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The impact of socio-economic conditions and clinical characteristics on improving childhood care seeking behaviors for families living far from the health facility

Farzana Ferdous[1], Sumon Kumar Das[1], Shahnawaz Ahmed[1], Fahmida Dil Farzana[1], Guddu Kaur[2], Mohammod Jobayer Chisti[1], Abu Syed Golam Faruque[1,*]

[1]International Centre for Diarrhoeal Disease Research, Bangladesh
[2]University of Sydney, Sydney, Australia

Email address:

farzanaf@icddrb.org(F. Ferdous), sumon@icddrb.org(S.K. Das), shahnawz@icddrb.org(S. Ahmed), fahmidaf@icddrb.org(F.D. Farzana), kkau887@uni.sydney.edu.au(G. Kaur), chisti@icddrb.org(M.J. Chisti), gfaruque@icddrb.org(A.S.G. Faruque)

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Abstract: Background: Lack of proper transportation and poor road infrastructure to the health facility act as a strong barrier for the adequate accessibility to healthcare services. There is lack of evidence based information particularly in Bangladesh examining the relationship between health care seeking behavior of mothers for their children with diarrhea and barriers such as distance to be travelled in reaching health facility. Objective: This study explored the factors that determine improving care seeking behaviors by the caregivers of under-5 children with diarrhea and also measured its impact due to living too far from a tertiary health facility in rural Bangladesh. Methodology: From January 2010 to December 2011, a total of 2,324 under-five children with diarrhea received treatment at *Kumudini Womens' Medical College and Hospital,* Mirzapur, Tangail. Among them, 1,919 (83%) received treatment at home before coming to the health facility. Based on median value of 4 miles needed to travel, we divided distance into two groups: (i) >4 miles, (ii)≤4 miles. Results: Forty nine percent (n=1,144) of the diarrheal children presented to the facility from a distance of >4 miles and 86% of them received treatment at home before reporting to the hospital. Multivariate analysis revealed that age [aOR=0.72 (95% confidence interval;0.53, 0.99) p-value=0.042], longer distance [1.46 (1.15, 1.86) 0.002], onset of diarrhea (≥3days) [3.19 (2.37, 4.30) <0.001], stool frequency (>10 times/24 hours) [2.72 (2.05, 3.60) <0.001], presence of blood in stool [0.41 (0.31, 0.54) <0.001], vomiting [1.78 (1.38, 2.30) <0.001] and rotavirus infection [2.08 (1.49, 2.91) <0.001] were significantly associated with prior healthcare seeking behavior of children after controlling for other confounders. On the other hand, longer distance of the facility from home for children who received prior treatment was associated with children aged <2 years old [1.62 (1.26, 2.09) <0.001], electricity in the household [1.59 (1.23, 2.05) <0.001], vomiting [1.26 (1.03, 1.54) 0.028] and fever [1.42 (1.10, 1.83) 0.007] after adjusting for other co-variates. Conclusions: Longer distance of health facility delays seeking appropriate medical care from the facility rather parent seeks care from facilities to the next door of the locality. Clinical features such as fever, vomiting, and more stool frequency influence parents to get prior treatment before reporting to health facility, whether, presence of blood in stool influence parents in reporting directly to the health facility.

Keywords: Diarrhea, Distance, Healthcare Seeking Behavior, Rural, Under-Five Children

1. Introduction

Although most episodes of diarrhea are mild, severe cases may lead to significant loss of fluid and electrolyte resulting in hypovolaemic shock and if not treated properly, may cause death [1]. Therefore, it is critical to begin the replacement of fluid lost immediately after the onset of disease and seek appropriate care in timely manner if needed then visit the health facility [2]. Studies have

indicated that prompt and appropriate care is essential for reducing adverse outcome of childhood illnesses [3, 4]. However, in developing countries, health care seeking behavior is weighted by some indicated factors and determinants [5]. Factors that influence delay in seeking appropriate medical treatment may lead to self-care, use of home remedies and consultation with traditional healers at household level [5]. Lack of financial accessibility may impede out-of-pocket expenditure for care seeking [6]. Demographic, socioeconomic, environmental factors are reported to be associated with child health status by previous studies [7, 8]. Additionally, the consequence of travelling difficulties due to lack of transportation and poor road infrastructure to the health facility signifies as a strong barrier for the adequate accessibility to healthcare services [9]. Thus, improving mothers' care seeking behavior could result in significant reduction in childhood diarrheal disease related mortality in developing countries [10].

