RESEARCH

Factors influencing prospective mother with prenatal qualified doctor care among the reproductive women in Bangladesh

Humayun Kiser* and Tasmina Nasrin

Abstract

Maternal and child mortality are the key indicators of health and development of the country. Maternal and child health are interconnected to prenatal care. Consulting a doctor at the prenatal stage will not only ensure mother's and her unborn babies' safety, but also has a great influence to reduce the maternal and infant mortality. In this paper, an attempt has been made to analyze the status of prenatal care provided by the qualified doctor among pregnant mothers in Bangladesh. Data and required information of 8793 reproductive women were collected from the Bangladesh Demographic and Health Survey (BDHS) 2014. Logistic regression model has been used to identify the most significant determinants of the prenatal doctor visits. In this research, it is found that prenatal cares by a qualified doctor during pregnancy depend on several social and demographic characteristics of a woman. It is observed that women staying both urban and rural areas have similar behaviour of caring regarding their pregnancy related complications. Beside this Respondent's age, education, her husband's education and the number of ever born children have significant contribution on prenatal doctor visit. On the other hand, division, religion, husband's desire for children has no effect on it. Overall the model is able to predict 71.65% women into their appropriate group based on these factors.

Keywords: Prenatal care, Logistic regression, Reproductive mother, BDHS

Introduction

Prenatal care is such care that a pregnant woman requires in order to ensure a healthy pregnancy and safe childbirth. The visits to a qualified doctor at prenatal stage can persuade pregnant mothers to choose for skilled attendance at birth and encourage them to have some healthy behaviours such as early breastfeeding, early postnatal care as well as help them in planning for optimal pregnancy spacing. It is evident that without prenatal care, there are three times more likely to have a baby with low weight and five times more likely to die in comparison to those babies whose mother gets care.

The practice of having checkups at the initial stage of pregnancy is very low in developing countries compared to developed countries. In developed countries, a majority of pregnant mothers has access to prenatal care. But in developing countries like Bangladesh, large

proportion of pregnant mothers die in complications related to pregnancy. Thus, proper care during pregnancy and delivery is extremely necessary for Bangladesh. This strategy emphasizes the provision of prenatal care and is predicted by the framework of factors that affect safe motherhood service utilization. Good care during pregnancy is important for the health of the mother and the development of the unborn baby. Pregnancy is a crucial time to promote healthy behaviours and parenting skills. Good prenatal care links the woman and her family with the formal health system, increases the chance of using a skilled attendant at birth and contributes to good health through the life cycle.

Though a number of studies have been conducted on prenatal care in Bangladesh, only a few of them involved statistical estimation of the relationship between prenatal visits to qualified doctors and different socio-demographic factors. In this study, our aim is to identify the factors associated with prenatal visits by a qualified doctor, the findings can be helpful for organizations those

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working for improving maternal and neonatal health to implement new strategies regarding awareness of prenatal visits.

Prior research

Prenatal care is generally aimed at producing healthy mother and baby at the end of any pregnancy. This also provides a source to supply information may positively influence maternal and child outcomes. The prenatal care could play a role in reducing maternal mortality rate and that it could ensure that pregnant woman delivers at hospital under the supervision of qualified doctors. Most maternal deaths and pregnancy complications can be prevented by quality prenatal care as well as identifying influential factors.

In past, Stokoe [1] found that some socioeconomic factors that affect women during pregnancy and childbirth when they are more vulnerable. Gokhale et al. [2] showed in their study that Illiteracy of females had a more detrimental impact on rural than on urban areas. In the event of high female illiteracy, male literacy was beneficial for improving the use of services for reducing infant mortality rate. Beside this, Chakrabarti [3] enlisted major findings of their study as follows. First, a woman with greater educational qualification and autonomy in terms of her power to take decisions on her own, control over household resources and complete freedom to move beyond the confines of her household which exerts a significant influence on the probability of seeking care. Moreover, this prenatal care is important towards opportunities for linking the health system and the community by encouraging women to deliver with a skilled attendant [4].

On the other hand, Pillai [5] linked that family planning and health services also have effect on mortality and reproductive health. In a study carried out by Murthy and Barua [6] explored that most deaths in India occurred at home and during the prenatal period. Educated woman is indicated as more maternal health care in practice with a high standard of living in India [7]. In addition to this, Bloom et al. [8] found strong positive association with prenatal care and maternal mortality through Logistic Regression.

Iyengar and Iyengar [9] exposed that there is a lack of doctors, especially in tribal districts to provide qualified prenatal care because doctors are technically more resourceful than any other supports like paramedical personnel [10]. Facuveau et al. [11] showed that maternal survival can be improved by the posting of the qualified doctors at the village level and if they are given proper training, means, supervision, and back-up.

