Sarker, Abdur Razzaque and Sultana, Marufa and Mahumud, Rashidul Alam and Sheikh, Nurnabi and Van Der Meer, Robert and Morton, Alec (2016) Prevalence and health care–seeking behavior for childhood diarrheal disease in Bangladesh. Global Pediatric Health, 3 (1). pp. 1-12. ISSN 2333-794X , http://dx.doi.org/10.1177/2333794X16680901

Global Pediatric Health
Volume 3: 1–12

DOI: 10.1177/2333794X16680901
gph.sagepub.com
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Prevalence and Health Care–Seeking Behavior for Childhood Diarrheal Disease in Bangladesh

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Abstract

In Bangladesh, the burden of diarrheal diseases is significant among children <5 years old. The objective of this study is to capture the prevalence of and health care–seeking behavior for childhood diarrheal diseases (CDDs) and to identify the factors associated with CDDs at a population level in Bangladesh. We use a logistic regression approach to model careseeking based on individual characteristics. The overall diarrhea prevalence among children <5 years old was found to be 5.71%. Some factors found to significantly influence the health care–seeking pattern were age and sex of the children, nutritional score, age and education of mothers, wealth index, and access to electronic media. The health care service could be improved through working in partnership with public facilities, private health care practitioners, and community-based organizations, so that all strata of the population get equitable access in cases of childhood diarrhoea.

Keywords

Bangladesh, care seeking, childhood diarrhea, incidence, prevalence

Received October 5, 2016. Accepted for publication October 11, 2016.

Introduction

Diarrheal disease is a major threat to human health and still a leading cause of mortality and morbidity worldwide.[1] Globally, 1.5 million deaths and nearly 1.7 billion diarrheal cases occurred every year.[2] It is also the second leading cause of death in children <5 years old and is responsible for the death of more than 760 000 children every year worldwide.[3] In the latest UNICEF report, it was estimated that diarrheal diseases constituted 9% of all deaths among children <5 years old in 2015.[4] Although the burden of diarrheal diseases is much lower in developed countries, it is an important public health problem in low- and middle-income countries because the disease is particularly dangerous for young children, who are more susceptible to dehydration and nutritional losses in those settings.[5] In Bangladesh, the burden of diarrheal diseases is significant among children <5 years old.[6] Global estimates of the mortality resulting from diarrhea have shown a steady decline since the 1980s. However, despite all advances in health technology, improved management, and increased use of oral rehydration therapy, diarrheal diseases are also still a leading cause of public health concern.[7] Moreover, morbidity caused by diarrhea has not declined as rapidly as mortality, and global estimates remain at between 2 and 3 episodes of diarrhea annually for children <5 years old.[8] There are several studies assessing the prevalence of childhood diarrhea in children <5 years of age. However, in Bangladesh, information on the age-specific prevalence rate of childhood diarrhea is still limited, although such studies are vital for informing policies and allowing international comparisons.[9,10]

Clinically speaking, diarrhea is an alteration in a normal bowel movement characterized by an increase in the

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water content, volume, or frequency of stools.[11] A decrease in consistency (ie, soft or liquid) and an increase in the frequency of bowel movements to ≥3 stools per day have often been used as a definition for epidemiological investigations. Based on a community-based study perspective, diarrhea is defined as at least 3 or more loose stools within a 24-hour period.[12] A diarrheal episode is considered as the passage of 3 or more loose or liquid stools in 24 hours prior to presentation for care, which is considered the most practicable in children and adults.[13] However, prolonged and persistent diarrhea can last between 7 and 13 days and at least 14 days, respectively.[14,15] The disease is highly sensitive to climate, showing seasonal variations in numerous sites.[16] The climate sensitivity of diarrheal disease is consistent with observations of the direct effects of climate variables on the causative agents. Temperature and relative humidity have a direct influence on the rate of replication of bacterial and protozoan pathogens and on the survival of enteroviruses in the environment.[17]

Health care seeking is recognized to be a result of a complex behavioral process that is influenced by several factors, including socioeconomic and demographic and characteristics, perceived need, accessibility, and service availability.[18-20] The patterns of care-seeking behavior also depend on the quality of health care providers, effectiveness, convenience, opportunity costs, and quality service.[21-24] In addition, symptoms of illness, duration, and an episode of illness as well as age of the sick person can be important predictors of whether and where people seek care during illness.[25-27] Therefore, it is important to identify the potential factors related to care-seeking behavior during childhood diarrhea because without proper treatment, it can lead to death within a very short time.[28] Although there are few studies about health care–seeking behavior for diarrheal disease in different settings, such an analysis using a nationwide sample has not been seen in this country context.[5,29,30] The objective of this study is to capture the prevalence of and health care–seeking behavior associated with childhood diarrheal diseases (CDDs) and to identify the factors associated with CDDs at a population level in Bangladesh with a view to informing policy development.

Materials and Methods

Data

This study analyzed data from the latest Demographic and Health Survey (DHS) in Bangladesh. This DHS survey is a nationally representative cross-sectional household survey designed to obtain demographic and health indicators. Data collection was done from June 28, 2014, to November 9, 2014, covering all the 7 administrative divisions of Bangladesh. With a 98% response rate, a total of 17 863 ever-married women aged 15 to 49 years were interviewed for this survey. The detailed sampling procedure has been reported elsewhere.[31] In the DHS, information on reproductive health, child health, and nutritional status were collected through the interview with women aged 15 to 49 years. Mothers were requested to give information about diarrhea episodes among children <5 years old in the past 2 weeks preceding the survey.[32] The data set is publicly available online for all researchers; however, the approval was sought from and given by MEASURE DHS (Measure Demographic and Health Survey) program office to use this data set.

