

Maternal Healthcare Services Along Indo-Bangladesh Bordering Districts: Exploring Effects of Social Determinants on Access to Maternal Healthcare Services.

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Abstract

Background

Regardless of government efforts toward ameliorating easy access and utilization of healthcare services, the disparity in Maternal Mortality Rate (MMR) is significantly higher across states of India. Post-Sustainable Development Goals (SDGs), equity in healthcare largely remain in the health policy discourse. The policy implementation's effectiveness remained confined to the central geographical location, remotely reaching the peripheral region. The study seeks to assess socio-demographic and household wealth's effect on the access and utilization of healthcare services among women. A cross-sectional study was conducted among 355 women aged 15–49 years in three Indian districts of Assam that share an international border with Bangladesh.

Results

The study's findings reported that utilization and accessibility are primarily influenced by households' wealth and women's age. Education qualification has no significant effect on healthcare utilization. Younger women from wealthier households are more likely to utilize government healthcare services in India's borderline regions.

Conclusion

Besides educating women, the availability of healthcare resources and empowering the livelihood resources in the peripheral region should be prioritized. In these fragile areas, efforts to empower women and their families to seek healthcare should be strengthened, which shall enhance well-being.

Introduction

The healthcare services and health outcomes are inequitably distributed between and within countries ⁽¹⁾. The inequity persists in many low and middle-income countries ⁽²⁾, despite efforts to foster equal access and utilization to healthcare ^(3, 4). Wealth-based inequities in the utilization of maternal, neonatal, and child health services exist in low-income countries ⁽⁵⁾. Shreds of evidence suggest inequities in mortality and morbidity continue to grow among the poor and marginalized socially excluded populations in low and middle-income countries ^(6–8). Furthermore, studies in the South Asian region have indicated that improving equitable access to child and maternal healthcare services leads to a decreased child and maternal mortality ^(9, 10).

Equity is defined as the equal utilization of services for equal needs ^(1, 11). Evidence suggests the social excluded groups are multidimensionally weaker section of the population, particularly the children and women are more likely to get suboptimal healthcare services than the advantageous one ^(12, 13, 14).

Thereby, the morbidity and mortality rates are concentrated on the weaker side than the population on the better-off side, where the services' utilization is higher with lesser needs ^(15, 16). The inequities in health outcomes and services utilization raise concerns with social and economic implications among population of diverse cultural spheres based on the group identity ^(14, 17). As a result, equity in healthcare is set on a vital priority in the Sustainable Development Goals (SDGs) alongside Universal Health Coverage (UHC) ⁽¹⁸⁾. Thus, India's government has emphasized on National Health Mission (NHM) for the improvement of maternal health, which is an essential aspect of increasing equity through reaching almost to every corner of the country.

In India, considerable improvement has been observed in Maternal Mortality Rate (MMR) that is decreased by 51.96 percent, from 254 deaths per 100,000 live births in 2004-06 ⁽¹⁹⁾ to 122 deaths per 100,000 in 2015-17 ⁽²⁰⁾. Similarly, the Infant Mortality Rate (IMR) has witnessed a sharp decline from 53 deaths per 1000 live births in 2008 to 33 deaths per 1000 live births in 2017 ⁽²¹⁾. But the demographic indicators are substantially poor among the population who are resident of a fragile ecosystem such as Indo-Bangladesh border. The resident face disclamations in the lines of regional identity. The areas have seen huge influx of cross border migration since decades which makes certain sections excluded. Studies have shown that decreasing mortality rate not necessarily assure equity in the utilization of healthcare services ^(22, 23, 24). A high level of inequity in health outcomes is evident within and between the states. The state-wise MMR in India revealed a wide-ranging inequity between states like Assam at 237 deaths per 100,000 live births, Uttar Pradesh at 201, and different scenarios from states like Kerala and Tamil Nadu at 46 and 66 deaths per 100,000 live births, respectively. Further, inequity in health outcomes exists within states favoring the better-off population subgroups ⁽²⁵⁾.

Likewise, studies have shown that healthcare services' utilization is considerably higher among the better-off population ^(26, 27). Marginalized sections of the population in a disadvantaged region often have less access to healthcare services, resulting in under-utilization of services rather than the population in a less disadvantageous region ^(25, 28). Areas where there exists prolonged history of cross border international migration.

