

Determinants of Antenatal Care and its Impact on Child Health in Bangladesh

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Abstract Bangladesh has taken significant initiatives in the health care sector in last few decades. Though the availability of affordable maternal and child health care has been increased, low utilization of maternal care continues to threaten both mothers and their children. Along with accessibility some behavioral phenomena are also important for use of antenatal care. This paper tries to identify the socioeconomic determinants of antenatal care use. Two dimensions of antenatal care use- utilization and frequency of utilization- are used in this paper. Using a binomial logit model it was found that mother's education, household head's education, exposure to media and urban residence have significant positive impact on professional antenatal care use. A Poisson model for counts of antenatal visits shows that household head's education; exposure to media; mother's age, weight, employment and education; and urban residence have significant positive impact on more frequent antenatal visits whereas birth order of the child and distance from the nearest professional health care facility decrease the frequency of visits. A 2SLS regression model is run to predict the impact of antenatal care on child health during early childhood (0-59 months). A positive impact of antenatal visits on child health has been found along with a bias towards male child. We conclude that in order to improve health-seeking behavior, policies should be directed towards increase in education level of the family and disseminate knowledge among people about the importance of routine professional care utilization and healthy reproductive behavior. Moreover, aligning other sectors with nutrition goals- such as economic growth, poverty reduction, focusing on female health and education sector etc- to form broad-based cross-cutting policies are likely to have ripple effect on child health and thus on overall health of the future generation.

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1. Introduction

Antenatal care is an important predictor of safe delivery and provides health information and services that can improve the health of women and infants. Bangladesh has strengthened its emergency obstetric care (EmOC) through national and international collaborations; however, pregnancy-related complications remain the leading cause of death and disability among women of childbearing ages. Low use of maternal care prevails and continues to threaten both-mothers and their children in infancy and early childhood.

Despite all the significant initiatives taken in the health care sector of Bangladesh in the last few decades, Bangladesh still remains one of those countries in the world with extremely high maternal mortality ratios. According to the World Bank data, maternal mortality ratio was 240 per 100,000 live births during 2009-2013. Complications during pregnancy and at child birth still kill hundreds of mothers and lack of utilization of post-natal care results in poor child health.

Both government and out-of-pocket health care expenditures increased consistently over time. Health care centers were built in remote areas too. In fact, the most important variable determining the utilization of health care is its physical accessibility (Abbas and Walker, 1986). Why then, despite the increased availability of affordable maternal and child health care, is there a comparatively low level of utilization? The answer is that the utilization of antenatal and postnatal care cannot be merely determined by accessibility alone. It is a behavioral phenomenon and is also determined by social perspectives, personal attributes of family members, household characteristics etc.

In our research, we try to identify the contributing factors of antenatal care use in Bangladesh. Here we mainly focus on the social determinants of antenatal care utilization. Moreover, we further analyze the influence of antenatal care use on child health. The second section of the paper lays out the objectives, both in terms of determinants of antenatal care among pregnant mothers and how it affects early child health. In section three, findings of other relevant researchers, both national and international, are summarized. Section four provides a short overview on maternal health-seeking behavior and child health in Bangladesh. Section five discusses about the data used, methods adopted and results obtained from our econometric models. Lastly, section six contains some brief conclusive words including what can be done next.

2. Objectives

The purpose of this study is to examine which factors can play important roles to determine whether antenatal care will be utilized by a woman in Bangladesh. After controlling for some variables, we expect to see education of both- mother and household head (which is in most of our cases- the father) - affects decision making process of antenatal care utilization positively. Several studies found that better educated parents are more aware of health problems, know more about the availability of health care facilities and utilize information more effectively. Apart from this, education acts as a proxy for the socioeconomic status of the family and geographic area of residence too (Desai and Alva, 1998). We are also interested to see whether birth-order of a child affects decision-making process of receiving antenatal care. One would expect that a mother would be more inclined to utilize antenatal care facilities during first order than higher order birth because of perceived risk, less resource constraint etc. Lastly this paper aims to see whether there is a higher tendency of antenatal care utilization in urban areas compared to the rural ones. This is justified because a study suggested that with respect to professional delivery care even the urban slums in Nairobi, which were worse off than the rest of the urban areas in Kenya, were better off compared to the rural communities (Magadi, 2004).