Variable Description

In this study, 2 outcome variables were focused on: first, outcomes related to diarrheal diseases among children <5 years old in the past 2 weeks ("1" denoted occurrence of diarrhea for the indicated period and "0" denoted no occurrence), and second, health care–seeking behavior for diarrheal diseases, which were categorized as "No care," "Public Care" (hospital/medical college hospital/specialized hospitals, district hospital, Mothers and Child Welfare Centre, Union Health Complex, Union Health and Family Welfare Centre, satellite clinic/EPI outreach site), "Private Care" (private hospital/clinic, qualified doctors, NGO static clinic, NGO satellite clinic, NGO field worker), "Care from the Pharmacy," and "Others" (home remedy, traditional healer, village doctor herbals, etc). For capturing the health care–seeking behavior for a young child, mothers were requested to give information about where they sought advice/care during the child's illness. Nutritional index was measured by Child Growth Standards proposed by WHO (*z* score of height for age [HAZ], weight for age [WAZ], and weight for height [WHZ]) and the standard indices of physical growth that describe the nutritional status of children as stunting—that is, if a child is more than 2 SDs below the median of the WHO reference population.[33] Mother's occupation was categorized as homemaker or no formal occupation, poultry/farming/cultivation (land owner, farmer, agricultural worker, poultry raising, cattle raising, home-based handicraft), and professional. Access to electronic media was categorized as "Access" and "No Access" based on that particular household having radio/television. The source of drinking water was categorized as "Improved" (piped into a dwelling, piped to yard/plot, public tap/standpipe, tube-well or borehole, protected well, rainwater, bottled water) and "Unimproved" (unprotected well, unprotected spring, tanker truck/cart with the drum, surface

water). In this study, types of toilet facilities were categorized as "Improved" (flush/pour flush to piped sewer system, flush/pour flush to septic tank, flush/pour flush to pit latrine, ventilated improved pit latrine, pit latrine with slab) and "Unimproved" (facility flush/pour flush not to sewer/septic tank/pit latrine, hanging toilet/hanging latrine, pit latrine without slab/open pit, no facility/bush/field). Floor types were coded as "Earth/Sand" and "Others" (wood planks, palm, bamboo, ceramic tiles, cement, and carpet).

Data Processing and Analysis

After receiving the approval to use these data, data were entered, and all statistical analysis mechanisms were executed by using statistical package STATA 13.0. Descriptive statistics were calculated for frequency, proportion, and the 95% CI. Bivariate statistical analysis was performed to present the prevalence of diarrhea for different selected sociodemographic, economic, and community-level factors among children <5 years old. To determine the factors affecting childhood diarrhea and health care seeking, logistic regression analysis was used, and the results were presented as odds ratios (ORs) with 95% CIs. Adjusted and unadjusted ORs were presented for addressing the effect of single and multifactors (covariates) in the model.[34] Health care–seeking behavior was categorized as no-care, pharmacy, public/Government care, private care, and other care sources to trace the pattern of health care–seeking behavior among different economic groups. Finally, multinomial multivariate logistic regression analysis was used to examine the impact of various socioeconomic and demographic factors on care seeking behavior. The results were presented as adjusted relative risk ratios (RRRs) with 95% CIs.

Ethical Approval

We analyzed a publicly available DHS data set by contacting the MEASURE DHS program office. DHSs follow standardized data collection procedures. According to the DHS, written informed consent was obtained from mothers/caretakers on behalf of the children enrolled in the survey.

Results

Background Characteristics

A total of 6563 mothers who had children aged <5 years were included in the study. Among them, 375 mothers (5.71%) reported that at least 1 of their children had suffered from diarrhea in the 2 weeks preceding the survey. Sociodemographic characteristics of the respondents and study children are presented in Table 1. The mean age of the children was 30.04 ± 16.92 months (95% CI = 29.62, 30.45), and age of children was almost equally distributed for each age category; 52% of the children were male. Considering nutritional status measurement, 36.40%,14.37%, and 32.8% of children were found to be stunted, wasted, and underweight, respectively. Most of the children were from rural areas—4874 (74.26%)—and lived in households with limited access (44% of the total) to electronic media. The average age of the mothers was 25.78 ± 5.91 years and most of them (74%) had completed up to the secondary level of education. Most of the households had an improved source of drinking water (97.77%) and improved toilet (66.83%); however, approximately 70% households had an earth or sand floor.

Prevalence of Diarrheal Disease

The prevalence and related factors are described in Table 2. The overall prevalence of diarrhea among children <5 years old was found to be 5.71%. The highest diarrheal prevalence (8.62%) was found among children aged 12 to 23 months, followed by <1-year-old children (6.25%). The lowest prevalence of diarrhea (3.71%) was found among children aged between 36 and 47 months (see Table 2). Diarrhea prevalence was higher among male (5.88%) than female children (5.53%). Stunted children were found to be more vulnerable to diarrheal diseases (7.31%) than normal-weight children (4.80%). As regards diarrhea prevalence and age of the mothers, it was found that children of young mothers (those who were aged <20 years) suffered from diarrhea more (6.06%) than those of older mothers. In other words, as the age of the mothers increases, the prevalence of diarrheal diseases for their children falls. A similar pattern was observed with the educational status of mothers. The prevalence of diarrhea is highest (6.19%) among the children whose mothers had no formal education; however, their occupational status also significantly influenced the prevalence of diarrhea among children. Similarly, diarrhea prevalence was found to be higher in households having more than 3 children (6.02%) when compared with those having less than 3 children (5.54%) and also higher for households with more than 1 child <5 years old (6.13%). In terms of the divisions (larger administrative unit of Bangladesh), diarrhea prevalence was found to be higher (7.10%) in Barisal followed by Dhaka division (6.98%). The lowest prevalence of diarrhea was found in Rangpur division (1.81%) because this division is comparatively not as densely populated as other divisions. Based on the socioeconomic status of

Table 1. Distribution of Sociodemographic Characteristics of Mothers and Children <5 Years Old.