The under-utilization of maternal healthcare services in India largely contributes to higher mortality and morbidity ^(15, 29). The morbidity and mortality can be prevented with regular antenatal care, institutional delivery, and postnatal care after the delivery ⁽³⁰⁾. Previous studies revealed that other than the clinical reason for maternal deaths such as hemorrhage, sepsis, obstructed labor, and anemia, socioeconomic and demographic factors play a significant role in a higher mortality rate ⁽³¹⁾. Studies have demonstrated that socioeconomic and demographic factors play a significant role in utilizing healthcare services ^(3, 32). Numerous studies in India documented the range of structural and contextual factors determining the utilization of healthcare services. Factors such as wealth status, education qualification, socio-cultural, socioeconomic, and accessibility-related factors have a significant association with maternal healthcare ⁽²⁹⁾. Against this backdrop, geographical location further contributes to the inequity in the utilization of

healthcare services^(33,34). Saprii et al., (2015) further added that the healthcare workforce's availability influences the parameters of the utilization of services in any steep terrain.

Thus, this paper attempts to assess the effect of households' wealth and socio-demographic characteristics on the utilization of maternal healthcare services along Indo-Bangladesh border districts of Assam, through a primary cross-sectional dataset among Indian women aged 15–49 years. The study assessed the wealth of household and housing conditions for three critical indicators of maternal health service utilization: Antenatal Care, Institutional Delivery, and Postnatal Care after the delivery.

Methods

Study setting and research design

A cross-sectional study was conducted in three districts of Assam in India. The three districts, namely Karimganj, Dhubri, and South Salmara, share a maximum border with Bangladesh. Assam performs significantly poorly in every health indicator, particularly in maternal health^(35,36). Likewise, the status of health outcomes in the selected peripheral region for the study is considered inferior. The state of Assam is home to 31 million people, and one-third of the population is below the poverty line. However, the poverty line declined radically over the years, but poverty's incidence remains higher than the national average. The World Bank report on Assam stated that 43 to 60 percent of the population is below the poverty line in the selected districts neighboring Bangladesh⁽³⁷⁾.

Data source and sampling design

The present study uses primary sources of data collected from Assam's three districts adjacent to the Indo-Bangladesh border area. A stratified random sampling technique was used to select the respondents for the study. The three districts are namely Karimganj, Dhubri, and South Salmara have seven, thirteen, and two development blocks, respectively. Out of the 22 development blocks, four development blocks adjacent to the border are selected. Consequently, 24 villages were selected from all the four development blocks adjacent to the border area within 15 kilometers from the border road that runs parallel to the border fence. The sampling frame was prepared from the data provided by the National Rural Health Mission (NRHM) center of each district. A total of 26757 women from the 24 villages of the age group 15–49, who are currently pregnant or gave birth or had a miscarriage in the last five years, are included in the sampling frame. The probability sampling technique is used to select the representative sample from the sampling frame of 26757. The representative sample is drawn from the sample frame by calculating through the Cochran Formula. The representative sample reflected the population accurately through

Cochran's formula^(38,39). The representational cases are attained using the formula
$$\frac{\frac{z^2 * p(1-p)}{e^2}}{1 + \left(\frac{z^2 * p(1-p)}{e^2 N}\right)}$$
 of sample design, where N = population size, p= percentage, or proportion picking a choice, e= sampling error, and z= number of standard deviations a given portion is away from the mean. The assumptions

were: confidence level at 95 % = 1.96, sampling error = 0.05, taking the proportion of 45 % = 0.45. A total of 355 women are finally considered to be the representative sample from all three districts. District-wise distribution of the sample is presented in the table below:

Table 1
District-wise distribution of Sample

Districts	Sample Distribution
Karimganj	125
Dhubri	111
South Salmara	119

Measurements

The study used four indicators to measure the utilization of maternal healthcare services. The first indicator of the utilization is women having four or more antenatal (ANC + 4) visits to the health center. Women with four or more than four antenatal visits are marked yes coded as 1, and with no or, less than four visits were marked no coded as 0. The postnatal care (PNC) is the second indicator where women who have received the PNC at least within 24 hours of childbirth was marked as yes with code one and no with code 0. The two indicators, ANC + 4 and PNC, are defined as a dichotomous variable. However, to measure how and to what extent wealth and socio-demographic characteristics of individual households drive the choice of place of delivery.

