Pakistan Journal of Social Sciences 6 (3): 175-180, 2009
ISSN: 1683-8831

Determinants of Infant and Child Mortality in Bangladesh

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Abstract: Infant and child mortality rates reflect a country's level of socio-economic development and quality of life and are used for monitoring and evaluating population and health programs and policies. This study examines the mortality of children under five using information from women's birth histories pertaining to children born during the 10 years period before the survey by major divisions in Bangladesh, using data from the 1999-2000 Bangladesh Demographic and Health Survey (BDHS). Specifically, information is provided on levels, trends and differentials in neonatal, post-neonatal, infant and child mortality and assessing the effects of socio-economic, demographic and mother's health-care characteristics on infant and child mortality. Mortality estimates are desegregated by urban-rural residence, division, mother's education and antenatal care received and by selected demographic characteristics to identify segments of the population requiring special attention. This will help policy makers to formulate better policies in order to fight the current situation.

Key words: Infant, child, mortality, logistic regression analysis, Bangladesh

INTRODUCTION

Mortality is one of the three components of population change, the infant and child survival of a population is one of the key indicators of the improvement of the quality of life. Although, levels of infant and child mortality are failing, there are still considerable high in Bangladesh. Several socio-economic factors have been found to be associated with infant and childhood mortality in the developing countries. However, the relative importance of socio-economic and demographic factors in influencing infant and child mortality varies with the level of socio-economic development of the nation (Gubhaju *et al*., 1991).

Loss of life in early years of life is an outcome of socio-economic, environment, biological and cultural factors. Variations in the infant mortality rates in rural areas of developing countries have been primarily associated with accessibility of health care services and education of the women, as well as husband's education, occupation and income (D'Souza and Bhuiya, 1982; Flegg, 1982; Mosley and Chen, 1984). Education of the mother has varied degrees of influence on infant mortality depending on difference in religion, electricity and household variables such as husband's education, occupation and income (Aksit and Aksit, 1989; Caldwell, 1979; Caldwell and Mcdonald, 1981; Ware, 1984). The effect of mother's education on infant and child mortality may also vary in different populations due to differences in social factors at the community level. Infant mortality may be influenced by mother's education as it reflects her skill in caring for the child and manage childhood illness (Flegg, 1982). Children with a lower socioeconomic status might be a higher risk of diseases. Which are related with infant and child mortality than those with higher socio-economic status and poor health status of children is typically associated with high level of mortality exceptionally (Fosu, 1994). It is very difficult to identify, which factors are more responsible for infant and child mortality. Infant and child mortality may be affected by demographic and socio-economic factors. The main concern of this study is to examine what factors are responsible for infant and child mortality.

MATERIALS AND METHODS

The data of the present study is taken from Bangladesh Demographic and Health Survey (BDHS, 1999-2000) was conducted under the authority of the National Institute for Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare.

In any situation, where a multivariate problem is encountered, the method of analysis should proceed from simple to complex in an ordinary manner (Srinivasan, 1979). We have performed univariate classification analysis in order to find the percentage of occurrence,

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factor affecting infant and child mortality, etc. of the respondents. Finally, a multivariate technique named as logistic regression analysis is used for determining factors that are affecting infant and child mortality.