Variable	n (%)	95% CI
Child's age (in months)		
Mean age (mean ± SD, years)	30.04 ± 16.92	(29.62, 30.45)
<12	1207 (18.39)	(17.47, 19.34)
12-23	1406 (21.43)	(20.45, 22.44)
24-35	1317 (20.06)	(19.11, 21.05)
36-47	1301 (19.82)	(18.87, 20.80)
48-59	1333 (20.30)	(19.35, 21.30)
Sex of children		
Male	3414 (52.01)	(50.80, 53.22)
Female	3149 (47.99)	(46.78, 49.20)
Nutritional index		
Height for age		
Normal	4174 (63.60)	(62.43, 64.76)
Stunting	2389 (36.40)	(35.24, 37.57)
Weight for height		
Normal	5620 (85.63)	(84.76, 86.46)
Wasting	943 (14.37)	(13.54, 15.24)
Weight for age		
Normal	4411 (67.2)	(66.06, 68.33)
Underweight	2152 (32.8)	(31.67, 33.94)
Mother's age		
Mean age (mean ± SD, years)	25.78 ± 5.91	(25.63, 25.93)
Less than 20	886 (13.50)	(12.70, 14.35)
20-34	5140 (78.31)	(77.30, 79.29)
Above 34	537 (8.19)	(7.55, 8.88)
Mother's education level		
No education	1126 (17.16)	(16.27, 18.09)
Primary	1840 (28.03)	(26.96, 29.13)
Secondary	3004 (45.78)	(44.57, 46.98)
Higher	593 (9.03)	(8.36, 9.78)
Mothers occupation		
Home maker/No formal occupation	4651 (70.86)	(69.75, 71.95)
Poultry/Farming/ Cultivation	1117 (17.02)	(16.13, 17.95)
Professional	795 (12.12)	(11.35, 12.93)
Number of children		
Less than 3	4174 (63.60)	(62.43, 64.76)
3 And above	2389 (36.40)	(35.24, 37.57)
Number of children <5 years old		
One	4213 (64.19)	(63.02, 65.34)
Two and above	2350 (35.81)	(34.66, 36.98)
Division		
Barisal	373 (5.68)	(5.15, 6.27)
Chittagong	1398 (21.30)	(20.33, 22.31)
Dhaka	2288 (34.87)	(33.72, 36.03)
Khulna	498 (7.60)	(6.98, 8.26)
Rajshahi	676 (10.29)	(9.58, 11.05)
Rangpur	667 (10.16)	(9.46, 10.92)
Sylhet	663 (10.10)	(9.39, 10.85)
Residence		
Urban	1689 (25.74)	(24.70, 26.81)
Rural	4874 (74.26)	(73.19, 75.30)
Wealth index		
Poorest	1507 (22.96)	(21.96, 23.99)
Poorer	1224 (18.65)	(17.72, 19.61)
Middle	1277 (19.46)	(18.52, 20.44)
Richer	1305 (19.89)	(18.94, 20.87)
Richest	1250 (19.04)	(18.11, 20.01)
Access to electronic media		
Access	2901 (44.19)	(43.00, 45.40)
No access	3663 (55.81)	(54.60, 57.00)
Source of drinking water[a]		
Improved	6417 (97.77)	(97.39, 98.10)
Nonimproved	146 (2.23)	(1.90, 2.61)
Type of toilet[a]		
Improved	4386 (66.83)	(65.68, 67.96)
Nonimproved	2177 (33.17)	(32.04, 34.32)
Type of floor[a]		
Earth/Sand	4541 (69.19)	(68.06, 70.29)
Other floors	2022 (30.81)	(29.71, 31.94)
Total (n = 6563)		

[a]Categorized based on BDHS report, 2014.

the households, diarrheal prevalence was higher in the lower socioeconomic status households (see Table 2). Such a disparity was not found for type of residence. A high prevalence was observed in households that had no access to electronic media (5.91 vs 5.47) and source of drinking water (6.73 vs 5.69) and had unimproved toilet facilities (6.78 vs 5.18).

Factors Associated With Childhood Diarrhea

Table 2 shows the factors influencing diarrheal prevalence. For this purpose, 2 models were considered: using bivariate logistic regression analysis (model I) and using multivariate logistic regression analysis (model II) to control for any possible confounding effects. We used both unadjusted and adjusted ORs to address the effects of single factors. In model I, several factors such as the age of the children, age-specific height, age and occupations of the mothers, division-wise distribution, and type of toilet facilities were found to be significantly associated with the prevalence of

Table 2. Prevalence and Associated Factors of Childhood Diarrhea.[a]

Variables	Prevalence of Diarrhea, n (%)	Model I	Model II
		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Child's age (in months)			
<12	75 (6.25)	1.73*** (1.19, 2.50)	1.88*** (1.27, 2.77)
12-23	121 (8.62)	2.45*** (1.74, 3.45)	2.44*** (1.72, 3.47)
24-35	68 (5.19)	1.42* (0.97, 2.07)	1.46* (1.00, 2.14)
36-47 (reference)	48 (3.71)	1.00	1.00
48-59	62 (4.62)	1.26 (0.86, 1.85)	1.31 (0.88, 1.93)
Sex of children			
Male	201 (5.88)	1.07 (0.87, 1.31)	1.06 (0.85, 1.31)
Female (reference)	174 (5.53)	1.00	1.00
Nutritional index			
HAZ			
Normal (reference)	200 (4.80)	1.00	1.00
Stunting	175 (7.31)	1.56*** (1.27, 1.93)	1.91*** (1.48, 2.47)
WHZ			
Normal (reference)	326 (5.80)	1.00	1.00
Wasting	49 (5.18)	0.89 (0.65, 1.21)	1.05 (0.74, 1.50)
WAZ			
Normal (reference)	255 (5.79)	1.00	1.00
Underweight	120 (5.56)	0.96 (0.77, 1.20)	0.71** (0.53, 0.95)
Mother's age (years)			
Less than 20	54 (6.06)	1.64* (0.95, 2.68)	1.45 (0.81, 2.59)
20-34	300 (5.84)	1.54* (0.98, 2.42)	1.57* (0.97, 2.54)
Above 34 (reference)	21 (3.88)	1.00	1.00
Mother's education level			
No education	70 (6.19)	1.34 (0.86, 2.11)	1.04 (0.62, 1.74)
Primary	108 (5.89)	1.27 (0.83, 1.95)	1.00 (0.62, 1.61)
Secondary	169 (5.63)	1.21 (0.80, 1.83)	1.06 (0.69, 1.64)
Higher (reference)	28 (4.68)	1.00	1.00
Mother's occupation			
Homemaker/No formal occupation	298 (6.40)	1.96*** (1.39, 2.77)	1.97*** (1.38, 2.83)
Poultry/Farming/Cultivation (reference)	38 (3.37)	1.00	1.00
Professional	40 (4.98)	1.50* (0.95, 2.37)	1.53* (0.95, 2.45)
Number of children			
Less than 3 (reference)	231 (5.54)	1.00	1.00
3 And above	144 (6.02)	1.09 (0.88, 1.35)	3.00 (0.86, 1.45)
Number of children <5 years old			
One (reference)	231 (5.48)	1.00	1.00
Two and above	144 (6.13)	1.13 (0.91, 1.40)	0.99 (0.78, 1.25)
Division			
Barisal	26 (7.01)	4.08*** (2.04, 8.16)	3.59*** (1.78, 7.24)
Chittagong	93 (6.68)	3.87*** (2.11, 7.10)	3.64*** (1.97, 6.75)
Dhaka	160 (6.98)	4.06*** (2.25, 7.33)	4.01*** (2.20, 7.30)
Khulna	17 (3.36)	1.88 (0.89, 3.98)	1.82 (0.86, 3.88)
Rajshahi	25 (3.65)	2.05** (1.02, 4.12)	2.11** (1.05, 4.25)
Rangpur (reference)	12 (1.81)	1.00	1.00
Sylhet	42 (6.37)	3.68*** (1.92, 7.04)	3.14*** (1.62, 6.09)
Residence			
Urban (reference)	97 (5.71)	1.00	1.00
Rural	278 (5.71)	1.00 (0.79, 1.27)	0.97 (0.73, 1.29)