There is lack of evidence based information examining the relationship between health care seeking behavior of mothers for their children with diarrhea and barriers such as distance to be travelled for reaching the health facility in Bangladesh. The present paper aimed to explore the factors that determined improving childhood care seeking behaviors of the caregivers of infant and young children aged under 5 years for their illnesses due to diarrhea. The study also measured the impact of distance to a tertiary health facility on care seeking behavior in rural Bangladesh.

2. Methodology

2.1. Study Site

The study was conducted at the Kumudini Womens' Medical College and Hospital (KWMCH), in the Mirzapur sub-district of rural Bangladesh. It was located about 60 km north of Dhaka, the capital city with an area of 374 sq km. KWMCH is one of the largest and oldest tertiary hospital established in 1942. Since 1982, it has been operating a separate out-patient and in-patient diarrhea treatment unit. To facilitate the present hospital based prospective study, an active diarrheal disease surveillance system was established in 2010 by International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b). Nearly 1,500 diarrhea patients (mostly children) report each year to this facility for treatment. The system created a database by collecting information on socio-demographic, epidemiologic, clinical, and laboratory characteristics of patients including under-5 children reporting with diarrhea.

2.2. Definition

1) Diarrhea was defined as passage of 3 or more abnormally loose or watery stools during the previous 24 hours [11].

2) 'Prior treatment' was defined as children who received ORS, zinc tablets, antimicrobials, or home made fluids at home for the present illness before coming to health facility.

2.3. Study Population

From January 2010 through December 2011, a total of 2,324 under-five years children with diarrhea (of either sex, regardless of socio-economic and nutritional status, and disease severity), who resided in the Mirzapur Demographic Surveillance System (DSS) catchment area, and sought care for diarrheal disease at KWMCH, Mirzapur, comprised the study population for this analysis.

2.4. Specimen Collection and Laboratory Procedures

A single, fresh, whole stool specimen (at least 3 ml or grams) was collected from all under-5 years' old children presenting with diarrhea. A faecal swab was then placed in Cary-Blair medium in a plastic screw top test tube. Using a Styrofoam container with cold packs, the specimens were transported to the central laboratory of icddr,b in Dhaka within 6 hours of collection. Each specimen was aliquoted into three serial containers and submitted to the respective laboratories for routine screening of four common enteric pathogens: Enterotoxigenic *Escherichia coli* (ETEC) [12], *Vibrio cholerae* [13], *Shigella* spp. [13], and rotavirus [14] using standard laboratory methods.

2.5. Variable Derivation

Information on socio-demographic status (age, sex, maternal literacy, number of under-5 children, and family members, father stayed outside of home, electricity, monthly family income, household assets, and distance of hospital from home), nutritional status (stunting, underweight and wasting), clinical features (onset of diarrhea, number of stool passed per day, presence of blood in stool, vomiting, fever and some or severe dehydration, received treatment prior to hospital such as zinc, oral rehydration solution (ORS), and antimicrobial or any other medications were collected.

