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Parent's Education and its Impact on Child Mortality: A Case Study at Thakurgaon District in Bangladesh

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Abstract: Child mortality is the sensitive indices of development and often reflects a country's quality of life. Though mortality is a biological process and child mortality is a current important issue in the country. But there is little understanding of whether Bangladesh will be capable of achieving all of the Millennium development goals specially child mortality. For this we have collected information from 500 respondents with a questionnaire to estimate the parent's education and its impact on child mortality. The purpose of this study is to investigate the differential patterns and influencing factors on various socio-economic and demographic variables specially education that effect on child mortality. To identify the effect and statistical significance we have used the statistical techniques and multivariate analysis named path analysis. The present study shows that some of these selected factors significantly effects on child mortality. These factors are educational status of women, monthly income, age at first marriage, medical checkup during pregnancy and type of delivery.

Key words: Parental education, child mortality, medical checkup, educational status, demographic variable, Bangladesh

INTRODUCTION

The study of child mortality becomes one of the most important researches of the developing countries like Bangladesh. There are two major reasons behind this: high level of infant and child mortality and its relationship with parent's education. The reduction of infant and child mortality indirectly helps in reducing fertility by decreasing the desired number of children to be born due to increased probability of survival of a child. The child mortality is a composite index reflecting environmental, social, economic, health care services and delivery situation on the one hand and maternal as well as family and community norms and practices on the other Mosely and Chen (1984).

Child mortality has traditionally been viewed as an indicator of the social and economic well-being. Child mortality in Bangladesh has long been a topic of interest to population researchers because of its apparent relationship with fertility, education and indirectly with the acceptance of modern contraception. The decline in mortality may be attributed to the Government's efforts to implement a public health programmer including the immunization of children. Successive 5 year national development plans have been emphasizing reductions in infant and child mortality with varying targets. This emphasis has been reflected in increased budgetary allocations for the health sector as well as the development of the infrastructure at the lowest administrative level such as health and family welfare center's and the establishment of satellite clinics in outreach areas. In addition, large number Non Governmental Organizations (NGOs) have also been active in the areas of health, education and family planning. However, despite all these efforts, health care facilities in Bangladesh remain limited and inadequate; besides a lack of health personnel, medicines and other facilities are not uniformly available.

Various factors influence the levels of child mortality. For instance, childhood illness and death are much higher in the poorer strata of society (United Nations, 1991). Illiteracy of mothers, culturally determined attitudes with respect to health and medical care, lack of basic knowledge and awareness of health problems, poverty and the inaccessibility of health facilities, all contribute to these high rates.

Education of women, awareness of the importance of hygiene, the use of techniques such as Oral Dehydrations Therapy (ORT) in managing diarrhea and the importance of timely immunization are factors that could save the lives of many children. Research on child mortality and parent's education is increasingly oriented towards the measurement of the direct and indirect effects of different socio-economic and demographic variables and the interpretation of specific relationships. Numerous factors are correlates of child survival.

In terms of these effects, the factors that have received the most attention are maternal education, sanitation, access to safe drinking water and maternal and child health care services. Various studies conducted in recent years have demonstrated that improved sanitary conditions and access to safe drinking water are important factors contributing to a decline in child mortality. Many studies have demonstrated increased mortality risks among children born after short birth intervals. Maternal depletion is often cited as the primary mechanism responsible for the adverse effects of short birth intervals. Women with short intervals between two pregnancies have insufficient time to restore their nutritional reserves, a situation which is thought to adversely affect fetal growth. Competition among siblings is considered a plausible mechanism in the association between birth intervals and child survival: the newborn child has to complete with another young sibling for household resources and mother's care. The situation may have a bearing on the nutrition of the youngest child (Ali-Kabir, 1984). First born children of very young mothers are at risk of dying while infants because of their mother's physical immaturity. Children with short preceding birth intervals are less likely than others to have ever been breast fed.