(continued)

Table 2. (continued)

Variables	Prevalence of Diarrhea, n (%)	Model I	Model II
		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Wealth index			
Poorest	90 (5.96)	1.17 (0.84, 1.62)	1.17 (0.56, 2.44)
Poorer	79 (6.47)	1.27 (0.91, 1.79)	1.38 (0.69, 2.75)
Middle	73 (5.72)	1.12 (0.79, 1.58)	1.14 (0.62, 2.12)
Richer	68 (5.24)	1.02 (0.72, 1.44)	1.05 (0.68, 1.61)
Richest (reference)	64 (5.16)	1.00	1.00
Access to electronic media			
Access (reference)	159 (5.47)	1.00	1.00
No access	216 (5.91)	1.09 (0.88, 1.34)	0.94 (0.69, 1.29)
Source of drinking water			
Improved (reference)	365 (5.69)	1.00	1.00
Unimproved	10 (6.73)	1.20 (0.62, 2.31)	1.01 (0.51, 2.00)
Type of toilet			
Improved (reference)	227 (5.18)	1.00	1.00
Unimproved	148 (6.78)	1.33*** (1.07, 1.65)	1.23 (0.96, 1.58)
Type of floor			
Earth/Sand	271 (5.98)	1.18 (0.93, 1.49)	1.09 (0.69, 1.72)
Other floors (reference)	103 (5.11)	1.00	1.00
Overall prevalence	5.71 (5.20, 6.23)		

Abbreviations: OR, odds ratio; HAZ, height for age; WHZ, weight for height; WAZ, weight for age.
[a]*$P < .10$, **$P < .05$, ***$P < .01$.

diarrhea predicted directly by crude ORs. Finally, from model II, we also observed that child age, height for age, weight for age of the children, age and occupation of the mothers, and divisional distribution were identified as statistically significant factors for childhood diarrhea in Bangladesh. Diarrhea was significantly associated with the age of the children: 1- to 2-year-old children were at highest risk for exposure to childhood diarrhea followed by those <1 year old. From Table 2, it can be seen that children aged 12 to 23 months and those aged <12 months were 2.44 and 1.88 times more likely to have diarrhea than those in the age group of 36 to 47 months. Based on the age-specific height rate, we found that stunted children were 1.91 times more likely to experience diarrhea than nonstunted children (OR = 1.91; 95% CI = 1.48, 2.47). A dissimilar pattern was also observed for the weight of the child because the prevalence was lower for underweight children (OR = 0.71; 95% CI = 0.53, 0.95). Age and occupation of the mothers were also influencing factors for diarrheal disease. Children with relatively young mothers had a higher risk of diarrhea than those with older mothers. Geographic location was one of the vital influencing factors for diarrheal prevalence. From the distribution of diarrheal patients, it was found that the children who were most diarrhea prone were those who lived in Barisal region. From model II, it was found that the children who lived in Dhaka division were 4.01 times more likely to have diarrhea than those in Rangpur division (OR = 4.01; 95% CI = 2.20, 7.30). The Chittagong, Barisal, and Sylhet regions are mainly riverine areas, where there is a risk of seasonal floods and other natural hazards such as tidal surges, cyclones, and flash floods.

Health Care–Seeking Behavior

Health care–seeking behavior is reported in Figure 1. Among the total prevalence (375), a total of 289 mothers sought any type of care for their children. Most cases (75.16%) received service from any of the formal care services whereas approximately 23% of children did not seek any care; however, a small portion of patients (1.98%) received treatment from tradition healers, unqualified village doctors, and other related sources. Private providers were the largest source for providing care (38.62%) for diarrheal patients followed by the pharmacy (23.33%). In terms of socioeconomic groups, children from poor groups (first 3 quintiles) often did not seek care, in contrast to those in rich groups (upper 2 quintiles). In particular, the highest proportion was found (39.31%) among the middle-income community. However, the choice of health care provider did not

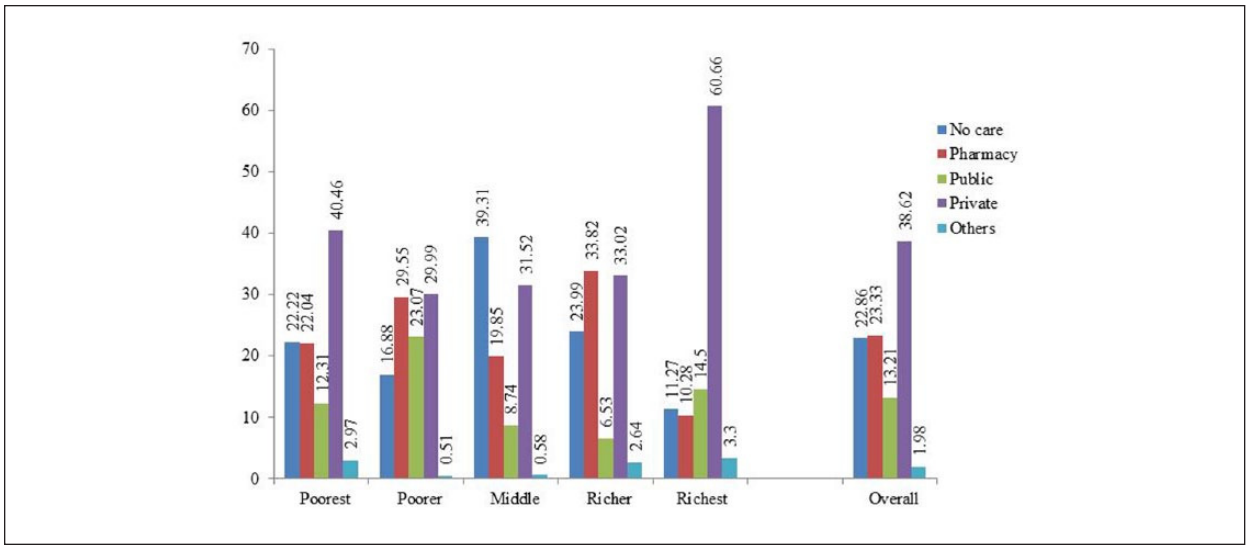

Figure 1. The proportion of treatment seeking behavior for childhood diarrhea (%).

depend on socioeconomic group because private treatment was popular among all socioeconomic groups.

