Condition of Child Health and Child Morbidity in Bangladesh

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Abstract: *The main aim of the study is to find the child health and child morbidity under five years for the cause of various diseases such as acute respiratory infection (ARI) and diarrhea. Therefore ARE and diarrhea are considered as the dependent variable and all other possible characteristics that may influence the child morbidity considered as independent variables. Many statistical techniques are used to analysis the data whenever warranted. To explore bi-variants relationship, series of cross tabulations have run. In some cases the extend of relationship discerned from the analysis has been evaluated by some usual measures of association such as chi square and odd ratio statistics. The statistical technique employed here include multivariate coefficient regression*

Keywords: *Health, Morbidity, Children, acute respiratory infection, diarrhea, Bangladesh.*

I.   Background of the study

One of the most burning problems of world today is that of controlling the population explosion. Bangladesh is one of the most densely populated countries of the world. The area of Bangladesh is only 56,977 sq. miles or   1, 47,570 sq. kilometer (Census 2011). It lies in the north-eastern part of south Asia between 2034 and 2638 north latitude and 8801 and 9241 east longitude. The country is bounded by India on the west, the north and the north -east and Burma on the south-east and the Bay of Bengal on the south. Bangladesh enjoys generally a sub-tropical monsoon climate.

The population of Bangladesh stood at 146.888 millions; Density is 1,015 /km^2 or 2,676.8/sq miles (Census 2011). The population of the country is growing at approximately the rate of 1.37 percent per annum (Census 2011). The percentage of urban residing population is 28.1 while that of rural is 71.9.

As in many developing region of the world the core health problem in Bangladesh are related to high fertility malnutrition and communicable disease about 1030000 children less than 5 year of age die every year. The infant mortality at birth in Bangladesh is the second highest in the world. Three illnesses that are major contributors to childhood mortality in Bangladesh are discussed in this section: acute respiratory infection (ARE) and diarrhea.

The battle with diarrhea in Bangladesh goes back a long time before the Independent of the country. Diarrhea, over the years, has killed millions of people and continues to be a major threat. It occurs throughout the year because of geographic, climate and poor socio-economic conditions, which hinder efforts to control the disease. Each year three million people in the world die of diarrhea. Despite the fact that diarrhea cases have started to decrease. It is still a critical health problem in Bangladesh. One way to address this issues us to stabilize the rapid population growth (RPG) of Bangladesh. Diarrhea is a symptom of a verity of clinical diseases and is not a disease itself .It is caused by bacterial and viral infections and parasites.

The second leading cause of child deaths after acute respiratory infections in the world, but in Bangladesh it is the leading cause. In Bangladesh, the people who are most affected by diarrhea are the urban crash dwellers and the people that live in rural areas (mainly children) because they are the ones who are most likely to get the disease and least likely to receive treatment (Paudyal, 1993). They lack knowledge about the causes and treatments, and they have limited access to health care. The sanitation in the areas where they live is also very poor. Child Mortality Data from the 2007 BDHS show that under-five mortality (88 deaths per 1000 live births) has continued to decline thanks primarily to the substantial decline (20 percent) in child mortality (age 1-4 years) over the past five years. However, this still means that for the most recent five-year period, one in every Bangladesh children dies before reaching the first birthday (65 death per 1000 live birth) A majority of infant deaths occur during the first month of life (neonatal mortality). Overall for all children under five, the two most important causes of death were: possible serious infections (31 percent) including possible ARI and diarrhea and ARI (21 percent). Which particularly affect children age 1-11 months.

Objective of the Study

The main aim of the study is to find the child morbidity for the cause of various disease such as acute respiratory infection (ARI) and diarrhea. Also analysis the levels and patterns of the child illnesses in Bangladesh. The specific objectives of this study are as follows:

1. To investigate the levels of illnesses of children under five years
2. To examine the associations between children illnesses and available background characteristics.
3. To examine the effect of different explanatory variables on child illnesses.

