
RESEARCH ARTICLE

Maternal Education and Child Nutritional Status in Bangladesh: Evidence from Demographic and Health Survey Data

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ABSTRACT

The objective of present study is to determine the effect of maternal education on child nutritional status in Bangladesh. The study has used 2007 Bangladesh Demographic and Health Survey (BDHS) data for the analysis. The study has employed various pathway measures linking maternal education and child nutritional status in Bangladesh. Logistic regression results explain that maternal education has significant effect on child better nutritional status. Socioeconomic status and attitude towards modern health care services are the most important pathways linking the both. Health knowledge and reproductive behavior describe some of the effect of mother's education on child nutrition. Only women empowerment appears to be the weakest pathway in our analysis.

Keywords

Bangladesh
Child nutrition
Health knowledge
Maternal education
Socioeconomic status

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INTRODUCTION

Socioeconomic development and quality of life of masses; living in any country is determined through child health and infant mortality rate. Children are the hope for this world. Development is not obtained only with physical capital in form of bricks, wheels, computers rather the actual capital is human itself. A healthy, intelligent and honest human force is the ardent energy to utilize the bricks and run the wheels. This is the reason that every developing country is striving hard to convert its population into human capital. It is one of the Millennium Development Goals (MDGs) to reduce infant mortality rate by two-third till 2015. Nourished children not only perform better in education rather grow into healthier adults, become active labour force and hence are able to give their own children a better life. In Bangladesh, under-five mortality rate is estimated as 65 deaths per 1000 child birth are reported. Neonatal deaths are estimated at 57 percent of under-five death rate (BDHS, 2007).

Whatever are the cultural and economic setups; at household level mothers are considered the main catalyst in better nutrition, health and education of children. Higher years of mother's schooling are

considered to lower the child mortality rate as education provides information relating to child nutrition, their proper treatment during illness and information relating to vaccination. According to World Bank (1993), mother education is necessary for improving child health status and lowering infant mortality rate. Various studies on health confirm the significant association between motherly learning and child health and use of health facilities than father education (Mondal et al., 2009; Frost et al., 2005; Young et al., 1983). Maternal education can improve child health and reduce infant mortality through various ways like women empowerment, enhanced use of modern health care services, small family size, better health knowledge, and increased family income (Glewwe, 1999; Castro and Juarez, 1995; Caldwell and Caldwell, 1993; Schultz, 1993; Cleland, 1990; Mason, 1984). Caldwell (1979) was the first to conclude that children of educated mothers have better health than uneducated mothers. Some studies on cross-country comparison demonstrated negative relationship between mother's years of education and children death rate (Bicego and Boerma, 1991; Mensch et al., 1985; Ware, 1984). Glowwe (1999) explained that health knowledge is the most significant factor explaining the relationship

between mothers' education and child health. However, there are some studies that failed to explain strong causal relationship between maternal education and child health (Kunstadter, 1995; Desai and Alva, 1995; Cleland and Ginneken, 1988).

Socioeconomic status is one of the most important pathways explaining the link between maternal education and child nutritional status (Frost et al., 2005; Desai and Alva 1998; Caldwell, 1994). Education and socioeconomic status not only improves mothers' knowledge relating to health but also change their attitude and behavior, which in turn positively affect the nutritional status of their children (Cleland, 1990). Children health depends upon educational attainment of mothers and their capacity to purchase those goods and services which are necessary for maintaining better health status of their children (Frost et al., 2005; Defo, 1997; Cleland and Ginneken, 1988). Higher years of education provide woman with more opportunities to find a better job and increase their family income (Barrette and Brown, 1996). Moreover, educated women prefer to marry highly educated men, with sound earnings (Cleland and Ginneken, 1988). According to Desai and Alva (1998) introduction of socioeconomic variables in the model reduce the strength of relationship between mother education and child health. On the contrary, Frost et al. (2005) considered the socioeconomic status as the most important variable explaining the relationship between mothers' education and child nutritional status. Similarly, Cleland and Ginneken (1988) found that nearly half of the bearing of mothers' education on child nutrition is explained by socioeconomic status. Attainment of formal education makes women knowledgeable relating to wide range of health issues like causes and symptoms of diseases, precautionary measures, proper nutrition during disease and greater exposure to health related messages and suggestions through different sources like mass media (Benta et al., 2011; Casterline, 2001; Defo 1997; Streatfield et al., 1990; Cleland and Ginneken 1988). The relationship between knowledge and child health implies that knowledge about conditions and cognitive measures for maintaining better health directly change previous behavior relating to health. According to Defo (1997) health knowledge can reduce the risk of infectious disease through improved hygiene, nutritious food and greater access to health products. Further, education leads to better income generating activities enabling the provision of improved housing. Enjoying these facilities in household environment means that these family members are less unhygienic on average (Frost et al., 2005).

