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DOES SERVICE ACCESSIBILITY REDUCE SOCIOECONOMIC DIFFERENTIALS IN MATERNITY CARE SEEKING? EVIDENCE FROM RURAL BANGLADESH

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Summary. Maternal mortality is a serious public health concern in Bangladesh. However, most deaths could be prevented through proper and timely care seeking and adequate management. Unfortunately, fewer than half of pregnant women in Bangladesh seek antenatal care, and only one in eight receive delivery care from medically trained providers. The specific objectives of this research are to examine the socioeconomic differentials of maternity care seeking, and to determine whether accessibility of health services reduces the socioeconomic differentials in maternity care seeking. A multi-level logistic regression method is employed to analyse longitudinal data collected from a sample of 1019 women from all over Bangladesh. The study finds significant socioeconomic disparities in both antenatal and delivery care seeking. Service accessibility, however, significantly reduces the socioeconomic differentials in delivery care seeking. Services need to be made accessible to reduce the inequality in maternity care seeking between rich and poor, empowered and non-empowered.

Introduction

In Bangladesh maternal mortality as well as associated maternal morbidity is a serious public health concern. The maternal mortality ratio is estimated to be 322 per 100,000 live births (NIPORT *et al.*, 2003). Several well-designed studies have documented high levels of maternal mortality (Chen *et al.*, 1974; Alauddin, 1986; Khan *et al.*, 1986; Fauveau *et al.*, 1988; Maine *et al.*, 1996; Rahman *et al.*, 2002). Also, the magnitude of maternal morbidities has been revealed in various studies (Akhter *et al.*, 1996; Ahmed *et al.*, 1998; Khanum *et al.*, 2000). The primary causes of maternal mortality are eclampsia, haemorrhage, abortion, sepsis and obstructed and/or prolonged labour

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(Fauveau *et al.*, 1988; Rahman *et al.*, 2002). However, most of these deaths could be prevented through proper and timely care seeking and adequate management. Antenatal care seeking and care seeking during delivery and the postpartum period are crucial to prevent mothers' deaths from complications related to pregnancy and childbirth.

Even though reproductive health has been included as one of the important elements of the essential services package of the Health and Population Sector Strategies in Bangladesh, use of antenatal care has been very low, and almost all deliveries are conducted at home. Fewer than half of pregnant women seek antenatal care, and only 13% receive delivery care from medically trained providers (NIPORT *et al.*, 2005). Not much is known about the determinants of care seeking among women during pregnancy and childbirth in Bangladesh. Even though maternity services are largely said to be 'free' at government facilities, associated hidden costs contribute to low utilization of maternity services (Nahar & Costello, 1998). Study results put the mean cost for a normal delivery at 1275 taka (US$31·9) and that for a Caesarean section at 4703 taka (US$117·5), which are cheap compared with these costs in the developed world, but affect poor women in rural Bangladesh who don't have enough money to pay for these services (Nahar & Costello, 1998). This research identifies the socioeconomic differentials, and factors associated with care seeking during pregnancy and childbirth among women in rural Bangladesh.

Also, the research focuses on the role of service accessibility in maternity care seeking. Despite having a reasonably well-structured health delivery system, Bangladesh has failed adequately to meet its people's health needs, in particular those of women and children. Accessibility of health services is a major issue for service utilization (Fauveau *et al.*, 1991; Sundari, 1992; Olukoya & Elias, 1996; Ronsmans *et al.*, 1997; Allotey, 1999; Shariff & Singh, 2000; Mills & Bertrand, 2005). The specific objectives of this research are to examine the socioeconomic differentials of maternity care seeking, and to determine whether accessibility of health services reduces any socioeconomic differentials in maternity care seeking. It is hypothesized that women with higher household resources are more likely to seek antenatal care and care during delivery. Similarly, gainfully employed women are more likely to seek antenatal and delivery care. However, accessibility of health care services should modify the effects of household resources and women's gainful employment on maternity care seeking.

Methods

Data

The study uses longitudinal data from the 'Maternal Morbidity Prospective Study' conducted during 1993–94 by the Bangladesh Institute of Research for Promotion of Essential and Reproductive Health and Technologies (BIRPERHT). A sample was selected from the four original divisions of Bangladesh (Dhaka, Chittagong, Khulna and Rajshahi) using a multi-stage sampling method. One district from each of the four divisions, and one thana from each of the four districts, were selected randomly. These were Kalkini thana of Madaripur district, Begumgonj thana of Noakhali

district, Akkelpur thana of Bogra district and Kaligonj thana of Jessore district. Two unions from each of the four thanas were selected by a simple random method, and all the villages under each of the eight (4×2) unions were included in the study.

