An Evidence of Socio-Demographic Effects on Child's Diarrhoea in Bangladesh

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Abstract **Background:** Children are the most vulnerable and high risk group in the prevalence of diarrhea in low income countries like Bangladesh. This can lead to the higher rate of child morbidity and mortality. Achievement of Millennium Development Goal's (MDGs) at a target period, it is important to comprise the issue first. Therefore, the purpose of the present study is to find out the risk factors of diarrhea in the childhood. **Methods:** Data and necessary information of 485 women were obtained from the Bangladesh Demographic and Health Survey (BDHS), 2007. These 485 women were extracted from 10,996 women whose children had experienced an episode of diarrhea in the two weeks before the survey. The chi-square test and binary logistic regression analyses have been used as the statistical tools. **Results:** Majority of the women (76.9%) reported their child had experienced diarrhea in the last two weeks. Respondent's educational level, husband occupation, living condition, birth interval and the sources of drinking water were found to be significantly associated (p<0.05) with the disease of diarrhea. Finally, binary logistic model identified that respondents' husband occupation, their living condition, birth interval and the source of drinking water were significant factors. **Conclusions:** The prevalence of diarrhea disease is more common in Bangladeshi children. So, it is necessary to educate general people about the possible living arrangements for avoiding diarrhea and its termination.

Keywords Diarrhoea, Children, Morbidity, Binary logistic model, Bangladesh

1. Introduction

Diarrhoea is the passage of three or more loose or liquid stools per day from the body of human. It is usually a symptom of gastrointestinal infection and entero toxigenic Escherichia coli (ETEC), Shigella, Salmonella, and Campylobacter bacteria have been reported as a causative agent [1, 2]. It can be recognized by four clinical features, each reflecting the basic underlying pathology and altered physiology. These clinical features are acute watery diarrhoea, acute bloody diarrhoea, persistent diarrhoea and diarrhoea with severe malnutrition of which 50% of worldwide cases of the condition present with watery diarrhoea [3, 4]. Approximately, 35% are persistent diarrhoea and 15% dysentery diarrhoea with blood stains [5]. It is one of the major factors that contribute significantly to high child morbidity and mortality in the world. Annually, there are about two billion cases of diarrheal disease worldwide and 1.9 million children younger than 5 years of age suffer from diarrhea each year, mostly in developing countries [3]. More than 5000 children are dying every day as a result of diarrheal diseases

[6]. It is well known that diarrhoeal disease is one of the leading causes of illness and death in children in Bangladesh. One third of the total child death and an average of 4.6 children suffers in rural areas from which 2,30,000 children death due to diarrhea in each year of Bangladesh [7].

Insufficient facility of safe drinking water, sanitation and hygiene, as well as poorer overall health and nutritional status in Bangladesh lead to the more prevalence of Diarrhoea. According to the latest available figures, an estimated 2.5 million people lack improved sanitation facilities, and nearly one million people do not have access to safe drinking water [8]. These unsanitary environments allow diarrhoea-causing pathogens to spread more easily [9]. Although food contamination is another major route for the transmission of diarrhea especially, under the hygienic conditions prevailing in a rural setting [1]. Various studies reported that the source of diarrhoea transmission was either water or food [10].

Children are the leader of the future and their growth and development has strong reflection on the future of a country [11]. But, they are considered as the most vulnerable worldwide because they are prone to common illnesses and are likely to get repeated infections due to their weak immune systems. Their health care considered as the integral part of a country's overall development and health system. This awareness had reflected the large number of growing researches in the country [12-14]. An improvement of child

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health and reduce mortality under five children in Bangladesh are more important for the fulfillment of MDGs. This issue can lead the researchers to identify as well as what factors are associated with child morbidity and mortality due to diarrhoeal epidemic. This study also helps policy planners and interest persons in national and international levels. Therefore, in present study, an attempt has been made to investigate the differentials pattern of diarrhoea according to socio-demographic variables and find out the most important determinants.