The broad goal of contemporary prenatal care is to promote the health of the mother, child and family through the pregnancy, delivery and the child's development. There is significant evidence that routine health care encounters during the prenatal period could potentially be used more effectively to enhance children's health trajectories (Noonan K. et al, 2013). In our research, we also further try to focus on whether routine antenatal visits have any significant impact on child health in Bangladesh.

3. Literature Review

There has been a substantial amount of research work done on women and child health care and utilization at national and international level. Almost all these papers established that mother's education plays an important role to determine self and child's health seeking behavior.

Feinstein, Sabates, Anderson, Sorhaindo and Hammond (2006) found considerable international evidence that education is strongly linked to health and to determinants of health, such as health behaviors, risky contexts and preventive service use. More importantly, they found a substantial element of this effect is causal.

Desai and Alva (1998) used the data from Demographic and Health Surveys for 22 developing countries to see the effect of maternal education on three markers of child care: infant mortality, children's height-for-age and immunization status. Surprisingly, although they found a strong correlation between maternal health and markers of child health, a causal relationship was far from established. They found that maternal education had statistically significant impact on infant mortality and height-for-age in only a handful of countries while maternal education was statistically significant for children's immunization status in about one-half of the countries. Since Bangladesh was not included in their list of countries, it might be interesting to see whether our research reveals results similar to or different from these 22 other developing countries.

Other research studies on this area were carried out using data at national level. Halim, Bohara and Ruan (2010) used data from a nationally representative sample of 3549 women and 2460 children in Nepal and results showed that maternal education, even at low levels, significantly raised the use of antenatal care; paternal education played a more important role in the use of routine antenatal care than the conventional wisdom suggests; and when mothers use routine professional antenatal care, their children tend to stay healthy through infancy and early childhood. What we draw from these findings is that whether a mother will opt for seeking antenatal care or not depends on her educational attainment, but whether she will seek for routine antenatal care (which in turn determines her child's health status during infancy and early childhood) is largely determined by her husband's educational attainment.

Magadi (2004) studied maternal and child health in the Nairobi slums using information on 1219 births from the Nairobi Cross-section Slum Survey (NCSS) of 2000. She found out that lower education attainment and belonging to the Luo ethnic group were considerably associated with poorer maternal and child health outcomes in the Nairobi slums. With respect to professional delivery care, Nairobi slums were worse off than other urban communities but still they were better off than the rural communities. In our paper we have controlled for area of residence of the mother and child and the household's per capita income.

A number of similar studies have been undertaken for India, especially rural India. Lee and Mason (2004) analyzed the determinants of the use of prenatal care and child immunization in rural India using 1993-1994 National Family Health Survey data. They asked whether learning-by-doing was an important feature of the health care system. Once important unobserved traits were controlled for in their model, they found that learning-by-doing was important for educated women

but not for uneducated women. They also found strong presence of gender-bias in demand for immunization services among the uneducated mothers.

Male bias in health care utilization was also proved in a study by Ganatra and Hirve (1994). This study was conducted on 3100 families (with children under five years of age) in rural communities of Western India. They found out that significantly more boys than girls were treated by a registered private medical practitioner; referrals for further treatment were followed by parents significantly more often in case of their sons; on average, more was spent on treatment of sons compared to daughters; in general, parents were willing to travel greater distance for treatment of their sons. This discrimination persisted even after controlling for severity of illness, parents' income, occupation and education, and birth order of the child.

In Bangladesh many studies have been carried out on this same field of interest-maternal and child health care- but from different perspectives. Majority of these studies were conducted on rural population of Bangladesh.

Rahman (2010) investigated the causal relationship among health expenditure, education expenditure and GDP for Bangladesh by doing the Var Granger Causality test. One of the findings of his study was that there was bidirectional causality from education expenditure to health expenditure.

In another paper focusing in what determines the use of maternal health services in rural Bangladesh, Chakraborty, Islam, Chowdhury, Bari and Akhter (2003) concluded that there was a strong influence of mother's education on the utilization of health care services. However, other factors, which were assumed to be important- such as mother's age, number of previous pregnancies and access to health facilities- could not show any significant impact on utilization. This was surprising because Fiedler (1981) and Elo (1992) showed a strong effect of women's current age on health care utilization; Wong et al (1987) showed strong association between birth order and utilization because of the perceived risk feared during the first pregnancy; and Abbas and Walker (1986) showed that accessibility is, in fact, the most important factor determining utilization of health care. We expect to see these factors play important roles in determining antenatal care utilization in our research too.