A total of 1019 married pregnant women up to and including 24 weeks of gestation were enrolled in this prospective study. Enrolled women were followed for each month of their pregnancy, and interviewed through structured questionnaires by trained interviewers. Of the 1019 enrolled women, 992 were available for at least one antepartum interview, and 961 were available for interview during delivery.

Dependent variables

The outcome variables are 'antenatal care seeking' and 'care seeking during delivery'. Antenatal care is modelled as a binary variable. Care seeking during delivery is based on who conducted the delivery; a delivery conducted by a physician, nurse, trained midwife or trained traditional birth attendant is considered as being conducted by a trained provider, and a delivery conducted by others (none, traditional birth attendant, relative, friend, neighbour) is considered as being conducted by an untrained provider.

Independent variables

The independent variables are broadly categorized into four groups: (a) predisposing, (b) enabling, (c) service, and (d) need variables. The *predisposing variables* include individual characteristics and health beliefs, *enabling variables* include household resources and women's gainful employment, *service variables* include accessibility of services, and *need variables* are perceived maternal morbidities, which have been depicted in the conceptual framework shown in Fig. 1.

Household resources are represented by *per capita* monthly household expenditure, which is categorized in quintiles. Maternity care seeking is examined by the quintiles of household average monthly expenditure. Antenatal care seeking is found to be 41·87%, 41·07%, 45·27%, 55·6% and 57·48% from lower to higher quintiles, and the distribution of delivery care seeking from a trained provider is 10·97%, 10·98%, 7·58%, 16·25% and 21·31% from lower to higher quintiles respectively. Given the similar distribution pattern, the lower three quintiles are merged into the lower household resource group while the upper two quintiles are merged to constitute the higher household resource group.

Woman's gainful employment is her personal resource. Gainful employment of women is modelled as a binary variable. Accessibility of a health centre is measured by the travel time to reach the health centre; a travel time of 1 hour or less is categorized as 'service accessible'.

Analytical methods

A multi-level logistic regression method is used for analysis. To ascertain the determinants of antenatal care seeking, hierarchically structured antenatal data are analysed, where the same individuals are measured or followed up on more than one occasion (up to and including nine). Follow-ups are clustered within individuals that

