort completed fertility (CCF) in Bangladesh;
- generate policy recommendations for bringing required change in fertility levels in Bangladesh

Achieving these objectives will contribute to address the above mentioned limitations of earlier research on fertility in Bangladesh. The findings of this research will also facilitate better understanding of the mechanisms of fertility changes and variations which would contribute for better policy interventions. Additionally, this research will precisely identify

which group of population need what type of intervention for bringing desired change in fertility. This monograph will also generate further interest among researchers in Bangladesh. Finally, this monograph will contribute a lot to fulfil the objectives of Bangladesh Bureau of Statistics (BBS), Government of Bangladesh and the donors in "producing a continuous series of reliable and timely demographic, social, and economic benchmark data at national and sub-national levels". It will also contribute in formulation of population and development policies and programs, and in strengthening capability of BBS both at national and sub-national levels.

1.2 Organization of the Monograph

The remaining chapters of this monograph are organized as follows. Chapter 2 provides review of literature on fertility. Chapter 3 focuses on data, methods and analytical plan used in this study. Chapter 4 presents results in detail utilizing data from the censuses of Bangladesh. Chapter 5 provides discussion of results in broader context, policy recommendations, research implications, and conclusions.

1.3 Definitions of Terms and Concepts

There are three outcome variables of interest in this study: current fertility, cumulative fertility, and cohort completed fertility. The 2011 census contains information on *whether gave a live birth during last 12 months* of the census. This variable is reported in the census into two categories: yes and no. This variable was used as the current fertility of the respondents and in subsequent analysis total fertility rate (TFR) was computed using this variable. Thus, in this study, *current fertility* indicates whether a live birth occurred during last 12 months of the survey.

The 2011 census also provides information on *total number of live births*. In this study, the total number of live births has been used as *cumulative fertility* of the respondents. Moreover, for sub-sample analysis, *cumulative fertility* was further defined into three categories: low fertility (less than 2.0 live births), medium fertility (2.0 live births) and high fertility (more than 2.0 live births).The *total number of live births* has been also used to measure the Cohort Completed Fertility (CCF) for women aged 50 and above at the time of the 2011 census.

- The *Crude Birth Rate (CBR)* is defined as the number of births over a specified period of time per 1,000 populations.
- The *age-specific fertility rate* is defined as the number of births to women of a given age group in a given period of time for every 1,000 women in the same age group.
- In this study, *current fertility* is defined as whether woman gave any live birth in the last 12 months of the census. Later using this information, *total fertility rate* (TFR) was calculated.

- Thus *TFR* is the average number of births per woman during their reproductive age (15-49). A TFR of 2.1 children per woman indicates the replacement level fertility.
- Information on the total number of live births ever is defined as *cumulative fertility*. This variable has been used to measure *cohort completed fertility (CCF)*. Thus CCF indicates average number of live births per woman at the end of their reproductive age (i.e., 49). For this reason, it is possible to compute CCF only for women aged 50 and above.
- *Tenancy status* was defined into three categories: i) Owned: Dwelling unit found occupied and used by household owning it. ii) Rented: Dwelling unit found occupied and used under arrangement of contractually rented. iii) Rent free: Dwelling unit found occupied and used without rent.

2. Literature Review

In this section, we reviewed the relevant literature to examine the factors associated with fertility differentials in Bangladesh. Major aspects covered in this section include socio-economic, cultural and geographic aspects that influence fertility differentials. Both nationally and internationally published literatures were reviewed.

2.1 Demographic Determinants of Fertility

Demographic determinants of fertility include women's age at marriage, birth cohort, and sex composition of their children. The variation in age-specific fertility, whether developed or developing countries, is largely related to women's *age at marriage*. Previous research shows that younger age at marriage is related with higher number of births and consequently older age at marriage is related to lower number of births. The latter is due to limited number of years available for childbearing. This situation is particularly true in countries where marriage is still a shine qua non for having children meaning that the having children out of wedlock is strictly prohibited by social and religious norms and values (Trovato, 2010; Kamal, 2012). Ahmed et al. (2007) examine the age at marriage and the fertility pattern of adolescent married girls residing in rural areas of Bangladesh. They notice that the mean age at marriage was observed to be 15.5 ± 1.5 years which was below the minimum legal age for marriage of females. Although a trend towards increasing age at marriage is observed in this study, the rise is very slow and too little. The total fertility rate among this group was estimated to be 2.6 per woman. Hence the authors argue that in order to reduce the rate of early marriage and childbearing, adolescents, their parents and communities should be made more aware of the negative health, social and economic consequences of these events. Such awareness could be created through social mobilization and information, education and communication campaigns.

Therefore it is well established in the literature that earlier *age at marriage* is associated with higher number of children. For this reason, women who had child marriage (married before age 18) had higher number of children than those who were married as adult (at 18 or above). Kamal (2012) examined the effect of child marriage on the reproductive outcomes of women in Bangladesh using data from the 2007 Bangladesh Demographic and health Survey. The author notice that women who were married before 18 had 4.27 times higher prevalence of having three or more births as compared to those who were married at age 18 or above. Kamal (2012) argue that in societies where marriage is the precursor of socially-acceptable childbirth, childbearing begins soon after marriage. Early marriage is associated with early childbearing in most cases, particularly in the developing world where the main purpose of marriage is to have children (Ikamari, 2001). For this reason the relationship between early

marriage and early motherhood is very strong (Choe et al. 2001). Kamal also argue that in the Bangladesh, women try to have childbirth as early as possible with a view to prove their fertility. Women are blamed if they cannot give birth immediately after marriage. This is particularly true in rural areas and among lower educated people of our society. In order to avoid this blame and to prove her fertility, most women want to have childbirth soon after their marriage. Thus, it is expected that women married at earlier stages of life should have early age at first birth which eventually leads to higher number of children at the end of their reproductive span (Kamal, 2012).

In addition to the variations in fertility across age at marriage, earlier research also shows that there are substantial variations in fertility across various *birth cohorts*. For instance, earlier birth cohorts are more likely to have higher number of births compared to recent cohorts (Jain and McDonald, 1997; and Yoo, 2014). The reason for having higher number of births in earlier cohorts is lower level of education and employment rate among women. In addition, pronatalist norms and values of religion also promote having more children among women. Due to the waning influence of religion on fertility in recent decades the numbers of total births among recent birth cohorts are relatively lower as compared to their older counterparts.

In consistent with above expectation, Jain and McDonald (1997) examine fertility differentials among Australian birth cohorts measured in terms of the cohort parity progression ratios, and the four components of cohort total fertility: the proportion of women who proceeded to have a birth, mean age at first birth, mean age at last birth, and average inter-birth interval for women who had at least two births. In general the authors reveal a downward completed fertility of successive generations of Australian women born since 1933-37. For this reason they argue that if the fertility of the Australian birth cohorts of women were to rise or even to remain constant, incentives and infrastructure support to parents will have to be provided such that they could combine child bearing and rearing with their already modified life style and working arrangements. Hence they fear that without such support it will be difficult to increase fertility in Australia in the future. Similarly, Yoo (2014) looked at the pattern of fertility differentials by level of education and the contribution of the changes in women's educational attainment to the fertility decline during the fertility transition in South Korea. The author notice that the differences in fertility by educational attainment have gradually declined over the transition, with fertility almost converging at a low level among recent birth cohorts. Yoo argues that the change in women's educational attainment became an important factor in the further decline in fertility. The trend toward fewer children quickly spread from the most educated to the least educated women throughout the fertility transition.

Another pivotal determinant of high fertility is the *sex composition of children* (whether women have all boys, all girls, or mixed). Earlier research shows that in situations where parents have only either male of female children they prefer to have another child. However,

when parents' all children are males they intend to have further children due to their desire for son. Although the son preference is prevalent across the globe it is more prevalent in developing countries where education rate is lower and gender inequality is very high (Basten et al., 2013; Calhoun et al., 2013; Chaudhury, 2012).Chaudhury (2012) examines the relationship between son preference and fertility in India using data from India's 2005–2006 National Family Health Survey. The author notices that women with more sons than daughters were generally less likely than those with more daughters than sons to continue childbearing; parity progression driven by the desire for sons accounted for 7% of births. In addition, women without any sons were more likely than women without any daughters to continue childbearing at parities 1–4 (odds ratios, 1.4–4.5). Moreover, researchers also established significant relationship between fertility and many other demographic variables such as duration of breastfeeding, contraceptive prevalence, unmet need for family planning, and discontinuation rate of family planning (Bongaarts, 1982; Bongaarts and Feeney, 1998; Davis and Blake, 1956)

2.2 Socioeconomic Determinants of Fertility

Among the socioeconomic determinants of fertility Women's education, employment status and income are considered as the most three important determinants of fertility. In general, there is an inverse association between higher socioeconomic status and fertility of women (Akram, 2002, Weinberger, 1987). For instance, Akram (2002) showed that the greatest impact of education on fertility occurs when levels of education reached at secondary level. Small amounts of primary education are not likely to have a significant impact. The author argues that education has been found to increase women's levels of autonomy in decision-making, in acquiring knowledge, in gaining access to economic resources, and in interacting with a wider social circle. It is through this autonomy that education exerts an impact on fertility.

Concerning the impact of *employment status* on fertility of women Khuda and Hossain (1996) argued that female employment affect contraceptive use and fertility in at least three ways: female employment creates more favourable fertility attitudes and norms; it empowers women in household decision-making; and it increases opportunity costs associated with childbearing. Mahmud (1994) examined the role of women's employment in influencing fertility regulation in rural Bangladesh comparing fertility control among women participating in income-generation programs and among a socioeconomically similar comparison group in Bangladesh. The author conducted Interviews among a sample of about 100 currently married women from each of four income-generation programs in Bangladesh: the government's Women's Program of the Bangladesh Rural Development Board (BRDB), the Women's Entrepreneurship Development Program of Bangladesh's Small and Cottage Industries Corporation (BSCIC), the Grameen Bank, and the Bangladesh Rural Advancement

Committee (BRAC) Women's Program. There were 417 women in the sample and 389 women in the comparison group. These programs provided credit to women for activities, such as paddy husking and poultry keeping. The BSCIC did not provide any direct or indirect family planning input. The BRDB encouraged women to use modern contraceptives. The Grameen and BRAC educated participants about the benefits of small families. Three groups, with the exception of BRAC, used women's groups. Overall, the author notice that the sample and comparison groups differed significantly in the context of productive work and contraceptive use. Multivariate findings show strong support for the direct and significant effect of employment programs on fertility-regulating behaviour of poor respondents. Nongovernmental groups with a women's group approach were more effective in raising income levels and physical mobility. The BSCIC had much lower contraceptive prevalence. Program participants had higher sterilization rates, but actual fertility was also higher. The effect of employment on fertility was further confirmed by Rabbi (2013). In general, the authors notice lower fertility for employed women with exception for women living in rural areas. The author argues that one possible reason might be relaxed job structure in rural areas which essentially facilitate to have higher order births since they have the ability to take proper care.

Empirical studies find a clear negative relationship between *income*, or wages, and fertility. This finding has been confirmed across time and for different countries (Becker, 1960; Tertilt, 2008; Trovato; 2010). In their study, Khuda and Hossain (1996) observe that in Bangladesh ownership of land is associated with lower level of fertility suggesting an inverse relationship between wealth and fertility. The inverse relationship between income/wealth index and fertility is further confirmed by findings from the Bangladesh Demographic Health Surveys (BDHS). For instance, the 2011 BDHS shows that poorest women have the lowest rate of contraceptive prevalence rate, higher desired fertility, higher levels of unwanted pregnancy and unmet need for family planning. These factors eventually lead to lower fertility for poorest women as compared to the richest women.

2.3 Cultural Determinants of Fertility

Among cultural factors religion is an important determinant of fertility. Earlier research shows that religion influences fertility through its pronatalist norms, values and beliefs (McQuillan, 2012; Heaton, 1986).Calvin Goldscheider (1971) first started extensive discussion on religious differences in demographic behavior. For example, Alagarajan (2008) find that Muslims have highest TFR and highest number of children ever born than Hindus and Christians in India. The author attributes the differences in fertility to their differential pattern of fertility related factors such as contraceptive prevalence rate and unmet need for family planning. Alagarajan notice that Muslims have lower contraceptive prevalence rate and higher unmet need for family planning than other religions which essentiality contributes to Muslims' higher fertility as compared to other religions.