Table 1. Percentage distribution of the women whose children were experienced an episode of diarrhoea in the last two weeks before the survey and some selected socio-demographic independent variable

Characteristic	Frequency	Percent (%)
Still has diarrhoea		
No	373	76.9
Yes	112	23.1
Respondents education		
Primary	300	61.9
Secondary	164	33.8
Higher	21	4.3
Husband occupation		
Service	12	2.5
Business	97	20.0
Farmer	124	25.6
Day labor	245	50.5
Unemployed	7	1.4
Living condition		
Poor	196	40.4
Middle	106	21.9
Rich	183	37.7
Preceding Birth Interval (in month)		
≤24	74	21.6
25-36	90	26.2
≥37	179	52.2
Religion		
Islam	451	93.0
Hindu	29	6.0
Other	5	1.0
Source of drinking water		
Tubewell	383	79.0
Tap	40	8.2
Pond	11	2.3
Others	51	10.5

2. Data and Methods

The study had been used a representative set of cross-sectional data extracted from the Bangladesh Demographic and Health Survey (BDHS), 2007 [15]. The survey was conducted under the authority of National Institute of Population Research and Training (NIPORT) of Ministry of Health and Family Welfare, Bangladesh. It was designed to produce representative results for the country as a whole, for both urban and rural areas separately, and for each of the six administrative divisions of country. Primary sampling units (PSU) for the survey was based on

enumeration areas (EAs) from the population census 2001. Data collection took place over a five month period from March, 24 to August, 2007 and total of 10,996 respondents were interviewed. Among of these only 485 respondents were included in this study based on the experienced an episode of diarrhoea in the last two weeks before the survey. In this study, frequency distribution, contingency analysis and binary logistic analysis had been employed. For binary logistic model, dependent variables were coded women whose children are affected by diarrhoea as one (1) and if not then coded as zero (0). This study includes five explanatory variables with categories shown in the parenthesis, viz. respondents education (1=primary, 2=secondary, 3=higher), husband occupation (1=service, 2=business, 3=farmer, 4=day labor, 5=unemployment), living condition (1=poor, 2=middle, 3=rich), preceding birth interval (1= ≤24 month, 2=25-36 month, 3= ≥37 month), sources of drinking water (1=Tubewell, 2=tap, 3=pond, 4=others. The Statistical Package for Social Sciences version 16.0 (SPSS Inc, Chicago, IL, USA) was used for statistical analysis.

3. Results

Table 2. Distributions of selected socio-demographic variables on the basis of child's still had diarrhoea in last two weeks before the survey

Characteristics	Still had diarrhoea		Total (%)	ρ - value
	No (%)	Yes (%)		
Respondents education				
Primary	231(61.9)	69(61.6)	300(61.9)	
Secondary	124(33.2)	40(35.7)	164(33.8)	0.037
Higher	18(4.8)	3(2.7)	21(4.3)	
Husband occupation				
Service	10(2.7)	2(1.8)	12(2.5)	
Business	78(20.9)	19(17.0)	97(20.0)	
Farmer	98(26.3)	26(23.2)	124(25.6)	
Day labor	181(48.5)	64(57.1)	245(50.5)	0.043
Unemployed	6(1.6)	1(0.9)	7(1.4)	
Living condition				
Poor	146(39.1)	50(44.6)	196(40.4)	
Middle	83(22.3)	23(20.5)	106(21.9)	
Rich	144(38.6)	39(34.8)	183(37.7)	0.005
Preceding birth Interval (in month)				
≤24	50(19.0)	24(30.0)	74(21.6)	
25-36	72(27.4)	18(22.5)	90(26.2)	0.009
≥37	141(53.6)	38(47.5)	179(52.2)	
Religion				
Islam	346(92.8)	105(93.8)	51 (93.0)	
Others	27(7.2)	6(6.2)	29(7.0)	0.937
Source of drinking water				
Tube well	301(80.7)	82(73.2)	383(79.0)	
Tap	24(6.4)	16(14.3)	40(8.2)	
Others	48(12.9)	14(12.5)	62(12.8)	0.0066

The frequency distribution of the child still have diarrhoea

or not by some selected socio-demographic and economic characteristics of the respondents are presented in Table 1. Results revealed that more than three fourth (76.9%) of the total child had diarrhoea. Most of the respondents were primary educated (61.9%) and day labour (50.5%). About 40.4% of the children grew up with poor living condition and about half of them (52.2%) born with more than three years interval ($\geq$ 37 month). Three fourth of the respondents used Tubewell (79.0%) and only 2.3% used pond as a source of daily used water.

The determination of association between dependent variable (still had diarrhea before last two weeks of the survey) and independent variables, chi-square ($\chi2$) test analysis was used. The $\chi2$ test results in Table-2 revealed that child mothers education, fathers occupation, their living condition and birth interval and the sources of drinking water were significantly associated ($p<0.05$) with the prevalence of diarrhoea of child.

Thereafter, the logistic regression analysis was utilized to assess the net effects of independent variables on prevalence of child diarrhoea. In this analysis, all the independent variables were coded in dummy coding scheme. Odds ratio (OR) had been used to compare different groups with 95% confidence interval (CI) presented in Table 3.

Out of five independent variables, four, viz. child fathers occupation, their living condition and birth interval and the sources of drinking water were identified as the significant predictors.