Begum and Sen (2005) took a different approach in addressing what aspect of a woman determines her health-seeking behavior. According to their findings, while household poverty is an important explanatory variable of maternal and child deprivation, women's agency can play a noteworthy role to get favorable outcomes. In Bangladesh women's agency can promote strategic investments in

maternal and child health e.g. improved health care practices without any gender-bias.

Another study by Amin, Shah and Becker (2010) used data from rural communities of three divisions of Bangladesh and concluded that education, age and relative decision-making power of women had less pronounced effect. However, household's relative poverty status, represented by wealth quintiles, acted as a major determinant in health seeking behavior in rural Bangladesh.

Chen, Huq and D'Souza (1981) showed that in rural Bangladesh there is a strong gender bias in parental care, intra-family food distribution, feeding practices and utilization of health services. Drawing from their conclusion inclusion of gender variable in our model is justified.

Most of the papers on maternal and child health in Bangladesh concentrated their focus on the rural communities. Our paper includes households from urban areas too and one of the hypotheses to be tested is that whether a mother's area of residence influences her health seeking behavior.

4. An Overview of Maternal Health-seeking behavior during Pregnancy and Health Status during Early Childhood

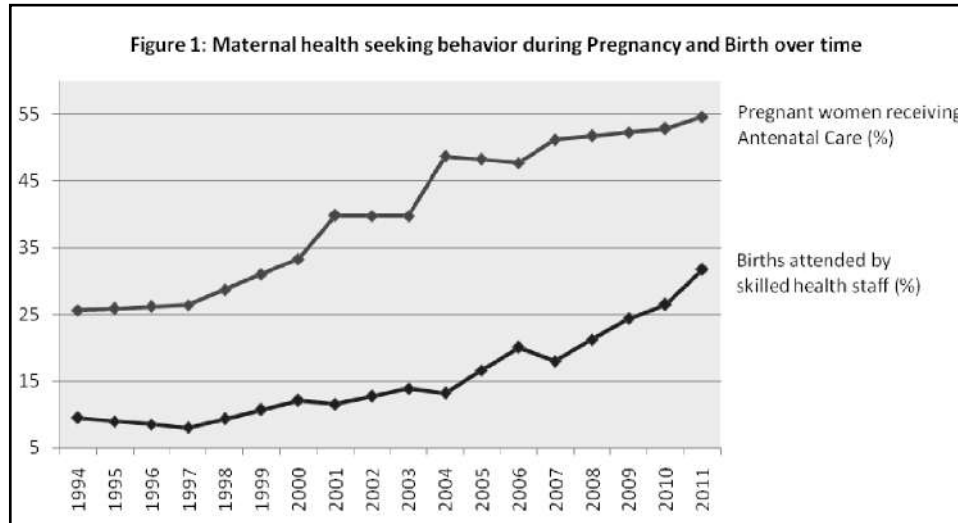
4.1 Trends of Antenatal Care Seeking Practices and Maternal Mortality Ratio

Although Bangladesh can pride itself for achieving a commendable success in reducing pregnancy related deaths, there is still much room for improvement. For about the last three decades, maternal mortality ratio has shown a steady decline. Women are having fewer children and these children are increasingly likely to live longer and healthier. Much of the credit can be attributed to the fact that women, in general, are more likely to receive skilled assistance during pregnancy and delivery than ever before.

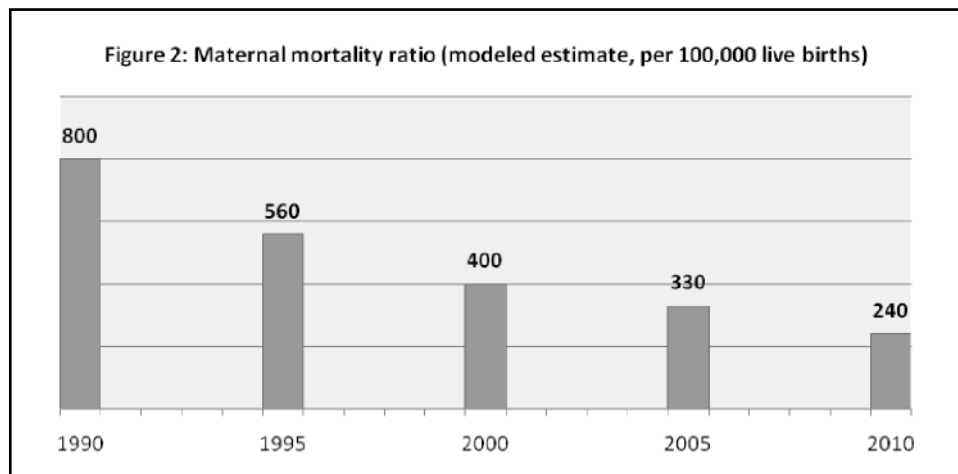
As figure 1 demonstrates, there has been a steady increase in percentage of women who opted for utilizing antenatal care during pregnancy and also chose to seek help from skilled health staff during child birth. Maternal mortality ratio also fell sharply and consistently which is demonstrated in figure 2; in 1990, 800 women died of pregnancy and birth-related complications per 100,000 live births which fell to 240 in 2010 only within 20 years of time span. The good thing about the trajectory of the maternal mortality ratio is that the fall is consistent and once it fell, it never increased back up; so we must be doing something right. However, while this surely is an impressive fall, the absolute value of maternal mortality rate is still quite high. Albeit supply-induced increases in maternal health services,