Parental education, through its impact on household income has both direct and indirect effects on child survival. The effect is more pronounced in environments dominated by uncertainties that are created by both men and nature. For example, household income can have a dramatic effect in reducing malnutrition especially during periods of crisis where food prices usually rise dramatically. Education also plays a direct role in shaping parental behaviour towards their children (Tabutin and Akoto, 1992). The inverse relationship between mother's education and infant and child mortality is supported by many studies in widely different populations (Frenzen and Hogan, 1982). Caldwell (1979) suggested that educated mothers are more likely to shift from a fatalistic acceptance of health outcomes towards the implementation of simple health-promoting practices. This often includes an increased capacity to manipulate modern medical systems. Caldwell (1994) suggests that father's education increases the survival chances of children through the greater knowledge and affluence it brings to the household. In this study, we hypothesize that the impact of parental education on child mortality will be more profound during times of crises because educated parents are more likely to be able to protect their children from military conflict, famine and disruptions of the social and physical environment. Educated parents are more likely to have food reserves for their children during famine periods and fathers with higher education are expected to have better coping strategies and better economic resources (Shaik, 1984). Consequently, they are more able to send their children to safe places during war. Because of these independent avenues of influence of mother's and father's education we hypothesize that mother and father's education will have a joint impact on child survival during time of crisis

The main purpose of this study is to examine the role of mother's and father's education in reducing excess child mortality in a small area (Thakurgaon district) of Bangladesh.

MATERIALS AND METHODS

Data sources and methodology: We utilize the data for analysis extracted for Thakurgaon district in Bangladesh. The district of Thakurgoan area is 1810 km^2 and its male population is 626720 and female population is 587940 and density is 671 km^{-2}. In this study, a number of 500 respondents were questioned during survey period in 2009. The respondents were randomly interviewed by some selected questions from several villages in the rural area and urban area of Thakurgaon Thana in Thakurgaon district, Bangladesh by purposive sampling technique. Various socio-economic and demographic variables were considered at the time of data collection.

Path analysis: A path analysis is one of such technique of showing causal linkages among the interrelated variables. The technique of path analysis which was developed during 1920s by Sewall Wright as an aid to the quantitative development of genetics, gained popularity in social science studies with the further expositions. Recently its application is gained popularity in demography (Loebner and Driver, 1973; Kendall and O'Muircheartaigh, 1977). Path analysis presumes the existence of causal framework interlinking different predictor variables with the response variables. Such representation of the causal variables is called as a path model and it is both stochastic and explanatory and it is said to be an extension of the multiple regression model. It helps in estimating the magnitude of the linkages between interrelated variables and provides information about the underlying causal processes. This technique explores a chain of relationship among the variables by using standardized regression coefficients of a set of regression equations. The fundamental to the path analysis is the path diagram which is the out come of a set of linearly interrelated variables and the assumed causal relationship among them. In the path diagram the following principles are as follows:

- The variables are arrange from left in such a way that all the endogenous variables are to the right of their exogenous variables
- The unidirectional straight arrows called henceforth as causal paths that go from left to right represents the endogenous variables
- On the other hand, the two-headed curvilinear arrows represent the non-causal (correlated) relationship among the exogenous variables. This study employs a recursive path model relating to the effect of female education on child health

Methods and model specification for path analysis: Path analysis is a straightforward extension of multiple regression. Its aim is to provide estimates of the magnitude and significance of hypothesized causal connections between sets of variables. This analysis disentangles the specific mechanisms of the socio-economic factor affects child health by taking into consideration the intermediate variables involved in the analytical system. Moreover, path analysis provides a theoretical model specified as a system of simultaneous regression equations which are linear, additive and usually recursive.

This is best explained by considering a path diagram. In the research study a number of socio-economic and demographic variables are available. Among them, 10 variables have been taken into consideration in the present study in order to construct a path analysis. Table 1 shows a detailed description of the variables. Place of residence, respondent's education, respondent's occupation, monthly income and religion are considered as the socio-economic and background variables while the demographic as well as intermediate variables regarded in this analysis are age at marriage, medical check up during pregnancy, type of delivery and number of child alive. Finally, the number of children dead is used here as a measure of child mortality.