Figueiredo et al. [12] established relationship between infant mortality and prenatal care and showed that

inadequate prenatal care has linked with the death of infants and can be avoidable by consulting qualified prenatal care.

Data

The data for this study has been obtained from Bangladesh Demographic and Health Survey (BDHS) for the year 2014, which is the seventh national-level demographic and health survey designed to provide information on demographic status, family planning, maternal health, and children's health and nutritional status.

The Bangladesh Demographic and Health Survey (BDHS) 2014 is a nationwide cross-sectional survey that used a sampling frame provided by the Bangladesh Bureau of Statistics (BBS) considering the list of enumeration areas (EAs) of the 2011 Population and Housing Census of Bangladesh that consist of 7 divisions, 64 districts and 545 upazilas/thanas that also divide the whole country into rural and urban areas. Each of those EAs has on an average 120 households. Using two stage stratified sampling, 600 EAs were selected in the first stage with probability proportional EAs size and on an average 30 household were selected in the second stage using systematic sampling of each of selected EAs, and total 18,000 households were selected to get a statistically reliable estimates. Among these household data, this research only considered the socio-demographic profile of the ever married women aged 15–49 who had 0–5 year's children.

A set of predictor variables has been selected from the BDHS data to estimate the statistical relationship between the number of prenatal care by a qualified doctor and the predictor variables. The predictor variables include—women age, division, place of residence, women education, wealth quintile, religion, child ever born, last caesarian birth, husband's desire for the child, husband's education and watching television of respondents.

The age was recorded for the ever married women and categories into 7 groups starting from 15 and ending at 49. These respondents varied among 7 geographic divisions including Dhaka, Chittgong, Barisal, Khulna, Rajshai, Rangpur and Sylhet. Furthermore, they were classified as urban and rural according to their place of residence. The educational attainment of these ever married women were measured based on the years of schooling completed, that is, no schooling, primary, secondary and higher. Similar categories of education were collected also as their husband's education. The wealth quintiles was considered as a wealth index that is used to measure the inequalities based on household assets ranging from poorest to richest using principle component analysis and frequently applied in demographic health survey in various country. Though majority of the

population were Muslims in Bangladesh, that was also reflected in the data considering other religions too. The total number of ever born children was counted from the respondents and it was also asked dichotomous question whether last birth was in caesarean section or not. Medical care of these respondents were decided by herself, their husband alone, both of them, someone else or others, and considered here as that might have linked with the prenatal care. However, this study also attracts interest whether husband desire for more, fewer or same in comparison to the respondents. Besides, watching television once a week, less than once a week or not at all were the three categories were collected from these ever married women in Bangladesh.

Statistical method

Logistic regressions analyze a dataset in which there are one or more independent variables that determine an outcome. The outcome is measured as a dichotomous variable.

The goal of logistic regression is to find the best fitting model to describe the relationship between the dichotomous characteristic of interest and a set of independent variables. Logistic regression generates the coefficients of a formula to predict a *logit transformation* of the probability of the presence of the characteristic of interest:

$$\text{logit}(p) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k$$

where p is the probability of the presence of the characteristic of interest. The logit transformation is defined as the logged odds:

$$\text{odds} = \frac{p}{1-p} = \frac{\text{probability of presence of characteristic}}{\text{probability of absence of characteristic}}$$

and

$$\text{logit}(p) = \ln\left(\frac{p}{1-p}\right)$$

Rather than choosing parameters that minimize the sum of squared errors estimation in logistic regression chooses parameters that maximize the likelihood of observing the sample values.

Empirical analysis

In the Bangladesh Demographic Health Survey, woman who have 0–5 years child was asked several dichotomous questions on their prenatal care. It is evident from Table 1 that only 58.59% mother had visited with a qualified doctor in their prenatal stage among the 4494 women who have 0–5 year's children. Beside this, 21.45% women have conceived without consulting with anyone. On the other hand, women in Bangladesh like to visit NGO workers and Nurse or Midwife as their trusted partner before

starting their pregnancy with 10.48 and 7.85% respectively. Others choices are rarely used by these prospective mothers in Bangladesh.

Discussion

The prenatal qualified doctor care is essential for the health of the prospective mothers and her upcoming babies. This doctor's care on potential pregnancy can essentially contribute, by not only improving infant survival but also decreasing maternal mortality. Moreover, many factors recognized poorly by the women before child bearing is problematic and therefore seek qualified doctor care. The result from Table 1 showed that 41.41% women had not received prenatal qualified doctor care when they supposed to be pregnant. Besides, age of the respondents was one of the strongest influential factors of prenatal care. From the outcomes of logistic regression model in Table 2, it is evident that the women with age group 15–19 and 20–24 had the very similar strategy of visiting doctor at the prenatal stage but significantly higher among the women age interval 25–34 and highest for the age group 35–39 with odd ratio 2.49 with compare to the reference group 15–19. The possible reasons of women with age group 35–39 has 2.49 times higher chance to visit a doctor at the prenatal stage in comparison to not visiting a qualified doctor with reference to the youngest mother as they may have faced greatest pregnancy complications.