RESULTS AND DISCUSSION

Socio-demographic characteristics: Information on the background characteristics of the study population is essential for interpretation of the study results and examination of any cause-effect relationship among the study variables. In any survey research, it is important to know the background characteristics of the study or target population. This is also essential because these characteristics are supposed to influence the infant and child mortality. Percentage distributions of women who have at least one child death in terms of socioeconomic characteristics by major division are shown in Table 1. Table 1 shows that 67.3, 69.7, 80.6 and 74.6% mothers are in exist rural areas, respectively. Among all four divisions, child mortality is higher in rural areas than in urban areas and highest rural childhood mortality is in Khulna division (80.6%). The reasons for higher infant and child mortality in rural areas may be due to several factors such as higher fertility, lack of health care facilities, poverty and so on. In all 4 divisions childhood mortality are observed higher among women who have no education (illiterate). Child mortality has decreased in all divisions with the increase of education level. Table 1 shows that women who are not working or who did not work are majority percent experiencing child mortality in all four divisions. The percentages are 76.4, 76.4, 67.7 and 67.8% in Chittagong, Dhaka, Khulna and Rajshahi respectively. Father's education and occupation are also important for infant and child mortality analysis. The percentage distribution shows most of the women's partner belongs to education category 'no education' and occupation category skilled/unskilled manual among all divisions. Women's participation in NGO is very low in all four divisions. Among the divisions, Khulna has the highest percentage (38.71%) NGO's participation. In 4 divisions mother's of first order birth has the 36.4, 22.5, 25.8 and 28.8% with respect of Chittagong, Dhaka, Khulna and Rajshahi division. Mother's of second and third order birth are experiencing less childhood mortality which percentages are 21.8, 31.5, 35.5 and 33.9%, respectively. Again fourth and above order births are experiencing higher childhood mortality these are 41.8, 46.0, 38.7 and 37.3%. The percentage distribution of respondents by preceding birth interval for Chattagong, Dhaka, Khulna and Rajshahi divisions show that women fall in the birth interval group are regular. Only irregularity found at birth

Table 1: Percentage distribution of women who have at least one child death in terms of socio-economic characteristics by major division

Background characteristics	Chittagong	Dhaka	Khulna	Rajshahi
Type of residence				
Urban	32.7	30.3	19.4	25.4
Rural	67.3	69.7	80.6	74.6
Highest educational level				
No education	47.3	60.7	61.3	55.9
Primary	32.7	22.5	22.6	25.4
Secondary	20.0	16.8	16.1	18.6
Respondent occupation				
Did not work	76.4	76.4	67.7	68.8
Services	11.0	5.6	16.1	15.3
Agric-self employed and employee	10.8	15.8	12.9	11.9
Skilled and unskilled manual	1.8	2.2	3.3	4.0
Partner's education level				
No education	38.2	56.1	54.8	49.2
Primary	36.4	18.0	25.8	23.7
Secondary/higher	25.5	25.8	19.4	27.1
Partner's occupation				
Did not work	5.5	2.2	0.0	0.0
Prof., Tech., Manag.	14.5	15.7	22.6	22.0
Agric-self employed and employee	20.0	34.8	35.5	33.9
Skilled and unskilled manual	52.7	36.1	35.5	42.4
Don't know	7.3	1.1	6.5	1.7
Belongs to NGO program				
No	87.27	74.15	61.29	64.40
Yes	12.73	25.85	38.71	35.60
Birth order				
1	36.4	22.5	25.8	28.8
2-3	21.8	31.5	35.5	33.9
4 and above	41.8	46.0	38.7	37.3
Preceding birth interval				
<24 months	16.4	28.1	38.8	22.0
25-36 months	23.6	23.6	19.4	20.3
37 and above months	23.6	25.8	16.1	28.8
Missing system	36.4	22.5	25.8	28.8
Duration of breast-feeding				
Never breast-fed	41.7	22.4	62.5	34.1
<6 months	44.4	60.3	31.3	45.5
6-24 months	13.9	15.5	6.3	18.2
24+ months	0.0	1.7	0.0	2.3
Current contraception use status				
No	72.7	57.3	54.8	61.0
Yes	27.3	42.7	45.2	39.0
Family size				
1-4 members	29.1	47.2	51.6	52.5
5-7 members	49.1	31.1	38.7	35.6
8 and above	21.8	15.7	9.7	11.9
Source of drinking water				
Piped inside/ outside dwel.	7.2	13.4	16.1	3.4
Tube well	92.8	86.6	83.9	96.6
Type of toilet facility				
No facility, bush	19.1	24.7	19.4	37.9
Septic tank/toilet	9.2	11.2	13.4	5.1
Open/pit/hanging/water sealed slab la.	71.7	64.1	67.2	57.0
Reads newspaper once work				
No	94.5	91.0	100.0	96.6
Yes	5.5	9.0	0.0	3.4
Watches TV every week				
No	72.7	67.4	77.4	64.4
Yes	27.3	32.6	22.6	35.6
Listen to radio every week				
No	76.4	75.3	67.7	71.2
Yes	23.6	24.7	32.3	28.8
Tetanus injection during pregnancy				
No	9.1	33.7	32.3	30.5
Yes	58.2	31.5	22.6	44.1
Missing system	32.7	34.8	45.1	25.4