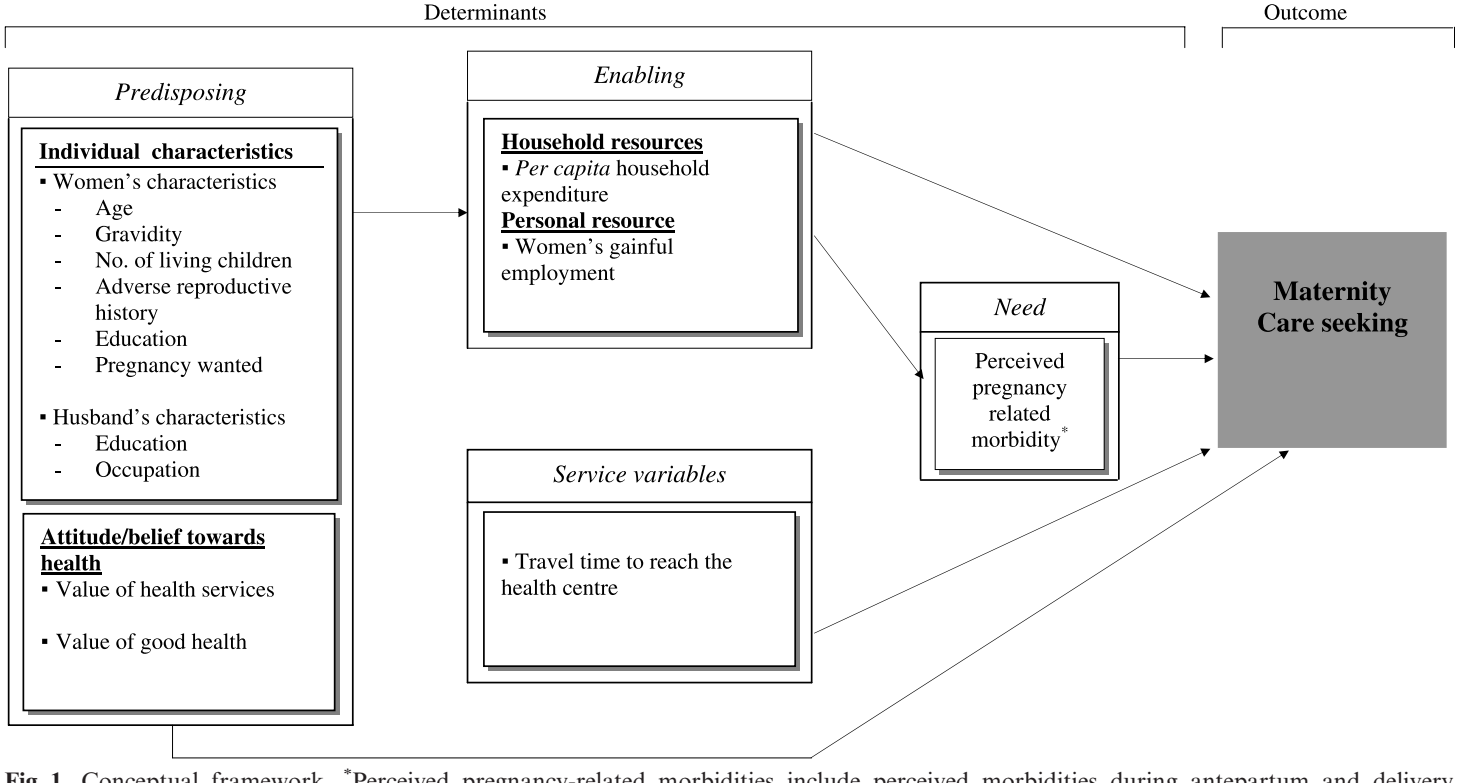

Fig 1. Conceptual framework. *Perceived pregnancy-related morbidities include perceived morbidities during antepartum and delivery period.

represent the level 2 units with follow-up occasions the level 1 units. Moreover, individuals are grouped into different clusters, which represent level 3 units. As the outcome variable, antenatal care seeking is dichotomous. To model for the probabilities and to control for the correlation at individual and cluster level, a three-level random effects logistic regression model is used:

$$\text{Log (Pr } (Y_{ijk}=1))/(\text{Pr } (Y_{ijk}=0))=\beta_0+\beta_{1ijk}x_{1ijk}+\ldots\ldots+\beta_{1ijk}x_{1ijk}+\mu^2_{ij}+\mu^3_{i}, \quad (1)$$

where i=cluster, j=individual, k=follow-up at time t=1,2, ……9 during antenatal period, Y_{ijk}=antenatal care seeking, x=covariates, β=vectors of parameters to be estimated, μ^2_{ij}=random intercept for individual j in cluster i (level 2), μ^3_{i}=random effect of cluster i (level 3).

However, the two-level random effects logistic regression method is used to analyse the delivery care seeking of women who were interviewed at one point of time and selected from different clusters (level 2 units).

$$\text{Log (Pr } (Z_{ij}=1))/(\text{Pr } (Z_{ij}=0))=\beta_0+\beta_{1ij}x_{1ij}+\ldots\ldots+\beta_{1ij}x_{1ij}+\mu^2_{i}, \quad (2)$$

where, i=cluster, j=individual, Z_{ij}=delivery care seeking from trained provider, x=covariates, β=vectors of parameters to be estimated, μ^2_{i}=random effect of cluster i (level 2).

The statistical software STATA (Stata Corporation, College Station, TX) version 9 is used to analyse the data. Statistical command 'gllamm' is used in the multi-level analysis.

Results

Research outcomes

Antenatal care seeking and care seeking during delivery are the two outcome variables. The results show that 25·7% of women seek any antenatal care at the time of enrolment, and 12·9% of women seek care from either a doctor, nurse or trained midwife or trained traditional birth attendant during delivery. However, longitudinal data were analysed from 1019 women who were enrolled in the study in their first or second trimester, and who were followed up monthly throughout their entire pregnancies. Information on antenatal care seeking obtained at any follow-up interview was considered in the analysis. Analysis shows that about 47·9% of women seek antenatal care at least once during their pregnancy.