There was no regional disparity among the women in seven districts of Bangladesh in case of prenatal doctor care. Most surprisingly, women residing at rural and urban had an insignificant association with prenatal doctor care. That means women in both rural and urban had similar awareness with a higher percentage to consult with the doctor at starting the maternal process. Similarly, religion also has no influence on prenatal care, that

Table 1 Distribution of prenatal care among 4494 women who have child 0–5 years

Prenatal care	Frequency	%
Qualified doctor	2633	58.59
Nurse/midwife/paramedic	353	7.85
Family welfare	172	3.83
Community skilled birth attendant	8	0.18
Medical assistance	11	0.24
Community health care provider	85	1.89
Trained traditional birth attendance	16	0.36
Untrained traditional birth attendance	4	0.09
Unqualified doctor	60	1.34
NGO workers	471	10.48
Others	19	0.42
No one	964	21.45

Table 2 Logistics regression table for prenatal qualified doctor's care among women

Dependent variables	Prenatal qualified doctor care		Odd ratio
	No (N, %)	Yes (N, %)	
<i>Age</i>			
15–19	392 (41.75)	547 (58.25)	Ref
20–24	638 (41.67)	893 (58.33)	1.014935
25–29	455 (39.67)	692 (60.33)	1.316015**
30–34	258 (42.43)	350 (57.57)	1.691583**
35–39	82 (39.05)	128 (60.95)	2.490665***
40–44	27 (60)	18 (40)	1.100783
45–49	9 (64.29)	5 (35.71)	2.5829
<i>Division</i>			
Dhaka	271 (34.09)	524 (65.91)	Ref
Chittagong	327 (37.94)	535 (62.06)	0.9470258
Barisal	255 (47.93)	277 (52.07)	0.7706722
Khulna	181 (34.09)	350 (65.91)	0.9962856
Rajshahi	230 (42.12)	316 (57.88)	0.8405074
Rangpur	245 (44.55)	305 (55.45)	0.8956992
Sylhet	352 (51.92)	326 (48.08)	0.867029
<i>Residence</i>			
Urban	427 (39.43)	1024 (70.57)	Ref
Rural	1434 (47.12)	1609 (52.88)	0.9777266
<i>Children ever born</i>			
1	618 (33.84)	1208 (66.16)	Ref
2	544 (40.54)	798 (59.46)	0.7413494***
3	324 (46.29)	376 (53.71)	0.6683213***
4	173 (53.40)	151 (46.40)	0.6302373**
5	93 (61.18)	59 (38.82)	0.4316164***
6	63 (75.90)	20 (24.10)	0.2315114***
7+	46 (68.66)	21 (31.34)	0.4116094**
<i>Higher education Label</i>			
No education	408 (67.22)	199 (32.78)	Ref
Primary	680 (55.06)	555 (44.94)	1.365249**
Secondary	710 (33.33)	1420 (66.67)	1.771926***
Higher	63 (12.07)	459 (87.93)	2.294826***
<i>Wealth quintile</i>			
Lowest	647 (68.83)	293 (31.17)	Ref
Second	457 (53.45)	398 (46.55)	1.414826***
Middle	348 (40.47)	512 (59.53)	1.658412***
Fourth	291 (30.76)	655 (69.24)	1.9526***
Highest	118 (13.21)	775 (86.79)	3.342858***
<i>Husband education level</i>			
No education	660 (64.14)	369 (35.86)	Ref
Primary	678 (50.11)	675 (49.89)	1.248053**
Secondary	431 (30.35)	989 (69.65)	1.693906***
Higher	92 (13.33)	598 (86.67)	2.530661***
<i>Last birth a caesarean section</i>			
No	1707 (50.13)	1698 (49.87)	Ref
Yes	153 (14.06)	935 (85.94)	2.756708***

Table 2 continued

Dependent variables	Prenatal qualified doctor care		Odd ratio
	No (N, %)	Yes (N, %)	
<i>Religion</i>			
Islam	1719 (41.58)	2415 (58.42)	Ref
Hinduism	126 (38.53)	201 (61.47)	1.054702
Buddhism	15 (60)	10 (40)	0.4619759
Christianity	1 (12.5)	7 (87.5)	3.367119
<i>Person who usually decides on respondent's health care</i>			
Respondent alone	185 (34.97)	344 (65.03)	Ref
Respondent & husband	847 (39.47)	1299 (60.53)	0.9086629
Husband/partner alone	677 (47.38)	752 (52.62)	0.784308*
Someone else	115 (34.64)	217 (65.36)	0.9460716
Other	4 (80)	1 (20)	0.0958685*
<i>Husband desire for children</i>			
Both want same	1400 (40.85)	2027 (59.15)	Ref
Husband wants more	222 (46.53)	257 (53.65)	1.029677
Husband wants fewer	112 (39.58)	171 (60.42)	1.035503
Don't know	51 (47.66)	56 (52.34)	1.05877
<i>Watching television</i>			
Not at all	1088 (58.72)	765 (41.28)	Ref
Less than once a week	174 (43.94)	222 (56.06)	1.161549
At least once a week	599 (26.98)	1646 (73.32)	1.475601***