Determinants of Care-Seeking Behavior

Table 3 shows the factors that are closely related to health care–seeking behavior for childhood diarrhea. From the binary logistic model, we found that age of children, height for age, weight for height, age and education of mothers, occupation of mothers, number of <5-year-old children, wealth index, types of toilet facilities, and floor of the household were significant factors compared with no care. Our analysis found that stunted and wasted children saught care less frequently compared with others (OR = 2.33, 95% CI = 1.07, 5.08, and OR = 2.34, 95% CI = 1.91, 6.00). Mothers between 20 and 34 years old were more likely to seek care for their children than others (OR = 3.72; 95% CI = 1.12, 12.35). Households having only 1 child <5 years old were more likely to seek care compared with those having 2 or more children <5 years old (OR = 2.39; 95% CI = 1.25, 4.57) of the households. The results found that the richest households were 8.31 times more likely to seek care than the poorest ones. The same pattern was also observed for types of toilet facilities and the floor of the particular households. In the multivariate multinomial regression model, we restricted the health care source from the pharmacy, the public facility, and the private providers. After adjusting for all other covariates, we found that the age and sex of the children, nutritional score (height for age, weight for height of the children), age and education of mothers, occupation of mothers, number of <5-year-old children in particular households, wealth index, types of toilet facilities and floor of the household, and accessing electronic media were significant factors for care seeking behavior. With regard to the sex of the children, it was found that male children were 2.09 times more likely to receive care from private facilities than female children. Considering the nutritional status of the children, those who were not stunted were found to be more likely to receive care from a pharmacy or any private sector (RRR = 2.50, 95% CI = 0.98, 6.38 and RRR = 2.41, 95% CI = 1.00, 5.58, respectively). A similar pattern was observed for children who were wasted when compared with those who were not, for care from the pharmacy (RRR = 4.09; 95% CI = 1.22, 13.78). Our results found that the children who lived in the wealthiest households compared with the poorest community were more likely to receive care from the private sector (RRR = 23.00; 95% CI = 2.50, 211.82). However, households with access to electronic media were more inclined to seek care from public providers (RRR = 6.43; 95% CI = 1.37, 30.17).

Discussion

The study attempted to measure the prevalence and health care–seeking behaviors regarding childhood diarrhea using nationwide representative data. Though diarrhea can be managed with low-cost interventions, still it remains the leading cause of morbidity for the patient who seeks care from a public hospital in Bangladesh.[35] According to the global burden of disease study 2010, diarrheal disease is responsible for 3.6% of global

Table 3. Factors Associated With Health-Seeking Behavior for Diarrhea Among Children <5 Years Old in Bangladesh.[a]

	Binary Logistic Regression[b]	Multivariate Multinomial logistic model[b]		
	Any Care	Pharmacy	Public Facility	Private Facility
Variables	Adjusted OR (95% CI)	RRR[b] (95% CI)	RRR[b] (95% CI)	RRR[b] (95% CI)
Child's age (months)				
<12 (reference)	1.00	1.00	1.00	1.00
12-23	2.45* (0.93, 6.45)	1.97 (0.63, 6.16)	4.00** (1.01, 15.79)	2.55* (0.9, 7.28)
24-35	1.25 (0.45, 3.47)	1.02 (0.3, 3.48)	2.14 (0.47, 9.72)	1.20 (0.39, 3.68)
36-47	0.98 (0.35, 2.76)	1.44 (0.44, 4.77)	2.01 (0.47, 8.58)	0.51 (0.15, 1.71)
48-59	1.06 (0.36, 3.17)	1.06 (0.29, 3.84)	0.83 (0.14, 4.83)	1.21 (0.36, 4.07)
Sex of children				
Male	1.70 (0.90, 3.20)	1.32 (0.63, 2.8)	1.41 (0.58, 3.45)	2.09** (1.03, 4.24)
Female (reference)	1.00	1.00	1.00	1.00
Nutritional score				
Height for age				
Normal	2.33** (1.07, 5.08)	2.50* (0.98, 6.38)	1.74 (0.57, 5.29)	2.41** (1.00, 5.8)
Stunting (reference)	1.00	1.00	1.00	1.00
Weight for height				
Normal	2.34* (0.91, 6.00)	4.09** (1.22, 13.78)	1.43 (0.35, 5.84)	2.03 (0.72, 5.72)
Wasting (reference)	1.00	1.00	1.00	1.00
Weight for age				
Normal	0.57 (0.23, 1.42)	0.48 (0.16, 1.42)	1.6 (0.41, 6.24)	0.46 (0.16, 1.29)
Underweight (reference)	1.00	1.00	1.00	1.00
Mother's age (years)				
<20	3.17 (0.66, 15.12)	1.25 (0.18, 8.51)	2.84 (0.33, 24.31)	5.43* (0.9, 32.84)
20-34	3.72** (1.12, 12.35)	2.85 (0.67, 12.03)	2.46 (0.48, 12.65)	5.17** (1.24, 21.57)
>34 (reference)	1.00	1.00	1.00	1.00
Mother's education level				
No education (reference)	1.00	1.00	1.00	1.00
Primary	0.47 (0.18, 1.25)	0.47 (0.15, 1.45)	0.47 (0.11, 2.03)	0.53 (0.18, 1.60)
Secondary	0.37* (0.13, 1.04)	0.33* (0.10, 1.10)	0.63 (0.14, 2.81)	0.36* (0.11, 1.16)
Higher	2.84 (0.29, 28.06)	2.80 (0.24, 33.12)	5.07 (0.36, 70.89)	2.91 (0.27, 31.55)
Mother's occupation				
Homemaker/No formal occupation	0.57 (0.18, 1.84)	0.92 (0.22, 3.76)	0.85 (0.16, 4.56)	0.37 (0.1, 1.3)
Poultry/Farming/Cultivation (reference)	1.00	1.00	1.00	1.00
Professional	0.33* (0.08, 1.41)	0.58 (0.1, 3.3)	0.61 (0.08, 4.96)	0.18** (0.04, 0.89)
Number of children				
Less than 3	1.90 (0.89, 4.04)	1.85 (0.76, 4.48)	1.46 (0.49, 4.38)	2.11* (0.90, 4.97)
3 And above (reference)	1.00	1.00	1.00	1.00
Number of children <5 years old				
One	2.39** (1.25, 4.57)	2.21** (1.01, 4.84)	2.24 (0.85, 5.88)	2.68** (1.29, 5.56)
Two and above (reference)	1.00	1.00	1.00	1.00
Residence				
Urban (reference)	1.00	1.00	1.00	1.00
Rural	0.95 (0.40, 2.26)	1.13 (0.4, 3.13)	1.05 (0.32, 3.49)	0.83 (0.32, 2.16)
Wealth index				
Poorest (reference)	1.00	1.00	1.00	1.00
Poorer	1.6 (0.64, 4)	2.21 (0.75, 6.46)	0.82 (0.22, 3.03)	1.52 (0.54, 4.22)