Path coefficients are standardized regression coefficients in a system of linear regression equations, usually denoted P_{ij} where the first subscript shows the dependent variable and the second subscript indicates to the variable whose direct effect on the variable is measured. In other hands, P_{ij} are path coefficients representing the direct effect of j on variable i. A path coefficient gives the proportion of the standard deviation of the dependent variable for which the independent variable is directly responsible. In other words,

$$P_{ij} = \frac{\sigma j}{\sigma i}$$

Table 1: Variables and their measurement used in the path analysis

Variables	Measurement
X_1 = Place of residence	1 = Rural
	2 = Urban
X_2 = Respondent's education	1 = Illiterate
	2 = Primary
	3 = Secondary
X_3 = Husband education	1 = Illiterate
	2 = Primary
	3 = Secondary
	4 = Higher
X_4 = Monthly income	1 = Below 5000
	2 = 5000-10000
	3 = 10001 and above
X_5 = Religion	1 = Muslims
	2 = Hindu
	3 = Others
X_6 = Age at marriage	1 = <15 years
	2 = 15-22 years
	3 = >22 years
X_7 = Medical check up during pregnancy	1 = Yes
	2 = No
X_8 = Type of delivery	1 = Hospitals
	2 = Home
	3 = Others
X_9 = Number of children alive	1 = 0
	2 = 1-3
	3 = 4-5
	4 = 6 and above
X_{10} = Number of children dead	1 = Yes
	2 = No

where, σj and σi denote the standard deviation of the dependent and independent variables, respectively. The path estimation equations are useful in deriving path coefficients, in deriving the direct, indirect and residual or joint effects and in predicting the implied correlation. The path estimation equations are derived from the structural equations by applying the basic theorem of the path analysis.

Thus, it is to be noticed that structural equations are different from the path estimation equations. According to the causal ordering of variables, we may divide the selected set of variables into three groups that are given below:

Exogenous = Variable X_1-X_5
Endogenous = Variable X_6-X_9
Dependent = Variable X_{10}

This model is a recursive path model in which each variable is assumed to be depend upon all prior causal variables. The system of equation for the model can be written as:

$$X_6 = P_{65}X_5 + P_{64}X_4 + P_{63}X_3 + P_{62}X_2 + P_{61}X_1 + P_{6u}R_v$$

$$X_7 = P_{76}X_6 + P_{75}X_5 + P_{74}X_4 + P_{73}X_3 + P_{72}X_2 + P_{71}X_1 + P_{7v}R_w$$

$$X_8 = P_{87}X_7 + P_{86}X_6 + P_{85}X_5 + P_{84}X_4 + P_{83}X_3 + P_{82}X_2 + P_{81}X_1 + P_{8w}R_x$$

$$X_9 = P_{98}X_8 + P_{97}X_7 + P_{96}X_6 + P_{95}X_5 + P_{94}X_4 + P_{93}X_3 + P_{92}X_2 + P_{91}X_1 + P_{9x}R_y$$

$$X_{10} = P_{109}X_9 + P_{108}X_8 + P_{107}X_7 + P_{106}X_6 + P_{105}X_5 + P_{104}X_4 + P_{103}X_3 + P_{102}X_2 + P_{101}X_1 + P_{10y}R_{yz}$$

where, P_{ij} are the path coefficients and R_v, R_w, R_x, R_y and R_z random disturbance terms. All the random disturbance terms are mutually independent and are independent of their corresponding explanatory variables. This system of equations are known as structural equations which gives the estimates of path coefficients and helps in understanding the important links between various variables considered in the causal model. Then multiple regression method is applied for each causal relationship. The residual of path coefficients can also be estimated with case from the regression equation as square root of $(1-R^2)$ where, R^2 (unadjusted) is the multiple correlation coefficients (square) of the regression equation. From the path analysis the direct effects, indirect effects, implied effects and total effects of each selected explanatory variables on child mortality are determined.

RESULTS AND DISCUSSION

Age is an important factor of child mortality. From the Table 2 we observed that 33.4% of the respondents are aged <15 years, 39.8% of the respondents are in 15-22 years of age and 26.8% of the respondents are aged >22 years. In demography, residence means the type of community ranging from the rural to the urban in which people lives. About 66% of the respondents are live in rural area and 34% are live in urban area. The potential impact of education on various aspects of behaviour including reproductive and family planning behaviours is too obvious to call for any discussion.