2.6. Data Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) for Windows (Version 15.2; Chicago, IL) and Epi Info (version 5.6). Initially children were categorized into two groups based on care received before coming to the hospital such as (i) received prior treatment, and (ii) did not receive prior treatment. Both the groups were subsequently assessed by considering the distance of tertiary health facility (KWMCH) as dependent variable. Median distance (4 miles) was considered as reference category and splitted into two strata; (i) >4 miles, and (ii) ≤4 miles. Both descriptive and analytic methods were referred $p<0.05$ for statistical significance. In the analytic method, logistic regression was performed using different models. First, receive of prior treatment was considered as dependent variable and its association was assessed with other confounders such as age, sex, maternal literacy, under-5 children, number of family members, father stayed outside of household, electricity in the household, monthly

family income, wealth index, distance of hospital from home, stunting, underweight, wasting, onset of diarrhea, number of passed stool, presence of blood in stool, vomiting, fever and some or severe dehydration, and etiologic agents (rotavirus, Shigella, Vibrio cholerae, and ETEC). Then, considering the distance of health facility as dependent variable, its association was measured adjusting for the same covariates for each of the groups separately (received prior treatment or not).

In addition to that, Principal Component Analysis (PCA) (factor analysis) was performed to determine the wealth quintiles by using household assets. Variables included were: land (homestead, land), construction material of the wall, roof and floor of the house, and household assets (radio, television, mobile, table, cupboard, local motorized vehicle, animal drawn cart, refrigerator, motor boat, rickshaw etc.). Wealth index was used as a measure of socio-economic status (SES) using information on household possessions. A weight was attached to each item from the first principal component. The households were classified into SES quintiles based on the wealth index: quintile 1 (poor), 2 (lower middle), 3 (middle), 4 (upper middle), and 5 (rich).

2.7. Ethics

This study was approved by the Research Review Committee and the Ethical Review Committee of icddr,b in December, 2009. Informed written consent was obtained from the caregiver of each study children prior enrolment.

3. Results

Of the 2,324 under-5 diarrheal children before coming to the hospital, 78% received ORS, followed by antimicrobials (38%), zinc (30%), and 2% received herbal medications at home. Forty nine percent (n=1,144) of the diarrheal children presented to the facility from a distance of >4 miles and 86% of them received treatment at home before reporting to the hospital. Children who traveled >4 miles, more often received ORS, and antimicrobials at home compared to the children coming from a distance below that (83% vs. 74%, p<0.001; 44% vs. 32%, p<0.001). Median expenditure for prior treatment was Taka 40.00 (0.5 US$), [range 0-11.9 US$)] for those children who received prior treatment regardless of distance covered (Data not shown).

Among all diarrheal children, at least 81% were aged <2 years and 61% were male. Eighty nine percent of the mothers in both the groups (child received prior treatment or not) were literate and 21% children were underweight followed by stunted and wasted. More than half of the families reported a monthly income of 100 US$ and more. Moreover, wealth quintile, fever and some or severe dehydration were similarly reported by the study children (see Table 1).

Children coming from a distance of more than 4 miles, received treatment at home more often than their comparison group who did not. Duration of diarrhea (≥3days), vomiting, stool frequency (>10 times per day) and rotavirus infection were also higher among the children who received initial treatment. Other pathogens such as *Shigella*, *Vibrio cholerae,* and ETEC were equally distributed among the study participants.

Multivariate analysis revealed that, age, distance of hospital from home, duration of diarrhea (≥3days), stool frequency (>10 times/24 hours), presence of blood in stool, vomiting and rotavirus infection were significantly associated with prior healthcare seeking behavior of children after controlling for other confounders (see Table 1).

Table 1. *Characteristics of under-5 children and health care seeking behavior prior to visit KWMCH in rural Bangladesh*