(continued)

Table 3. (continued)

	Binary Logistic Regression[b]	Multivariate Multinomial logistic model[b]		
	Any Care	Pharmacy	Public Facility	Private Facility
Variables	Adjusted OR (95% CI)	RRR[b] (95% CI)	RRR[b] (95% CI)	RRR[b] (95% CI)
Middle	1.02 (0.36, 2.87)	1.42 (0.4, 5.08)	0.13** (0.02, 0.85)	1.32 (0.41, 4.24)
Richer	2.36 (0.53, 10.52)	4.07 (0.7, 23.61)	0.29 (0.03, 3.15)	2.67 (0.5, 14.18)
Richest	8.31** (1.15, 59.96)	3.29 (0.3, 36.49)	1.06 (0.05, 21.57)	23.00** (2.5, 211.82)
Access to electronic media				
Access	1.46 (0.59, 3.59)	1.22 (0.42, 3.58)	6.43** (1.37, 30.17)	1.17 (0.42, 3.27)
No access (reference)	1.00	1.00	1.00	1.00
Source of drinking water				
Improved (reference)	1.00	1.00	1.00	1.00
Unimproved	4.30 (0.45, 40.68)	2.81 (0.21, 38.15)	6.82 (0.43, 108.4)	5.15 (0.47, 55.76)
Type of toilet				
Improved (reference)	1.00	1.00	1.00	1.00
Unimproved	2.10** (1.00, 4.43)	2.52** (1.06, 5.97)	2.08 (0.72, 5.99)	1.82 (0.8, 4.16)
Type of floor				
Earth/sand	3.71** (1.05, 13.07)	2.35 (0.57, 9.75)	3.83 (0.52, 28.13)	5.33** (1.27, 22.3)
Other floors (reference)	1.00	1.00	1.00	1.00

[a]*$P < .10$, **$P < .05$, ***$P < .001$.
[b]No-care reference group.

disability-adjusted life years (DALYs).[36] It has declined for children <5 years old from 41% of global DALYs in 1990 to 25% in 2010; however, children <5 years old are still vulnerable, and a significant proportion of deaths occur in the early stage of life—namely, the first 2 years of life.[36,37] Our results showed that the prevalence of diarrhea is frequently observed in the first 2 years of life, which supports previous findings from other countries such as Taiwan, Brazil, and many other parts of the world that because of maturing immune systems, these children are more vulnerable to gastrointestinal infections.[38-42] However, the prevalence of diseases is higher (8.62%) for children aged 1 to 2 years than children <1 year old. This might be because those infants are more dependent on the mother and require feeding appropriate for their age, which may lower the risk of diarrheal infections. [9] The study indicated that older mothers could be a protective factor against diarrheal diseases, in keeping with the results of other studies in other low- and middle-income countries.[43-45] However, the education and occupation of the mother are determining factors of the prevalence of childhood diarrhea.

Childhood diarrhea was also highly prevalent in some specific regions of the country. This could be because these regions, especially in Barisal, Dhaka, and Chittagong, divisions have more rivers, water reservoirs, natural hazards, and densely populated areas than the other areas; however, most of the slums are located in Dhaka and Chittagong regions, which are already proven to be at high risk for diarrheal-related illnesses because of the poor sanitation system and lack of potable water. The results agree with the fact that etiological agents and risk factors for diarrhea are dependent on location, which indicates that such knowledge is a prerequisite for the policy makers to develop prevention and control programs.[46,47] Our study found that approximately 77% of mothers sought care for their children at different sources, including formal and informal providers.[18] However, rapid and proper treatment for childhood diarrhea is important to avoid excessive costs associated with treatment and adverse health outcomes.[48] The study found that approximately (23%) did not seek any treatment for childhood diarrhea. A maternal view that the illness was not severe enough could be the primary reason for not seeking care.[30] In developing countries such as Bangladesh, diarrheal patients are often inadequately managed at home, resulting in poor outcomes: timely medical treatment is required to minimize the length of each episode and reduce mortality.[5]

The current study found that some factors significantly influence the health care–seeking pattern, such as age and sex of the children, nutritional score, age and education of mothers, wealth index, accessing electronic media, and others (see Table 3). The sex and age of the child have been shown to be associated with mothers'

care-seeking behavior. A similar study conducted in Kenya and found that care seeking is common for sick children in the youngest age group (0-11 months) and is slightly higher for boys than girls.[49] Our study results are consistent with those of a similar study of Brazil, where it was found that male children were more likely to be hospitalized for diarrheal disease than female children,[9] which also reflects the average cost of treatment in Bangladesh.[50] Age and education of mothers are significantly associated with treatment seeking patterns. An earlier study in Ethiopia found that the health care–seeking behavior of mothers is higher for younger mothers than for older mothers.[51]

Comparing the results of the current study with international experience, it is already known that in many countries such as Brazil and Bolivia, higher parental educational levels have great importance in the prevention and control of morbidity because knowledge about prevention and promotional activities reduces the risk of infectious diseases in children of educated parents.[52,53] However, in Bangladesh, it was found that higher educational levels are also associated with improved toilet facilities in both rural and urban settings, which means better access to sanitation and hygiene in the household.[54] Again, evidence suggests that mothers younger than 35 years and also mothers who have completed secondary education exhibit more health-seeking behavior for their sick children in many low- and middle-income countries.[49,55] Similarly, family size is one of the influencing factors because having a smaller family possibly allows parents to invest more time and money on their sick child.[51] The study found that wealth status is a significant determining factor for seeking care, which is in line with earlier findings that poor socioeconomic status is significantly associated with inadequate utilization of primary health care services.[49,56] However, the type of floor in the house also played a significant role, as in other earlier studies in Brazil.[57,58] Our study demonstrated that households with access to electronic media, such as radio and television, are most likely to seek care from public facilities for childhood diarrhea. Plausibly, this is because in these mass media, promotional activities including dramas, advertisement, and behavior change messages were regularly provided. However, it has been reported by another study that younger women are more likely to be exposed to mass media than older women, primarily because their level of education is higher,[59] which might have contributed to a better health-seeking behavior among younger mothers.

The study results can be generalized at the country level because the study utilized data from a nationally representative latest household survey. However, there are several limitations to be aware of when interpreting these results. All the information related to childhood diarrhea was provided by the mothers, especially whether their children had diarrhea and/or were seeking treatment, which may have compromised precision of the data. Moreover, respondents were asked about their previous events. Therefore, the potential effect of recall bias on our results cannot be ignored.