In the same table we also observed that 54.6% of the respondents have no education, 27.8% of the respondents have primary education and 17.6% of the respondents have secondary education. On the other side 37.8% husband have no education, 35% are primary education, 18.2% are secondary education and only 9% are higher education.

We see that more of the respondents are illiterate who have no any education. Education is major means today for reducing child mortality because educated parents are more conscious about their life and their children. The working status of respondent has valuable influence on child mortality. Women's status is widely acknowledged as one of the mail determinants of child mortality decline in developed countries. The table also shows that 90.4% of the respondents are housewife, 4.6%

Table 2: Socio-economic and demographic background characteristics of the study on child mortality, Thakurgon district, Bangladesh 2009

Categories	Frequency	Percentage
Age group of respondents		
<15 years	167	33.4
15-22 years	199	39.8
>22 years	134	26.8
Place of residence		
Rural	330	66.0
Urban	170	34.0
Respondents education		
Illiterate	273	54.6
Primary	139	27.8
Secondary	88	17.6
Respondents occupation		
Housewife	455	90.4
Service	20	4.6
Others	25	5.0
Husband education		
Illiterate	189	37.8
Primary	175	35.0
Secondary	91	18.2
Higher education	45	9.0
Husband occupation		
Farmer	280	56.0
Service	112	22.4
Others	108	21.6
Monthly income		
Below 5000	265	53.0
5000-10000	138	27.6
10001 and above	97	19.4
Monthly expenditure		
Below 4000	289	57.8
4000-9000	143	28.6
9001 and above	68	13.6
Age at marriage		
Below 15	272	54.4
15-22	194	38.8
23 and above	34	6.8
Religion		
Muslims	367	73.4
Hindu	120	24.0
Others	13	2.6
Contraceptive use		
Yes	308	61.6
No	192	38.4
Family member		
2-3	74	14.8
4-5	201	40.2
6-7	135	27.0
Above	90	18.0
Respondent health check up during pregnancy		
Yes	122	24.4
No	368	73.6
Respondent take immunization during pregnancy		
Yes	495	99.0
No	05	1.0
Place of delivery		
Hospitals	129	25.8
Home	356	71.2
Others	25	5.0
Birth spacing between two children		
1 years	227	45.4
2 years	117	23.4
3 years	77	15.4
4 years	45	9.0
Above	34	6.8
Number of children		
0	48	9.6
1-3	287	57.4

Table 2: Continue

Categories	Frequency	Percentage
4-5	138	27.6
6 and above	27	5.4
Son preference		
Yes	467	93.4
No	33	6.6
Number of children die		
0	380	76.0
1-2	102	20.4
3 and above	18	3.6
Reason of child mortality		
Diseases	478	95.6
Normal	22	4.4
Sources of water		
Tube well	337	67.4
Tap	106	21.2
Pond	57	11.4
Quality of sanitation		
Sanitary	126	25.2
Semi building	317	63.4
Kacha	47	9.4

of the respondents are engaged in services and 5% are engaged in others occupation. Most of the respondent her family monthly income is low only 19.4% is high and the other hand about 17% respondent his family expenditure is high. Age at marriage is closely related to child mortality, the duration of marriage life. About 54.4% respondent of her age at marriage below 15 years, about 73.4% are Muslims and only about 24% are Hindus. About 63.4% respondent use contractive and 36.6% don't use contraceptive.

Among of these respondent who don't use contraception. They believed that if use contraceptive Allah is punished. As result they born many child and few of them were die. They also believed that Allah protect their child if they were sick. They cannot go to doctor if their child sick, they go to Kobiraj or Emam. About 73.6% respondent do not check up during pregnancy period. Most of the respondent takes their delivery in home service and about 40.2% of the respondent their family size is 4-5 persons.

It is for better that 99% have take immunization during pregnancy period. About 45.4% respondent take their two child birth space for only 1 year and about 23.4% is 2 years. About 57.4% have got 1-3 child and 93.4% want son most of the respondent believed that their child die for diseases. About 67.4% respondent drink tube well water, 21.2% use tap and 11.4% are used pond or others. Sanitary management is not right only 25.2% respondent use sanitary about 63.4% used semi building sanitary and 9.4% respondent use kacha latin.