Constructing wealth index

The information collected from the household questionnaire concerning the household's ownership of the number of consumer items and housing patterns is used as indicator variables for determining wealth and socio-demographic characteristics. Each indicator variable is assigned a factor score generated through Principal Component Analysis (PCA). The factor scores are standardized concerning a standard normal distribution with a mean of zero and a standard deviation of one. These standardized scores are then used to create the breakpoint that defines wealth quintile as the poorest, second, middle, fourth, and least poor^(40, 41). Similarly, for housing conditions, the breakpoint is defined as unhealthy to healthy. The scores are summed by households, and individuals are ranked according to the total score of the household in which they reside. The sample is then divided into population quintiles – five groups with the same number of individuals in each. Each observation is ordered by scores, and the distribution is divided at the points that form 20 percent of the sections. The household score is recoded into the quintile variable so that each member of a household also receives that household's quintile category.

Data Analysis

The wealth and housing index were the predictor variables used to run the multivariate models for each outcome variable. Binary and multinomial logistic regression was used for each of the three outcome

variables using STATA 15.1. Further, the results were presented in the form of odds ratio (OR) at 95 percent confidence intervals (CI).

Results

The table below presents the socioeconomic characteristics of the studied population in the India Bangladesh borderland region. The study considered three predictor variables: age, level of education, and wealth of individual households to measure the effect on maternal healthcare services. The data below revealed that 65.35% of women are from the age group of 15–25. The education level is significantly low, with only 11.83% of women having higher degrees, while 22.82% did not attend any formal schooling. Being close to the Bangladesh border and having several historical events of migration, the majority (69.01%) of the studied region population are Muslims. The average household size of the studied population is 5.98 members per family, 33.03%, and 25.96% higher than the national average of 4.45 and 4.7 members per family, respectively ⁽⁴²⁾.

Table 2
Sample Characteristics of the study population

Background Characteristics	Categories	n	%
Age Group	15–25	232	65.35
	26–39	111	31.27
	40–49	12	3.38
Level of Education	No Education	81	22.82
	Primary	90	25.35
	Secondary	142	40
	Higher	42	11.83
Religion	Hindu	110	30.99
	Muslim	245	69.01
Wealth Index	Poor	140	40.58
	Mid	75	21.74
	Least Poor	130	37.68
Housing Quality	Unimproved	130	40
	Mid	65	20
	Improved	130	40
Antenatal Care	Yes	152	42.82
	No	203	57.18
Place of Delivery	Institutional	212	71.38
	Non-Institutional	85	28.62
Postnatal care	Yes	161	45.35
	No	194	54.65

Estimates of Antenatal Care Visits

Antenatal care (ANC) is crucial for preventing maternal deaths. Studies found a close association between the use of ANC and factors like women's education, household conditions, caste, and religion⁽³¹⁾. Several studies concluded that socioeconomic factors majorly influence maternal health services. The government of India framed the guidelines for a minimum of four ANC visits, where the first one should be immediately as soon as the period is missed within the first three months of missing the period. Regular ANC visits protect and ensure a healthy mother and child. The Checkup includes blood

pressure, urine, weight, and abdominal test, ensuring Iron Folic Acid (IFA) tablets and two doses of Tetanus Toxoid (TT) injection urine and hemoglobin examination. This test enables assessing fetal growth and wellbeing⁽⁴³⁾. However, for this study, one ANC visit is also taken into account for analysis.

The logistic regression analysis table shows that the wealth of households and women's age is statistically significant at the 0.001 level. The odds ratio represents how much the odds of outcome variable change for each unit change in the predictor variable. Here, the women from the age group of 26–39 are 2.21 times more likely to seek antenatal care than the age group of 15–25. Similarly, the odds of women from the mid household are 2.5 times more likely to visit antenatal care than the poorest section of the population. Simultaneously, the odds of women from the least poor section are 3.8 times more likely than the poorest section to receive antenatal care.

Estimates of choice for institutional delivery

Institutional delivery means the health team's availability with the necessary skills and equipped with the necessary drugs and equipment that can manage a certain level of complications. Unequipped to tackle the complications during pregnancy will lead to a higher mortality ratio. Institutional delivery includes C-section and blood transfusion, i.e., Comprehensive Emergency Obstetric and Newborn Care (CEmONC), and includes assured referral facility linkage⁽⁴³⁾. The table below shows the estimates of the effect of socioeconomic characteristics on the choice of place of delivery. The place of delivery is converted into a binary variable, i.e., Institutional Delivery = 1, non-institutional = 0 to run logistic regression.