Rabbi (2012) finds that on the way to reduce fertility rate of Bangladesh, mass media plays significant role to raise consciousness about the family planning program on general peoples. In this study the impact of mass media has been measured by the pattern of watching television, listening radio and reading newspaper. Using the proportional hazards model, the mass media exposure found to be a significant differential of fertility even after controlling the effects of contraception, place of residence, and mother's educational and employment status. This implies, by taking necessary steps, mass media can be used much more adequately to reduce fertility rate of Bangladesh. This is further confirmed by Guttmacher Institute (2000). They notice that exposure to general media programming and to family planning messages through the media has a strong impact on reproductive attitudes and behaviours in Pakistan, India and Bangladesh. According to analyses of national survey data, women in all three countries who regularly watch television and those who have been exposed to explicit family planning messages are more likely than other women to approve of family planning.[1]Having listened to explicit family planning messages on radio or television is associated with contraceptive use in all three countries. In addition to these factors mentioned above researchers also have found significant relationship between many other cultural factors such as religiosity, attitude towards contraceptive use, attitude towards abortion, household decision making and attitude towards gender equality (Lehr, 2009; McQuillan, 2004; Rabbi, 2013).

2.4 Spatial Determinants of Fertility

There are substantial differences in rural-urban fertility across the globe (Reed et al., 1999). Bangladesh is not an exception in this case. However, the differences in fertility between rural and urban areas are diminishing over time in Bangladesh. For example, in 1993-94 the total fertility rate in rural areas was 3.54 and for urban areas it was 3.44 (BDHS 1993-94). On the other hand, the 2014 BDHS shows very little difference in fertility between rural and urban areas (2.4 and 2.3 respectively). However, there are substantial variations in fertility by division in Bangladesh. In 2014, four divisions have total fertility rate above the replacement level. These divisions are Sylhet (2.9), Chittagong (2.5), Dhaka (2.3) and Barisal (2.2) On the contrary, three divisions have fertility levels either at replacement level or below the replacement level: Rajshahi (2.1), Khulna (1.9), and Rangpur (1.9). The divisional variations in fertility by place of residence (rural-urban) or division have been partly attributed to their differences in socioeconomic conditions and differences in religiosity (Islam et al., 2003; Kamal et al., 2003).

3. METHODOLOGY

This section presents information on data used for examining trends and determinants of fertility differentials, operational definition of dependent and independent variables, and analysis plan. Moreover, limitations of census data are also included in this section.

3.1 Data

We used data from the 1981, 1991, 2001, and 2011 censuses of Bangladesh. However, it should be mentioned that for describing trends of fertility we used census data from 1981 to 2011. On the other hand, for examining differential determinants of fertility we used individual level data from the 2011 Census of Bangladesh. In this case, we selected women aged 15 years and above. However, some analyses were restricted to women aged 15-49 years to cover the reproductive span (e.g., measuring TFR for sub-groups). Because of exploring causes of early childbearing we also restricted some analysis only to women aged 50 and over (e.g., measuring cohort completed fertility) depending on the objective of analysis.

3.2 Dependent Variables

There are three outcome variables of interest in this study: (1) current fertility, (2) cumulative fertility and (2) cohort completed fertility. Current fertility was measured using the information in *whether a live birth occurred during last 12 months* of the census. Cumulative fertility was measured using the information on *total number of live births* among women aged 15-49 and cohort completed fertility of women aged 50 and above was measured using the information of *total number of live births*.

3.3 Independent Variables

As mentioned in the review of literature that there are wide range of factors behind determining the levels of fertility in a society such as age, age at first marriage, birth cohort, sex composition of children, duration of breastfeeding, contraceptive prevalence, unmet need for family planning, discontinuation rate of family planning, education, employment, wealth index, residence, dwelling status, religiosity, attitude towards contraceptive use, attitude towards abortion, household decision making, attitude towards gender equality. However, census dataset does not contain such wide range of variables. As a result, we had to restrict the analysis of identifying fertility determinants to a selected list of variables based on the availability in census data. Thus the main independent variables of interest in this study include respondents' age, age at first marriage, birth cohort, division, dwelling location

(rural-urban), dwelling status (slum-non-slum), ethnicity (Bengali-others), religion, education, employment status, wealth index, and household media exposure.

In bivariate analysis, respondents' *age* was included into seven categories: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49. In multivariate analysis, age was included as a continuous variable. Respondents' *age at first marriage* was coded into three categories: less than 14, 14-17, and 18 and above. For women aged 15-49, *birth cohort* was coded into four categories: born before 1974, 1974-1983, 1984-1993, and 1994 and onwards.

There are seven *divisions* in Bangladesh: Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur, and Sylhet. All divisions were included in the analysis. *Dwelling location* of the respondents was coded into two categories: rural and urban. Similarly, *dwelling status* of the respondents was defined as slum and non-slum. *Ethnicity* was coded into two categories: Bengali and others. Religion was coded into two categories: Islam and Others.

Respondents' *education* was coded into four categories: (1) no education, (2) primary education, (3) secondary education, and (4) higher then secondary education. In addition, *literacy* of the respondents was coded into three categories: cannot read and write, can read only, and can read and write. Their *employment status* was coded into not employed and employed categories. We created *wealth index* of the respondents using information on construction material of walls, roofs and floors; sources of drinking water; whether the household drink boiled/bottled/filter water; type of toilet; disposal of solid waste; source of light; cooking fuel; whether the household own boat; bull/buffalo cart; push cart/rickshaw van; bicycle; motorcycle; motor car/bus/truck; scooter/CNG/Auto rickshaw; telephone; mobile; sewing machine; television/radio/transistor; dish antenna; computer; and freezer/deep freezer. Then *wealth Index* was categorized into five quintiles: (1) poorest (2) second (3) middle (4) fourth and (5) richest. Sex composition of the children was coded into three categories: boys and girls, all girls, all boys. Finally total number of living children was coded into three categories: <2.0 children, 2.0 children and 3+ children.

3.4 Analysis Plan

Both bivariate and multivariate analysis techniques were employed to meet the objectives of the monograph. Simple cross-tabulation and appropriate measures of association, such as chi-square tests were performed to explore the statistical association between the independent and dependent variables. The variables found significant in bivariate analyses were considered for inclusion into the multivariate analyses.

The outcome variable of interest, current fertility (whether a live birth occurred during last 12 months of the census), is a binary variable. Logistic regression was carried out to identify the determinants of current fertility. All the analyses were performed using SPSS (version 20).

3.5 Limitations of the Data

There are many strengths of the census data such as large number of sample size and wide range of information available for analysis. However, there are some limitations in the census data in the case of analyzing fertility. First, the dataset does not contain adequate control variables for in-depth examination of differential determinants of fertility such as duration of breastfeeding, contraceptive prevalence, unmet need for family planning, discontinuation rate of family planning, attitude towards contraceptive use, attitude towards abortion, household decision making, and attitude towards gender equality. Second, any analysis of fertility should consider birth order as well along with number of children ever born. The census data do not contain such information. Third, having timing of each parity would have enabled us to carry out more advanced analysis to assess the advancement or postponement of having children. Due to lack of information such analysis was not possible using the census dataset. Finally, the census data contains women's employment at the time of the census and no information is available regarding employment status at the time of each birth. As a result we had to use current employment status as a proxy variable.

4. RESULTS

The three outcome variables of interest in this research monograph are current fertility, cumulative fertility and cohort completed fertility. Results related to current fertility and cumulative fertility are presented simultaneously in order to provide reader better understanding about level of fertility. This subsection also includes trends in crude birth rate (CBR), age-specific fertility rate (ASFR), and total fertility rate (TFR). Emphasis was given in exploring changes across place of residence (rural-urban) and division. Then bivariate and multivariate findings of the current fertility based on the 2011 census of Bangladesh are presented. The subsequent sub-sections include results related to cumulative fertility and cohort completed fertility. In presenting results related to trends of fertility we have compared Census data findings (e.g, CBR, TFR, ASFR) with that of Sample Vital Registration Systems (SVRS) and Bangladesh Demographic and Health Surveys (BDHS).

4.1 Crude Birth Rate (CBR) in Bangladesh: 1981-2011

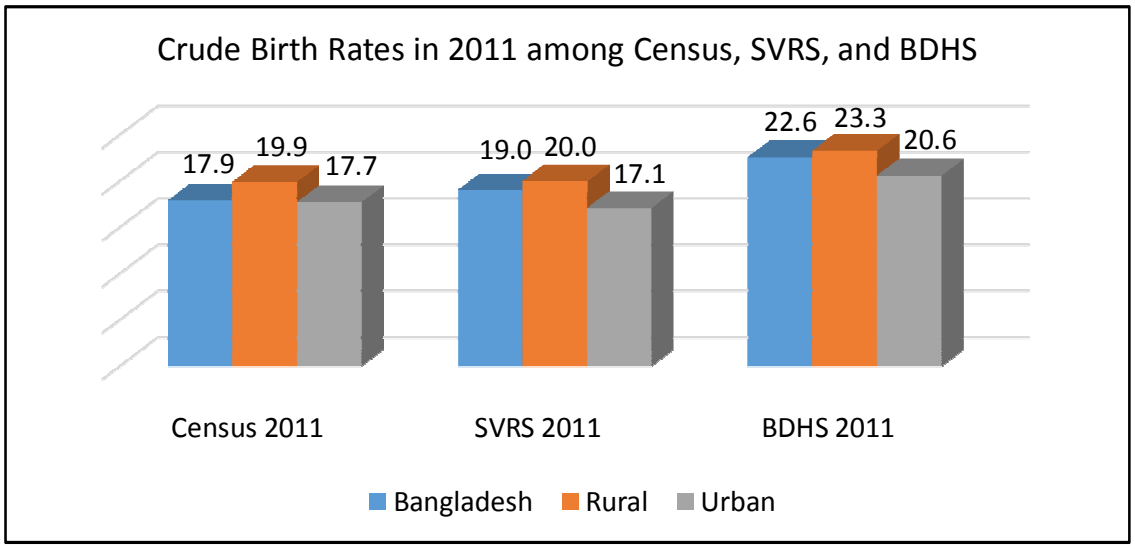
Crude birth rate is considered as the basic measurement of fertility which indicates number of births per 1000 population. Table 1 presents crude birth rates in Bangladesh based on census data during the period of 1981-2011. Overall, crude birth rates have declined in Bangladesh from 1981 to 2011 which is consistent also both in rural and urban areas. In 1981, CBR in Bangladesh was 34.4 per 1000 population which had reduced to 17.88 births in 2011. However, the differences in CBR between rural and urban areas had almost disappeared over time in Bangladesh. For instance, in 1981, the difference in CBR between rural and urban was 6.0 births (35.0 and 29.0 respectively) which had reduced to 0.17 (17.91 and 17.74 respectively). Comparison of CBRs from Census, SVRS and BDHS in 2011 showed CBRs based on BDHS were slightly higher than CBRs obtained from Census and SVRS (Figure 1).

Table 1: Crude Birth Rate in Bangladesh based on census data: 1981-2011

Residence	Census Year			
	1981	1991	2001	2011
Bangladesh	34.4	28.5	22.2	17.88
Rural	35.0	30.5	22.8	17.91
Urban	29.0	24.0	20.6	17.74

Source: National Series, Socioeconomic and Demographic Report, 2011, BBS

Figure 1: Comparison of CBR in 2011 among Census, SVRS and BDHS data



Source: The 2011 Census of Bangladesh, SVRS 2011, BBS, and BDHS 2011, NIPORT

4.2 Trend in Age-Specific Fertility Rate (ASFR)

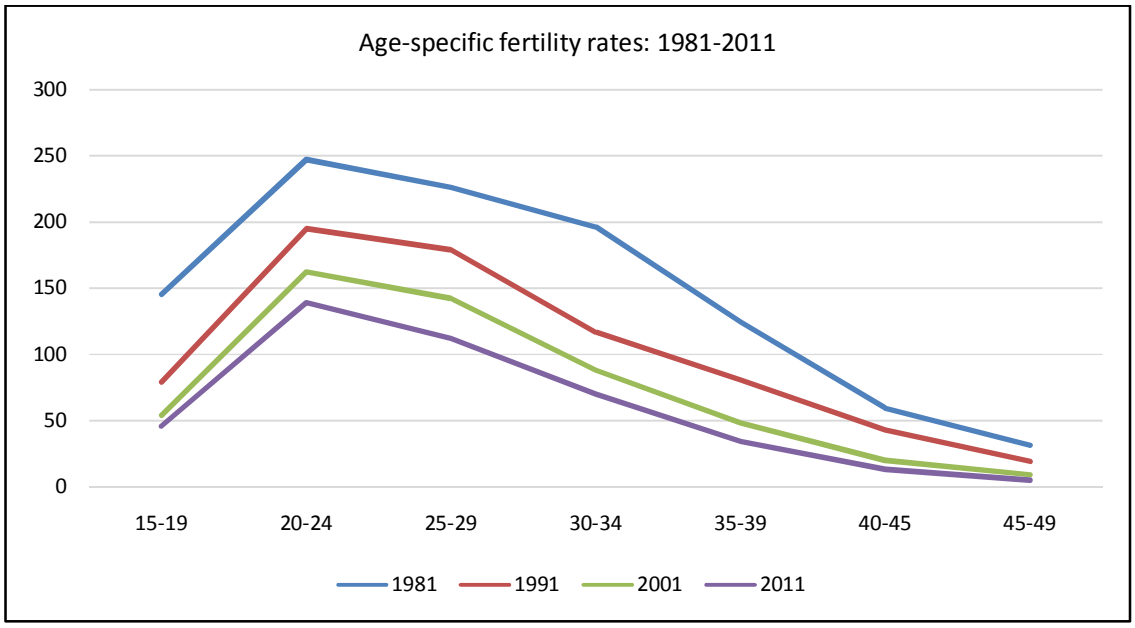
Trends of age-specific fertility rates for the census years of 1981, 1991, 2001 and 2011 are presented din Table 2. Overall, the age specific fertility for each age group has decline from 1981 to 2011. However, the level of declining was much higher in older age groups than younger age groups suggesting that the extent of early childbearing is still predominant in Bangladesh. This pattern is more evident in Figure 2. This is also true in the case of rural-urban fertility variations. Nevertheless, the different in age-specific fertility has narrowed over time.