From Table 3, we showed that place of residence (X_1), Age at marriage (X_6) and types of delivery (X_8) have negative significant effect on child mortality on the other hand monthly income (X_4) and medical check up during pregnancy (X_7) have positive significant effect on child mortality. Respondent education (X_2), husband education (X_3) and religion (X_5) have negative insignificant effect on child mortality and the same time number of children has positive insignificant on child mortality.

This table also show that respondent education have negative significant effect on medical check up during pregnancy and number of children and positive significant effect on monthly income, age at marriage and type of delivery. Husband education have positive significant on monthly income, age at marriage. The different types of variables are shown in Table 1 and 3 is zero order correlation coefficient between child mortality and the selected socio-economic and demographic variables.

The Table 3 shows that with view expectations of zero order correlation coefficients between child mortality and each of the selected variables generally do not much differ from their corresponding total effects. In Fig. 1 we observed that there are 17 paths out of 30 hypothesized paths are found to be statistically significant. In the study we have to mention about the significant path coefficients only.

In Fig. 1 out of 9 variables, only four variables are found to have significant effect on child mortality. Among them age at marriage and number of child have direct negative significant effect on child mortality. Type of delivery has negative direct insignificant effect on child mortality. Place of residence and husband education have indirect positive significant effect on the other hand religion has indirect negative significant on child mortality. Respondent education has indirect negative insignificant and monthly income has positive insignificant effect on child mortality.

According to the Table 4, we reveals that the total effects of type of place of residence and husband education (X_1) and (X_3) on child mortality (X_{10}) is 0.234 and 0.195 of which about 44.75 and 36.94% are conducted through its implied effect and about 11.13% is acts through monthly income (X_4) in the same direction then about 14.52 and 13.85% are transmitted through respondent education (X_2) and religion (X_5) in the opposite direction.

The total effect of respondent education, religion, age at marriage, type of delivery and number of children have negative effect on child mortality on the hand place of residence, husband education, monthly income and medical check up during pregnancy have positive effects on child mortality.

It is also observed that place of residence and monthly income on child mortality are about 11.47 and 14.12% is transmitted through age at marriage (X_6) and about 34.03 and 4.88% is acts through medical check up during pregnancy (X_7) in the same direction of its total effect. We reveals that respondent's education and

Table 3: Zero order correlation coefficient among selected socio-economic and demographic variables

Variables	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}
X_1	1.00	0.102	0.023	-0.077	0.076	0.080	0.133	-0.052	0.041	-0.239**
X_2		1.000	0.763**	0.369**	-0.095	0.488**	-0.507**	0.224**	-0.209**	-0.111
X_3			1.000	0.425**	-0.033*	0.446**	-0.461**	0.221**	-0.130	-0.001
X_4				1.000	-0.101	0.293**	-0.279**	0.337**	0.079	0.045*
X_5					1.000	-0.148*	0.121	0.005	0.031**	-0.030
X_6						1.000	-0.398**	0.138	-0.027	-0.103**
X_7							1.000	-0.324**	0.232**	0.114**
X_8								1.000	-0.175	-0.084*
X_9									1.000	0.043
X_{10}										1.000

**Correlation is significant at the 0.01 level (2-tailed). Correlation is significant at the 0.05 level (2-tailed)

Table 4: Analysis of the socio-economic and demographic factors on child mortality through the selected variables

Dep. vari	Sel. vari.	Total association	Total effect	Non-causal effect	Indirect effect via X_6	X_7	X_8	X_9	Other vari. (Implied effect)	Direct effect
X_{10}	X_1	-0.239	0.523	0.862	0.060	0.178	0.002	0.049	0.234	-
	X_2	-0.111	-0.416	-0.305	0.316	-0.328	0.027	-0.271	-0.160	-
	X_3	-0.001	0.258	0.259	0.155	-0.116	-0.019	0.043	0.195	-
	X_4	0.045	0.665	0.620	0.104	-0.036	0.281	0.234	0.082	-
	X_5	-0.030	-0.019	0.011	-0.106	0.042	0.061	0.021	-0.037	-
	X_6	-0.103	-0.179	-0.076	-	-0.183	-0.046	0.106	-	-0.056
	X_7	0.114	0.037	-0.077	-	-	-0.267	0.166	-	-0.138
	X_8	-0.084	-0.247	-0.163	-	-	-	-0.165	-	-0.082
	X_9	0.043	-0.014	-0.014	-	-	-	-	-	-0.014