Table 1: Continue

Background characteristics	Chittagong	Dhaka	Khulna	Rajshahi
Number of antenatal care visits				
No visit	38.2	44.9	32.3	55.9
Visit	29.1	20.3	32.5	18.7
Missing system	32.7	34.8	45.2	25.4
Place of delivery				
Home	58.2	57.3	45.2	64.4
Medical facility	9.1	7.9	9.7	10.2
Missing system	32.7	34.8	45.1	25.4

interval group <24 months in Khulna division (38.8%). Breast-feeding provides protection against infant mortality and child mortality by lengthening the birth interval and by increasing the disease preventive power in the infant body. In all four divisions the mothers who had never fed breast milk of her baby (41.7, 22.4, 62.5 and 34.1%) and fed only <6 months (44.4, 60.3, 31.3 and 45.5%) have experienced more childhood mortality. On the other hand respondent with breast-feeding duration is sharply decrease with the increase of breast-feeding duration in all four divisions. It is observed from Table 1 that the most of the respondents who have child mortality are not currently using contraception, which contains 72.7, 57.3, 54.8 and 61.0% in all 4 divisions, respectively. The percentages of respondent belong to family size 1-4 are 29.1, 47.2, 51.6 and 52.5%. The Table 1 shows the percentage of respondent belong to family size 5-7 are 49.1, 31.1, 38.7 and 35.6% The family size of the respondents is almost big that is all respondents belong to a joint or big family.

Infant and child mortality is also affected by sanitary facility. Better sanitary facilities reduce morbidity (D'Souza and Bhuiya, 1982). The better sanitation is a primary health care practice, which can easily be achieved without financial involvement. Children who use well latrine assumed to have lower morbidity level than children who do not use. From Table 1, we also see that tube well is the main source of drinking water for all divisions. It is also found that all four divisions show open/hanging sanitation facility is maximum. The percentage of respondent's in four divisions under the group of open/hanging latrine facility are 71.7, 64.1, 67.2 and 57.0%, respectively. In all four divisions, the number safe latrine is low, the percentages are 9.2, 11.2, 13.4 and 5.1%, respectively. The percentage of respondents in four divisions under the group of no latrine/bush are 19.1, 24.7, 19.4 and 37.9%, respectively. It is important to recognize that mother's awareness about infant and child mortality may be changed through newspaper, radio, television and posturing. Then, we may say that the respondent who reads newspaper will face less child mortality. Table 1 shows that the percentage of respondents in 4 divisions under the group of not reading news paper, not watching TV and not listening radio every week is very high. Of course, number of antenatal care visit, tetanus injection during pregnancy and place of delivery are the highlighted variables for infant and child mortality. In all four divisions the picture of taking tetanus injection during pregnancy, antenatal care and delivery at medical are not good. Even today, about 60% delivery occurred at home under the untrained midwife. This feature is true for all four divisions.

Logistic regression analysis on infant mortality cases: Result based on the multivariate logistic regression analysis for identifying those variables, which are truly related to infant mortality shown in Table 2, considering infant mortality i.e., were the respondents experiencing infant mortality as the dependent variable which is dichotomized by assessing 1 if the respondents were experiencing infant mortality and 0 for not.