Table 2: Age-specific Fertility Rates (ASFRs) by residence, 1981-2011

Age	Year											
	1981			1991			2004			2011		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
15-19	145	150	110	79	82	58	54	58	40	46	49	36
20-24	247	253	205	195	210	150	162	173	129	139	146	115
25-29	226	229	201	179	193	146	142	147	125	112	112	114
30-34	196	200	159	117	131	109	88	92	77	70	71	67
35-39	124	127	97	81	83	60	48	51	38	34	36	27
40-45	59	60	40	43	45	21	20	22	14	13	14	6
45-49	31	32	23	19	20	10	9	11	4	5	5	6

Source: Population and Housing Census 2011, *Socioeconomic and Demographic Report, National Series, Vol. 4, BBS*

Figure 2: Age-specific Fertility Rates (ASFRs) in Bangladesh, Censuses 1981-2011



Source: Population and Housing Census 2011, *Socioeconomic and Demographic Report, National Series, Vol. 4, BBS*

4.2.1 Comparison of Age-specific Fertility Rates among Census, SVRS, and BDHS

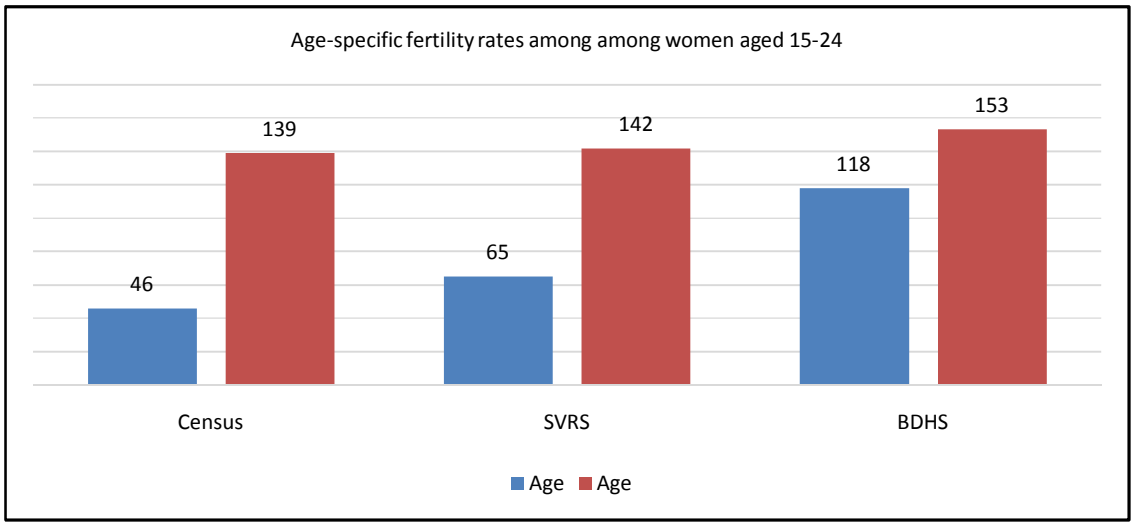
Table 3 presents age-specific fertility rates (ASFR) in 2011 in Bangladesh from three sources: Census, SVRS and BDHS. The ASFRs in 2011 among women 15-19 and 20-24 were highest in 2011 BDHS data than census and SVRS data. It should be mentioned that BDHS provides average fertility measures based on the past three years of fertility whereas Census and SVRS collect information from women on last 12 months of the census/survey. Concerning adolescent fertility we notice that in 2011 age-specific births per 1000 women aged 15-19 was 46 and among women aged 20-24 ASFR was 139 births per thousand. However, these rates are slightly higher based on SVRS and BDHS data (Figure 3).

Table 3: Age-specific Fertility Rates (ASFR) in Bangladesh, 2011

Year	Census	SVRS	BDHS
15-19	46	65	118
20-24	139	142	153
25-29	112	110	107
30-34	70	62	56
35-39	34	30	21
40-44	13	9	6
45-49	5	4	3
TFR: 15-49	2.10	2.11	2.3

Source: Bangladesh Demographic and Health Surveys, 2011, NIPORT; SVRS 2011, Census 2011

Figure 3: Age-specific Fertility Rate among women aged 15-24 years in 2011



Source: Bangladesh Demographic and Health Surveys, 2011, NIPORT; SVRS 2011, Census 2011

4.3 Trend of Total Fertility Rate (TFR) in Bangladesh

Bangladesh has achieved remarkable success in reducing total fertility rate (TFR) from 6.3 children per woman in 1975 to 2.3 children in 2014. Earlier research attributed this success in declining fertility to a large extent to the successful implementation of family planning programs in Bangladesh (Khuda & Hossain, 1996). Table 4 presents a comparative scenario of total fertility rates in Bangladesh by residence during the period of 1981 to 2011 based on census and sample vital registration system (SVRS). Census data show that in 1981 total TFR was 5.24 children per woman which has consistently declined over time and reached to 2.10 children per woman in 2011 census. It should be mentioned that 2.10 is an important marker of the fertility level which is considered as the replacement level fertility where population will stop increasing unless there is an effect of population momentum. In fact, population momentum indicates growth of population due to age structure rather than the rate of natural increase or total fertility. The age structure will affect growth if, for example, the proportion of women in the child-bearing age range is increasing due to higher fertility rates in the past (Jones, 2015). Total fertility rates by residence shows that from 1981 census to 2011 census rural areas consistently had higher fertility rate than urban areas. However, the differences in total fertility rate between rural areas and urban areas had decreased over time. For instance, in 2011, TFR in rural areas is close to replacement level (2.17) while it is below replacement in urban areas (1.85). The gap between rural and urban areas regarding TFR has been narrowing gradually. These patterns of declining total fertility rate, higher fertility in rural areas and diminishing trend in difference between rural-urban fertility are also consistent in data obtained from the SVRS (Table 2).

Table 4: Total Fertility Rate by residence 1981-2011

Year	Census			SVRS		
	Total	Rural	Urban	Total	Rural	Urban
1981	5.24	5.26	4.19	5.04	5.28	3.20
1991	3.67	3.82	2.77	4.24	4.51	2.89
2001	2.63	2.78	2.25	2.56	2.84	1.73
2011	2.10	2.17	1.85	2.11	2.25	1.71

Source: Censuses 1981 to 2011 and Sample Vital Registration System, 1981-2011, BBS, Ministry of Planning, Bangladesh

4.4 Comparison of Total Fertility Rates by Division

In addition to the variations in fertility by locality (rural-urban) are substantial differences in total fertility by division as well. Table 5 presents a comparative scenario of total fertility rates by division based on census, SVRS and BDHS in 2011. Census data showed that Sylhet had the highest TFR (2.73) than any other division which is followed by Chittagong, Rangpur, Dhaka, Barisal, Khulna, and Rajshahi. SVRS data showed replacement level fertility for all divisions except for Rangpur. However, BDHS data shows comparatively higher TFR in all divisions compared to census data except for Rangpur. Due to lack of information on TFR by divisions in earlier censuses (2001 and earlier) it was possible to carry out trend analysis of TFR by division.

The BDHS data show that Chittagong and Sylhet have total fertility rates consistently above the national TFR during the period of 1993-2014 whereas Khulna and Rajshahi have total fertility rates consistently lower than the national TFR (Table 5). In 1993-1994, Chittagong had the highest TFR (3.95) followed by Barisal, Dhaka, Khulna and Rajshahi. By 2014, Khulna and Rajshahi have reached to the replacement level of fertility and remaining four division have total fertility rates above the replacement level with highest in Sylhet (2.90) and second highest in Chittagong (2.50). However, analysis of SVRS data show that although Chittagong and Sylhet had highest higher fertility rates than other divisions, the divisional variations in total fertility rates has almost disappeared by 2012 (ranging from a TFR of 2.0 to 2.1) (Table 5). Analysis of divisional trend in TFR using SVRS data showed that all divisions had undergo consistent decline in TFR with sustained higher TFR in Sylhet than any other division in Bangladesh (Annex Table 2).

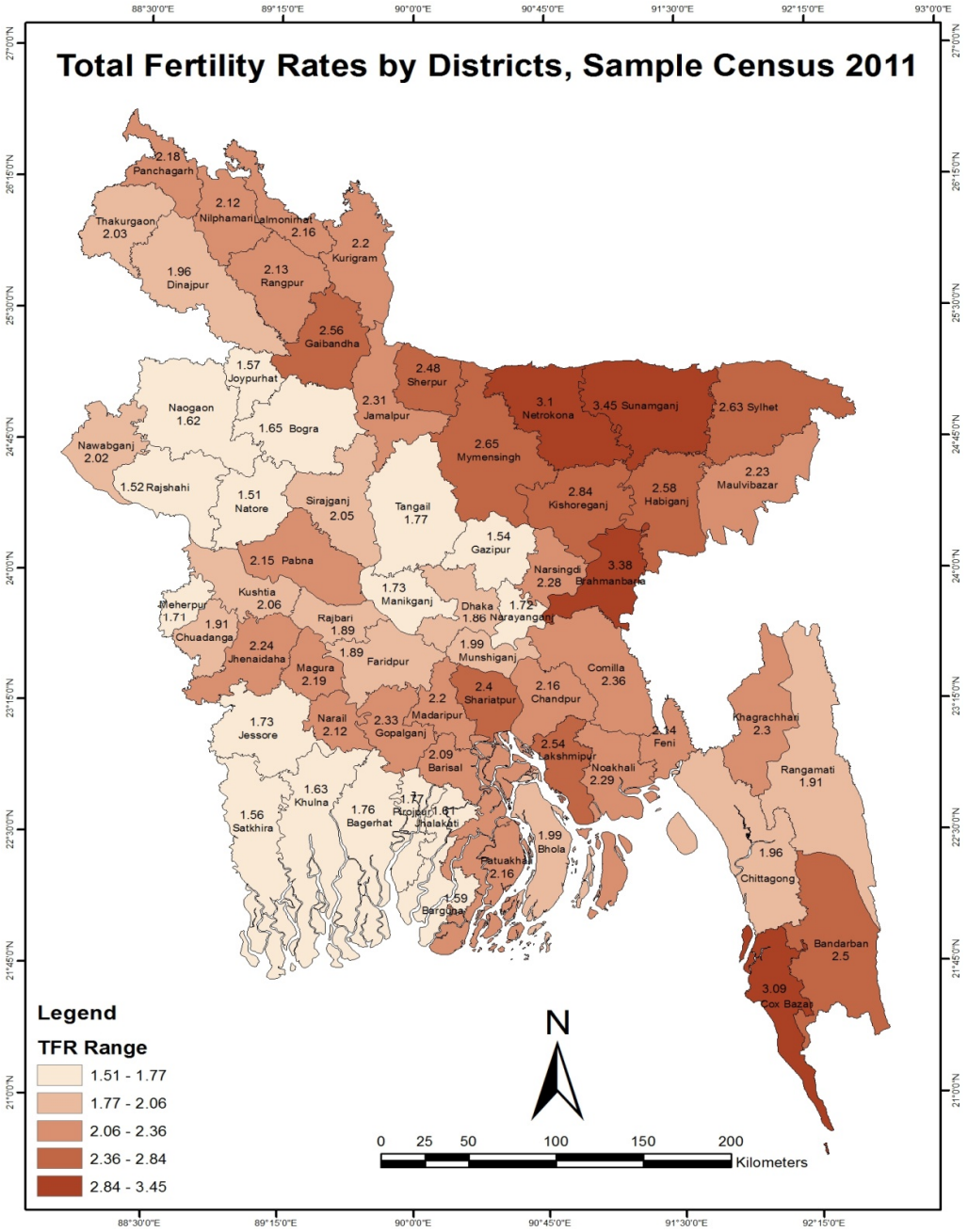
Table 5: Total Fertility Rates in Bangladesh by division in 2011

Division	Census 2011	SVRS 2011	BDHS 2011
Barisal	1.94	2.10	2.30
Chittagong	2.36	2.00	2.80
Dhaka	2.08	2.10	2.20
Khulna	1.85	2.00	1.90
Rajshahi	1.77	2.00	2.10
Sylhet	2.73	2.00	3.10
Rangpur	2.16	2.40	2.10
Bangladesh	2.10	2.12	2.30

Source: Bangladesh Demographic and Health Surveys, 2011, NIPORT; SVRS 2011, Census 2011

In addition to the divisional variations there are district level variations in fertility as well in Bangladesh and the magnitude of the differences among some districts are much higher than the divisional level variations (Annex Table 6). For instance, the census data show that the lowest TFR in 2011 was 1.51 in Natore and the highest TFR was 3.45 in Sunamganj suggesting a difference of about 2.0 children per woman. Overall, the 2011 Census data show that 31 districts had fertility below the replacement level of 2.1 children per woman and 33 districts had fertility levels above the replacement level (Figure 4).