II. Data collection and Methodology

The study uses a secondary data of which the source in Bangladesh demographic and health survey (BDHS), 2007. The survey was conducted under the authority of the National Institute of Population Research and Training (NIPORT) of the ministry of health and family welfare. Mitra and associates a private research firm implemented the survey. A total of 6150 children aged under five years were included in the analysis. Administratively, Bangladesh is divided into six divisions. In turn, each division is divided into zilas, and in turn each zilas into upazilas. Each urban area in the upzilas is divided into wards, and into mahallas within the wards; each rural area in the upzilas is divided into union parishads (UP) and into mouzas within the UP's. These divisions allow the country base a whole to the easily separated into rural and urban areas. The present study makes use of a number of statistical techniques to analysis the data whenever warranted. To explore bi-variants relationship, series of cross tabulations have run. In some cases the extend of relationship discerned from the analysis has been evaluated by some usual measures of association such as chi square and odd ratio statistics some advanced statistical techniques were employed with selected variable in order to access to contribution of each independent on the dependent variable controlling for the others.

Frequency and Percentage distribution of the Variables:

Table of Frequency distribution of socioeconomic characteristics:

Variable	Frequency	Percentage
1.Mother's education		
Illiterate	2129	27.3
Primary education	1927	31.3
Secondary & Above	2094	41.4
Total	6150	100.0
2.Father's education		
Illiterate	2094	34.0
Primary	1748	28.4
Secondary	1570	25.5
Higher & Above	758	12.0
Total	6150	100.0

Table of Frequency distribution of Demographic characteristics:-

Variable	Frequency	Percentage
1.Total children ever born		
Standard		
Not standard	1543	25.1
	4607	74.9
Total	6150	100.0
2.Birth order---		
1st	2039	33.2
2nd	1596	26.0
3rd	1027	16.7
4th	1488	24.2
Total	6150	100.0
3.Mother age at birth		
12 through 16		
All others	2193	35.7
	3957	64.3
Total	6150	100.0

3.No of family member		
Standard	2871	46.7
Not standard	3279	53.3
Total	6150	100.0
4.Respondent's occupation		
Not working	4532	73.7
Working	1536	25.0
Business	82	1.3
Total	6150	100.0
5.Husband's occupation		
Not working	76	1.2
Working	4726	76.8
Business	1348	21.9
Total	6150	100.0
6.Source of drinking water		
Hygienic	5313	86.4
Unhygienic	837	13.6
Total	6150	100.0
7.Type of toilet		
Hygienic	2527	41.1
Unhygienic	3623	58.9
Total	6150	100.0
8.Economic status---		
Poor	2504	40.7
Middle	1153	18.7
Rich	2493	40.5
Total	6150	100

Table of Frequency distribution of Community characteristics:-

Variable	Frequency	Percentage
1.Type place of residence		
Urban	2107	34.3
Rural	4043	65.7
Total	6150	100.0
2.Division(Religion)		
Barisal	791	12.9
Chittagong	1275	20.7
Dhaka	1285	20.9
Khulna	714	11.6
Rajshahi	967	15.7
Sylhet	118	18.2
Total	6150	100.0
3.Religion---		
Islam	5609	91.2
Others	541	8.8
Total	6150	100.0

Table of Frequency distribution of Psychological characteristics:-

Variable	Frequency	Percentage
1.Sex of child		
Male	3118	50.7
Female	3032	49.3
Total	6150	100.0
2.Access to mass media-		
No access	2355	38.3
Limited access	2544	41.4
Access	1251	20.3
Total	6150	100.0
3.Belong to organization		
No	3920	63.7
Yes	2230	36.2
Total	6150	100.0

Table of Frequency distribution of Dependent characteristics:-

Dependent variable	Frequency	Percentage
ARI		
No	3669	59.7
Yes	2481	40.3
Total	6150	100.0
Diarrhoea		
No	5203	84.6
Yes	947	15.4
Total	6150	100.0

Statistical Analysis & Comments:

A chi-square test is a statistical test commonly used for testing independence and goodness of fit. Testing independence determines whether two or more observations across two populations are dependent on each other. In both cases the equation to calculate the chi-square statistic is

$$X^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i}$$

Where, Oi =the observed frequency and E_i = the expected frequency and n= the number of cells.