Table 2 shows that in Chittagong division a few explanatory variables such as type of residence, respondents, educational level, partner educational level, birth order, preceding birth interval, family size, type of toilet facility, tetanus injection during pregnancy, antenatal care and place of delivery are statistically significant in terms of different components of infant mortality. Compared with type of residence, rural areas were 1.43 times more likely to responsible for infant mortality than urban areas. Among the highest educational level of respondents, no education was 97% more likely to responsible for infant mortality than other educational level. Partner with no education and primary education were 2.56 and 1.46 times more likely to face infant mortality than the reference category. First birth order was 2.20 times more likely to face infant mortality than the reference category. Preceding birth interval <24 months were 82% more responsible to infant mortality than reference category. Lower family members contains higher likelihood than the reference category. In case of toilet facility, no facility was 65% more responsible for infant mortality than reference category. Those taking tetanus injection during pregnancy were 0.76 times less likely to face infant mortality than those were not taking. For antenatal care i.e., no visit and place of delivery i.e., home were 1.89 and 1.71 times more likely responsible for infant mortality than the reference category, respectively.

In Dhaka division, we observed that some variables like type of residence, partner's educational level, birth order, preceding birth interval, family size, type of toilet facility, tetanus injection during pregnancy, antenatal care and place of delivery are statistically significant in terms of different components of infant mortality. Rural areas are 1.54 times more likely to prefer infant mortality than the urban areas. Partners educational level i.e., no educations

Table 2: Results of logistic regression analysis on infant mortality cases

	Odds ratio (Exp. (ß))			
Background characteristics	Chittagong	Dhaka	Khulna	Rajshahi
Type of residence				
Rural	1.425*	1.540*	1.659*	1.427*
Urban (Ref:)	1.000	1.000	1.000	1.000
Highest educational level				
No education	1.969*	1.576	2.312*	1.267
Primary	1.321	1.091	1.467**	0.868
Secondary (Ref:)	1.000	1.000	1.000	1.000
Respondent occupation				
Not working	1.390	0.851	0.598	0.816
Services	1.653	0.005	1.633	1.937
Agric-self employed and employee	2.125	0.570	0.003	0.585
Skilled and unskilled manual (Ref:)	1.000	1.000	1.000	1.000
Partner's education level				
No education	2.562**	1.687	2.453	1.087*
Primary	1.458*	0.969**	1.653**	0.686*
Secondary (Ref:)	1.000	1.000	1.000	1.000
Partner's occupation				
Not working	3.475	2.014	0.010	0.017
Prof., Tech., Manag.	0.242	0.599	0.576	0.677
Agric-self employed and employee	0.948	1.225	0.750	0.770
Skilled and unskilled manual (Ref:)	1.000	1.000	1.000	1.000
Birth order				
1	2.195***	0.687**	0.687**	0.987*
2-3	0.559**	0.354**	0.354**	0.681**
4 and above (Ref:)	1.000	1.000	1.000	1.000
Preceding birth interval (month)				
<24	1.815**	3.760***	9.692	1.923**
25-36	1.778*	2.187**	6.130	1.409*
37 and above months (Ref:)	1.000	1.000	1.000	1.000
Family size				
1-4 members	3.543	2.543	3.873	5.579
5-7 members	2.315**	1.181*	2.673*	2.631*
8 and above (Ref:)	1.000	1.000	1.000	1.000
Source of drinking water				
Tube well	1.203	1.274	2.154	1.753
Piped inside/ outside dwel. (Ref:)	1.000	1.000	1.000	1.000
Type of toilet facility				
No facility, bush	1.648**	1.899**	1.203*	0.906*
Septic tank/toilet	0.727*	0.942*	0.189*	0.848*
Open/pit/hanging etc. (Ref:)	1.000	1.000	1.000	1.000
Tetanus injection during pregnancy				
Yes	0.760*	0.956**	0.563*	0.885**
No (Ref:)	1.000	1.000	1.000	1.000
Number of antenatal care visits				
No visit	1.888**	1.723**	1.894**	1.786**
Visit (Ref:)	1.000	1.000	1.000	1.000
Place of delivery				
Home	1.712***	1.211*	1.425*	1.835*
Medical facility (Ref:)	1.000	1.000	1.000	1.000

Ref.: Reference Category; Level of significance: ***p<0.01; **p<0.05; *p<0.10

were 1.69 times more likely responsible for infant mortality than the higher education level. First birth orders were 0.69 times less, but significantly associated with infant mortality than the reference category. Lower birth interval and lower family size contains higher likelihood than the reference category, respectively. Respondents with no toilet facility were 1.90 times more likely to face infant mortality than the reference category. Those respondents, taking tetanus injection during pregnancy period were 4% less, but significantly face infant mortality than those were not taking. Respondents, with no visit as antenatal care and taking home as delivery place were 1.72 and 1.21 times more likely to face infant mortality than the reference category, respectively.