Women's characteristics

About one-third of the respondent women are less than 20 years of age. Nearly one-third are in the age group 20–24, and the other third are in the age group 25 and above. The mean age of the women is 23 years. The index pregnancy is the first pregnancy for 27% of respondent women. However, over a third of women reported having experienced 2–3 pregnancies, and more than one-third have experienced four pregnancies including the index pregnancy. The mean number of gravidity is 3·3. Over a third of women do not have any living children. The mean number of living children is 1·6. Women were asked if they ever had any adverse reproductive history. Nearly 15% of women reported having had either a miscarriage or an abortion, and

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Table 1. Percentage distribution of women, according to predisposing variables (women's and husband's characteristics)

Variables	% (N=992)
Characteristics of women	
Mean age in years (SD)	23 (6·1)
Mean gravidity (SD)	3·3 (2·4)
Mean number of children at present (SD)	1·6 (1·7)
Ever had adverse reproductive history	
Miscarriage/abortion	14·9
Stillbirth	8·3
Swollen feet/hands	22·5
Convulsion	5·8
Prolonged labour	22·4
Obstructed labour	4·7
Education	
None	54·7
Any primary (1st–5th grade)	28·4
Any secondary (6th–10th grade) or above	16·8
Mean in years (SD)	2·5 (3·2)
Index pregnancy unwanted	31·6
Women's attitude/belief towards health	
Value of health services:	
Visited the health centre in past 1 year	25·6
Value of good health:	
Regular health examination is necessary during pregnancy	66·3
Ate special food during index pregnancy	25·1
Characteristics of husbands	
Education	
None	45
Any primary (1st–5th grade)	22
Any secondary (6th–10th grade) or above	33·1
Mean in years (SD)	3·9 (4·1)
Occupation	
Farmer or day labourer	52·8
Other (service, business etc.)	47·2

over 8% a stillbirth. Over one-fifth of the women reported swollen feet or hands in any previous pregnancies. Prolonged labour was reported by over one-fifth of the women. However, about 6% of women reported having convulsions and nearly 5% reported obstructed labour (Table 1).

Over half (55%) of the women do not have any formal education. Around 28% women have any primary level (1st–5th grade), and the rest (17%) have any secondary (6th–10th grade) or above level of education. The mean education level is 2·5 years. Women were asked if the index pregnancy was wanted or not. Nearly one-third reported that the index pregnancy was unwanted (Table 1).

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Table 2. Percentage distribution of women according to enabling, service and need variables

Variables	% (N=992)
Enabling variables	
Per capita household expenditure	
Lower household resources	62
Higher household resources	38
Gainful employment	31·4
Service variables	
Travel time to health centre <1 hour	74
Need variables	
Antepartum morbidity	
Life-threatening[a]	17·7
High-risk[b]	36·3
Other[c]	97·9
Morbidity during delivery	% (N=961)
None	72
Bleeding before delivery	2·1
Bleeding after delivery	4·7
Retained placenta	0·4
Obstructed labour	6·5
Prolonged labour	14·3
Convulsion	0·1

[a]Bleeding or convulsion.
[b]Headache associated with swollen feet/hands or burning associated with fever and abdominal pain.
[c]Excessive vomiting, vaginal discharge, weakness, palpitation or fainting.

Variables measuring women's attitude/belief towards health, husband's characterstics, and morbidities during pregnancy and delivery (need variables) are presented in Table 1.

Enabling variables

Per capita monthly household expenditure and women's gainful employment are the two enabling variables. *Per capita* monthly household expenditure represents the material resources of the household, which are crucial for health care seeking. Women's gainful employment not only represents women's ability to increased health seeking, but also empowers women to get involved in the decision-making process in health seeking. While 38% of women have higher household resources, over 31% women have been engaged in gainful employment (Table 2).

Service variables

A travel time to a nearby health centre of less than one hour is considered as 'having access to a health centre'. Nearly three-quarters of the women reported that they can reach a health centre within an hour (Table 2).