Bvariate effect of ARI into different independent variables:

Background characteristics	Level	Acute Respiratory Infection		Total
		No	Yes	
Type of place of Residence	Urban	1314(62.4%)	793(37.6%)	2107
	Rural	2355(58.2%)	1688(41.8%)	4043
	Chi-squire=9.74	d.f.=1	P value=.002	6150
Sex of child	Male	1851(59.4%)	1267(40.6%)	3114
	Female	1818(60.0%)	1214(40.0%)	3032
	Chi-squire=.226	d.f.=1	P value=.034	6150
Division (Region)	Barisal	453(57.3%)	338(42.7%)	791
	Chittagong	730(57.3%)	545(42.7%)	1275
	Dhaka	801(62.3%)	484(37.7%)	1285
	Khulna	501(70.2%)	213(29.8%)	714
	Rajshahi	582(60.2%)	385(39.8%)	967
	Sylhet	602(53.8%)	516(46.2%)	1118
	Chi-squire=57.33	d.f.=5	P value=.000	6150
Father's education	Illiterate	1224(58.6%)	866(41.4%)	2094
	Primary	978(55.9%)	770(44.1%)	1748
	Secondary	962(61.3%)	608(38.7%)	1570
	Higher & Above	501(67.9%)	237(32.1%)	738
	Chi-squire=33.35	d.f.=3	P value=.000	6150
Mother's education	Illiterate	964(57.7%)	712(42.5%)	1676
	Primary	1120(58.1%)	807(41.9%)	1927
	Secondary & Above	1583(62.2%)	961(37.8%)	2547
	Chi-squire=12.04	d.f.=2	P value=.002	6150
Age of mother at birth	12 through 16	1283(58.5%)	910(41.5%)	2193
	16+year	2386(60.3%)	1571(39.7%)	3957
	Chi-squire=1.89	d.f.=1	P value=.170	6150
Access to mass media	No access	1354(57.5%)	1001(42.5%)	2355
	Limited access	1542(60.6%)	1002(39.4%)	2544
	Access	773(61.8%)	478(38.2%)	1251
	Chi-squire=7.91	d.f.=2	P value=.019	6150
Economic status	Poor	1408(56.2%)	1096(43.8%)	2504
	Middle	677(58.7%)	476(41.3%)	1153
	Rich	1584(63.5%)	909(36.5%)	2493
	Chi-squire=28.24	d.f.=2	P value=.000	6150
Source of drinking water	Hygienic	3170(59.7%)	2143(40.3%)	5313
	Unhygienic	499(59.6%)	338(40.4%)	837
	Chi-squire=.979	d.f.=1	P value=.001	6150
Type of toilet facility	Hygienic	1565(61.9%)	962(38.1%)	2527
	Unhygienic	2104(58.1%)	1519(41.9%)	3625
	Chi-squire=9.205	d.f.=1	P value=.002	6150

III.   Comments:

According to the table the highest prevalence of ARI is found in Sylhet (46.2 percent) and the lowest is at Khulna (29.8 percent). ARI is more common in rural areas than urban areas while there is statistically significant association between prevalence of ARI and place of residence. The prevalence of ARI varies according to the place of residence where their mother was born. 41.8 percent of children whose mother have rural childhood background are repeated to have had symptoms of respecter illness and it is 37.6 percent of the children of mother who was born in urban areas. Mother's educations have statistical significance effect on prevalence of ARI. ARI prevalence is found to be highest among children of mothers who have primary level education and lowest for children of mothers who have above primary education. The prevalence of ARI also

varies with respect to father's characteristic. According to table it is revealed that the higher education levels of father, the lower the prevalence of ARI. ARI prevalence is the lowest for children of father whose occupation is service. ARI is less common for children of mother's who are related to any media. The ARI prevalence is less common among the children of working respondent. Also from table we see that the higher wealth index of respondent, the lower the prevalence of ARI found among their children. The percentage of children with ARI is 36.9 percent found among rich women compared to 43.6 percent found among poor women.

Source of drinking water have effect on the prevalence of ARI among children under five year. The percentage of acute respiratory infected children whose households use unsafe water is higher than that of children whose household use safe water by 40.3 percent. The prevalence of ARI varies by the type of toilet facility. 38.1 percent children whose household use modern toilet are reported to have had symptoms of repertory illness and the household who use pit on open toilet have 41.9 percent of children with ARI. ARI is less common among female children and among children over 24 months old. ARI is also lower among children whose mother gives their first child at 20 years and above.