Education not only has direct and significant effect rather can shift negative attitude, traditional practices and beliefs relating to health towards the adoption of

modern ideas and medicated practices (Benta, et al., 2011; Frost et al., 2005; Defo 1997; Barrette and Brown 1996). Therefore, it is believed that educated mothers are less likely to believe in the supernatural reasoning of their child disease rather use modern medicine and preventive measures for the cure of disease (Heaton et al., 2005). Educated mothers' can take early decision regarding the health problem of their children (Frost et al., 2005; Jejeebhoy, 1995) and their family size and birth interval (Benta et al., 2011; Levin et al., 1994). Women greater control on family income can improve the nutritional status of children particularly female child (Saraswathi, 1992) and children survival rate (Kishor, 1995).

The relationship between maternal age and child health status is also found in many studies. Benta et al. (2011) found that child health increases with mother age. However, Sommerfelt and Stewart (1994) found no systematic relationship between child health and mothers' age. An inverse relationship existed between years of education, fertility and early age marriage (Cleland and Ginneken, 1988). Early age marriage is the main cause for increase in infant mortality rate (Tagoe-Dark, 1995).

The present study signifies the impact of maternal education on child nutritional status (assessed by stunting/ height for age) in Bangladesh using Demographic and Health Survey (DHS, 2007) data. According to BDHS (2007) stunting is the result of inadequate nutrition to children that affect child population over a long period of time. In Bangladesh, national estimates reveal that 43 percent children are stunted while 16 percent are severely stunted. This study provides the answer of the question; Whether maternal education significantly affects child nutritional status in Bangladesh?

MATERIALS AND METHODS

Bangladesh Demography and Health Survey (BDHS, 2007) collected separate estimates of major indicators for each of the six divisions of the country including Barisal, Chittagong, Dhaka, Khulna Rajshahi and Sylhet. The present study is limited to the sample set of ever married women having at least one alive child. The purpose of present study is to describe the effect of maternal education on child nutritional status through various parameters such as socio-economic status, health knowledge, attitude towards the utilization of health care services, women empowerment and reproductive variables. Height for age is an anthropometric index that is used as a proxy to measure the child nutritional status. According to WHO International Growth Conference, "the children who are below 2, standard deviations on the height for age growth curve are classified as stunted" (Benta et al.,

2011; Dibley et al., 1987). This variable is treated as dependent variables in our analysis in the form of binary variable. Child's height for age =1 for those children who are below negative 2 standard deviation of the median population and "0" otherwise following the Heaton et al. (2005).

Mothers education is the main explanatory variable and is classified into three categories: illiterate/ no education, primary, secondary and above. Using various measures, indices are constructed to operationalize the effect of selected pathways on child health. Before constructing these indices, different variables are selected that properly measure each pathway. Then, a factor analysis is performed to determine how well each set of variables factored together, omitting obvious outliers. Table 1 presents scores of factor analysis and Cronbach's alpha for each of the selected variables to show that every index is formulated from correlated variables. After this, the indices are constructed in simple additive form.

Socioeconomic status is measured by two additive indices: household wealth and household environment. Both indices range from 1 to 5. Household environment index is measured by the availability of following four basic facilities: (1) piped drinking water (2) flush toilet facility (3) non-dirt floor and (4) electricity. Household wealth index is measured by the availability of following four durables: (1) radio (2) television (3) refrigerator and (4) telephone. Various proxy variables are used to measure knowledge, attitude and empowerment because their direct measures are not available in survey data. Health knowledge index is constructed based on the knowledge about four indicators; (1) oral rehydration therapy (2) AIDS (3) tuberculosis and (4) modern methods of contraception. Women empowerment is measured through two proxy variables. Reproductive variables included are (1) mother's age (2) birth interval and (3) birth order/parity. Interval between two births is given in months. Birth order/parity is further classified into four categories ;(1)1st birth (2)2nd-3rd birth (3) 4th-6th birth (4) above 6th birth. Mother's age is given in complete year. Source of information is measured by the access to (1) newspaper (2) radio (3) television. Access to each of the sources is coded by a dummy variable. In addition to these variables, division of residence, rural/urban disparity and husband education are treated as control variables.