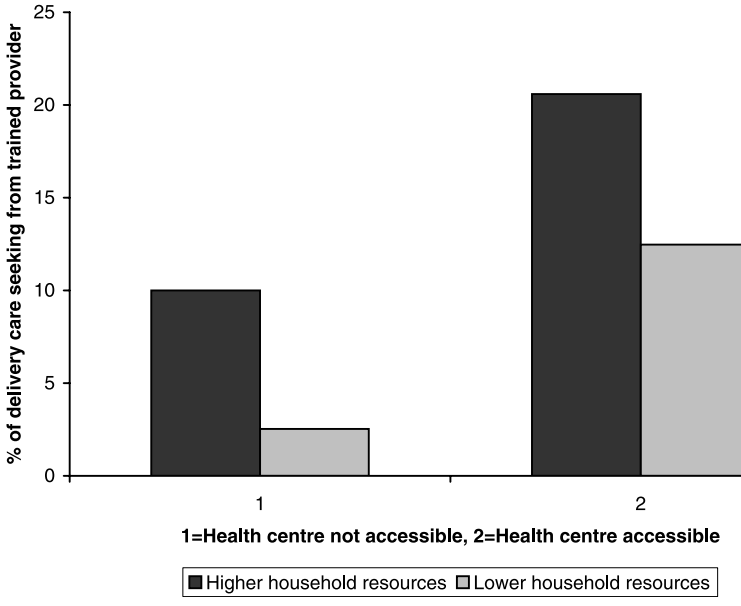

Fig. 2. Distribution of delivery care seeking from a trained provider by household resources, according to accessibility of health centre.

Results from the random effects logistic regression models for delivery care seeking

Of the two components of the health belief group of variables, 'the value of good health' turned out to be highly statistically significant. Women's belief in regular health examinations increases the odds of delivery care seeking from trained providers by 2·3 times.

Among the need variables, high-risk morbidities during current pregnancy had no impact on women's care seeking during delivery. However, women's experience of morbidities during current delivery increased the odds of delivery care seeking by 2·3 times compared with the odds for women who did not experience any morbidities during the index delivery.

Both the enabling variables, including household resources and women's gainful employment representing women's personal resources, are significantly associated with women's care seeking from trained providers during delivery. The odds of delivery care seeking from a trained provider are 6·3 times higher for women with higher household resources than those for women with lower household resources. Similarly, women's gainful employment increases the odds of delivery care seeking by 4·7 times. These significant findings of two enabling variables support the hypotheses formulated in relation to care seeking from trained providers during delivery.

Another hypothesis in relation to care seeking during delivery is service accessibility as the effect modifier for the two enabling variables. Figures 2 and 3 demonstrate the interaction between service accessibility and each of household resources and gainful employment based on the unadjusted data, which are significant at the 10% and 5% level when tested in multivariate models (Table 3). The significant

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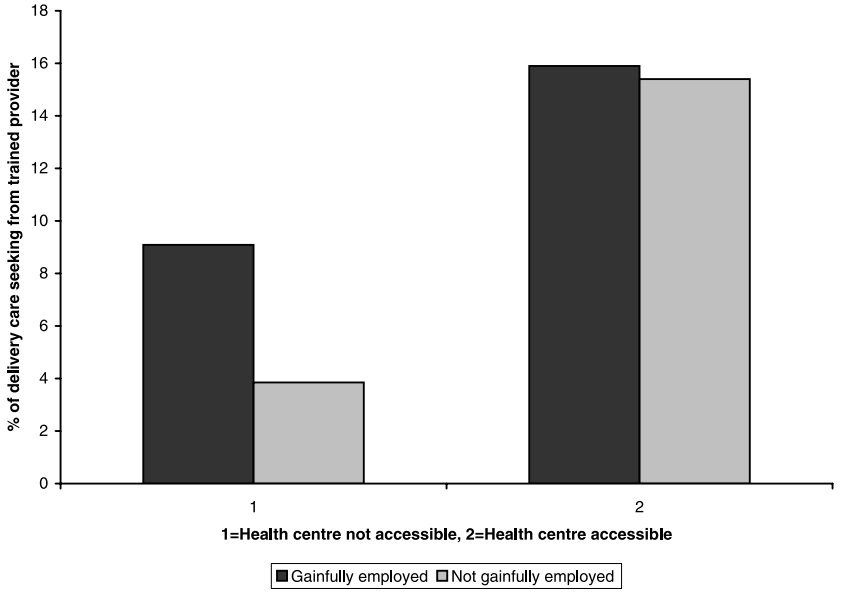

Fig. 3. Distribution of delivery care seeking from a trained provider by woman's gainful employment, according to accessibility of health centre.

findings of the interaction between service accessibility and each of household resources and women's gainful employment suggest that service accessibility reduces the differentials in delivery care seeking between women with higher household resources and lower household resources, and also reduces the differentials between women who are gainfully employed and those who are not (Table 3).

