Asian Journal of Medical Sciences 1 (1): 15-18, 2009
ISSN: 2040-8773

Divisional Variations in Safe Maternal Delivery Practices in Bangladesh: A Logistic Regression Analysis

Mahfuzar Rahman, Nazrul Islam Mondal and Rafiqul Islam
Department of Population Science and Human Resource Development,
University of Rajshahi, Bangladesh

Abstract: The aim of this research is to determine the effectiveness of the existing safe-delivery facilities in six divisions of Bangladesh and also investigate the effects of some selected factors in taking assistance from medically-trained persons, such as doctors, trained nurses or midwives, or family welfare visitors during delivery, with a view to reducing maternal morbidity and mortality in Bangladesh so that the country would be able to reach the Millennium Development Goals (MDGs) by 2015. Data for the study were drawn from the Bangladesh Demographic and Health Survey (BDHS), 2004. The study was executed separately for six administrative divisions for the five-year period preceding the survey, having an eligible woman with one or more child(ren). Well-known statistical tools, such as Pearson chi-square test and logistic regression model, were used for analyzing data. It is apparent from the study that the overall performance of respondents of six divisions towards safe delivery practices was very low. The divisional variations were also clearly evident in the study. Respondents' and their husbands' education, place of residence, electrification, husbands' occupational status, and respondents' exposures to mass media were significantly ($p<0.001$) associated with the delivery assistance taken from medically-trained persons. The probability of safe maternal delivery practice increased with the increase in education for both respondents and their husbands. Finally, the paper provides some additional suggestive policy measures that the planners and implementers may consider for quality development of the inconsistent factors.

Key Words: Delivery, maternal mortality, neonatal mortality, chi-square test; logistic regression model

INTRODUCTION

Millions of women in developing countries experience life threatening and other serious health problems related to pregnancy or childbirth. Complications of pregnancy and childbirth cause more deaths and disability than any other reproductive health problems (EC/UNFPA, 2000). The situation is worse in developing countries like Bangladesh due to inadequate access to modern health services and poor utilization.

Early child bearing or childbirth at adolescence has health risks on mother and also on her child (Ikamari, 2005). Mayor (2004) pointed out that early pregnancy and early childbearing are leading causes of death among adolescent girls in developing countries and in Bangladesh, risk of maternal mortality may be five times higher for mothers aged 10-19 years than that of aged 20-24 years. It is well recognized that mother's education has a positive impact on health care utilization. In a study in Peru using Demographic and Health Survey (DHS) data, Elo (1992) found quantitatively important and statistically significant effect of mother's education on the use of prenatal care and delivery assistance. In another study, Becker *et al.* (1993) found mother's education to be the most consistent and important determinant of the use of child and maternal health services. Several other studies also found a strong positive impact of mother's education on the utilization of health care services (Fosu, 1994; Costello *et al.*, 1996). Again, increased income has a positive effect on the utilization of modern health care services (Elo, 1992; Fosu, 1994). Husband's occupation can be considered a proxy of family income, as well as social status. Differences in attitudes to modern health care services by occupational groups depict occupation as a predisposing factor. Alternatively, viewing occupation as proxy to income, which enables acquisition of more and better health care, depicts it as an enabling factor (Fiedler, 1981).

Objectives of the Study: One of the agendas of Millennium Development Goals (MDGs) for Bangladesh is to reduce the maternal mortality ratio from 322 to 143 within the year 2015 and that to reduce the total fertility rate (TFR) to 2.2 by the year 2010. To draw feasible intervention programs to enhance further reduction in maternal mortality due to delivery related complications, it is important to understand the magnitude and direction of socio-economic and demographic factors that are affecting safe maternal delivery practices in six divisions of Bangladesh. Keeping this in view, this study is felt important to incorporate some selected factors along with maternal delivery assistance from medically trained person. So, the specific objectives of this study are:

Corresponding Author: Nazrul Islam Mondal, Department of Population Science and Human Resource Development, University of Rajshahi, Bangladesh

- To determine the effectiveness of the existing safe-delivery facilities in six divisions of Bangladesh.
- To investigate the effects of some selected factors in taking assistance from medically-trained persons such as doctors, trained nurses or midwives, or family welfare visitors during delivery.

- **Hypothesis:** It is argued that better educated people are more aware of health problems, know more about the availability of health care services and use this information more effectively to maintain or achieve good health status. Mother's education may also act as a proxy variable of a number of background variables, representing women's higher socio-economic status, thus enabling her to seek proper medical care whenever, she perceives it necessary. Therefore, based on the above discussion, the hypothesis of this study is:

  - The higher level of education (both of women and their husbands), more likely the use of existing maternal delivery services to women that should lead them to medically trained providers (e.g., doctors, trained nurses or midwives, or family welfare visitors) during their delivery.