Analytical framework

In our analysis, predicted variable: child height for age has two categories. So, our model was estimated by following binary logistic regression equation.

Where:

α is the constant and β is the slope coefficient of the estimated parameter, $P/(1-P)$ is the odd ratio of the occurring of an event given the value of the predictor variable. Here a flow chart diagram is also added to explain the relationship of variables.

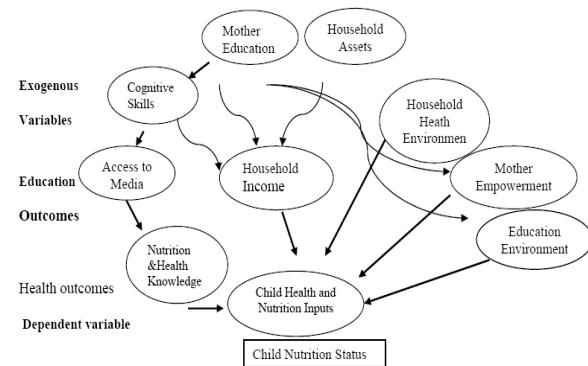


Fig. 1: Relationship between maternal education and child nutritional status

The estimated coefficients are interpreted on the basis of their significance level. Finally, exponential log of estimated coefficients is taken to find out odd ratios (Bronte and Dejong, 2005). Odd ratios explain the effect of explanatory and control variables on the probability of child stunting.

RESULTS AND DISCUSSION

It was alarming to know that approximately 65 percent of children were stunted in Bangladesh (Table 2). Maternal education attainment level was not satisfactory in Bangladesh as 71 percent of mothers were either illiterate or having less than primary education. Socioeconomic status of women; measured by household wealth index and environmental index, indicated that wealth status of women was not satisfactory in Bangladesh. The average score of wealth index was less than 2.5 out of total score of 5 and environmental index was less than 3.5 out of total score of 5 showing a better sign. Results demonstrated that mother's knowledge relating to health was not satisfactory, showing an average score of 2.78 out of a total score of 6. Average score for health care utilization index was 2.72 out of total score of 6. Women empowerment index showed a moderate score of 2.11 out of a total score of 4.

Reproductive variables show that approximately 34 percent of children were born within the birth interval of 0 to 24 months, 47 percent within the 25 to 45 months and only 19 percent of children were having birth interval greater than 45 months. The average age of mothers at the time of 1st birth interval was approximately 17 years. Father's education attainment

Table 1: Results of Factor Analysis of Variables included in Indices

Indices/Variables	Factor analysis	Reliability Analysis (α)
Household Wealth Index		
Own a TV	0.772	
Own a Radio	0.464	0.789
Own a refrigerator	0.574	
Own a telephone	0.684	
Household Environment Index		
(better environment conditions)		
Electricity available in house	0.736	
Piped water provided in house	0.651	0.668
Flush toilet available in house	0.485	
Non-dirt floor type	0.624	
Knowledge index (improved knowledge)		
heard of oral rehydration therapy	0.447	
heard of modern method of contraception	0.642	0.752
Has heard of tuberculosis	0.588	
Has heard of HIV/AIDS	0.707	
Health care utilization (Healthy lifestyle)		
Received pre-natal care from doctor	0.636	
Doctor attended birth	0.825	0.724
Received tetanus injection before birth	0.537	
Has used modern method of contraception	0.489	
Women empowerment		
Decision for spending money in household	0.621	0.710
Decision relating to family planning	0.697	

level was also low. About 36 percent of father's were illiterate, 45 percent were having primary education and only 19 percent of men reported secondary and higher level of education. About 70 percent of women were living in rural areas. Majority of women lived in Chittagong division (22 percent) followed by Dhaka (21 percent). Surprisingly, most commonly used source of information in Bangladesh was television, as 45 percent of women were watching television to get information relating to child health.

The results of logistic regression are reported in Table 3. Model 1 shows that educated mothers significantly decrease the likelihood of having a stunted child by 14 percent (1- exponent of the log odds) and 60 percent respectively as compared to illiterate mothers. In model 2, when place of residence and division of residence was added in model; educated mothers were again less likely to have stunted child meaning have lower.