Bivariate effect of Diarrhoea into different independent variables:

Background characteristics	Level	Diarrhoea		Total
		No	Yes	
Type of place of Residence	Urban	1796(85.2%)	311(14.8%)	2107
	Rural	3407(84.3%)	636(15.7%)	4043
	Chi squire=1.002	d.f.=1	P value=.317	6150
Division (Region)	Barisal	678(85.7%)	113(14.8%)	791
	Chittagong	1061(83.2%)	214(16.8%)	1275
	Dhaka	1091(84.9%)	194(15.1%)	1285
	Khulna	621(87.0%)	93(13.0%)	714
	Rajshahi	844(87.3%)	123(12.7%)	967
	Sylhet	908(81.2%)	210(18.8%)	1118
	Chi-squire=20.79	d.f.=5	P value=.001	6150
Father's education	Illiterate	1738(83.0%)	356(17.0%)	2094
	Primary	1453(83.1%)	295(16.9%)	1748
	Secondary	1336(85.1%)	234(14.9%)	1570
	Higher & Above	676(91.6%)	62(8.4%)	738
	Chi-squire=35.09	d.f.=3	P value=.000	6150
Mother's education	Illiterate	1385(82.6%)	291(17.4%)	1676
	Primary	1604(83.2%)	323(16.8%)	1927
	Secondary and Above	2211(86.9%)	333(13.1%)	2544
	Chi-squire=18.12	d.f.=2	P value=.000	6150
Sex of child	Male	2606(83.6%)	512(16.4%)	3118
	Female	2597(85.7%)	4135(14.3%)	3032
	Chi-squire=5.08	d.f.=1	P value=.024	6150

Age of mother at birth	12 through 16	1832(83.5%)	361(16.5%)	2193
	16+year	3371(85.2%)	586(14.8%)	3957
	Chi-squire=2.96	d.f.=1	P value=.086	6150
Access to mass media	No access	1967(83.5%)	388(16.5%)	2355
	Limited access	2168(85.2%)	376(14.8%)	2544
	Access	1068(85.4%)	183(14.6%)	1251
	Chi-squire=3.41	d.f.=2	P value=.181	6150
Economic status	Poor	2097(83.7%)	407(16.7%)	2504
	Middle	952(82.6%)	201(17.4%)	1153
	Rich	2154(86.4%)	339(13.6%)	2493
	Chi-squire=11.27	d.f.=2	P value=.004	6150
Source of drinking water	Hygienic	4490(84.5%)	823(15.5%)	5313
	Unhygienic	713(85.2%)	124(14.8%)	837
	Chi-squire=.253	d.f.=1	P value=.001	6150
Type of toilet facility	Hygienic	2156(85.3%)	371(14.7%)	2527
	Unhygienic	3047(84.1%)	5761(15.9%)	3623
	Chi-squire=1.692	d.f.=1	P value=.193	6150

Comments: According to the response of the respondent the children of Sylhet division are more affected by diarrhea than all other divisions. And it is followed by Chittagong, Khulna, Rajshahi, Sylhet and Dhaka. The prevalence of diarrhea decreases with the increases of mother's education. Economic status of the respondent is found to have negative association with their child illness due to diarrhea. Diarrheas are reported on 42.4% found among poor respondent which gradually decreases to 37.0% found among rich respondent. Diarrhea is more common among male children than female children and also among children aged below 25 months. There exist little variations in the percentage of children who had diarrhea with respect to age of mother at first birth. Diarrhea prevalence is more common among children of respondent who have became mother in the teenage and among children of respondent whose households use open latrine. There exist statistically significant relation association between father's education and prevalence of diarrhea among their children who have had diarrhea. The percentage of children whose father has no education is higher by 17.0% than that of children of father having above primary education. It is seen that father's education is more effective variable than mother's education in this case.

Diarrhea prevalence is less common among children of father who works in service occupation. Urban-Rural comparison reveals that diarrhea is more common in rural areas than that of urban areas. But on the basis of childhood place of respondent we get the opposite result. The respondents who are accessed to any mass media can safe their children from effect of diarrhea compared to the others. And also those who use safe water and modern toilet facility can safe their children from the illness of diarrhea compared to other respective counterparts.

Logistic Regression Analysis:

Logistic regression model is useful to find the best fitting and most parsimonious, yet biologically reasonable model to describe the relationship between an outcome (dependent or response variable) and a set of independent (predictor or explanatory) variables.

For a single variable, the logistic regression model is of the form

$$\text{Prop (event)} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x)}}$$

Where β_0 and β_1 are the regression co-efficient estimated from the data, x is the independent variable and e the base of natural logarithm.