the limited gains in maternal and child health indicate that we need a comprehensive understanding of the demand-driven utilization of antenatal care.

However numbers and statistics often can overlook many details. For instance, the sample of pregnant women receiving antenatal care in the above figure includes



Source: Databank, World Bank



Source: Databank, World Bank

all women who received any kind of antenatal care service at least once during pregnancy. Whereas, under normal circumstances, the World Health Organization (WHO) recommends that a pregnant woman should have at least four ANC visits (WHO, 2005). For the data source used in our paper, about 78% of pregnant

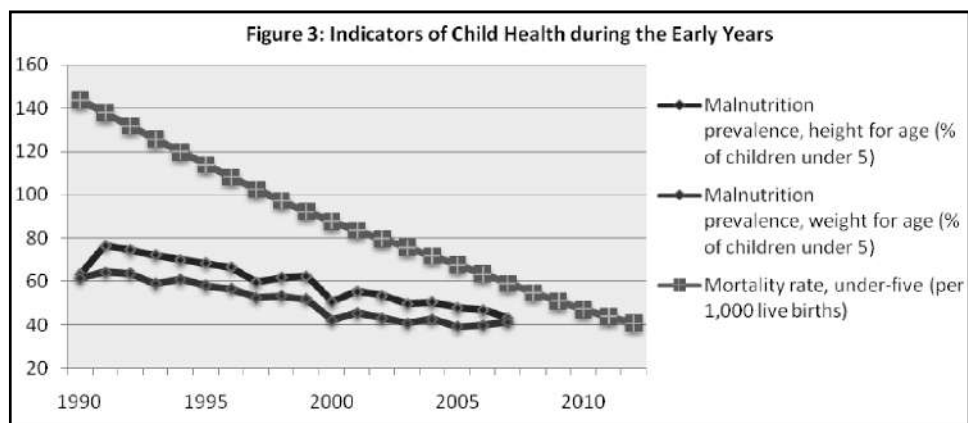
women utilized antenatal care facilities at least once; but an appalling 16.5% utilized ANC services four/more times as required by the WHO. There was also a huge urban-rural differential present in our data. In urban areas, 27% mothers received ANC services at least four times whereas only 11% of rural mothers received ANC services at least four times.

According to Bangladesh Demographic and Health Survey 2004, about 63% of those who did not seek ANC services during pregnancy thought it was not necessary and/or beneficial for the mother and child.

4.2 Trends of Health Status during Early Childhood¹

Because maternal and newborn health is so inextricably linked, whatever steps were targeted towards reducing maternal mortality ratio were also directly playing huge roles to provide a better health status of the children. In fact, of those women who die while giving birth, only one in four of their babies will survive their first week of life (Bangladesh Maternal Health Services and Maternal Mortality Survey 2001).

Child survival has been improving substantially in Bangladesh. Under-five mortality rate dropped to double-digit value in 1998 (97.2 deaths per 1000 live