Table 2: Descriptive Statistics of households (N=5382)

Stunted =1	65.4%
Not stunted = 0	34.6%
Mother's education	
No education	34.3%
Primary	36.6%
Secondary and higher	29.1%
Socio economic status	
Household Wealth Index	Range, Mean, SD
Household Environment Index	1-5, 2.34, 1.106
Knowledge index	1-6, 2.78, 1.66
Health care utilization Index	1-6 2.72, 1.776
Women empowerment	1-4, 2.11, 1.735
Reproductive Variables	
Mother age at 1 st birth	17.39, 2.936
Birth order	
1 st birth	18.1%
2-3 birth	25.4%
4-6 birth	39.3%
Above 6 birth	17.2%
Birth interval	
0-24 months	33.8 %
25-45 months	46.8 %
Above 45 months	19.5 %
Control Variables	
Partner's education ,	
Illiterate(no. education)	35.9 %
Primary	44.7 %
Secondary and higher	19.5 %
Place & type of residence	
Rural	70.5 %
Urban	29.5 %
Division of residence	
Barisal	15.1 %
Chittagong	22.6 %
Dhaka	21.1 %
Khulna	08.7 %
Rajshahi	14.0 %
Sylhet	18.5 %
Source of Information	
Listen to radio	20.8 %
Watch TV	44.8 %
Read News Paper	15.9 %

In model 3 on addition of mother age and partner educational level, maternal education again confirmed to have less probability of stunted or poor nutrition child but education of child's father (partner education) indicated higher probability for having stunted child. This explains for the more promising effect of mother education on child health and nutrition than his father education.

However, after controlling for wealth index, household environmental index, health knowledge index, health care utilization index and women empowerment index

Table 3: Effects of Maternal Education and Intervening Mechanisms on Likelihood of Stunting of children in households of Bangladesh

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Maternal Education (uneducated , reference category)									
Primary education	0.862** (-0.15)	0.883*** (-0.12)	0.875 (-0.13)	0.877 (-0.13)	0.902 (-0.10)	0.920 (-0.08)	0.911 (-0.09)	1.226 (0.20)	1.215 (0.19)
Secondary /above	0.403* (-0.90)	0.426* (-0.85)	0.574* (-0.55)	0.575* (-0.55)	0.628* (-0.46)	0.669* (-0.40)	0.664* (-0.41)	0.612** (-0.49)	0.652* (-0.43)
Place of residence (Rural, reference category)									
Urban	0.758* (-0.27)	0.750* (-0.29)	0.752* (-0.28)	0.859*** (-0.15)	0.876 (-0.13)	0.886 (-0.12)	0.986 (-0.014)	0.989 (-0.011)	
Region of residence (Barisal, reference category)									
Chittagong	0.981 (-0.02)	0.841 (-0.17)	0.839 (-0.17)	0.905 (-0.09)	0.899 (-0.10)	0.893 (-0.11)	0.773 (-0.25)	0.775 (-0.25)	
Dhaka	0.822** (-0.19)	0.717** (-0.33)	0.715** (-0.33)	0.791*** (-0.23)	0.815*** (-0.20)	0.80*** (-0.22)	0.570 (-0.562)	0.572 (-0.55)	
Khulna	0.592* (-0.52)	0.516* (-0.66)	0.514* (-0.66)	0.549* (-0.59)	0.573* (-0.56)	0.573* (-0.55)	0.082* (-2.501)	0.089* (-2.42)	
Rajshahi	0.682* (-0.38)	0.626* (-0.46)	0.624* (-0.47)	0.659* (-0.14)	0.668* (-0.40)	0.664* (-0.41)	0.48*** (-0.733)	0.489*** (-0.71)	
Sylhet	0.802** (-0.22)	0.683* (-0.38)	0.681* (-0.38)	0.74** (-0.30)	0.73** (-0.31)	0.71** (-0.43)	0.410** (-0.891)	0.414** (-0.88)	
Mother's Age at 1 st birth	0.999 (-0.001)	0.999 (-0.001)	1.004 (0.004)	1.008 (0.008)	1.009 (0.009)	0.993 (0.009)	0.994 (-0.007)	0.994 (-0.006)	
Partner's education (uneducated , reference category)									
Primary education	1.500* (0.40)	1.551* (0.44)	1.322* (0.28)	1.222* (0.200)	1.204* (0.18)	1.207* (0.19)	1.211** (0.19)		
Secondary education	1.591* (0.46)	1.791* (0.58)	1.699* (0.53)	1.647* (0.49)	1.663* (0.509)	1.665 (0.509)	1.666 (0.51)		
Socioeconomic Status									
Wealth index		0.993* (-0.007)	0.971* (-0.03)	0.929* (-0.07)	0.982* (-0.02)	0.975* (-0.025)	0.99* (-0.01)		
Better Environment index			0.883* (-0.12)	0.844* (-0.17)	0.772* (-0.26)	0.793* (-0.23)	0.789** (-0.24)		
Improved Knowledge index				0.850*** (-0.16)	0.871 (-0.14)	0.890 (-0.11)	0.898 (-0.10)		
Healthy life style (Health care Index)					0.923* (-0.08)	0.922* (-0.08)	0.981* (-0.02)	0.983* (-0.02)	
Women empowerment						0.930 (-0.04)	0.921 (-0.08)	0.925 (-0.07)	
Birth order (Above 6 birth , reference category)									
1 st birth							0.472** (-0.75)	0.491** (-0.71)	
2-3 birth							0.741*** (-0.30)	0.778*** (-0.25)	
4-6 birth								1.197 (0.18)	1.185 (0.17)
Birth interval (Above 45 months, reference category)									
0-24 months							1.46** (0.38)	1.48** (0.39)	
25-45 months							0.901 (-0.10)	0.902 (-0.10)	
Source of Information (No,reference)									
Listen to radio								1.215 (0.19)	
Watch TV								0.663*** (-0.41)	
Read News Paper								0.438 (-0.82)	
-2 Log likelihood	6739.90	6686.83	6126.37	6127.18	6109.99	6100.51	6095.12	5890.98	5862.54