Figure 4: Total Fertility Rate (TFR) by district in Bangladesh



Source: The 2001 Census of Bangladesh

4.5 Determinants of Fertility in Bangladesh: Results from the Analysis of 2011 Census Data

This section presents findings related to the determinants of fertility (current, cumulative and cohort completed) based on the 2011 census data of Bangladesh. Background characteristics of women, bivariate and multivariate findings of fertility are presented in subsequent subsections.

4.5.1 Background characteristics of the respondents

Table 6 presents sociodemographic and other characteristics of three categories of women aged 15-49, <18 and 50+ in 2011. Among women aged 15-49 in 2011, one-third were from Dhaka division followed by Chittagong, Rajshahi, Khulna, Rangpur, Barisal, and Sylhet. This pattern is also consistent for women aged 50+ in the same census. One-fifth of the total respondents live in urban areas. The percentage of women living in slums is higher for respondents aged <18 in 2011 followed by women aged 15-49 (1.7%), and women aged 50+ (1.0%). Among women aged 15-49, 97.8 percent are Bengali and a similar percentage of women aged 50+ are also Bengali. Concerning tenancy, among women aged 15-49, 80.3 percent owned their houses, 13.4 percent live in rented houses and remaining 6.3 percent live in rent free houses. This pattern is also similar in the case of women aged 50 and above with a slight exception in the case of owned tenancy. In all categories of the respondents, about 90.0 percent are Muslims. More than half of the women aged 15-49 have household media exposure. This percentage is slightly lower for women aged 50 and above.

Table 6: Sample characteristics of the respondents: Frequency (%)

Variables	Aged 15-49	Aged <18	Aged 50+
Division			
Barisal	1721185 (5.9)	16272 (6.4)	423530 (7.4)
Chittagong	5224910 (17.9)	27749 (10.9)	1067947 (18.6)
Dhaka	9706211 (33.3)	84068 (32.9)	1824233 (31.7)
Khulna	3479151 (11.9)	43371 (17.0)	700264 (12.2)
Rajshahi	4061182 (13.9)	50677 (19.8)	788861 (13.7)
Rangpur	3339439 (11.5)	30015 (11.7)	592579 (10.3)
Sylhet	1592713 (5.5)	3420 (1.3)	356149 (6.2)
Place of residence			
Rural	23279753 (79.9)	204884 (80.2)	4843914 (84.2)
Urban	5845038 (20.1)	50688 (19.8)	909650 (15.8)
Dwelling status			
Slum	487794 (1.7)	6979 (2.7)	56622 (1.0)
Non-slum[1]	28636997 (98.3)	248593 (97.3)	5696942 (99.0)
Ethnicity			
Bengali	28506557 (97.9)	251611 (98.5)	5619561 (97.7)
Others	618234 (2.1)	3961 (1.5)	134003(2.3)
Tenancy			
Owned	23401092 (80.3)	195008 (76.3)	5211389 (90.6)
Rented	3911716 (13.4)	35485 (13.9)	321390 (5.6)
Rent Free	1811982 (6.3)	25079 (9.8)	220785 (3.8)

Contd

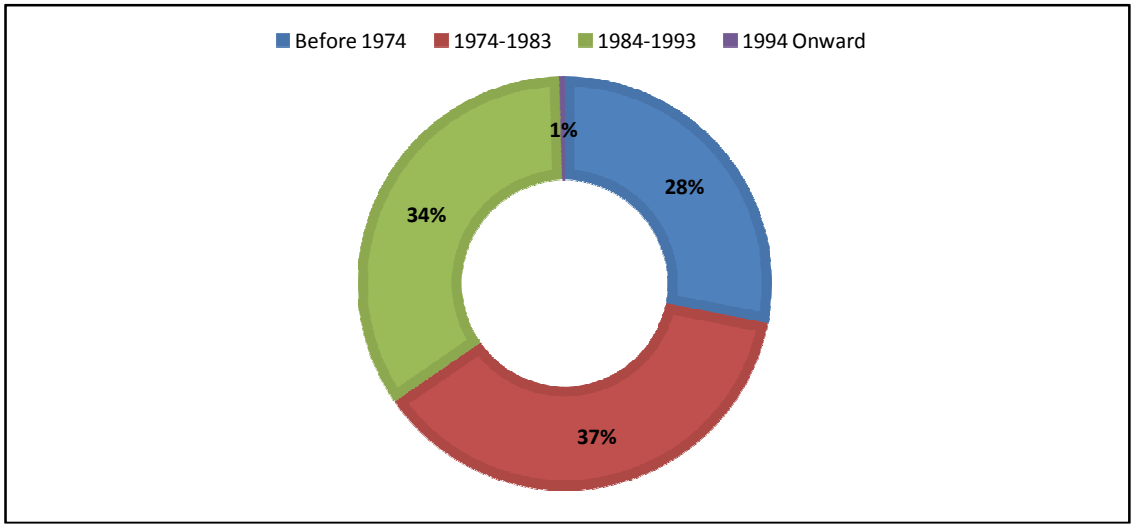
[1] Non-slum includes both urban and rural area

Variables	Aged 15-49	Aged <18	Aged 50+
Religious Affiliation			
Muslim	26218522 (90.0)	433735 (93.1)	5117066 (88.9)
Non-Muslim	2906269 (10.0)	32062 (6.9)	636499 (11.1)
Age at first marriage			
<14	3237875 (11.1)	101973 (39.9)	1079933 (18.8)
15-17	10585955 (36.3)	153598 (60.1)	1976568 (34.4)
18 and above	15300961 (52.5)	na	2697062 (46.9)
Employment			
Not employed	26010261 (89.3)	242429 (94.9)	5397651 (93.8)
Employed	3114529 (10.7)	13143 (5.1)	355913 (6.2)
Household media Exposure			
Don't have exposure	12939141 (44.4)	110901 (43.4)	2939565 (51.1)
Have exposure	16185650 (55.6)	144671 (56.6)	2813999 (48.9)
Wealth quintile			
Poorest	5503772 (18.9)	48809 (19.1)	1136640 (19.8)
Second	5521671 (19.0)	50249 (19.7)	1198467 (20.8)
Middle	5819331 (20.0)	45530 (17.8)	1215885 (21.1)
Fourth	6042681 (20.7)	65795 (25.7)	1205802 (21.0)
Richest	6237336 (21.4)	45189 (17.7)	996770(17.3)
Literacy			
Cannot Read and Write	11700683 (40.2)	45710 (17.9)	4255834 (74.0)
Can Read Only	1612278 (5.5)	12768 (5.0)	246754 (4.3)
Can Read and Write	15811830 (54.3)	197094 (77.1)	1250976 (21.7)
Total	29124791 (100.0)	255572 (100.0)	5753564 (100.0)

Source: The 2001 Census of Bangladesh

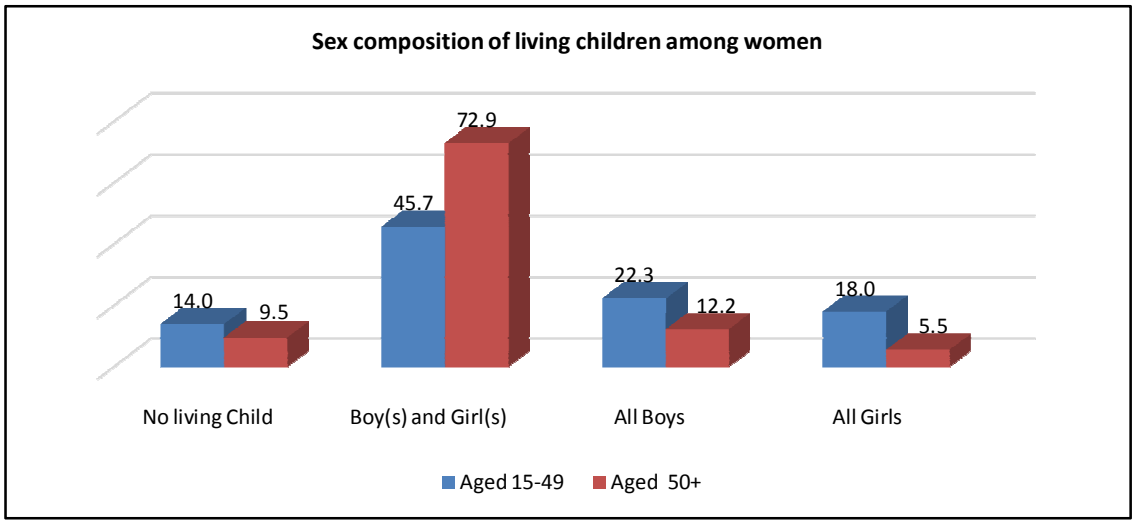
Among women aged 15-49, 28.1 percent were born before 1974, 37.2 percent during 1974-1983, 34.3 percent during 1984-1993, and only 0.4 percent 1994 and onward (Figure 5). Almost half of the women aged 15-49 were married before age 18 which is higher for women aged 50 and above. Majority of the women aged 15-49 had children with a combination of boy(s) and girl(s) followed by all boys, all girls, and no child. This trend of sex composition of children is also consistent for women aged 50 and above (Figure 6).

Figure 5: Birth cohort of women aged 15-49 in 2011



Source: The 2001 Census of Bangladesh

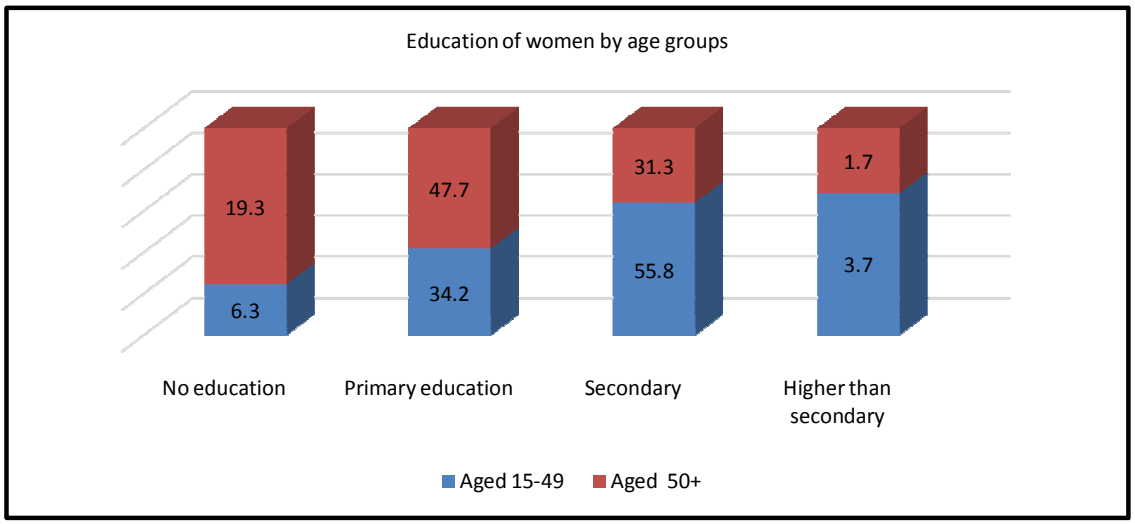
Figure 6: Sex composition of living children among women (%)



Source: The 2001 Census of Bangladesh

Socioeconomic distribution of the women in Table 6 shows that among women 15-49 40.2 percent cannot read and write, 5.5 percent can read only, and 54.3 percent can both read and write. However, the percentage of women who cannot read and write is much higher for women aged 50 and above. Among women aged less than 18, more than two-third can read and write. Majority of women aged 15-49 had secondary education followed by primary education, no education and higher than secondary education. However, among women aged 50 and above, the percentage of no education is higher as compared women aged 15-49 (Figure 7). The employment rate among women aged 15-49 is 10.7 percent which is followed by women aged 50 and above and women aged less than 18.