Source: Databank, World Bank

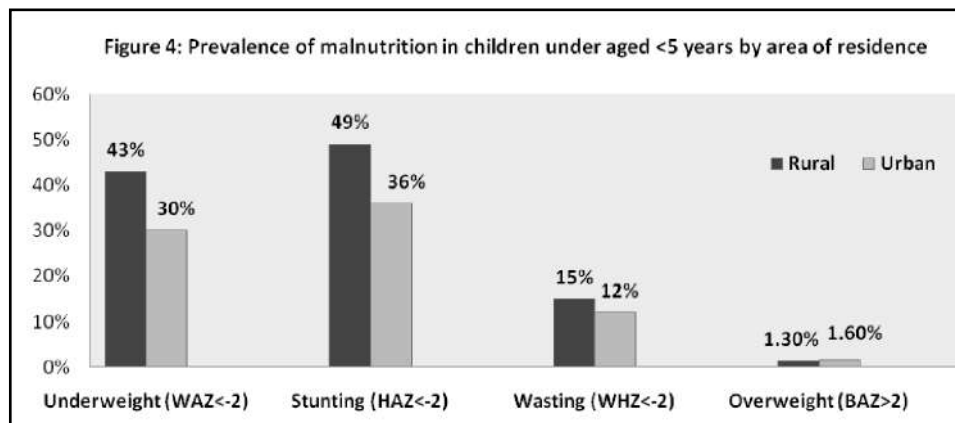
births) and never increased after that as figure 3 suggests. Despite showing such huge fall over the years, it is still very high. In 2012, probability that a baby would die before reaching age five was 40.9 per 1000. This means that about 41 children

¹ This sub-section is adapted from Barkat and Farzana (2014)

in every 1000 births die before reaching the age of five. Interestingly, the prevalence of malnutrition (as measured by height-for-age and weight-for-age) do not show as dramatic a fall as child mortality rate.

While dealing with such generalized data, it is not always apparent that there is a huge difference if we consider the urban-rural, poor-non-poor or male-female populations separately. For instance, nutritional status as measured by prevalence of malnutrition among urban and rural children can vary widely. Figure 4 shows prevalence of four main types of malnutrition among Bangladeshi children. Clearly, the only case where children in urban areas are less healthy than rural areas is when they are overweight/ obese.

While nutritional status has improved somewhat during the last decade, a greater proportion of Bangladesh's children suffer from acute and chronic malnutrition



Source: Child and Mother Nutrition Survey of Bangladesh 2005

than children in far poorer countries like Uganda and Nepal. Given the presence of differentials, early deaths and malnutrition can be further reduced by targeting the poorest especially in rural areas.

5. Determinants of Utilization of Antenatal Care and the Effects it has on Child Health

5.1 The Data

In our research, secondary data was used from the Child and Mother Nutrition Survey (CMNS) carried out by Bangladesh Bureau of Statistics (BBS) in 2005. The CMNS was carried out among a nationally representative sample of rural and urban children aged 0-59 months and their mothers. The survey included 3797

children aged 0-59 months and 3050 mothers living in 3069 households in rural and urban Bangladesh. Among the households, 35% were urban and 65% were rural. The sample was taken from 80% (403) of the 504 Primary Sampling Units (PSUs) of the BBS Household Income and Expenditure Survey, 2005.

5.2 Methodology

5.2.1 Outcome Variables

Antenatal Care Use

To secure healthy pregnancies not only professional antenatal care but regular antenatal visits are required (WHO 1994). In our model we included two dimensions of antenatal care- utilization and frequency of utilization of ANC. We measured antenatal care with a binary outcome (ANC= 1 if a mother uses professional antenatal care and 0 otherwise). Professionals included doctor/ nurse/ FWV/ FWA/ MA/ HA. To capture the effects of routine antenatal visits we use a count variable- the frequency of visits during pregnancy. Professional care educates pregnant women about healthy practices and behavior while routine visits are expected to maximize amount of care and reduce health hazards (Coria-Soto et.al 1996).

Child Health

The health status of a child (0-59 months) was measured by using Mid-Upper Arm Circumference (in C.M.). This indicator of child health is simple and cheap and so can be effectively used by community-based people for active case finding, especially in countries with some amount of resource-constraints. It is less prone to mistakes and is subject to fewer errors than the traditional method of calculating the weight-for-age method. In fact, MUAC has proved to be a better marker of mortality risk associated with malnutrition than weight-for-height. According to the United Nations System's Standing Committee on Nutrition, it is a good indicator for muscle mass and can be used as a proxy of wasting. Other studies show that it gives a rough estimate of protein (muscle) and energy (subcutaneous fat stores) along with its added advantage of operational simplicity (Ighogboja, 1992).