Respondents whose husband were farmer they had 3.138 times (OR=3.138, 95% CI=1.368-13.426) more prevalence of child diarrhoea as compared to the respondents whose husband were service holders. Again, respondents in rich living condition were 58.8% (OR=0.412, 95% CI = 0.192-0.887) less prevalence of child diarrhoea as compared to the children with poor living condition. Similar result was also observed among the respondents whose birth intervals were greater than two and three years. Respondents of birth interval >2 years were 46.00% (OR=0.540, 95% CI=0.257-1.135) and 48.40% (OR=0.516, 95% CI=0.273-0.976) less prevalence of child diarrhoea as compared to the respondents belonging birth interval with $\leq$2 years ($\leq$ 24 month) birth interval. Sources of drinking water had the greatest impact of the prevalence of child diarrhoea and the respondents had used pond as a sources of drinking water had 4.649 times (OR = 4.649, 95% CI=1.634-13.225) more prevalence of diarrhoea as compared to the respondents who used pond as a sources of drinking water.

Table 3. Logistic regression analysis for the effects of socio-demographic variables on children still had diarrhoea in last two weeks before the survey

Characteristics	Coefficient (β)	S.E. of estimates (β)	Significant (ρ)	Odds ratio(OR)	95% CI of OR
Respondents education					
Primary®				1.000	
Secondary	0.420	0.313	0.179	1.522	0.824-2.809
Higher	-0.853	1.001	0.394	0.426	0.060-3.030
Husband occupation					
Service®				1.000	
Business	-1.790	1.185	0.131	0.167	0.016-1.703
Farmer	1.983	1.203	0.099***	3.138	1.368-13.426
Day labor	1.761	1.185	0.137	3.072	0.268-46.949
Unemployed	1.505	1.687	0.373	2.722	1.021-12.461
Living condition					
Poor®				1.000	
Middle	-0.440	0.363	0.225	0.644	0.316-1.311
Rich	-0.886	0.391	0.023**	0.412	0.192-0.887
Preceding birth interval (in month)					
$\leq$ 24 ®				1.000	
25-36	-0.615	0.379	0.104***	0.540	0.257-1.135
$\geq$ 37	-0.661	0.325	0.042**	0.516	0.273-0.976
Source of drinking water					
Tube well®				1.000	
Tap	1.537	0.533	0.004*	4.649	1.634-13.225
Others	0.176	0.859	0.838	1.192	0.221-6.425
Constant	1.187	1.210	0.326	3.277	
-2 log likelihood			353.597		
Model chi-square			19.008		
d.f.			15		

*Significant at ρ <0.01, **Significant at ρ <0.05, *** Significant at ρ <0.1

Note: ® means reference category.

4. Discussion

Diarrhoea is one of the most important causes of death among infants in developing countries like Bangladesh [16]. A systematic review of the research suggested that such an association is more likely to occur among low socio-economic groups, less empowered and under-nutrized infants of women. Educational attainment of the respondents is an important item in the study of child's still has diarrhoea. The prevalence of diarrhoea was more among the child whose mother was uneducated or only primary educated. Some others previous studies also had demonstrated the similar result [16, 12]. Similarly, occupation of husband is one of the vital events of child's still has diarrhoea. As a religious restricted country, family income status in Bangladesh mainly depends on husband income [17]. If the income is sufficient than obliviously life style will be more improved and lower prevalence of diarrhoea. By supporting the previous study [18, 12, 19], it had concluded that higher percentage of diarrhoea prevalence among the family with earning sources were day labour. It was notified that upper qualities of the asset index, which represents children in families in the group of highest living status had the low prevalence of diarrhea [18, 12]. Preceding birth interval is the key item in the study of child's still had diarrhoea. Children who were born with more preceding birth intervals were physically more cable to prevent the morbidity [18]. Present study and similar others previous studies also supported this argument [20, 21, 12]. Another major cause of diarrhoea is the sources of drinking water. By supporting the previous many others studies, the present study revealed that safe water reduce the chance of having diarrhoea [22, 21, 12].

5. Conclusions

In our study, high prevalence of diarrhoea are suspected and reported in Bangladesh. The authors recommend that the frequent nutritional surveys and targeting persons are displaced to better understand the causes of diarrhea. In addition, higher birth interval, increasing the female education, living condition, community health facilities and ensure the sources of safe drinking water are also important to reduce the prevalence of diarrhoea.

REFERENCES

[1]   Khatun A, Rahman SS, Rahman H, Hossain S (2013). A Cross Sectional Study on Prevalence of Diarrhoeal Disease and Nutritional Status Among Children Under 5-Years of Age In Kushtia, Bangladesh. *Science Journal of Public Health,* 1(2): 56-61.4566.