Table 3 revealed that the age of the women and the wealth of households are statistically significant at 0.001 level and 0.05 level, respectively. The odds of women from the age group 26–39 are 65% less likely to go for institutional delivery than the women from 15–25 years old. Similarly, the odds of women from the age group of 40–49 years are 86% less likely to have institutional delivery as a choice of place for delivery than the women aged 15–25. However, the odds of women from the least poor households are 18 times more likely to go for institutional delivery than the most deprived section.

Estimates of postnatal care receive

Labour, birth and immediate postnatal period are crucial for newborn and maternal survival; however, most mothers and newborns in low- and middle-income countries do not receive optimal care⁽⁴⁴⁾. Government guidelines recommend that postnatal care visits should be scheduled immediately after the delivery. The postnatal complication occurs during the first 48 hours of delivery, and the mother and newborn should be kept under supervision. In this study, any number of postnatal services by the health worker, whether it is a home visit or clinical visit, will be accounted for analysis. Despite the government guidelines of PNC within 42 days of delivery, studies in different parts of India reported that two out of 10 women receive the care⁽⁴³⁾. Therefore, it becomes pertinent to recognize the economic determinant to understand the under-utilization of PNC in rural India.

Table 3 revealed that access to postnatal care services is determined by the household's wealth, significant at 0.01 and 0.001 level. The odds of women accessing the postnatal from mid-level wealthy

increase 2.11 times more than the household with the poorest section. Similarly, women's odds in access to postnatal care among the least poor section increases 2.46 times more than the poorest section.

Table 3
Logistic regression analysis of access to maternal healthcare services among the women

Predictor Variable		Outcome Variable					
		Antenatal Care		Institutional Delivery		Postnatal Care	
		OR	[95%CI]	OR	[95%CI]	OR	[95%CI]
Age Group	15–25 [®]						
	26–39	2.21***	1.31–3.74	0.35***	0.18–0.71	1.01	0.68–1.68
	40–49	0.68	0.13–3.42	0.14***	0.034–0.59	0.38	0.78–1.88
Education Level	No Education [®]						
	Primary	1.74	0.83–3.67	1.2	0.52–2.77	1.15	0.57–2.35
	Secondary	0.88	0.41–1.88	0.93	0.42–2.06	1.01	0.51–2.07
	Higher	2.16	0.79–5.89	0.45	0.11–1.81	1.23	0.49–3.11
Wealth Index	Poor [®]						
	Mid	2.52***	1.29–4.91	1.21	0.57–2.53	2.11*	1.13–3.93
	Least Poor	3.78***	2.01–7.11	17.95*	5.77–55.81	2.46***	1.37–4.43
Pseudo R ²		0.118		0.209		0.174	

Level of Significance *p < 0.01; **p < 0.05; ***p < 0.001 || [®]= Reference category

Discussion

The study showed that socioeconomic determinants play a central role in maternal health choices, thereby influencing the health outcome. Among the three socioeconomic determinants considered for the study, the age of the pregnant women and the household's economic wellness significantly determines the access to healthcare services. However, the present study does not show any significant effect of women's education on the choice of maternal healthcare services for the studied population. It is unlikely for education to have no significant effect on the healthcare choices among women. Studies conducted

in the developing world showed that educated wealthier middle-aged women are more likely to utilize the maternal healthcare services than their counterparts^(3, 32, 45). However, such a phenomenon is not observed among the population adjacent to the Bangladesh border. The data implies that women's education does not necessarily drive women's decision to utilize maternal care services. The decision and preference of women for self-wellness are not common among the studied population; instead, they are decided by the family's economic conditions. Even at the times of pregnancy, the health services are not determined by the women and are restricted to the family members' choice. The choice of healthcare is usually the family decision, particularly the husband's decision in a highly male-dominant social setting across the marginalized and population in the peripheral, women's education not necessarily have a positive effect on the healthy choices.

It is found that the wealthier women of higher age are more likely to visit the health centers for antenatal care. The women from the age group of 15–25 in the studied population are usually the first pregnant cases, immediately after marriage. Despite the community health workers' efforts to bring the care of health centers close to the home by providing essential health services, the husband's family members are reluctant to regularly take the pregnant to take the pregnant women to the hospital regularly transportation were the primary reasons for women from the less wealthy household to not opt for antenatal care visit. Majorly, the household's breadwinner in the borderland areas is either agricultural or migrant laborer; therefore, an unproductive day would cost a day wage. Moreover, the cost of comfortable transportation to the healthcare center is significantly higher in borderline regions because of the lack of all-weather roads and limited public vehicle movements. Besides, young women with first-time pregnancy always prefer to visit the health center with husband⁽⁴⁶⁾; therefore, the husband's absence usually leads to the irregularity of the antenatal visits.