5.2.2 Explanatory Variables

To estimate the determinants of professional antenatal care use and frequency of antenatal visits we used the same explanatory variables. Education is a very important determinant in antenatal care use. Prior studies show that if a mother is

educated and if she belongs to a family where the household head is educated, then the tendency to take regular professional antenatal visits increases. Better educated parents are more aware of health problems, know more about the availability of health care facilities and utilize information more effectively. Education also acts as a proxy for the socioeconomic status of the family and geographic area of residence (Desai and Alva, 1998). For both the cases, education was measured by the highest class completed by them. We controlled other attributes of mother (namely height, weight, age, employment) in these models. Birth order was also included as prior studies found that a mother is less enthusiastic about antenatal care if she is currently pregnant with a child with higher birth order (Wong et al, 1987; Elo, 1992). Accessibility is an important factor determining utilization of health care (Abbas and Walker, 1986) which was measured by the distance from the nearest professional service provider in kilometers. Finally a dummy variable was created to capture the effect of area of residence (1 if urban and 0 if rural) as rural people are less likely to utilize facilities of professional ANC. Exposure to media is another important determinant of antenatal care use. The exposure to mass communication channels has important influence for creating awareness and using of antenatal care (Okafor, 1991). As an indicator of access to media, data on whether a household had a television or not was used.

For determining the factors affecting child health status, we controlled for the following variables- characteristics related to children (some of which include his/her genetic and/or biological attributes), mothers and households. As for the mother's different attributes, we used- her professional antenatal care utilization (both whether she utilized ANC and if so, how many times did she utilize it), her height, weight, current age and age at marriage; as for the child's attributes, we included the child's gender, age and birth order; other general features that were included were per capita income of the household, daily per capita calorie consumption of that family, source of water supply, toilet facility and area of residence. Dummy variables were used in case of child sex (1 if male; 0 if female), source of drinking water (1 if from safe sources like tube well and well; 0 otherwise) and toilet facilities (1 if hygienic like flush/ sanitary/ water seal/ pit; 0 otherwise).

5.2.3 Econometric Models

Three different models are run to test the hypotheses- (1) a logit model for the response of professional antenatal care use, (2) a Poisson model for counts of antenatal visits and (3) a 2SLS equation for predicting the impact of frequency of antenatal visits on child health.

As professional antenatal care use is a binary variable, we ran a logit model to estimate the determinants of professional antenatal care. On the contrary, frequency of antenatal visits is a count variable as it takes on only a few different values. In this case Poisson regression is appropriate to determine the estimates of frequency of professional antenatal care (Wooldridge, 2008).

When determining the factors affecting child health in the third model, there was a risk of confronting an endogeneity problem because of the likely correlation between antenatal care utilization and the error term in the model. For this, the endogenous variable (frequency of antenatal care use) was regressed on all exogenous variables and residuals were obtained. After adding these residuals in the structural equation, the coefficients obtained were found to be statistically significant. So the presence of endogeneity was confirmed (Wooldridge, 2008).

When facing such endogeneity problem, applying the 2SLS method with instrumental variable is better than OLS method. We used mother's education, household head's education, mother's employment and exposure to media as instruments for professional antenatal visits. An effective instrument must be correlated with the endogenous variable but uncorrelated with the error term. Our instruments are closely correlated with antenatal care use but they are uncorrelated with the child health status. To identify the validity of instruments we tested for over-identification restrictions. For this, first we ran a structural equation by 2SLS and obtained the residuals. Then the residuals were regressed on all exogenous variables; the goodness-of-fit obtained was $R^2 = 0.0006$. Multiplying this by the total number of observations ($n = 2921$) gives the value 1.74 which is a very small value in a $\chi^2_{(3)}$ distribution. So our variables pass the over-identification test and they are valid instruments for frequency of antenatal care utilization.

5.3 Results and Interpretation Determinants of Professional Antenatal Care Utilization

The regression results for the logit and the Poisson models are tabulated in Table 1, with the second column representing the value of the coefficients when we determine the factors affecting whether or not a mother will seek professional antenatal care and with the third column representing the results for the determinants of the frequency with which antenatal care visits are made.

Logistic regression coefficients indicate that education is an important determinant of seeking professional antenatal care. An additional year in mother's education increases the odds for utilizing professional antenatal care by 8%.

Educated household head in a family also increases the probability of taking professional antenatal care. For a unit increase in years of household head's education the odds of utilizing professional antenatal care increases by 2%. This means that although both mother's and household head's education are both significant factors affecting antenatal care utilization, an additional year in mother's education increases the odds of utilizing professional antenatal care more than an additional year of the household head's education.