Figure 7: Educational attainment of women (%)



Source: The 2001 Census of Bangladesh

The distribution of whether had a live birth in last 12 months of census by age at first marriage shows that 14.0 percent of the women married at age 13 had a live birth in the last 12 months of the census. This is followed by married at age 15, married at age 14, married at age 11, married at age 12, married at age 16. Nevertheless, none of the women married at age 10 had live births in the last 12 months of the census (Annex Table 3).

4.5.2 Level of current and cumulative fertility among women aged 15-49

As mentioned earlier, information on whether respondents gave birth in the last 12 months of the census has been used to compute total fertility rate and was defined as *current fertility*. Among women aged 15-49, only 7.4 percent gave birth in the last 12 months of the census which is slightly higher for women aged less than 18 (10.9%). Concerning cumulative fertility (total number of live births), among women aged 15-49, 40.1 percent had more than two children, 26.0 percent had two children and 33.9 percent had less than two children. On the other hand, the percentage of having more than two children is much higher among women aged 50 and above (78.2%) (Annex Table 2). The distribution of total fertility rates by women socioeconomic, demographic, cultural and spatial characteristics is presented below in Table 9.

4.6 Level of Current and Cumulative Fertility by Demographic Characteristics (age 15-49)

The total fertility rate (TFR) among women married before age 14 is the lowest (1.9) compared to women married between age 15-17 (2.4) and 18 and above (2.7). This TFR indicates that the rate of having birth in the last 12 months of the census is lowest among women married before age 14 than those who were married after age 14. However, this does not indicate that, in general, women married before age 14 have the lowest cumulative fertility (total number of live births) than two other categories of women (married between aged 15-17; and married after age 18). This is confirmed by the total number of live births shown in Table 9. It is clearly evident from the table that more than half of women married before age 14 had more than two live births which is followed by women married at aged 15-17 and 18 and above. In addition, total fertility rate by sex composition of children shows that women who had all girls are more likely to have higher total fertility rate than women who have all boys or both boys and girls indicating the existence of son preference in Bangladesh. Furthermore, the total fertility rate among Bengali ethnic women is higher than other ethnic groups (Table 7).

Table 7: Current fertility (TFR) and Cumulative fertility (total number of live births) among currently married women aged 15-49 years in 2011 by demographic characteristics

Variables	TFR	Number of Live Births (%)			Total
		Less Than 2.0	**2.0**	**More than 2.0**	
Sex composition of Children					
No Child	**na**	**na**	**na**	**na**	**na**
Boy(s) and Girl(s)	3.8	0.0	29.6	70.4	13296494 (45.7)
All Boys	3.7	48.4	32.5	19.1	6491701 (22.3)
All Girls	3.9	50.9	28.6	20.5	5249550 (18.0)
Age at marriage					
<14	1.9	21.7	26.8	51.5	3237875 (100.0)
15-17	2.4	30.9	26.6	42.5	10585955 (100.0)
18 and above	2.7	38.6	25.3	36.1	15300961 (100.0)
Ethnicity					
Bengali	2.7	34.0	25.9	40.1	28506557 (100.0)
Others	2.5	31.5	26.8	41.7	618234 (100.0)
Tenancy					
Owned	2.6	32.0	25.5	42.5	23401092 (100.0)
Rented	2.2	44.1	27.3	28.6	3911716 (100.0)
Rent Free	2.8	36.5	28.4	35.1	1811982 (100.0)
Literacy					
Cannot Read and Write	2.6	20.2	22.8	57.0	11700683 (40.2)
Can Read Only	2.8	30.2	27.2	42.6	1612278 (5.5)
Can Read and Write	2.5	44.4	28.2	27.4	15811830 (54.3)
Total	2.5	33.9	26.0	40.1	29124791 (100.0)

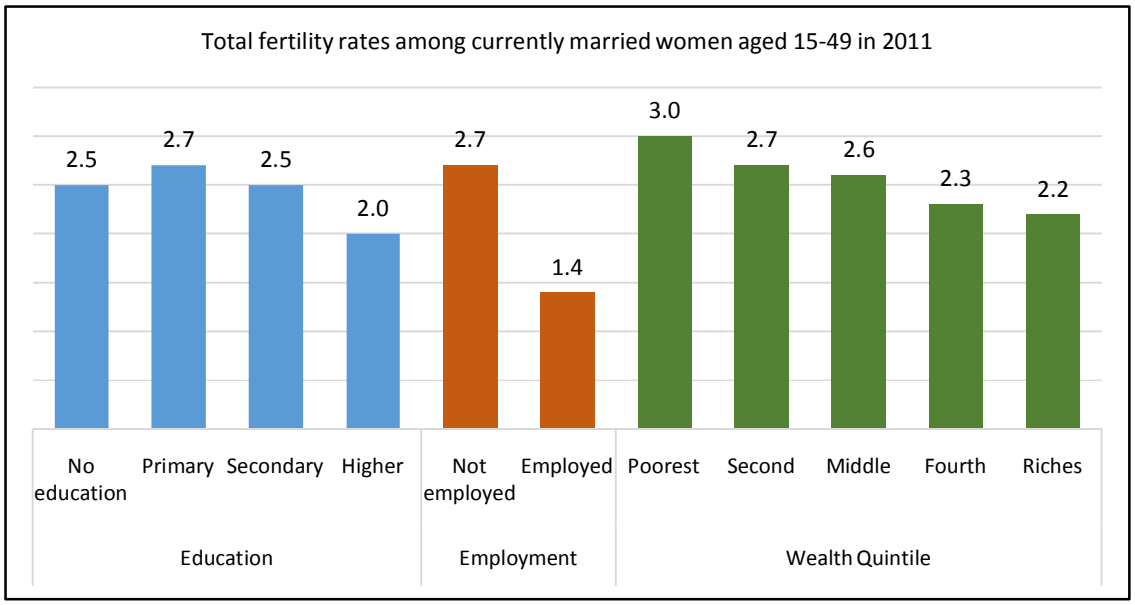
Source: The 2011 Census of Bangladesh

4.7 Level of Current and Cumulative Fertility by Socioeconomic Characteristics

Table 7 shows that those who cannot read and write had a TFR of 2.6 and women who can both read and write had a TFR of 2.5 indicating lower TFR among highly literate women. This trend is further confirmed by their total number of live births. For instance, Table 11 shows that more than half of the women who cannot read and write had more than 2.0 live births. On the contrary, 42.6 percent of those who can read only had more than two live births and only 27.4 percent of those who can both read and write had more than two live births. Concerning education we also had similar findings: higher educated women had lower TFR and lower percentage of having more than two children than lower educated women (Figure 7).

Consistent with earlier research Figure 8 shows that not employed women had higher TFR than employed women (2.7 and 1.4 respectively). Consistent with this, we also found inverse relationship between wealth index and total fertility rate. For example, poorest women had a TFR of 3.0 as compared to the TFR of 2.2 in the case of richest women (Figure 8). Concerning tenancy, we found that women who live in rented houses had the lowest TFR (2.2) as compared to women who owned houses (2.6) and rent free (2.8). However, total number of live births show that women who live in rent free houses had the lowest percentage of having more than 2.0 children and those who owned houses had the highest percentages of having more children.

Figure 8: Total Fertility Rates (TFR) among currently married women aged 15-49 in 2011



Source: The 2011 Census of Bangladesh

4.8 Level of Current and Cumulative Fertility by Spatial and Cultural Characteristics

Consistent with previous research, it was found that TFR in rural areas was higher as compared to urban areas (2.6 and 2.3 respectively). Similarly, among women living in rural areas 41.9 percent had more than two children which is 33.2 percent among women living in urban areas (Table 8). In addition, women living in slums had lower TFR than women living in non-slum areas. Here it should be mentioned that the non-slum also includes rural areas of Bangladesh. As shown in the literature review that rural areas have higher fertility than urban areas. For this reason, non-slum fertility was showing higher than slum areas. The variations in fertility by place of residence are also evident in the cases of fertility patterns by division. For instance, Sylhet and Chittagong had higher TFR (3.9 and 3.2 respectively) than other divisions and Rajshahi division is the only division with below replacement fertility (2.0) (Table 8).

Among cultural characteristics, in this study we have looked at the impact of religion and access to media on fertility in Bangladesh. Consistent with the expectation, it was found that Muslims had higher TFR than non-Muslims (2.6 and 2.4 respectively). Regarding access to media, we noticed that those who did not have exposure to media had higher TFR (2.8) than those who have exposure to media (2.4). This pattern is clearly evident in the case of total number of live births (Table 8).

Table 8: Current fertility (TFR) and Cumulative fertility (total number of live births) among currently married women aged 15-49 years in 2011 by spatial and cultural characteristics

Variables	TFR	Number of Live Births (%)			Total
		Less Than 2.0	**2.0**	**More than 2.0**	
Division					
Barisal	2.2	33.8	24.5	41.7	1721185 (100.0)
Chittagong	3.2	30.2	22.2	47.6	5224910 (100.0)
Dhaka	2.4	35.9	25.3	38.8	9706211 (100.0)
Khulna	2.3	34.8	30.9	34.3	3479151 (100.0)
Rajshahi	2.0	36.2	29.4	34.5	4061182 (100.0)
Rangpur	2.5	32.4	28.6	39.0	3339439 (100.0)
Sylhet	3.9	29.2	19.1	51.7	1592713 (100.0)
Place of residence					
Rural	2.6	32.7	25.4	41.9	23279753 (100.0)
Urban	2.3	38.6	28.3	33.2	5845038 (100.0)
Dwelling status[2]					
Slum	2.4	36.0	25.7	38.2	487794 (100.0)
Non-slum	2.6	33.9	26.0	40.2	28636997 (100.0)
Religion					
Muslim	2.6	33.8	25.4	40.8	2906269 (100.0)
Non-Muslim	2.4	34.7	30.9	34.4	26218522 (100.0)
Household Media Exposure					
Don't have exposure	2.8	31.8	24.2	44.0	12939141 (44.4)
Have exposure	2.4	35.6	27.4	37.0	16185650 (55.6)
Total	2.5	33.9	26.0	40.1	29124791 (100.0)

Source: The 2011 Census of Bangladesh

4.9 Multivariate Logistic Regression Estimates of Current Fertility

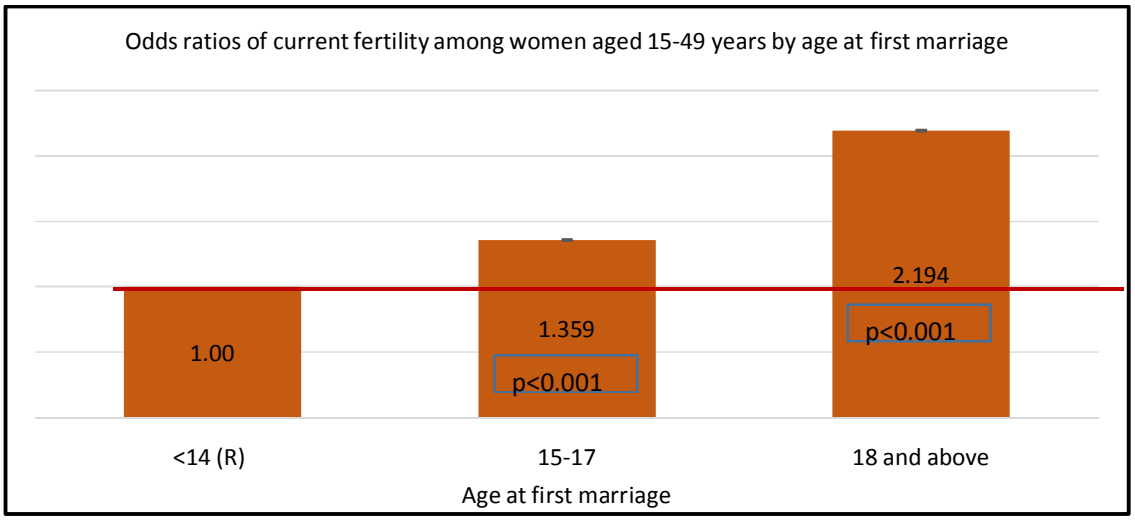
All bivariate findings on current fertility mentioned above were statistically significant. Thus analysing the bivariate patterns of fertility provides us a better understanding of the extent to which fertility (both current and cumulative) differs across various socioeconomic, demographic, cultural and spatial characteristics of the respondents. However, the above findings raise the question of whether these variations remain significant even after adjusting for respondents' background characteristics. For this reason, it is worthwhile to carry of multivariate regression analysis of current fertility of women. This will facilitate generating better recommendations for policy makers in designing effective intervene programs for achieving desired fertility. Hence, all variables found significant at bivariate level were included in multivariate analysis of current fertility. In connection with this, it should be mentioned that although we have carried out multivariate regression analysis only for current fertility but we did not conduct multivariate regression analysis for cumulative fertility and cohort completed fertility. Because, to analyse cumulative fertility (number of live births), we could have run Ordinary least Square regression or the Poisson regression since it is a count variable. But the distribution of this variable neither fits with the normality assumption of OLS regression nor equality in mean and variance assumption of Poisson regression. As a result, data limitations restrict carrying out multivariate regression analysis to current fertility only.