Note: coefficient values are reported below the odd ratios. *P<0.001, ** P<0.05, *** P<0.01.

(model 4 to 7) secondary education has significant effect on child nutritional status while primary education of mothers has less effect on child health. In model 8, when birth parity and child birth interval are controlled for and source of information was included (model 9) as a proxy for awareness, secondary school and above level of mother education decreases the likelihood of stunting by approximately 35 percent compared to those mother having no educational status. However, the effect of mothers' primary education and child nutritional status got weaker and insignificant after controlling for source of information (model 9). Household wealth index and better environment index are main contributing factors in explaining child health status. These results support the findings of Benta et al. (2011), Frost et al. (2005) and Desi and Alva (1998). Socio-economic status is the primary pathway explaining the effect of maternal education on child nutritional status, but modern health care utilization services and health knowledge also explain the effect of maternal education on child health. In reproductive behavior, birth order and birth interval has some influence on child health status. Watching television is connected with less likelihood of children being stunted. This means that watching television is an important source for broadcasting public health campaign in Bangladesh. On the basis of our result we can conclude that maternal education not only improve socioeconomic condition but also transform behavior from traditional and fatalistic view of health care to the acceptance and utilization of modern health care services. Still in our final model, maternal secondary education has significant influence on child nutritional status.

We find insignificant effect of mothers' empowerment on child health status. This result supports the findings of Benta et al. (2011). The reason for insignificance effect of women empowerment on child health status is the lack of direct measures of this variable in BHDS dataset. Further this variable requires other household conditions like better socioeconomic conditions, wealth and better education of child father to facilitate these facilities as being traditional developing country this is important in south Asian culture. This result is totally in contradiction to Gupta (1990) who pointed out those personality characteristics and abilities of mother influence child health status are independent of education and wealth status. She also said that mothers with strong will and decision making power in household matters have children with better health status. Simon et al. (2002) concluded that mothers having greater power in household matters can better utilize the resources to meet the nutritional needs of their children.

Conclusions

In this study, we used the Bangladesh Demography and Health Survey (BDHS) data to estimate the effect of maternal education on child nutritional status (measured by stunting/ height for age) through various pathways like socioeconomic status, health knowledge, and attitude toward modern health care services, women autonomy and reproductive behavior. Results estimated by applying Binary Logistic regression models explained that socioeconomic status, attitude toward modern health care and health knowledge are important pathways in explaining the effect of maternal education on child health. In reproductive behavior birth interval (25-45 months) has significant effect on child health status. Estimated results overall suggest that maternal education can influence child nutritional status by improving health knowledge, reproductive behavior and using modern health care services.

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