As shown in the table, there is a lower propensity to seek professional care if a mother is currently pregnant with a child of higher birth order. Keeping other

Table 1: Determinants of professional antenatal care use, Child and Mother Nutrition Survey of Bangladesh 2005

Variables	Binomial logit model	Poisson regression model
Mother's age	0.008 (0.009)	0.007** (0.003)
Mother's height	0.005 (0.005)	-0.002 (0.001)
Mother's weight	0.008 (0.005)	0.009*** (0.001)
Mother's employment	0.084 (0.214)	0.127* (0.068)
Child's birth order	-0.178*** (0.033)	-0.092*** (0.014)
Mother's education	0.077*** (0.013)	0.047*** (0.004)
Household head's education	0.019* (0.011)	0.011*** (0.004)
Distance from nearest Professional Health care facility	-0.001 (0.009)	-0.009** (0.004)
Area of Residence	0.645*** (0.084)	0.166*** (0.004)
Television	0.204** (0.093)	0.198*** (0.034)
Constant	-1.322 (0.810)	0.469* (0.253)
N	3656	3656
Pseudo R ²	0.0845	0.10

Note: ***P<0.01, **P<0.05, *P<0.10; Robust standard errors are in parentheses

factors unchanged, the odds of utilizing professional antenatal care is almost twice (90% more) if a mother lives in an urban area than compared to a mother residing in a rural area. Owning a television in the household (which in our model is considered to be an indicator of exposure to mass media) also significantly affects professional antenatal care utilization decisions. It raises the odds of seeking professional antenatal care by 22.7%. That means efforts to disseminate health knowledge through mass communication media is helpful to aware mothers about benefits of taking professional care.

From the Poisson regression model in the third column, we see that among mother's attributes- mother's age, weight, employment and education are significant determinants of ANC visits. Mothers with higher age and weight frequently go for ANC visits. If a mother is employed, then the number of visits by her is estimated to be about 13.5% higher compared to an unemployed mother. Furthermore, an additional year in mother's education is expected to increase probability of ANC visits by 4.7%. An educated household head also increases the probability of ANC visits by mother. It is seen that one more year of household head education increases probability of visits by 1.1%. In addition, urban mother are expected to have 17% more visits than rural mothers. Exposure to media not only encourages people to take professional care but also increases awareness about routine antenatal care. If a family has television in house, then the mother of that family take about 20% more visits.

One important distinction found between the two models is the effect that distance from the nearest professional health facility had in determining utilization of professional antenatal care. Although a priori, we expected that distance would be a significant factor, in the logit model, it was not.

Determinants of Child Health²

Table 2 represents OLS and 2SLS coefficients of the determinants of child health. In determining the factors affecting child health, endogeneity is found to be present as professional antenatal visits change with variation in educational attainment, exposure to media and other attributes which have no direct effect on child health. So these will go into the error term making professional antenatal visits variable endogenous. To rectify this problem, the instrumental variable approach was used to obtain 2SLS estimates. Household head's education, mother's education, mother's employment and access to media were used as

² This sub-section is adapted from Barkat and Farzana (2014)

Table 2: Determinants of Child Health, Child and Mother
Nutrition Survey of Bangladesh 2005

Variable	OLS	2SLS fitted Poisson model
Antenatal visits	0.012 (0.009)	0.106*** (0.125)
Mother's height	-0.003 (0.002)	-0.003 (0.002)
Mother's weight	0.032*** (0.002)	0.030*** (0.002)
Mother's age at marriage	-0.002 (0.008)	-0.010 (0.008)
Mother's age	0.006 (0.005)	0.007 (0.005)
Per capita income of the family	3.81X10 ⁻⁶ *** (8.5X10 ⁻⁷)	3.06X10 ⁻⁶ *** (8.73X10 ⁻⁷)
Drinking water	-0.100 (0.080)	-0.078 (0.080)
Toilet facility	0.084** (0.040)	0.044 (0.041)
Per capita calories consumption of the family	0.000* (0.000)	0.000 (0.000)
Child's sex	0.178*** (0.036)	0.177*** (0.036)
Child's age	0.049*** (0.007)	0.051*** (0.007)
Child's age ²	-0.0003*** (0.0001)	-0.0003*** (0.0001)
Child's birth order	-0.078*** (0.018)	-0.073*** (0.018)
Area of Residence	0.157*** (0.042)	0.137*** (0.042)
Constant	11.763*** (0.449)	11.768*** (0.448)
N	2921	2921
R ²	0.25	0.25

Note: ***P<0.01, **P<0.05, *P<0.10; Robust standard errors are in parentheses

instruments of antenatal visits. In the first stage we estimated the reduced form regression where we regressed ANC visits on the entire set of exogenous variables and obtained the predicted value of ANC visits. In the second stage we ran the

structural equation by regressing child health on predicted values of ANC visits and other exogenous variables.