From Khulna division, we observed that such variables as type of residence, respondent's educational level, partner's educational level, birth order, preceding birth interval, family size, type of toilet facility, tetanus injection during pregnancy, antenatal care and place of delivery exerts the significant effect in terms of different components of infant mortality. Infant mortality in rural areas was 1.66 times more likely than the urban areas. Both respondents and partner with no education were 2.31 and 2.45 times more likely to face infant mortality than the reference category respectively. Compared with birth order only those birth order, 1 or 2-3 were 31 and 65% lower risk of infant mortality than 4 and above birth order, respectively. Respondents with no toilet facility were 1.20 times more likely to face infant mortality than the reference category. Those taking tetanus injection during pregnancy were 0.56 times less and no visit as antenatal care were 1.89 times more and taking home as delivery place were 1.43 times more likely to face infant mortality than the reference category, respectively.

From Rajshahi division, we observe that such variables as type of residence, partner's educational level, birth order, preceding birth interval, family size, type of toilet facility, tetanus injection during pregnancy, antenatal care and place of delivery are statistically significant in terms of different components of infant mortality. Infant mortality in rural areas was 1.43 times more likely than the urban areas. Partners with no education were 1.09 times more likely to face infant mortality than the reference category. Compared with birth order only those birth order, 1 or 2-3 were 1 and 32% lower risk of infant mortality than 4 and above birth order. Preceding birth interval <24 months were 1.92 times more likely responsible for infant mortality than the reference category, also lower family size contains higher likelihood of infant mortality than the reference category. Respondents with no toilet facility were 0.91 times less likely to face infant mortality than the reference category. Respondents with tetanus injection during pregnancy were 11% less likely to face infant mortality than those were not taking. Also, respondents with no antenatal care visit were 1.79 times more and those taking home as delivery place were 1.84 times more likely to face infant mortality than the reference category.

Logistic regression analysis on child mortality case: Result based on the multivariate logistic regression analysis for identifying those variables, which are truly related to child mortality shown in Table 3, considering

Table 3: Results of logistic regression analysis on child cases

Background characteristics	Chittagong	Dhaka	Khulna	Rajshahi
Type of residence				
Urban (Ref:)	1.000	1.000	1.000	1.000
Rural	5.912***	1.000	1.652**	0.965**
Highest educational level				
No education	7.014***	-	-	3.190***
Primary	3.868***	-	-	2.234***
Secondary (Ref.)	1.000	-	-	1.000
Respondent occupation				
Not working	0.238	0.270	0.158	0.578
Services	0.003	0.001	0.008	0.004
Agric-self employed and employee	0.382	0.001	3.00	1.193
Skilled and unskilled manual (Ref:)	1.000	1.000	1.000	1.000
Partner's education level				
No education	4.386***	4.373***	-	2.603***
Primary	3.763***	4.678***	-	5.835***
Secondary (Ref:)	1.000	1.000	-	1.000
Partner's occupation				
Not working	0.012	0.008	0.020	0.036
Prof., Tech., Manag.	1.23	0.170	0.533	0.684
Agric-self employed and employee	1.611	1.302	1.562	1.070
Skilled and unskilled manual (Ref:)	1.000	1.000	1.000	1.000
Birth order				
1	0.851	0.112	0.001	0.952
2-3	0.429	0.255	1.034	0.546
4 and above (Ref:)	1.000	1.000	1.000	1.000
Preceding birth interval				
<24 months	1.153	1.923	7.014	9.134
25-36 months	1.766	2.440	0.001	7.518
37 and above months (Ref:)	1.000	1.000	1.000	1.000
Family size				
1-4 members	0.682*	7.532***	2.543***	0.424*
5-7 members	0.908**	4.910***	0.479*	0.320*
8 and above (Ref:)	1.000	1.000	1.000	1.000
Source of drinking water				
Piped inside/ outside dwel.	0.001	0.272	1.938	0.006
Tube well (Ref:)	1.000	1.000	1.000	1.000
Type of toilet facility				
No facility, bush	1.253*	4.033***	0.982**	2.143***
Septic tank/toilet	0.564*	1.270*	0.353*	0.003*
Open/pit/hanging etc. (Ref:)	1.000	1.000	1.000	1.000
Tetanus injection during pregnancy				
No	3.487	2.386	2.909	0.912
Yes (Ref:)	1.000	1.000	1.000	1.000
Number of antenatal care visits				
No visit	-	2.815	2.709	3.714
Visit (Ref:)	-	1.000	1.000	1.000
Place of delivery				
Home (Ref:)	1.000	1.000	1.000	1.000
Medical facility	0.000	0.000	0.000	0.000