For more than one independent variable, the model assumes the form

$$\text{Prop (event)} = \frac{1}{1 + e^{-z}}$$

Where $z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots + \beta_P X_P$

The model is to be written in terms of the log odds of event occurring. This is called logit;

$$\ln\left(\frac{prob(event)}{prob(noevent)}\right) = \beta_0 + \beta_1 X_1 + \ldots\ldots\ldots + \beta_P X_P$$

Here we consider, the absence of diarrhea among children is coded as 0 and the presence of diarrhea is coded as1

Regression co-efficient (β) and odds ratios (Exp (β)) of ARI by background variables

Background variables	β	Sig.	Exp(β)
Type of place of residence			
Urban	.030	.625	.970
Rural(RC)	----	.----	1.00
Division			
Barisal	-.167	.083	.846
Chittagong	-.106	.206	.899
Dhaka	-.328	.000	.720
Khulna	-.668	.000	.513
Rajshahi	-.250	.006	.779
Sylhet	----	----	1.00
Father's education			
Illiterate	.223	.045	1.250
Primary	.375	.000	1.455
Secondary	.219	.026	1.245
Higher	----	----	1.00

Mother's education			
Illiterate	-.020	.804	.980
Primary	-.002	.979	.998
Secondary and Higher	-----	-----	1.00
Access to mass media			
No access	-.036	.661	1.265
Limited access	.021	.774	1.021
Access	----	----	1.00
Type of toilet facility			
Hygienic	-.028	.641	.972
Unhygienic	----	----	1.00
Economic status			
Poor	.225	.006	1.252
Middle	.131	.112	1.140
Rich	----	----	1.00

RC = Reference Category
*Significance at the p-value of 0.01
**Significance at the p-value of 0.05

Comments: From the results, it appears that the region has influence on the prevalence of ARI. Children in Barisal and Chittagong are 84.6 percent and 89.9 percent higher ill with ARI than children in Sylhet. These analyses reveal that the children whose fathers are illiterate are 1.25times more likely to have had ARI than whose fathers have higher education. Among the children of father who have primary and secondary education are 1.455 and 1.245 times more likely to have ARI than whose fathers have higher education. The respondents who use hygienic toilet, the prevalence of ARI is .028 times less than the respondents who use unhygienic toilet and The respondents who have no Access to mass media, the prevalence of ARI is 1.265 times more than the respondents who have Access to mass media. Economic status is an important variable which determine the child illness with ARI. From the logistic regression it is clear that there exists a negative association between economic status and ARI. The prevalence of ARI in poor children is 1.252 times more likely than rich children.

Regression co-efficient (β) and odds ratios (Exp (β)) of diarrhea by background variables:

Background variables	β	Sig.	Exp(β)
Division			
Barisal	-.307	.020	.736
Chittagong	-.107	.329	.898
Dhaka	-.262	.021	.769
Khulna	-.384	.006	.681
Rajshahi	-.413	.001	.662
Sylhet	----	-----	1.00
Father's education	.608	.000	1.836
Illiterate	.655	.000	1.925
Primary	.575	.000	1.778
Secondary	----	-----	1.00
Higher			
Mother's education	.045	.680	1.046
Illiterate	.060	.535	1.062
Primary	-----	-----	1.00
Secondary and Higher			
Sex of child	.164	.022	1.178
Male	---	----	1.00
Female			
Respondent's occupation	.781	.069	2.183
Not working	.888	.040	2.430
Working	-----	-----	1.00
Business			

Comments: From the results, it appears that region has influence on the prevalence of Diarrhea. Children in Barisal and Chittagong are 73.6 percent and 89.8 percent higher ill with Diarrhea than children in Sylhet. The analysis reveals that the children whose father is illiterate are 1.836 times more likely to have diarrhea than the

children whose fathers have secondary and higher education. Among the children of father who have primary education, the risk of having been diarrhea in 92.5 percent higher than reference category (RC).

The children whose mother was illiterate are 1.046 times more likely to have diarrhea then children whose mother has secondary and higher education. The analysis shows that respondent's occupation is one of the strongest determinants of diarrhea. For respondent occupation it is 2.183 time higher for not working and 2.430 for working than business. The risk of occurring diarrhea is 17.8 percent higher among the male children than the female children.

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