As shown in the table, a mother taking professional antenatal care regularly will benefit the child's health during the first five years of childhood. An additional visit to a professional health care facility during pregnancy increases the child's arm circumference (MUAC) by 0.10 C.M. Maternal health, as reflected by her weight and not her height, significantly affected child health. Families with higher per capita income had healthier children on average; surprisingly though, the results did not indicate anything about a family consuming more per capita calorie had a healthier child.

Another factor affecting child health is age. During the first five years, a child's health on average improves until it reaches some threshold level and then the health status deteriorates. These phenomena of gradually improving and then declining health status could be attributed to the fact that over the years, the parents either do not know the complete nutritional requirement a growing child needs or simply they cannot afford to provide the requirements. Another finding was that a child with a higher birth order is likely to have poorer health. This again could be either because parents tend to be more concerned about their first-borns or because of the increased resource constraints of a bigger family.

Gender bias was evident. A male child, on average, showed a better health status than a female child during the first five years of childhood. Moreover, presence of a significant urban-rural differential was also apparent. On average, the MUAC of a male child was 0.17 C.M. more than the MUAC of a female child; also, on average an urban child had 0.14 C.M. more MUAC than a rural child.

6. Policy Implications and Conclusion

This paper shed light on a number of prime factors determining utilization of antenatal care by women in Bangladesh. We also studied that whether routine use of antenatal care has any effect on child health in the following years to come. Results supported that routine visits for antenatal care during pregnancy did affect the child's health during early childhood.

Given the current situation in Bangladesh, professional antenatal care providers are not exactly scarce (even in the remote rural areas). However, the rate of utilization is still very poor. Our findings show that the distance to the nearest professional health care centre do not play a significant role in determining whether or not a family will utilize ANC facilities, but it does not determine the

frequency of ANC utilization. This can be explained either by low transport cost required to get to the hospital or simply because during the last decade, many new healthcare centers, hospitals, NGOs and clinics have been established, so accessibility is perhaps no longer a pressing issue. So, based on what we found, government and non-government policies and aids should probably be more focused on improving the skills among lower cadres of health care providers (especially in rural areas) and on creating a women-friendly environment, rather than just setting up more hospitals.

Maternal education (along with household head's education) seemed to prove itself extremely important repeatedly in our study. Educated mothers are more likely to seek professional care during her pregnancy and act better in case of any complications before, during and after child birth. Maternal education also determined the child health status during the first five years of childhood through good child caring practices.

Apart from all the direct goodness education has on health of the mother and the child, it is also extremely important to acknowledge the fact that maternal education is reflected in healthy reproductive behavior, better timing and spacing during pregnancies and increased participation of the mother in family planning process. Thus average family size can be reduced so that child health does not suffer due to resource constraints. Government already has taken significant steps to provide free education for females and female enrollment rate has been quite satisfactory over the last few years; however, policies should be directed towards keeping drop-out rates low too. By controlling female drop-out rates in primary and secondary schools, it is possible to control early marriage, unintended pregnancies and raise overall women participation in the labor force. Government can also effectively use media to increase awareness among people about the importance of routine professional antenatal care and how it benefits both the mother and child.

Gender-bias was evident in child health. Son-preference in parental care, intra-family food distribution, feeding practices and utilization of health resources are some mechanisms which may result in a female child to have poorer health than a male counterpart. New health strategies should directly challenge rigid, deep-rooted and harmful social, cultural or religious biases that create discrimination. Equality should be promoted by mass dissemination of information through media using television, radio etc. Desirable shifts in attitudes require working for and working with women, but more so with men and boys to show them the benefits that gender equality brings about for individual families and the community as well.

One of the most challenging steps towards improving mother and child health in our country cannot be solved by finances alone. Improving overall scenario of health facilities requires policies targeting the health sector directly; moreover, cross-cutting policies may be even more significant in the long-run. Incorporating other sectors with nutrition goals- like growth, poverty alleviation, and education- will bolster the progress in overall health sector. Thus multi-sectoral policy measures to encourage higher utilization of professional antenatal care among pregnant mothers are important because they are likely to have a ripple effect on child health and hence on overall health scenario of the nation.

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