Conclusions

Diarrhea is still an important public health issue in children younger than 2 years in Bangladesh. The prevalence of childhood diarrhea and care-seeking behavior of mothers in Bangladesh is patterned by age, wealth, and other markers of deprivation, as one might expect from studies in other countries. Equitability of access is a concern, and interventions should target mothers in low-income households with less education and younger mothers. The health care service could be improved through working in partnership with public facilities, private health care practitioners, and community-based organizations, so that all strata of the population get similar access during episodes of childhood diarrhea.

Author Contributions

ARS: Contributed to conception and design; contributed to acquisition; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

MS: Contributed to design; contributed to analysis; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

RAM: Contributed to analysis; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

NS: Contributed to analysis and interpretation; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

RVDM: Contributed to interpretation; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

AM: Contributed to conception and design; contributed to interpretation; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Murray C, Lopez AL. Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study. *Lancet*. 1997;349:1436-1442.
2. World Health Organization. Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health. Geneva, Switzerland: WHO, 2009. http://apps.who.int/iris/bitstream/10665/43840/1/9789241596435_eng.pdf. Accessed June 30, 2016.
3. World Health Organization. *Diarrhoeal Disease: Fact Sheet N* 330. Geneva, Switzerland: WHO; 2013.
4. UNICEF. Diarrhoea remains a leading killer of young children, despite the availability of a simple treatment solution. http://data.unicef.org/child-health/diarrhoeal-disease.html. Accessed June 28, 2016.
5. Chowdhury F, Khan IA, Patel S, et al. Diarrheal illness and healthcare seeking behavior among a population at high risk for diarrhea in Dhaka, Bangladesh. *PLoS One*. 2015;10:e0130105.
6. Ministry of Health and Family Welfare (MOHFW). *Bangladesh Demographic and Health Survey 2014: Key Indicators*. Dhaka, Bangladesh; Mitra and Associates, and ICE International 2015.
7. Kumar S, Subita L. Diarrhoeal diseases in developing countries : a situational analysis. *Kathmandu Univ Med J*. 2012;11:83-88.
8. World Health Organization. *Diarrhoeal Diseases. Factsheets 330*. Geneva, Switzerland: WHO; 2012.
9. Konstantyner T, Cláudia T, Oliveira R De, Mais L, Warkentin S. Prevalence and hospitalization rates due to diarrhoea in infants : the 2006 Brazilian National Demographic Health Survey. *J Epidemiol Res*. 2016;2:29-38.
10. Parashar UD, Bresee JS, Glass RI. The global burden of diarrhoeal disease in children. *Bull World Health Organ*. 2003;81:236.
11. Ozguler M. *Febrile Neutropenia: An Approach as an Infectious Disease Specialist*. USA: Scientific Research Publishing, Inc, 2015.
12. Baqui AH, Black RE, Yunus M, Hoque ARA, Chowdhury HR, Sack RB. Methodological issues in diarrhoeal diseases epidemiology: definition of diarrhoeal episodes. *Int J Epidemiol*. 1991;20:1057-1063.
13. Deen JL, Seidlein L, Sur D, et al. The high burden of cholera in children: comparison of incidence from endemic areas in Asia and Africa. *PLoS Negl Trop Dis*. 2008;2:e173.
14. Isanaka S. Systematic review of diarrhea duration and severity in children and adults in low- and middle-income countries. *BMC Public Health*. 2012;12:832.
15. Isanaka S. Chronic diarrhoea: a methodologic basis for its apparent heterogeneity. *Trop Geogr Med*. 1989;41:100-107.
16. Drasar BS, Tomkins AM, Feacham RG. *Seasonal Aspects of Diarrhoeal Disease*. London School of Hygiene and Tropical Medicine. London, UK; 1978.
17. Black RE, Lanata CF. *Epidemiology of Diarrhoeal Diseases in Developing Countries*. New York, NY: Raven; 1995.
18. Sikder SS, Labrique AB, Craig IM, et al. Patterns and determinants of care seeking for obstetric complications in rural northwest Bangladesh: analysis from a prospective cohort study. *BMC Health Serv Res*. 2015;15:166.
19. Koenig MA, Jamil K, Streatfield PK, et al. Maternal health and care-seeking behavior in Bangladesh: findings from a National Survey Maternal Health and Care-Seeking Behavior in Bangladesh. *Int Fam Plan Perspect*. 2016;33:75-82.
20. Armitage CJ, Norman P, Conner M. Can the theory of planned behaviour mediate the effects of age, gender and multidimensional health locus of control? *Brit J Health Psych*. 2002;7:299-316.
21. Sarker AR, Mahumud RA, Sultana M, Ahmed S, Ahmed W, Khan JA. The impact of age and sex on healthcare expenditure of households in Bangladesh. *Springerplus*. 2014;3(1):435. http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4153877&tool=pmcentrez&rendertype=abstract. Accessed October 21, 2014.
22. Rahman A, Rahman M. Sickness and treatment: a situation analysis among the garments workers. *Anwer Khan Mod Med Coll J*. 2013;4(1):10-14.
23. Helman CG. *Culture, Health and Illness: Cultural Factors in Epidemiology* (3rd ed.). Oxford, UK: Butterworth-Heinemann. 1995;101-145.
24. Chrisman N. The health seeking process: an approach to the natural history of illness. *Cult Med Psychiatry*. 1977;1:351-377.
25. Ahmed SM, Adams AM, Chowdhury M, Bhuiya A. Gender, socioeconomic development and health-seeking behaviour in Bangladesh. *Soc Sci Med*. 2000;51:361-371.
26. Ahmed SM, Tomson G, Petzold M, Kabir ZN. Socioeconomic status overrides age and gender in determining health-seeking behaviour in rural Bangladesh. *Bull World Health Organ*. 2005;83:109-117.
27. Larson CP, Saha UR, Islam R, Roy N. Childhood diarrhoea management practices in Bangladesh: private sector dominance and continued inequities in care. *Int J Epidemiol*. 2006;35:1430-1439.
28. Sarker AR, Islam Z, Khan IA, et al. Estimating the cost of cholera-vaccine delivery from the societal point of view: a case of introduction of cholera vaccine in Bangladesh. *Vaccine*. 2015;33:4916-4921.
29. Nasrin D, Wu Y, Blackwelder WC, et al. Health care seeking for childhood diarrhea in developing countries: evidence from seven sites in Africa and Asia. *Am J Trop Med Hyg*. 2013;89(1, suppl):3-12.
30. Das SK, Nasrin D, Ahmed S, et al. Health care-seeking behavior for childhood diarrhea in Mirzapur, rural Bangladesh. *Am J Trop Med Hyg*. 2013;89(suppl 1): 62-68.