Results from random effects logistic regression models for antenatal care seeking

Women's previous reproductive history of miscarriage/abortion appears to be borderline significant for antenatal care seeking. All three variables measuring the value of health services and value of good health appear to be highly statistically significant for antenatal care. Both the need variables including life-threatening and high-risk morbidities in pregnancy appear to be statistically significant. Women's higher household resources are highly statistically significant to the extent that women with higher household resources are 1·6 times more likely to seek antenatal care compared with women with lower household resources. Women's gainful employment and service accessibility, however, do not appear to have any significant effect on women's antenatal care seeking (Table 4).

Discussion and Conclusion

This study investigates the effect of inequality in household resources (resources at household level) and gainful employment (resources at personal level) on maternity

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Table 3. Adjusted odds ratios from two-level random effects logistic regression analysis. Dependent variable: seeking delivery care from trained provider

Characteristics	Odds ratio
Predisposing variables	
Individual characteristics	
Women's age	1·03
Gravidity	0·94
Women's education	1·04
Adverse reproductive history (ever):	
Miscarriage/abortion	1·06
Stillbirth	1·76
Swollen feet/hands	0·52*
Convulsion	1·24
Prolonged labour	0·77
Obstructed labour	0·62
If pregnancy was wanted	0·87
Husband's occupation (ref: Farmer/day labourer)	
Service/business	1·07
Health belief	
Visited health centre in past 1 year	1·22
If regular health examination is necessary	2·25***
If had eaten any special food during index pregnancy	1·07
Enabling variables	
Household resources (ref: Lower resources)	6·31***
Women's gainful employment (ref: No)	4·69**
Need variables (current risk variables)	
High-risk morbidities in pregnancy	0·94
Morbidity during delivery	2·32***
Service variables	
Accessibility of health centre	7·72***
Interaction terms	
Household resources × Service accessibility	0·27*
Gainful employment × Service accessibility	0·21**
N	961

*$p<0·10$; **$p<0·05$;***$p<0·01$.

care seeking. It also determines the role of service accessibility, particularly if service accessibility modifies the effect of household resources and gainful employment on women's care seeking in rural Bangladesh.

Maternity care seeking and socioeconomic differentials

In this research, a significant difference is found between women with higher household resources and women with lower household resources in delivery care seeking from trained providers. The multivariate analysis shows that women with

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Table 4. Adjusted odds ratios from three-level random effects logistic regression analysis. Dependent variable: antenatal care seeking

Characteristics	Odds ratio
Predisposing variables	
Individual characteristics	
Women's age	0·99
Gravidity	0·94
Women's education	1·04
Adverse reproductive history (ever):	
Miscarriage/abortion	1·44*
Stillbirth	0·98
Swollen feet/hands	0·82
Convulsion	0·62
Prolonged labour	1·01
Obstructed labour	1·17
If pregnancy was wanted	1·18
Husband's occupation (ref: Farmer/day labourer)	1·24
Service/business	
Health belief	
Visited health centre in past 1 year	2·33***
If regular health examination is necessary	2·02***
If had eaten any special food during index pregnancy	2·48***
Enabling variables	
Household resources (ref: Lower resources)	1·58***
Women's gainful employment (ref: No)	1·29
Need variables (current risk variables)	
Life-threatening morbidities in pregnancy	1·75**
High-risk morbidity in pregnancy	2·62***
Service variables	
Accessibility to health centre	0·96
N	992

*$p<0·10$; **$p<0·05$; ***$p<0·01$.

higher household resources are 6·3 times more likely to seek delivery care from trained providers than those with lower resources (Table 3). These findings are supported by those of another study conducted on general health seeking in a selected rural area of Bangladesh (Ahmed *et al.*, 2003).

The inequality between the poor and rich in care seeking is not only limited to childbirth; it is obvious during the course of pregnancy as well, and has been seen in the analysis of DHS data of most countries (Kunst & Houweling, 2001). Our research also demonstrates a significant difference between women with higher and lower household resources in care seeking during pregnancy. Compared with women with lower household resources, women with higher household resources are 1·6 times more likely to seek antenatal care.