In this study, institutional and non-institutional delivery is driven by women's age and the wealth of individual households. It is observed that women from the least wealthy household of older age groups tend to go for non-institutional delivery. Most of the women (65%) are from the age group of 15–25, with first-time pregnancy cases, prefer to go for institutional delivery compared to women from 40–49. The family members of the younger women usually abstain from taking help from the local *dai* and prefer to go for healthcare centers. However, with the growing age of women, the family members prefer to go for the non-institutional delivery—besides, the economic condition of the household effect mainly on the choice. The irregular financial assistance and lack of government supplementary nutrition for pregnant women, the women's family members prefer to go for non-institutional delivery. The data also revealed that the odds of going for institutional delivery significant rise among the wealthiest quintile of the population by 17 times than the population at the lowest quintile. The wealthiest population is more aware and informed about the healthcare facilities and resources than the people at the lowest quintile. Information and awareness increase with the medium of communication, as wealthier household owns television and is informed about various government initiatives to promote institutional delivery and overall delivery care.

It has been observed that age and education do not play a significant role in seeking postnatal care after delivery. The wealth of the household came out to be an essential determinant driving the postnatal care decision. Other than the age and wealth of households, it is revealed that education qualification does not play a significant role in regular and recommended antenatal visits. Women in lower quintiles are too poor or marginalized even to seek free care. Often they are single women without male support and, at the same time, have to look after the children. So, once the child is born, the priority is not to look for the newborn's wellbeing but to feed the family. Women, as well as their family members, are usually skip the registration. So, they are neither registered nor eligible for any government subsidized schemes for maternal health. With the improvement in households' wealth and living conditions, the family tends to be more aware of the complication during pregnancy and newborn children's risk. In that case, they prefer a safer option to keep the mother and child under the supervision of professionals continually.

Considering the present context of women's decision on utilization and access to healthcare services, it was driven by households' wealth and geographical location. Therefore, this can be concluded that the government's effort in information and communicating directly towards women largely remain ineffective. It is pertinent for the health workers to focus on the health promotional activities towards the family as decision-makers, rather than the pregnant women herself. Moreover, health promotion and campaigns remotely reach the periphery audience, only if the campaign is made in person. A digital campaign is less likely to reach the needy audience. Lack of source of any information like television, internet, and mobile phones reduces the message's possibility of reach. Information plays a crucial role in the utilization of healthcare service, and the wealth of individuals directly coincides with the medium of information.

Conclusion

The age of women and the household's economic condition play a significant role in women's maternal health outcomes. The household's economic status can positively affect the individuals' access to several services that directly coincide with healthcare services usage. The government's efforts to digitalize health information and awareness campaign will not effectively help the audience in the rural population as the mass media exposure is relatively lower among the population in the lower quintile. Efforts to strengthen the health workers are pertinent in the rural peripheral areas that will help the lower quintile population easily access healthcare services. The utilization of antenatal services helps determine mother and child's health, and information regarding any complication can be disseminated to the patients immediately. Furthermore, it is evident from the studied area that the availability of resources is not a concern, rather an economic condition of household and other social determinants of health influence the choice for utilization of services. A robust policy which formulates socially inclusive measures and intervening more into employability and improving rural infrastructure will affect the region's health outcome.

Declarations

Ethical approval and consent to participate:

Prior approval for conducting this research was received from the Student Research Ethics Committee of the Institute. All methods were carried out in accordance with relevant guidelines and regulations. All experimental protocols were approved by Birla Institute of Technology and Sciences Institutional Ethics Committee. Informed consent was obtained from all the subjects. In case of subject age below 18 years old, written consent was availed from the guardian / parents. The purpose of the study was explained to the respondents and confidentiality of the collected information were assured. Complete anonymity was maintained while analyzing the data.

Consent for publication:

All the authors give the consent for publication.

Availability of data and materials:

The data will be made available only at the request from the publisher.

Competing interests:

The authors declare that they have no competing interests.

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Authors' contributions:

Nayan Jyoti Nath has conceptualized the idea, written the entire manuscript.

Bedanga Talukdar has done the statistical analysis of the data.

Dr. Tanu Shukla critically reviewed the paper.

Dr. Sangeeta Sharma has completed the final edit the paper.

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