31. National Institute of Population Research and Training (NIPORT), Mitra and Associates and II (2014). *Bangladesh Demographic and Health Survey-2014*. Dhaka, Bangladesh, and Rockville, Maryland, USA:NIPORT, Mitra and Associates, and ICE International. 2014.
32. Forsberg BC, Petzold MG, Allebeck P. Diarrhoea case management in low- and middle-income countries: an unfinished agenda. *Bulletin of the World Health Organization* 2007;85(1):42-48.
33. World Health Organization (WHO). *WHO Child Growth Standards: Length/Height-for-Age, Weight-for-Age, Weight-for-Length, Weight-for-Height and Body Mass Index-for-Age: Methods and Development*. Geneva, Switzerland: WHO; 2006.
34. Pourhoseingholi MA, Baghestani AR, Vahedi M. How to control confounding effects by statistical analysis. *Gastroenterol Hepatol Bed Bench*. 2012;5(2):79-83.
35. Sultana M, Mahumud RA, Sarker AR. Emerging patterns of mortality and morbidity in district level hospitals in Bangladesh. *Ann Public Health Res*. 2015;2:2-4.
36. Murray CJL, Vos T, Lozano R, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380:2197-2223.
37. Mengistie B, Berhane Y, Worku A. Prevalence of diarrhea and associated risk factors among children under-five years of age in Eastern Ethiopia: a cross-sectional study. *Open J Prev Med*. 2013;3:446-453.
38. Boschi-Pinto C, Claudio FL, Black RE. In: Ehiri J, ed. *The Global Burden of Childhood Diarrhea: Maternal and Child Health-Global Challenges, Programs, and Policies*. Geneva, Switzerland: Department of Child and Adolescent Health and Development, World Health Organization. 2013;225-244.
39. Chen L, Lu H, Shih S, Kuo KN, Chen C, Huang LC. Poverty related risk for potentially preventable hospitalisations among children in Taiwan. *BMC Health Serv Res*. 2010;10:196.
40. Granzotto JA, Stringari S, Steffen MS, Vecchi AÂ, Barros TP, Pauletto MC. Fatores relacionados à internação pediátrica em um hospital universitário da Região Sul do Brasil. *Pediatria (Santiago)*. 2010;32:15-19.
41. World Health Organization. *Diarrhea: Why Children Are Still Dying and What Can Be Done. WHO Library Cataloging-in-Publication Data*. Geneva, Switzerland: WHO; 2009.
42. Lins M, Silva G. Doença diarreica em crianças hospitalizadas: importância da diarreia persistente. *J Pediatr*. 2000;76:37-43.
43. Costa Fuchs S, Gomes Victora C. Risk and prognostic factors for diarrheal disease in Brazilian infants: a special case-control design application. *Cad Saude Publica*. 2002;18:773-782.
44. Finlay JE, Ozaltin E, Canning D. The association of maternal age with infant mortality, child anthropometric failure, diarrhoea and anaemia for first births: evidence from 55 low- and middle-income countries. *BMJ Open*. 2011;1:e000226.
45. Diouf K, Tabatabai P, Rudolph J, Marx M. Diarrhoea prevalence in children under five years of age in rural Burundi: an assessment of social and behavioural factors at the household level. *Global Health Action*. 2014;7:24895.
46. Szwarcwald CL, Damacena GN. Amostras complexas em inquéritos populacionais: planejamento e implicações na análise estatística dos dados. *Rev Bras Epidemiol*. 2008;11(suppl 1):38-45.
47. World Health Organization. *WHO Child Growth Standards: Length/Height-for-Age, Weight-for-Age, Weight-for-Length, Weight-for- Height and Body Mass Index-for-Age: Methods and Development*. Geneva, Switzerland: WHO; 2006.
48. Shillcutt SD, Lefevre AE, Walker CLF, Taneja S, Black RE, Mazumder S. Economic costs to caregivers of diarrhoea treatment among children below 5 in rural Gujarat India: Findings from an external evaluation of the DAZT programme. *Health Policy Plan*. 2016;31(10):1411-1422.
49. Taffa N, Chepngeno G. Determinants of health care seeking for childhood illnesses in Nairobi slums. *Trop Med Int Heal*. 2005;10:240-245.
50. Sarker AR, Islam Z, Khan IA, et al. Cost of illness for cholera in a high risk urban area in Bangladesh: an analysis from household perspective. *BMC Infect Dis*. 2013;13:518.
51. Astale T, Chenault M. Help-seeking behavior for children with acute respiratory infection in Ethiopia: results from 2011 Ethiopia Demographic and Health Survey. *PLoS One*. 2015;10:e0142553.
52. Maria M, Machado T, Lindsay AC, et al. A community perspective on changes in health related to diarrhea in northeastern Brazil. *Food Nutr Bull*. 2011;32:103-111.
53. George CM, Perin J, De Calani KJN, et al. Risk factors for diarrhea in children under five years of age residing in Peri-urban Communities in Cochabamba, Bolivia. *Am J Trop Med Hyg*. 2014;91:1190-1196.
54. Colombara DV, Faruque ASG, Cowgill KD, Mayer JD. Risk factors for diarrhea hospitalization in Bangladesh, 2000-2008: a case-case study of cholera and shigellosis. *BMC Infect Dis*. 2014;14:440.
55. Manna B, Nasrin D, Kanungo S, et al. Determinants of health care seeking for diarrheal illness in young children in urban slums of Kolkata, India. *Am J Trop Med Hyg*. 2013;89(suppl 1):56-61.
56. Navaneetham K, Dharmalingam A. Utilization of maternal health care services in Southern India. *Soc Sci Med*. 2002;55:1849-1869.
57. Vanderlei LC de M, Silva GAP da, Braga JU. Fatores de risco para internamento por diarréia aguda em menores de dois anos: estudo de caso-controle. *Cad Saude Publica*. 2003;19:455-463.
58. Ichihara MYT, Rodrigues LC, Santos CAST, Teixeira MDGLC, Barreto ML. Risk factors for hospital admission of Brazilian children with non-rotavirus diarrhoea: a case control-study. *Trans R Soc Trop Med Hyg*. 2015;109:454-461.
59. Central Statistical Agency [Ethiopia] and ICF International. *Ethiopia Demographic and Health Survey 2011*; Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International, 2012.