[2] Non-slum also includes rural area

Annex Table 4 presents odds ratios of the logistic regression estimates of current fertility among women aged 15-49 years at the time of the census. The regression model include sex composition of children, age, age at marriage, education, employment status, wealth index, media access, religion, ethnicity, dwelling status, place of residence and division. Annex Table 4 showed that those who had only girls had 2.12 times higher level of current fertility than the reference category of both boys and girls. Women married after age 18 had higher current fertility than women married either before age 14 or at aged 15-17 after controlling for the selected characteristics of the respondents (Figure 9). Consistent with the bivariate findings, employed women had 29.2 percent lower current fertility than not employed women. In addition, we also noticed that educated women who are employed had lower fertility than women who are not educated and not employed (Figures 10 and 11). Consistent with earlier findings we found that even after adjusting for selected sociodemographic and cultural characteristics the inverse relationship between wealth and current fertility persists (Annex Table 4).

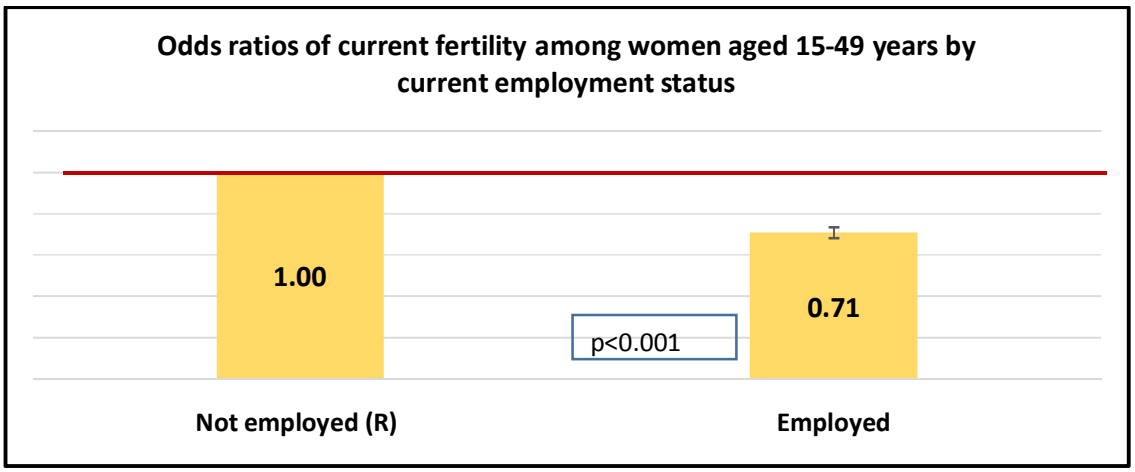
Concerning fertility variations in place of residence, we noticed that urban areas had 8.9 percent higher current fertility than rural areas. However, further analysis of urban and wealth index shows that in urban areas those who are poorer and richest had higher current fertility and middle class people in urban areas have relatively lower fertility suggesting a U-shape pattern in the distribution of fertility in urban areas after adjusting for the selected covariates. The current fertility of women living in slums was 11.3 percent lower after controlling for the background characteristics of the respondents. The variations in fertility by division and access to media were net of background characteristics were consistent with bivariate findings mentioned above (Annex Table 4).

Figure 9: Logistic regression estimates (OR) of current fertility among women aged 15-49 by age at first marriage in Bangladesh



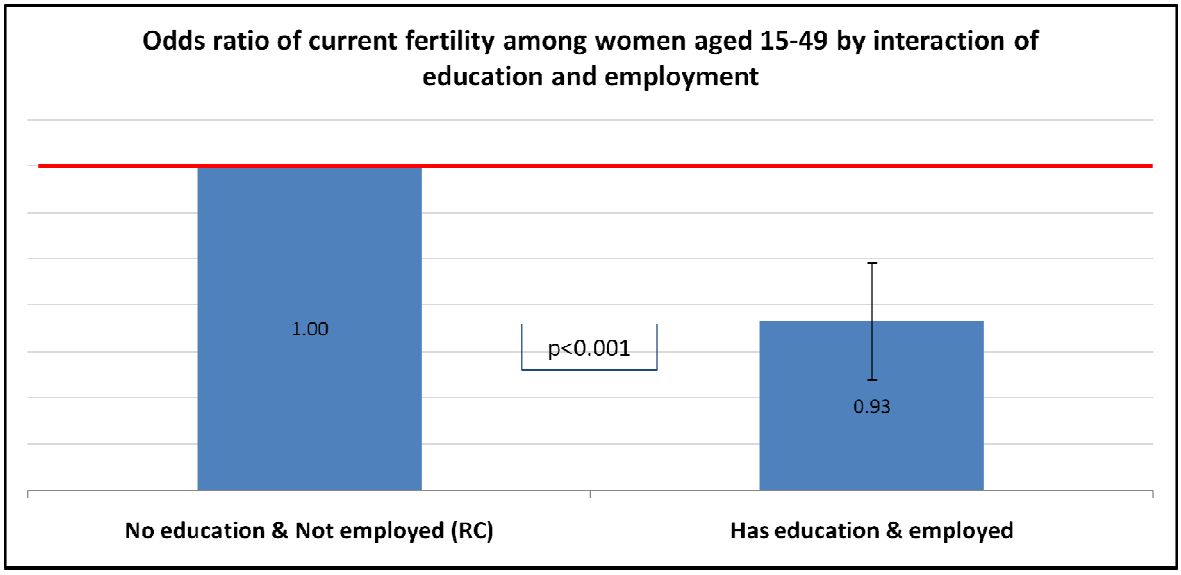
Source: The 2011 Census of Bangladesh

Figure 10: Logistic regression estimates (OR) of current fertility among women aged 15-49 by age at first marriage in Bangladesh



Source: The 2011 Census of Bangladesh

Figure 11: Logistic regression estimates (OR) of current fertility among women aged 15-49 by age at first marriage in Bangladesh



Source: The 2011 Census of Bangladesh

4.10 Level of Cohort Completed Fertility among Women Aged 50+

4.10.1 Level of Cohort Completed Fertility by demographic characteristics

Table 9 presents cohort completed fertility by demographic characteristics among women aged 50 and over in 2011. It is evident that women married before age 14 had higher CCF (5.34) than those women who were married after age 18 (4.36). This is also true in the case of women married at 15-17 years compared to those married as adult (18 and above).

In addition, more than four-fifth of the total women married before age 18 had more than two children. On the other hand, about three-fourth of the women marriage after age 18 had more than two children. In addition, there was an inverse U-shape pattern in the CCF among women age 50 and above by their birth cohort. Finally, sex composition of children showed that women with girls only had higher CCF than women with boys only.

Table 9: Cohort completed fertility (CCF) among women aged 50+ by demographic characteristics

Variables	CCF	Number of Live Births (%)			Total
		Less Than 2.0	**2.0**	**More than 2.0**	
Age at marriage					
<14	5.34	11.7	5.5	82.8	1079933 (100.0)
15-17	5.00	11.5	7.5	81.0	1976568 (100.0)
18 and above	4.36	15.4	10.4	74.2	2697062 (100.0)
Birth Cohort					
1911-20	3.97	39.8	3.8	56.5	47248 (100.0)
1921-30	4.65	28.3	5.6	66.1	132286 (100.0)
1931-40	5.12	19.1	5.2	75.7	504494 (100.0)
1941-50	5.12	13.9	6.7	79.5	1665918 (100.0)
1951-60	4.56	11.3	10.0	78.7	3403618 (100.0)
Sex composition					
No Child	na	na	na	na	na
Boy(s) and Girl(s)	5.78		5.6	94.4	4194366 (100.0)
All Boys	2.95	24.4	25.4	50.2	701492 (100.0)
All Girls	3.38	20.6	22.0	57.4	313818 (100.0)
Total	4.76	13.4	8.5	78.2	5753564 (100.0)

Source: The 2011 Census of Bangladesh

4.10.2 Level of Cohort Completed Fertility by socioeconomic characteristics

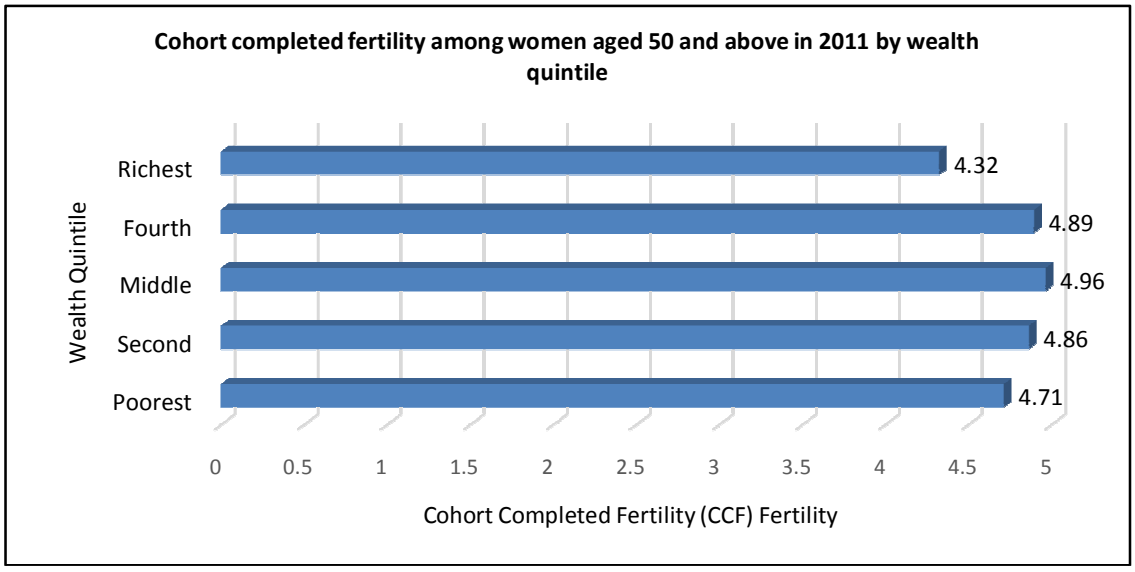
Among older generations (aged 50+ in 2011) had higher CCF (more than four children per woman), though there is an inverse relationship between literacy and fertility. For instance, Table 10 shows that those who cannot read and write had higher CCF than those who can both read and write (4.89 and 4.33 respectively). This pattern is also consistent across four categories of education: women with no education had a CCF of 4.77 compared to 3.22 among higher than secondary education. In accordance with the expectation, not employed women had higher CCF than employed women. Women who live in rented houses had lower CCF than women who live in owned houses. Distribution of CCF by wealth quintile also shows an inverse U-shape pattern. However, overall, the poorest women had higher CCF than the richest women (Figure 12).

Table 10: Cohort Completed Fertility (CCF) among women aged 50+ by socioeconomic characteristics

Variables	CCF	Number of Live Births (%)			Total
		Less Than 2.0	**2.0**	**More than 2.0**	
Literacy					
Cannot Read and Write	4.89	13.8	7.4	78.8	4255834 (100.0)
Can Read Only	4.82	12.8	7.6	79.6	246754 (100.0)
Can Read and Write	4.33	11.9	12.4	75.7	1250976 (100.0)
Education					
No education	4.77	16.8	7.5	75.7	1111631 (100.0)
Primary education	4.92	12.3	7.5	80.2	2745147 (100.0)
Secondary	4.61	12.4	9.3	78.2	1801325 (100.0)
Higher than secondary	3.22	20.7	31.7	47.6	95461(100.0)
Employment					
Not employed	4.84	12.7	8.1	79.3	5397651 (100.0)
Employed	3.68	24.1	14.4	61.5	355913 (100.0)
Tenancy					
Owned	4.82	13.0	8.2	78.8	5211389 (100.0)
Rented	3.98	17.5	12.1	70.4	321390 (100.0)
Rent Free	4.50	16.5	9.3	74.2	220785 (100.0)
Total	4.76	13.4	8.5	78.2	5753564 (100.0)

Source: The 2011 Census of Bangladesh

Figure 12: Cohort completed fertility among women aged 50 and above in 2011 by wealth quintile



Source: The 2011 Census of Bangladesh

4.10.3 Level of Cohort Completed Fertility by cultural characteristics

Cultural factors also exert strong influence on fertility behaviour of women. Table 11 depicts cohort completed fertility of women aged 50 and above in 2011 across cultural characteristics. We noticed that women who didn't have media exposure had higher levels of

cohort completed fertility than those who had some exposure to media (4.86 and 4.67 respectively). Consistent with the pattern of current fertility, Muslims had higher cohort completed fertility than the followers of other religion. Similarly, Bengali women had higher cohort completed fertility than other ethnic women (Table 11).