Non-causal effect = Total effect-total association

Table 5: Percentages of the total absolute effect on child mortality through endogenous and exogenous variables

Dep. vari	Sel. vari.	Indirect effect via X_6	X_7	X_8	X_9	Other variables (Implied effect)	Direct effect
X_{10}	X_1	11.47	34.03	0.39	9.36	44.75	-
	X_2	28.67	29.77	2.45	24.59	14.52	-
	X_3	29.35	21.97	3.60	8.14	36.94	-
	X_4	14.12	4.88	38.12	31.75	11.13	-
	X_5	39.70	15.73	22.85	7.87	13.85	-
	X_6	-	46.80	11.76	27.11	-	14.33
	X_7	-	-	46.76	29.07	-	24.17
	X_8	-	-	-	66.80	-	33.20
	X_9	-	-	-	-	-	100.00

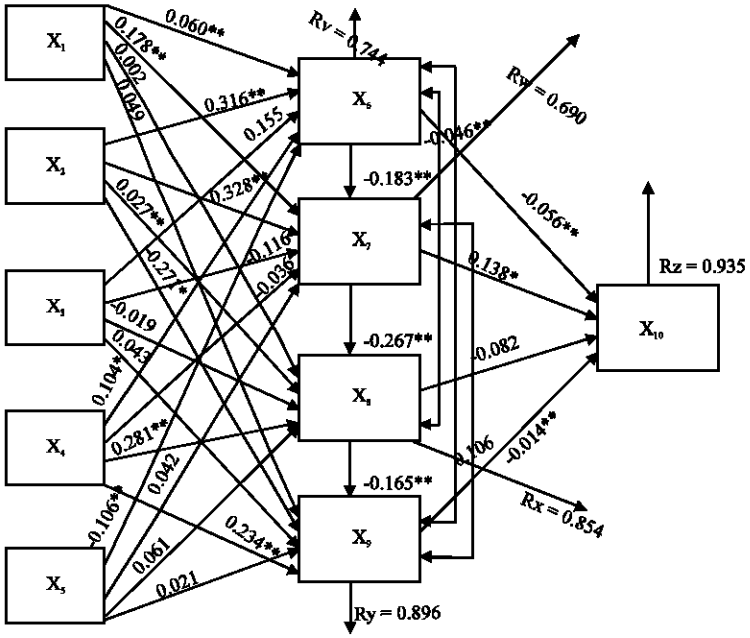

Fig. 1: Effects of the selected socio-economic and demographic variables on child mortality

age at marriage on child mortality are about 2.45 and 11.76% is acts through type of delivery and about 24.59 and 27.11% is transmitted through number of children (X_9) in the same direction (Table 5).

The total association of place of residence, respondent education, husband education, religion, age at marriage and type of delivery have negative effect on child mortality and other variables monthly income medical check up and number of children have positive effect on child mortality.

CONCLUSION

In the face of formidable socio-cultural and economic constraints impressive progress has been made in child mortality in Bangladesh. The study documented a change in the sustainable child mortality decline over a decade or two or less coherent with policy goals and targets. The achievement of the goals and targets to reduce child mortality seem to depend largely on steady improvement in the basic conditions of life of the poor and neglected vulnerable groups of the population and not on family planning programs alone. Birth should be reduced to very young mother (<18 years) to postponement of premature birth, unwanted pregnancies and unstable marital union. This study shows that child mortality have high whose parents have no education (illiterate), do not medical check up during pregnancy, right place of delivery, low income of parents and to much number of children. A well-known multivariate technique named path analysis suggested that educational qualification of respondents have direct significant positive effects on child mortality. Age at marriage, age at first marriage, monthly income and medical checkup during pregnancy also have indirect significant effects on child mortality. Because education may provide better employment opportunities outside of home and age at marriage can be raised through providing education. When parents get proper education they tend to take medical checkup during pregnancy and the tendency of giving birth with trained birth attendants can be increased. Finally we may conclude that parent's education has important influence to reduce child mortality.

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