***, ** and * refers to 1, 5 and 10% level of significance

Table 3 Specification for the logistic model

Sensitivity	77.8%
Specificity	63%
Positive predictive values	74.73%
Negative predictive values	66.86%
Correctly classified	71.65%

means though majority of the respondents are Muslims but had a similar strategy of prenatal care for the others religions.

Mother's education was the most significant influential factor for the prenatal care. A mother with primary education had 1.37 more likely to visit the qualified doctor with reference to no education in Bangladesh. The odds, in favour of prenatal doctor care had increased for secondary and highest label of the educated mother in comparison to the illiterate mother (1.77 & 2.29). That means women with the highest label of education were responsive more due to the knowledge of maternal and neonatal health consciousness. Not only the educational status of respondent but also their partner's or husband's

Table 4 Link test for the logistic regression model

Prenatal qualified doctor care	Coefficient	Standard error	z	P > z	[95% confidence interval]	
_hat	1.023817	0.043936	23.30	0.000	0.9377045	1.10993
_hatsq	− 0.0253412	0.025589	− 0.99	0.322	− 0.0754947	0.0248124
_cons	0.0201966	0.0415298	0.49	0.627	− 0.0612003	0.1015934

education level had the link with prenatal qualified doctor care. It was found that women had more likely to consult a doctor with the increase of educational level of the respondent's husband/partner with significant odds of 1.25, 1.69 and 2.53 respectively for primary, secondary and highest education with reference to no education.

As this paper is particularly interested in number of women who had ever child, it was significant that higher parity women had lower likelihood to go to the doctor before starting their pregnancy. Not only this, the chance of visiting prenatal care was higher for first child bearing period but started to decrease with the increase of birth order among the women in Bangladesh. That might due to the fact that higher parity women were little conscious about their health and the upcoming baby.

The percentage of caesarian is almost well above by the WHO recommendation in Bangladesh. In this research, it is evident that women with last caesarian birth had significantly higher possibility (OR 2.76) of consulting a doctor in order to avoid the pregnancy related complexity in comparison to a non-caesarian mother.

Wealth quintile playing vital role in prenatal care, as women belong to highest quintile had 3.34 times higher likely to consult a doctor at prenatal stage with compare to lowest quintile group. Others category of wealth also has significant effect on prenatal care among the women in Bangladesh.

In many societies, it is crucial to take decision on women health care. The study refers that the percentage of respondents who had consulted a doctor for prenatal care, among the women who generally solely or jointly with husband take health care decision, was 60 or more. But when the respondents had to depend on her husband or some other person for medical care, then there was lower chance to have this service. Whatever the husband had desired of more or fewer children or other choices, there was no significant effect on women prenatal doctor care.

Electronic media also had the influence on prenatal care, especially, different awareness programs on maternal and neonatal health are being telecasted regularly. So watching television had significant effect on women with 1.48 times more likely to visit prenatal qualified doctor care with reference to not watched television.

It was found that overall sensitivity and specificity are 77.8 and 63% respectively and this logistic regression correctly classified 71.65% women who had visited or not visited the qualified doctor as a prenatal care (Tables 3, 4).

The link test also suggest that there is no specification error that is no relevant variable have omitted from the logistic model as the predicted square is not statistically significant ($p > 0.322$). To conclude, this logistic model is justified enough without further correction to predict the prenatal qualified doctor care.

Conclusion

Prenatal care was established as major key factors for the determination of infant and maternal mortality [13]. In order to promote better maternal and child health, this research has found that prenatal care by a qualified doctor depends on several social and demographic characteristics of women. It is observed that there was no regional disparity that is urban and rural women had similar care about their pregnancy related complications. The educated woman had more chance to have prenatal care by a qualified doctor rather than the women who had no education. Woman's ages, respondent's husband's education, wealth quintile and last birth caesarian were considered most significant influential factors. Moreover, it is observed that there was no religious effects on consulting a doctor but watching television at least once a week had contributed 1.48 time higher to consult a doctor in comparison to not watching TV, if other factors remained constant. Overall, this model performs well if the status is classified accurately of the respondents in case of prenatal qualified doctor care.

Competing interests

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