Ref.: Reference Category; Level of significance: ***p<0.01; **p<0.05; *p<0.10

child mortality i.e. were the respondents experiencing child mortality as the dependent variable, which is dichotomized by assessing 1 if the respondents were experiencing child mortality and 0 for not.

Table 3 shows that in Chittagong division some explanatory variables such as type of residence, respondents, educational level, partner's educational level, family size and type of toilet facility are statistically significant in terms of different components of child mortality. Child mortality in rural areas were 5.91 times more likely than the urban areas. Respondents with no education and primary education were 7.01 times and 3.87 times more likely to face child mortality than the reference category respectively. Also partner's with no education and primary education were 4.39 and 3.76 times more likely to experience child mortality than the reference category, respectively. Table 3 also shows lower family member contains lower likelihood than the reference category, also respondents with no toilet facility were 1.25 times more likely to face child mortality than reference category.

From Dhaka division, we observed that partner's educational level, family size and type of toilet facility exerts significant effect in terms of different components of child mortality. Respondents with no educated partners and primary educated partners were 4.37 and 4.68 times more likely to face child mortality than the reference category, respectively. Respondents with lower family members contain the higher likelihood than the reference category. Respondents with no toilet facility were 4.03 times more likely to experience in child mortality than the reference category.

From Khulna division, we observed that some variables like type of residence, family size and type of toilet facility exerts the significant effect on dependent variable. Compared with type of residence child mortality in rural areas were 65% higher than the urban areas. Family with member 1-4 were 2.54 times more likely to experience than the reference category. Here, we also observed a different result i.e., respondents with no toilet facility were 2% less likely to face child mortality than the reference category.

In Rajshahi division we also observed that such variables as type of residence, respondent's educational level, partner's educational level, family size and type of toilet facility are statistically significant in terms of different components of child mortality. Here child mortality in rural areas were 3% less likely than the urban areas, which is different from other divisions. Respondents with no education and primary education were 3.19 times and 2.23 times more likely to face child mortality than the reference category respectively. Also respondents whose partners were not educated and primary educated were 2.60 and 5.84 times more likely to face child mortality than the reference category, respectively. Lower family member exerts lower risk of child mortality than the reference category. Respondents with no toilet facility were 2.14 times more likely to experience child mortality than the reference category.

CONCLUSION

Infant and child mortality has become the burning issue of the day. The infant and child mortality in Bangladesh has long been a topic of interest to population research because of its apparent direct relationship with lack of health facilities and indirectly

with the poverty. By running and interpreting the logistic regression analysis, study shows that residence, education of father and mother, preceding birth interval, family size, toilet facility, delivery place, antenatal care are the major factor/contributors of infant and child mortality. This indicates that various socio-economic and demographic factors have played a crucial role in influencing infant and child mortality of four major divisions of Bangladesh. Though, it is difficult in poor setting Bangladesh, the regarding authority should take proper steps in improving the situation of education, sanitation and health sectors in rural areas as well as throughout the country. However, there is a real need for more in depth studies on this regard. Thus, necessary action in called for to reduce future level of infant and child mortality in the country. In order to achieve better living conditions in future.

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