Maternity care seeking and women's gainful employment

Women's gainful employment raises a woman's status in the family, and empowers her to take part in decision-making processes. In this research, nearly a third of women were gainfully employed. However, most of the women worked at home, and only less than 3% women worked outside home for money. Of those who were gainfully employed, 93% were involved in small business activities. Women in rural areas usually take out loans from micro-credit programmes run by non-government organizations, and invest in two major sectors: livestock and fisheries, and processing and manufacturing (Ghai, 1984). Women's earning opportunity creates a division of labour within the household. While women borrowers make bamboo and cane products, or look after the cow, husbands sell milk, eggs and handicrafts. Ghai also notes that women's participation in the process of earning money does not create any tension in the family, but rather helps improve the relationship between spouses and mothers-in-law. It also improves a wife's 'overall status in the household and in the local community' (Ghai, 1984). The positive association between women's participation in micro-credit programmes and women's autonomy, as well as actual decision-making power, has been noted in other studies conducted in rural Bangladesh (Mizan, 1994; Amin *et al.*, 1998).

The current research examines whether woman's gainful employment influences her health-seeking behaviour. The results show that gainfully employed women are significantly more likely to seek delivery care compared with women who are not gainfully employed (OR = 4·69, $p<0·05$) (Table 3).

Accessibility of health services

A positive association was found in this study between service accessibility and women's care seeking. Women who reported having access to a health centre were more likely to seek delivery care from trained providers. Two studies conducted in one sub-district by Fauveau *et al.* (1991) and Ronsmans *et al.* (1997) in rural Bangladesh show results that support this study's findings.

One of the major findings of this research is the interaction between service accessibility and enabling variables. In areas where services are accessible, the difference in delivery care seeking between women with higher household resources and women with lower household resources is significantly diminished. This is also the case with service accessibility and women's gainful employment, suggesting that the difference in delivery care seeking from trained providers between gainfully employed women and women not gainfully employed diminishes in the areas where services are accessible (Table 3, Figs 2 and 3).

One argument that may be posed is how can service accessibility make a significant difference in rural Bangladesh when health facilities are under-utilized and only around 9% of deliveries are conducted in health facilities (NIPORT *et al.*, 2005)? Keeping in mind this very low proportion of deliveries conducted at health facilities, this study considers the variable measuring the delivery conducted by trained versus untrained provider regardless of place of delivery. It is assumed that where health facilities are available and services are accessible, they are more likely to have trained providers for the conduction of delivery even at home.

However, the non-significant effect of service accessibility on antenatal care seeking is consistent with the fact that in rural areas of Bangladesh, antenatal care is provided free of charge by outreach centres, and service accessibility may not have a significant impact on antenatal care seeking.

To the best of the authors' knowledge these research findings are unique, and no other studies have looked into this issue so far. Most of the studies conducted in this area deal mainly with cross-sectional data collected from a small area of the country. This study employs longitudinal data collected from a sample selected from all regions (divisions) of Bangladesh using a multi-stage simple random method.

The findings suggest policy and programme recommendations that target interventions for poor women. Programmes should make health services accessible, affordable and acceptable to poor women (Koblinsky *et al.*, 2000). Women's gainful employment significantly helps them seek delivery care from trained providers. Micro-credit programmes, which have had a proven impact on women's empowerment, need to be promoted and proliferated. Moreover, targeted programmes need to be developed to reach those unempowered women who do not seek delivery care.

The effect-modifying role of service accessibility has a major policy implication: to reduce the inequality in care seeking between rich and poor, empowered and non-empowered, services need to be made available and accessible. Availability and accessibility of health centres from the home are very important issues to consider for care seeking. In many studies physical distance and access to transportation have been found to have an association with health care seeking for maternal mortality and morbidities (Sundari, 1992; Shariff & Singh, 2000). However, utilization of available service facilities depends not only on physical access but also financial access, access to adequate care, access to information about services and range and quality of services (McCarthy & Maine, 1992). Sometimes service utilization depends on deep-rooted social beliefs and family practices though it was seen in many cases that the care sought depended on 'practicalities of service availability' and 'cost' rather than 'deeply held beliefs concerning disease pathogenesis' (Olukoya & Elias, 1996). However, parallel to supply-side components, demand-side components of service accessibility also need to be strengthened. Demand for seeking health care needs to be generated. Apart from the importance of preventive care, programmes should put more emphasis on building awareness about the seriousness of maternal morbidities and seeking appropriate care from trained providers.

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