Table 11: Cohort Completed Fertility (CCF) among women aged 50+ by cultural characteristics

Variables	CCF	Number of Live Births (%)			Total
		Less Than 2.0	**2.0**	**More than 2.0**	
Household Media Exposure					
Don't have exposure	4.86	14.0	7.7	78.3	2939565 (100.0)
Have exposure	4.67	12.7	9.3	78.0	2813999 (100.0)
Religion					
Muslim	4.86	13.3	7.9	78.8	5117066 (100.0)
Non-Muslim	4.00	13.9	13.4	72.7	636499 (100.0)
Ethnicity					
Bengali	4.77	13.3	8.4	78.2	5619561 (100.0)
Others	4.34	14.7	11.0	74.3	134003(100.0)
Total	**4.76**	**13.4**	**8.5**	**78.2**	**5753564 (100.0)**

Source: The 2011 Census of Bangladesh

4.10.4 Level of Cohort Completed Fertility by spatial characteristics

Cohort completed fertility among women aged 50 and above in 2011 is presented in Table 12. The cohort completed fertility among women aged 50 in rural areas is 4.86 whereas in rural areas it is 4.27. Majority of the respondents in rural areas had more than two children and in urban areas it is lower than rural areas. In accordance with the current fertility, women living in slums had lower CCF than women living in urban areas (4.16 and 4.77 respectively). However, the percentage of having less than 2.0 children is higher in slums (18.3%) than non-slums (13.3%) suggesting that the lower CCF in slums were due to the variations in fertility between slums and non-slums across higher order births. Another plausible explanation of lower fertility in slums was mentioned earlier: non-slum also includes rural areas which are characterized by higher fertility.

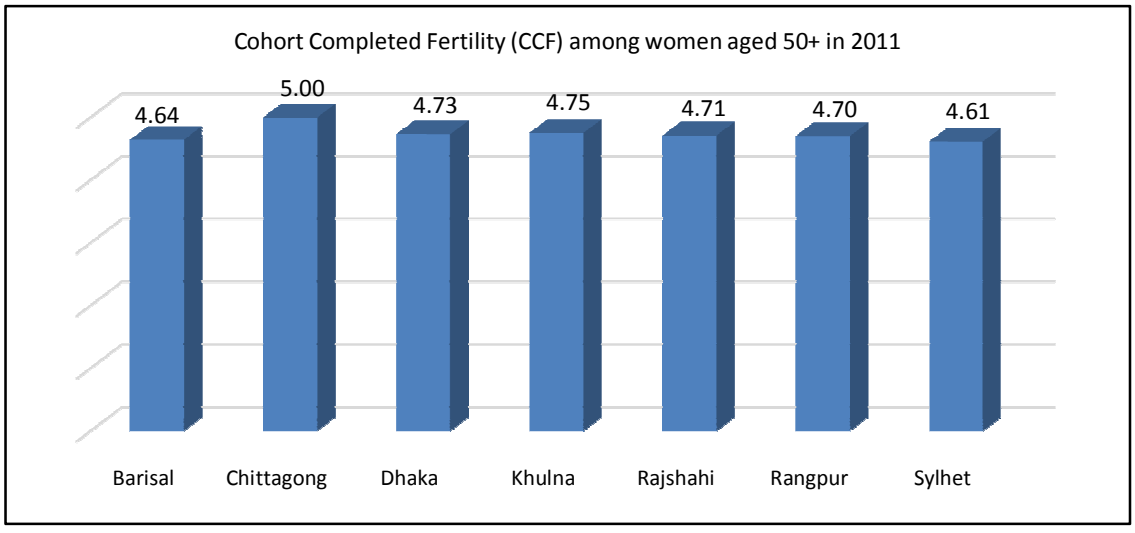
Table 12: Cohort Completed Fertility (CCF) among women aged 50+ by spatial characteristics

Variables	CCF	Number of Live Births (%)			Total
		Less Than 2.0	**2.0**	**More than 2.0**	
Place of residence					
Rural	4.86	12.9	7.9	79.2	4843914 (100.0)
Urban	4.27	15.6	11.8	72.6	909650 (100.0)
Dwelling status					
Slum	4.16	18.3	9.1	72.6	56622 (100.0)
Non-slum[3]	4.77	13.3	8.5	78.2	5696942 (100.0)
Total	**4.76**	**13.4**	**8.5**	**78.2**	**5753564 (100.0)**

Source: The 2011 Census of Bangladesh

Moreover, there were also divisional variations in CCF among women aged 50 and above. Chittagong had the highest cohort completed fertility (5.00). This is followed by Khulna, Dhaka, Rajshahi, Rangpur, Barisal, and Sylhet (Figure 13). It is evident that Sylhet had the lowest cohort completed fertility although earlier we found that Sylhet had the highest current fertility than any other division. Here it should be mentioned that cohort completed fertility is based on a real cohort who have already passed their reproductive years (15-49) and hence a true experience of the same cohort spreading over more than three decades of their reproductive span. On the other hand, current fertility (measured as TFR) is based on a synthetic cohort in a certain time period, in this case 2011. Thus comparison of CCF and TFR requires long series data on the TFR. Due to unavailability of long-series TFR data is it not possible to compare between these two indicators (CCF and TFR) in here.

Figure 13: Cohort Completed Fertility among women aged 50 and above in 2011



Source: The 2011 Census of Bangladesh

[3] Non-slum also includes rural area

5. Discussion and Conclusion

The objectives of this research monograph were to examine trends and determinants of fertility differentials. These objectives have been achieved using data from the 2011 census of Bangladesh and Sample Vital registration System (SVRS) and Bangladesh Demographic and Health Surveys (BDHS) through the application of bivariate analysis and multivariate regression analysis. This chapter presents discussion of the findings, policy implications, research implications and conclusion.

5.1 Discussion

Based on census data, in general, it was found that the total fertility rate in Bangladesh has declined consistently during the period of 1981 to 2011 and Bangladesh has achieved replacement level fertility (i.e., on average 2.1 children per woman) in 2011. This is also true when we are using data from the SVRS. However, by using data from the BDHS we notice that although the TFR has decline substantial from 6.3 children in 1975, the total fertility rate in Bangladesh was above the replacement level in 2011 (i.e., 2.3 children per woman). This pattern is also true in the case of age-specific fertility rates in younger age groups (15-19 and 20-24). One possible reason might be that BDHS collects fertility data for the last three years of the survey and then taken the average value based on the last three years' fertility information. On the other hand, BBS collects fertility data based on the last 12 months of the census. Any estimate of fertility based on longer duration in Bangladesh will give higher rates as fertility rates have declined consistently over time since 1975, whatever the data source are used. However, this is an important issue and deserves particular focus in future research since under-estimation of fertility will have huge impact on the planning and development process of any country.

Concerning the impact of demographic factors on current and cumulative fertility, the major findings include the role of *age at marriage* and sex composition of children in determining fertility of women aged 15-49. It was found that women married before age 14 has the lowest current fertility (whether had any live births in the past 12 months) than two other categories of women: married at aged 15-17 and married after age 18. However, this does not indicate that women marrying at younger ages are having fewer children compared to women who are having married at older ages. One possible reason might be that those who were married at age 18 or above already had one or two children and therefore, they were not having any child in the last 12 months of the census. For this reason, their current fertility is showing lower than those who had married relatively at younger ages (before age 18). In fact, women married before age 18 are more likely to have higher number of children than women married after age 18. This is further confirmed by the cohort completed fertility (CCF) which shows

that among women aged 50 and above in 2011 who were married before age 18 had higher number of children than those who were married as adult. The reason for having higher number of children among women married before age 18 include higher rate of unmet need for family planning, higher prevalence of discontinuation rate, and lower prevalence of contraceptive use. In addition, higher level of gender inequality between spouses (among women married as children) also eventually leads to higher number of children since women cannot play equal role in family decision making process.

Analysis of the impact of *sex composition of children* on current and cumulative fertility shows that women with all girls at the time of census are more likely to have higher TFR and higher number of children than those who either have all boys or both boys and girls. This finding clearly indicates the existence of son preference in our society. The cause of son preference in the context of Bangladesh include greater dependency on agriculture where more workers are needed, ensuring adequate support and assistance in daily living, ensuring future security due to lack of widespread pension coverage, and maintenance of religious traditions in some cases. Existence of son preference in the society has negative consequences on the current fertility for short term, and on the total population in the long-term. In order, to bring desire change in the TFR it is worthwhile to take advocacy or awareness programs so that people give equal preference for sons or daughters and invest their time and money equally for their children.

With respect to the role of socioeconomic factors in determining current and cumulative fertility, it was found that women with lower socioeconomic status (lower education, not employed and lower wealth index) were more likely to have higher fertility even after adjusting for other characteristic of women. Lower educated women are lower rate of contraceptive prevalence, higher rate of unmet need and lower level of awareness about the negative consequences of having more children which eventually exert strong influence on the total number of children ever born. Similarly, not employed women are likely to have higher children than their employed counterparts. In the literature on fertility and employment the major contribution came from the economic theory of the household which suggests that fertility and job market behaviour are interrelated choices because both strongly affect household time allocation (Becker 1960, 1965; Mincer 1962; and Willis 1973). According to Soares and Falcao (2008) the global fall in fertility and increase in female labor-force participation over the past century reliably represent a single causal process of demographic transition. These two sets of theories support a strong link between female labor force participation and fertility decisions. Several empirical studies confirm these predictions (Kalwij 2000; and Lehr 2009). Better labor-force opportunities for women appear to have played a role in the historic reductions in fertility that defined the demographic transition that swept Europe and the United States from the 1800s to the early 20th century (Guinnane 2011). For this reason, sustained increase in socioeconomic status of women will have

significant impact on fertility reduction. Therefore, Bangladesh should focus on ensuring sustained socioeconomic development to check future population growth.

It is evident in this study that access to media has significant positive impact on reducing fertility. In fact, through access to media people become more family with the family planning programs and also they become aware about the negative consequences of having more children including the effect on maternal and child health. Thus, media access becomes an important agent of changing fertility in a society. Another important finding in this study is the divisional variations in fertility. Chittagong and Sylhet have consistently higher current and cumulative fertility than other divisions even after adjusting for socioeconomic, cultural and demographic characteristics suggesting that these regions should get higher preference in allocating budget and resources for family planning programs. This is also true in the case of rural areas in relation to urban areas.

Finally, both the 2011 census and the 2011 SVRS showed that Bangladesh achieved the replacement level of fertility (i.e., on average 2.1 children per woman). One consequence of achieving replacement level fertility is that population will stop increasing and will become stabilize since women are having two children on average. These two children will replace herself and her partner in the future. Thus considering this situation one can argue that Bangladesh no more needs to invest in family planning programs for control of population growth. However, it should be mentioned that despite achieving the replacement level of fertility the population of Bangladesh will continue to grow in future at least for two decades due to large number of younger population that are inbuilt in the current composition, a situation known as *population momentum*. Therefore, to off-set the effect of population momentum on population growth Bangladesh should aim for continuing declining TFR even below the replacement level. This is further confirmed by a recent *Demographic Impact Study conducted* by the UNFPA edited by Jones et al. (2015). According to Jones et al. (2015), under the medium scenario, the total population of Bangladesh will be 225.7 million by 2061 of which 17.1 million population increases will be due to the effect of population momentum. Therefore, in the long-term planning of the Government of Bangladesh intervention programs for family planning should be continued to off-set the effect population momentum on population growth.

5.2 Policy Recommendations

- Prevent marriage before 18 (child marriage) through strict implementation of laws and creating awareness about the negative consequences of child marriage. Preventing child marriage will have significant impact on reducing early childbearing and having higher number cumulative fertility.
- Ensure higher than secondary education for all women and prevent drop-outs and at primary and secondary levels. Increasing level of higher education will make people

aware about adopting family planning methods and consequently will contribute to lower fertility rates.