[2]   WHO (1999). Selected publications and documents on diarrhoeal diseases (including cholera), 1999. url:http//www. who.int/aboutwho/en/preventing/preventing.h tm.

[3]   Onyango and Angienda (2010). Epidemiology of Waterborne Diarrhoeal Diseases among Children Aged 6-36 Months Old in Busia, Western Kenya. *International Journal of Biological and Life Sciences,* 6:2-12.

[4]   Onyango DM, Angienda PO (2012). Epidemiology of Waterborne Diarrhoeal Diseases among Children Aged 6-36 Months Old in Busia - Western Kenya. *World Academy of Science, Engineering and Technology.*, 4: 984-991.

[5]   WHO (2002). Justin DeNormandie and Janette Sunita. Combating diarrhoeal disease in India through safe drinking water, Population Services. international, Delhi,2000, http://www.who.int/mdiacenter/2002/ind_sanitation/en/print. html.

[6]   Farthing M, Salam M, Lindberg G, Dite P et. al., (2012). *Acute diarrhea in adults and children: a global perspective.* Bulletin of World Gastroenterology Organisation.

[7]   Piechulek H, Sabbir AA, Aldana MJ (2003). Diarrhea and ARI in Rural Areas of Bangladesh. *Southeast Asian Journal of Tropical Medicine and Public Health,* 34(2): 337-342.

[8]   Sumon MNK (2014). Differentials and Determinants of Early Marriage and Child Bearing: A study of the Northern Region of Bangladesh. *International Journal of Scientific Footprints,* 2(1): 52–65.

[9]   UNICEF & WHO (2009). Why Children are Still Dying and What Can Be Done. *United Nations Children's Fund (UNICEF)* New York, USA and World Health Organization (WHO), Geneva, Switzerland.

[10] Black RE, Morris SS, Bryce J (2003). Where and why are 10 million children dying every year?. *Lancet,* 361: 2226-34.

[11] Gulati JK (2010). Child Malnutrition: Trends and Issues. *Anthropologist,* 12(2):131-140.

[12] Kandala NB, Ji C, Stallard N, Stranges S, Cappuccio FP (2007). Spatial Analysis of Risk Factors for Childhood Morbidity in Nigeria. *The American Society if Tropical Medicine and Hygiene,* 77(4):770-778.

[13] Bodai KO, Kuitunen M (2005). Childhood Diarrheal Morbidity in the Accra Metropolitan Area, Ghana: Socio-Economic, Environmental and Behavioral Risk Determinants. *Journal of Health & Population in Developing Countries,* 7(1):15-22.

[14] Mekasha A, Tesfahun A (2003). Determinants of diarrhoeal diseases: A Community Based Study in Urban South Western Ethiopia, *East African Medical Journal*, 80 (2): 77-82.

[15] National Institute of Population Research and Training (NIPORT), Mitra and Associates & Macro International. Bangladesh Demographic and Health Survey 2007. Dhaka, Bangladesh and Calverton, Maryland, USA, 2009.

[16] Boschi-Pinto C, Velebit L, Shibuya K (2008). Estimating child mortality due to diarrhea in developing countries. *Bull World Health Organ.*, 86: 710-17.

[17] Khan MN, Mondal MNI, Hoque N,Islam MS, Shahiduzzaman M (2014). A Study on Quality of Life of Elderly Population in Bangladesh. *American Journal of Health Research.*, 2(4):152-157.

[18] Gausia K, Fisher C, Ali M, Oosthuizen J (2009). Magnitude and contributory factors of postnatal depression: A community-based cohort study from a rural sub-district of Bangladesh. *Psychol Med*, 39: 999-1007.

[19] Rahman A, Iqbal Z, Bunn J, Lovel H, Harrington R (2004). Impact of maternal depression on infant nutritional status and illness: A cohort study. *Arch Gen Psychiatry*, 61: 946-52.

[20] Gausia K, Hamadani JD, Islam MM, et al (2007). Bangla translation, adaptation and piloting of Edinburgh Postnatal Depression Scale. *Bangladesh Med Res Counc Bull.*, 33: 81-87.

[21] Rahman A, Bunn J, Lovel H, Creed F (2007). Maternal depression increases infant risk of diarrheal illness: A cohort study. *Arch Dis Child.*, 92: 24-28.

[22] Gausia K, Fisher C, Algin S, Oosthuizen J (2007). Validation of the Bangla version of the Edinburgh Postnatal Depression Scale for a Bangladeshi sample. *J Reprod Infant Psychol*, 25: 308-317.