MATERIALS AND METHODS

Data sources: Data for the study were drawn from the Bangladesh Demographic and Health Survey (BDHS), 2004 (Mitra *et al*., 2005). The study was executed separately for six administrative divisions of Bangladesh for the five-year period preceding the survey, having an eligible woman with one or more child (ren). The sample for this analysis consisted of 1072, 1013, 970, 653, 582, and 541 ever-married women aged 10-49 years from Dhaka, Chittagong, Rajshahi, Khulna, Sylhet and Barisal divisions, respectively.

Data analysis: Descriptive statistics, Pearson chi-square test and logistic regression model were used for analyzing data. In this study, the dependent variable was maternal delivery assisted by a medically trained person during last delivery (dichotomous variable). The independent variables were respondents' and their husbands' education, place of residence, religion, sex of the child, has electricity in the household, husbands' occupation (categorized into two groups such as professional worker treated as non-manual and the rest as manual) and exposure to mass media (a composite index, computed for this purpose, based upon three factors- whether she watches Television (TV) or listens to radio or reads newspaper or magazine in every week).

RESULTS AND DISCUSSION

Descriptive analysis: Table 1 shows the percentage of maternal delivery assisted by a medically trained person for the five-year period preceding the survey for all the six divisions of Bangladesh. The results show that maternal delivery assisted by a medically trained person is higher in Khulna division (only 25.70%), followed by Dhaka (19.30%), Barisal (15.90%), Rajshahi (15.30%), Sylhet (15.10%) and Chittagong (14.00%) divisions, respectively. The delivery assistance taken from medically trained person increases with the increase of education. The urban-rural differentials clearly exist for all the six divisions. The percentages of safe maternal delivery among non-Muslim women, women having electricity in the household, and husbands with non-manual occupation are also higher.

Pearson Chi-square test: The association between some selected background characteristics and assistance from medically trained person during maternal delivery, using Pearson Chi-square test are shown in Table 2. The results indicate that respondents' and their husbands' education, place of residence, has electricity in the household, husbands' occupation and respondents' exposure to mass media for all the six divisions are significantly ($p<0.001$) associated with the delivery assistance taken from medically trained persons for the five-year period preceding the survey. The significant association also exists in case of religion (except for Khulna and Rajshahi divisions) and child's sex (except for Barisal, Khulna, Rajshahi and Sylhet divisions).

Multivariate analysis: In previous study, bivariate analysis of maternal delivery assistance from medically trained person by several background characteristics has been performed to examine the nature of association between these factors and delivery assistance received

Table.1: Percentage distribution of delivery assistance taken from medically trained persons

Background characteristics	Assistance from medically trained person					
	Dhaka	Chittagong	Rajshahi	Khulna	Barisal	Sylhet
Mothers' education						
No education	3.90	3.80	5.70	10.50	4.30	6.30
Primary	13.10	8.40	10.90	17.90	7.30	10.60
Secondary	31.80	20.60	23.60	32.10	25.00	35.90
Higher	79.70	64.50	51.50	67.90	63.90	89.50
Husbands' education						
No education	4.90	4.10	6.90	12.30	7.60	6.40
Primary	11.70	4.30	13.40	20.00	6.20	6.30
Secondary	28.20	18.10	18.30	31.00	19.40	35.20
Higher	66.70	49.60	43.50	66.30	51.40	52.90
Residence						
Urban	36.50	25.40	33.00	43.80	34.10	33.80
Rural	8.50	8.30	8.50	17.30	10.50	8.60
Religion						
Muslim	18.50	12.20	15.50	25.50	14.10	13.20
Non-Muslim	30.60	34.10	11.60	27.50	38.50	24.00
Child's sex						
Male	16.10	16.40	15.40	24.80	17.70	14.30
Female	22.40	11.40	15.20	26.60	14.00	16.00
Has electricity						
No	5.50	5.10	6.30	12.80	7.70	5.90
Yes	32.80	23.60	35.60	38.10	32.40	29.40
Husbands' occupation						
Manual	14.00	10.10	10.90	19.30	12.00	10.10
Non-manual	32.70	24.50	29.90	40.90	25.20	28.50
Exposure to mass media						
No	2.600	2.40	4.60	16.40	6.00	5.10
Yes	25.00	18.80	20.10	28.90	21.70	21.80
Total	19.30	14.00	15.30	25.70	15.90	15.10