- Ensure higher labour force participation of women at all levels. Higher level of labour force participation among women would exert positive influence on reducing fertility in Bangladesh.
- Increase access to media for all and introduce new awareness programs related to family planning to make those more effective.
- Design need-based intervention programs for control of population growth by giving priority in allocation of budget and resources in high-fertility prone divisions, for example Sylhet and Chittagong.
- Although census is conducted only in every ten years and very expensive for developing countries like Bangladesh, it is also an excellent opportunity to collect complete and in-depth information on many demographic issues including marriage, family planning, fertility, mortality and migration. Currently BBS is collecting information on these topics as well but there are several limitations of census data in terms of adequacy of important variables for conducting large-scale advanced demographic research that have substantial positive impact on the policy formation for sustainable development. For this reason, emphasis should be given in collecting quality data in greater detail on the important demographic issues in future censuses of Bangladesh.
- Due to the size and complexity of census operations it is obviously a big challenge to collect quality data. For this reason, it is likely that errors may arise at any stage of the census process. These errors have consequences for the quality of the output or results of the census. Therefore, a process of quality assurance and improvement should be introduced as part of the overall census plan. To achieve these goals, BBS, census implementing agency, should regularly measure performance against set goals of a given process so that the process can be improved when a fall in quality is indicated. To minimize and control errors, it is good practice to devote an adequate budget to quality assurance and control programs. In addition, Government should emphasize on developing a *National Quality Assurance Framework* which will be certainly useful to generate an updated quality standards and checklist for the 2021 census.

5.3 Research Implications

- It is worthwhile to mention that although this research monograph has covered many important issues on fertility in Bangladesh it was not possible to carry out parity-specific analysis. Examining parity-specific analysis is important because it had substantial implication on health and empowerment of women since women can decide the extent to which they will either postpone or advance their childbearing. Future research should explore these aspects in greater detail.

- The paradox regarding fertility and poverty in Bangladesh did not receive adequate attention in this monograph. Hence, in-depth analysis should be carried out in future research on the poverty-fertility nexus in the context of Bangladesh.
- Having long-series of data on current fertility (TFR) and cohort completed fertility (CCF) enable researcher to better predict future trend of fertility in country. It also facilitate providing explanations for any discrepancy between TFR and CCF. For instance, we noticed than in 2011 Sylhet had the highest TFR and the lowest CCF among all divisions. To provide plausible explanations for this inconsistency we need long-series of TFR. Future research should look into this aspect with greater focus considering its higher importance from a policy point of view.

5.4 Conclusion

In this research monograph, trends and determinants of fertility were examined using census data. However, comparison was given using SVRS and BDHS data wherever appropriate. This research monograph arrives at five basic conclusions related to policy interventions. First, earlier age at marriage is associated with higher fertility. Second, better socioeconomic condition (education, employment and wealth index) leads to lower fertility. Third, regional differences in fertility sustained even after adjusting for socio-demographic characteristics which indicates region-specific policy interventions should be taken for fertility control. Fourth, household media exposure has substantial positive impact on reducing fertility. Finally, period measurement of fertility (i.e., current fertility) sometimes may not reflect exact fertility behaviour of women since period measures (i.e., TFR) are affected by seasonal factors. For example, occurrence of a disaster in a year might have negative impact on the total fertility rate. Therefore, cohort completed fertility measures also should be taken into consideration in policy formulation.

As mentioned in the methodology section, this research monograph has some limitations due to unavailability of some important variables that are related to fertility such as duration of breast feeding, contraceptive use, unmet need for family planning, and religiosity. Despite this limitation, this research monograph provides comprehensive scenario through a combination of current, cumulative and cohort completed fertility. Comparison of census estimates with that of SVRS and BDHS has shed better light into the fertility scenario in Bangladesh. Hence this research monograph will work as an important guideline for policy makers and would motivate researchers and academicians to carry out further research on this issue.

Annex-I

Table 1: Total Fertility Rate (TFR) per woman by locality, 1981-2011

Year	National	Rural	Urban
1981	5.04	5.28	3.20
1982	5.21	5.50	3.01
1983	5.07	5.36	3.45
1984	4.83	5.08	3.10
1985	4.71	4.91	3.52
1986	4.70	4.89	3.26
1987	4.42	4.64	3.05
1988	4.45	4.70	3.08
1989	4.35	4.59	2.90
1990	4.33	4.57	2.90
1991	4.24	4.51	2.89
1992	4.18	4.33	2.88
1993	3.84	4.00	2.62
1994	3.58	3.79	2.58
1995	3.45	3.78	2.50
1996	3.41	3.76	2.48
1997	3.10	3.32	2.28
1998	2.98	3.00	2.24
1999	2.64	2.91	1.76
2000	2.59	2.89	1.68
2001	2.56	2.84	1.73
2002	2.55	2.69	1.94
2003	2.57	2.70	1.91
2004	2.51	2.67	1.91
2005	2.46	2.65	1.87
2006	2.41	2.63	1.81
2007	2.39	2.61	1.79
2008	2.30	2.60	1.79
2009	2.15	2.28	1.65
2010	2.12	2.27	1.72
2011	2.11	2.25	1.71

Source: Sample Vital Registration System, 2011, BBS Ministry of Planning

Table 2: Total Fertility Rate (TFR) per woman by division, 1998-2012

Year	Barisal	Chittagong	Dhaka	Khulna	Rajshahi	Sylhet	Bangladesh
1998	2.90	3.00	3.10	2.80	3.20	2.80	2.98
2000	2.50	2.70	2.60	2.60	2.70	2.90	2.59
2001	2.40	2.80	2.50	2.70	2.60	2.80	2.59
2002	2.50	2.80	2.70	2.30	2.30	2.70	2.55
2003	2.40	2.70	2.50	2.40	2.40	2.80	2.57
2004	2.40	2.60	2.50	2.40	2.50	2.80	2.51
2005	2.30	2.50	2.50	2.30	2.40	3.00	2.46
2006	2.40	2.60	2.40	2.30	2.30	2.70	2.41
2007	2.50	2.40	2.50	2.20	2.40	2.40	2.39
2008	2.50	2.30	2.20	2.20	2.40	2.40	2.30
2009	2.10	2.00	2.10	2.00	2.20	2.60	2.15
2010	2.10	2.20	2.20	2.00	2.20	2.30	2.12
2011	2.10	2.00	2.10	2.00	2.00	2.20	2.11
2012	2.10	2.00	2.10	2.00	2.00	2.00	2.12

Source: Sample Vital Registration System, 1998-2012 BBS Ministry of Planning

Table 3: Distribution of dependent variables by age categories

Dependent variables	15-49 years	<18 years	50+ years
Number of live births	**Frequency**	**Frequency**	**Frequency**
Low (less than 2.0 children)	9876804 (33.9)	251945 (98.6)	768596 (13.4)
Medium (2.0 children)	7560739 (26.0)	2736 (1.1)	488217 (8.5)
High (more than 2.0 children)	11687248 (40.1)	891 (0.3)	4496751 (78.2)
Total	**29124791 (100.0)**	**255572 (100.0)**	**5753564 (100.0)**
Whether gave birth in last 12 months			
Yes	2141947 (7.4)	27731 (10.9)	na
No	26982844 (92.6)	227841 (89.1)	na
Total	**29124791 (100.0)**	**255572 (100.0)**	

Source: The 2011 Census of Bangladesh

Table 4: Having live birth in past 12 months of the census among women aged <18

Age at first marriage	Whether had a live birth in last 12 months		
	Yes	**No**	**N**
10	0.0	100.0	680
11	8.2	91.8	2726
12	6.0	94.0	11176
13	14.0	86.0	25044
14	11.8	88.2	62346
15	13.4	86.6	97654
16	5.2	94.8	55945
17	na	na	Na

Source: The 2011 Census of Bangladesh

Table 5: Adjusted Odds Ratios (OR) of current fertility among women aged 15-49

Characteristics	Odds Ratio (OR)	95 C.I. for OR		p-value
		Lower	**Upper**	
Sex composition				
Boy(s) and girl(s) (R)				
No child	0.017	0.017	0.018	0.000
Only boys	1.828	1.822	1.834	0.000
Only girls	2.122	2.115	2.129	0.000
Age (years)	0.764	0.763	0.765	0.000
Age square	1.002	1.002	1.002	
Age at marriage				
<14 (ref)				
15-17	1.359	1.351	1.366	0.000
18 and above	2.194	2.182	2.206	0.000
Education				
No education (ref)				
Has education	1.075	1.066	1.083	0.000
Currently employed				
No (ref)				
Yes	0.708	0.691	0.725	0.000
Has exposure to mass media				
No (ref)				
Yes	0.959	0.956	0.962	0.000
Household wealth index				
Poorest (ref)				
Second	0.938	0.933	0.942	0.000
Middle	0.912	0.907	0.916	0.000
Fourth	0.834	0.829	0.839	0.000
Richest	0.778	0.773	0.783	0.000

Contd.

Religious Affiliation				
Non-Muslim (ref)				
Muslim	1.178	1.172	1.184	0.000
Ethnicity				
Bengali (ref)				
Ethnic	0.937	0.927	0.947	0.000
Dwelling status				
Non-slum (ref)				
Slum	0.887	0.877	0.897	0.000
Place of residence				
Rural (ref)				
Urban	1.089	1.077	1.102	0.000
Division				
Dhaka (ref)				
Barisal	0.922	0.916	0.929	0.000
Chittagong	1.136	1.131	1.141	0.000
Khulna	0.934	0.930	0.939	0.000
Rajshahi	0.739	0.735	0.743	0.000
Rangpur	0.884	0.880	0.889	0.000
Sylhet	1.379	1.371	1.388	0.000
Education*Employment				
Education*Employed	0.933	0.910	0.957	0.000
Urban and Wealth Interaction				
Urban*second	1.156	1.132	1.180	0.000
Urban*Middle	0.965	0.949	0.982	0.001
Urban*Fourth	0.874	0.861	0.887	0.000
Urban*Richest	1.081	1.067	1.096	0.000
N	*29117477*			
-2 LL	*12716732.56*			
Nagelkerke R Square	*0.208*			

Source: The 2011 Census of Bangladesh

Annex-II

List of Abbreviations

ASFR	Age-specific Fertility Rate
BBS	Bangladesh Bureau of Statistics
BDHS	Bangladesh Demographic and Health Survey
BFS	Bangladesh Fertility Survey
BRAC	Bangladesh Rural Advancement Committee
BRDB	Bangladesh Rural Development Board
BSCIC	Bangladesh's Small and Cottage Industries Corporation
CBR	Crude Birth Rate
CCF	Cohort Completed fertility
OLS	Ordinary Least Squares
OR	Odds Ratio
SPSS	Statistical Package for Social Science
SVRS	Sample Vital Registration System
TFR	Total Fertility Rate

Annex-III

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Annex-IV

Government of the People's Republic of Bangladesh
Bangladesh Bureau of Statistics
Population and Housing Census-2011 Project
Parishankhyan Bhaban
E-17/A, Agargaon, Dhaka-1207

No: 52.01.0000.401.29.315.15- 347 Date: 12-05-2015

Subject: Selection of Expert Panel to Review Population Monographs

The following distinguished persons have been nominated as experts to review the Population Monographs being prepared under Population and housing census-2011 Project of Bangladesh Bureau of Statistics:

Expert Panel for Population Monographs

No	Broad Area	Monographs	Expert Pannel
01	Reproductive Behavior of Population	1. Population Composition: age and sex. 2. Fertility 3.Marriage& Family	Prof.M. Nurul Islam Ex. Professor ,DU Syeda Shahanara Huq, Prof.JNU Dr. Ahmed-Al-Sabbir,USAID Dr.Obidur Rob, Country Director, Population Council, Bangladesh
02	Special Protection Groups	1.Elderly Population 2.Disabled Population 3. Children and Youth 4. Population Density and Vulnerability	Dr.Nazma Ahmed Social Protection Specialist Dr.Sharifa Begum, SRF BIDS Prof. Mahmuda, Khatoon,DU Dr. A.J Faisal Country Representative Engender Health Dr.Eshani Ruwan Pura Programme Specialist UNFPA
03	Household and Housing Characteristics, Education& Literacy	1.Housing Condition 2.Household Facilities 3.Education & Literacy	Prof. Kazi Saleh Ahmed Ex.VC JNU Mr. Abdur Rashid Sikder Former DDG ,BBS Dr. Anwara Begum SRF BIDS
04	Economic and Social Aspects of Population	1.Urbanization 2.Labour Force Participation 3.Characteristics of International Migrant Households 4. Population Distribution and Internal Migration	Mr.Nichole MALPAS, Programme Manager Human and Social Development, Delegation to the European Union to Bangladesh. Prof. Kazi Saleh Ahmed Ex.VC JNU Dr.Sarwar Jahan Prof. Department of URP,BUET Prof. Nurul Islam Najem Dept. of Geography, DU

Terms of Reference:

i) The members of the panel will remain present in the presentation of the monographs and will act as a co-opt member of the Technical Committee;
ii) They will review the draft of the Monographs;
iii) They will provide guidance in improving the draft;
iv) They will get financial benefit as per provision in the AWP of the Population and Housing Census -2011 Project.

Mohammad Abdul Wazed
(Additional Secretary)
Director General

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