Table 2: Association between background characteristics and delivery assistance from medically trained persons

Selected Variables	Dhaka	Chittagong	Rajshahi	Khulna	Barisal	Sylhet
Mothers' education	267.695	181.590	113.278	82.276	96.494	132.618
Significant level	0.000	0.000	0.000	0.000	0.000	0.000
Degrees of freedom	3	3	3	3	3	3
Husbands' education	254.595	182.455	95.710	96.106	88.139	101.999
Significant level	0.000	0.000	0.000	0.000	0.000	0.000
Degrees of freedom	3	3	3	3	3	3
Residence	127.525	54.466	89.276	51.883	39.658	55.288
Significant level	0.000	0.000	0.000	0.000	0.000	0.000
Degrees of freedom	1	1	1	1	1	1
Religion	6.265	29.992	29.992	0.132	16.007	7.847
Significant level	0.012	0.000	0.380	0.716	0.000	0.005
Degrees of freedom	1	1	1	1	1	1
Child's sex	6.731	5.071	0.007	0.264	1.365	0.322
Significant level	0.009	0.024	0.932	0.607	0.243	0.570
Degrees of freedom	1	1	1	1	1	1
Has electricity	128.831	71.218	137.267	54.774	54.513	59.440
Significant level	0.000	0.000	0.000	0.000	0.000	0.000
Degrees of freedom	1	1	1	1	1	1
Husbands' occupation	48.413	33.931	47.226	33.149	14.445	30.166
Significant level	0.000	0.000	0.000	0.000	0.000	0.000
Degrees of freedom	1	1	1	1	1	1
Exposure to mass media	65.522	46.251	38.237	10.131	23.244	30.444
Significant level	0.000	0.000	0.000	0.000	0.000	0.000
Degrees of freedom	1	1	1	1	1	1

Table 3: Odds ratios of delivery assistance taken from medically trained persons with selected background characteristics

			Odds Ratio			
Background characteristics	Dhaka	Chittagong	Rajshahi	Khulna	Barisal	Sylhet
Mothers' education						
No education®	1.000	1.000	1.000	1.000	1.000	1.000
Primary	3.100*	1.210	1.257	1.407	1.260	1.198
Secondary	4.407*	1.616	2.413*	2.122**	3.401**	2.434**
Higher	15.786*	3.987*	5.615*	3.876*	8.290*	34.468*
Husbands' education						
No education®	1.000	1.000	1.000	1.000	1.000	1.000
Primary	1.327	0.666	1.428	1.332	0.424***	0.788
Secondary	2.617*	2.186**	1.092	1.729**	0.769	3.282*
Higher	4.755*	5.747*	1.311	3.737*	1.574	1.826
Residence						
Urban®	1.000	1.000	1.000	1.000	1.000	1.000
Rural	0.335*	0.466*	0.349*	0.371*	0.449*	0.390*
Religion						
Muslim®	1.000	1.000	1.000	1.000	1.000	1.000
Non –Muslim	2.177*	1.945**	0.930	1.252	3.747*	2.619*
Child's sex						
Male ®	1.000	1.000	1.000	1.000	1.000	1.000
Female	1.802*	0.602*	0.924	1.012	0.651	0.699
Has electricity						
No®	1.000	1.000	1.000	1.000	1.000	1.000
Yes	1.839*	2.090*	3.489*	1.903*	2.259*	2.233*
Husbands' occupation						
Manual®	1.000	1.000	1.000	1.000	1.000	1.000
Non- manual	1.337	1.354	1.496***	1.280	1.082	1.708***
Exposure to mass media						
No ®	1.000	1.000	1.000	1.000	1.000	1.000
Yes	2.742*	2.844*	1.544	0.799	1.461	1.143

Note: ® indicates the reference group in each category, * p<0.01; ** p <0.05 and *** p<0.10

status. But bivariate association often does not necessarily imply a significant causal relationship. Therefore, a multivariate approach was applied to determine which factors best explain and predict safe maternal delivery practices outcome. For this, logistic regression (logit regression) model was employed for all the six administrative divisions of Bangladesh. The assistance status during maternal delivery was coded "1" if the women obtained assistance from medically trained person and "0" for obtained assistance from anywhere. The details of the logistic regression (logit regression) model are reported elsewhere (Gujarati, 2008). The results are presented in Table 3.

The results from this study support that the level of education (both of the respondents and their husbands) has increased odds of taking assistance from medically trained person and also showed positive significant effect, irrespective of unequal literacy rate in all the six divisions. Respondents who lived in rural areas were less likely in taking such assistance, compared with the urban

resides women. Because of not easy and available accesses to employment, communications, treatment and other such facilities in rural areas, they are far away from safe maternal delivery practices than the urban residence. Religion exerts statistically significant effect on the safe maternal delivery practices, except for Khulna and Rajshahi divisions. The results indicate that Muslim women are less likely to have their delivery assisted by medically trained person probably because of their conservatism and religious taboos (which might be one of the plausible reasons). Electricity has not yet been reached to the doorsteps of the common people in Bangladesh. Moreover, it is also considered as good economic condition because it increases the people's accessibility to modernization. The results of logistic regression indicate that the women having electricity in their household were more likely to go for safe maternal delivery practices. Husband's occupation seems to be an important determinant of taking assistance from medically trained person among the selected factors, indicating that wives of men who engaged in non-manual occupation are more likely to seek their delivery from medically trained person. Women from families in good economic condition are more likely to receive treatment from a doctor or nurse. However, the positive impact of higher economic status on safe maternal delivery was not found to be statistically significant (except for Rajshahi and Sylhet divisions).

CONCLUSION

The study results clearly indicate the maternal delivery under the supervision of medically trained person is still far below any acceptable standard among the six administrative divisions of Bangladesh, despite of government's serious commitment to deliver health facilities to the doorsteps of common people through innovative approaches, such as Essential Service Package (ESP). Both bivariate and multivariate analysis confirmed the importance of education (both of respondents and their husbands) on the delivery assistance taken from medically trained person. Female education retains a net effect on maternal health service use, independent of other background characteristics, household's socioeconomic status and access to health care services. Also, women's whose husbands are involved in non-manual occupation are more likely taking help from medically trained person during their delivery. Rural respondents were less likely to go for safe delivery practices than urban respondents. Non-Muslims were more ahead to safe maternal delivery than Muslims, except for Rajshahi division. Appropriate Behavior Change Communication (BCC) activities need to be undertaken to overcome conservatism and religious taboos against maternal delivery. Electrification increased the probability of safe delivery practices. At the same time, these factors had a significant ($p<0.01$) influence on safe maternal delivery practices. As the results indicate that education, urbanization and electrification encourage women to deliver with assistance from medically-trained persons. So, quality education to all and planned urbanization can, in turn, reduce the probability of mortality of mothers and their newborn babies.

ACKNOWLEDGEMENTS

The authors are very grateful to the National Institute of Population Research and Training (NIPORT), Dhaka, Bangladesh, for providing the data to complete this study. Thanks also go to the editor and referees for their valuable comments and criticism, which led to a greatly improved revision of this study.

REFERENCES

Becker, S., D.H. Peters, R.H. Gray, C. Gultiano and R.E. Blake 1993. The Determinants of Use of Maternal and Child Health Services in Metro Cebu, the Philippines. Health Transition Review, 3: 77-89.

Costello, M.A., L.C. Lleno and E.R. Jensen, 1996. Determinants of Two Major Early-Childhood Disease and their Treatment in the Philippines: Findings from the 1993 National Demographic Survey. Asia-Pacific Population Research Reports, No. 9, East-West Center.

EC/UNFPA, 2000. Making Pregnancy and Childbirth Safer [fact sheet]. EC/UNFPA Initiative for Reproductive Health in Asia in cooperation with the German Foundation for World Population.

Elo, T.I., 1992. Utilization of Maternal Health-Care Services in Peru: The Role of Women's Education. Health Transition Review, 2: 49-69.

Fosu, G.B., 1994. Childhood Morbidity and Health Services Utilization: Cross-National Comparisons of User-Related Factors from DHS Data. Social Science and Medicine, 38: 1209-1220.

Fiedler, J.L., 1981. A Review of the Literature on Access and Utilization of Medical Care with Special Emphasis on Rural Primary Care. Soc. Sci. Med., 15: 129-142.

Gujarati, D.N., 2008. Basic Econometrics. 4th Edn. Tata McGraw-Hill Publishing Company Limited, 7 West Patel Nagar, New Delhi 110 008.

Ikamari, L.D.E., 2005. The Effect of Education on the Timing of Marriage in Kenya, Demographic Research, 12: 1-28.

Mayor, S., 2004. Pregnancy and Childbirth are Leading Causes of Death in Teen Age Girls in Developing Countries. Brit. Med. J., 328: 1152.

Mitra, S.N., A.A. Sabir, T. Saha and S. Kumar, 2005. Bangladesh Demographic and Health Survey (BDHS), 2004, National Institute of Population Research and Training (NIPORT), Dhaka.