Indicators	Received prior treatment, n=1919 (83%)	Did not receive prior treatment, n=405 (17%)	X^2 value	Unadjusted OR (95% CI) p-value	Adjusted OR (95% CI) p-value
Socio-economic status					
Age (0-23 months)	1561 (81)	326 (81)	0.11	1.06 (0.80, 1.40) 0.742	0.72 (0.53, 0.99) 0.042
Male sex	1177 (61)	244 (60)	0.12	1.05 (0.84, 1.31) 0.725	1.05 (0.83, 1.34) 0.689
Maternal literacy	1720 (90)	351 (87)	2.73	0.75 (0.54, 1.05) 0.098	0.86 (0.59, 1.25) 0.434
Under-5 children in the household (≥2 children)	493 (26)	97 (24)	0.45	1.10 (0.85, 1.42) 0.504	1.08 (0.81, 1.45) 0.598
Number of household members (≥6 people)	818 (43)	166 (41)	0.30	1.07 (0.86, 1.34) 0.582	0.88 (0.67, 1.15) 0.347
Father stayed outside of household	410 (21)	86 (21)	0.00	1.01 (0.77, 1.32) 0.993	0.87 (0.64, 1.20) 0.401
Presence of electricity	1406 (73)	280 (69)	2.66	1.22 (0.96, 1.56) 0.102	0.91 (0.66, 1.24) 0.537
Monthly family income (≥100 US$)	1145 (60)	222 (55)	3.05	1.22 (0.98, 1.52) 0.080	0.88 (0.65, 1.18) 0.378
Wealth index					
Poor	490 (25.5)	91 (22.5)	1.18	1.18 (0.91, 1.54) 0.218	-
Lower middle class	301 (15.7)	48 (11.9)	3.56	1.38 (0.99, 1.94) 0.059	0.78 (0.49, 1.25) 0.303
Middle class	382 (19.9)	81 (20.0)	0.00	0.99 (0.75, 1.31) 0.979	0.62 (0.38, 1.02) 0.060

Upper middle class	374 (19.5)	92 (22.7)	1.98	0.82 (0.63, 1.08) 0.159	0.85 (0.56, 1.30) 0.456
Rich	372 (19.4)	93 (23.0)	2.46	0.81 (0.62, 1.05) 0.117	0.99 (0.68, 1.45) 0.957
Distance of hospital from home (>4miles)	986 (51)	158 (39)	19.98	1.65 (1.32, 2.07) <0.001	1.46 (1.15, 1.86) 0.002
Nutritional status					
Stunted (<-2.00 SD)	283 (15)	70 (17)	1.48	0.83 (0.62, 1.11) 0.223	0.88 (0.59, 1.29) 0.502
Underweight (<-2.00 SD)	410 (21)	85 (21)	0.01	1.02 (0.78, 1.34) 0.918	1.05 (0.69, 1.61) 0.814
Wasted (<-2.00 SD)	282 (15)	54 (13)	0.40	1.12 (0.81, 1.55) 0.528	1.25 (0.81, 1.91) 0.314
Clinical features					
Duration of diarrhea (≥3days)	626 (33)	71 (18)	35.55	2.28 (1.72, 3.02) <0.001	3.19 (2.37, 4.30) <0.001
Number of stool passed (>10 times)/24hrs	805 (42)	77 (19)	73.74	3.08 (2.34, 4.05) <0.001	2.72 (2.05, 3.60) <0.001
Presence of blood in stool	477 (25)	205 (51)	105.79	0.32 (0.26, 0.40) <0.001	0.41 (0.31, 0.54) <0.001
Vomiting	1123 (59)	138 (34)	79.54	2.73 (2.17, 3.44) <0.001	1.78 (1.38, 2.30) <0.001
Fever (>37.8ºC)	328 (17)	73 (18)	0.14	0.94 (0.70, 1.25) 0.704	0.85 (0.62, 1.17) 0.318
Some or severe dehydration	219 (11)	37 (9)	1.54	1.28 (0.88, 1.88) 0.214	1.03 (0.69, 1.54) 0.886
Etiologic agents					
Rotavirus	699 (36)	57 (14)	75.10	3.48 (2.57, 4.73) <0.001	2.08 (1.49, 2.91) <0.001
Shigella	267 (14)	61 (15)	0.28	0.91 (0.67, 1.25) 0.599	1.39 (0.98, 1.97) 0.068
ETEC	61 (3)	15 (4)	0.15	0.85 (0.47, 1.58) 0.699	0.90 (0.49, 1.66) 0.737
Vibrio cholerae	38 (2)	8 (2)	0.04	1.00 (0.45, 2.35) 0.849	0.95 (0.42, 2.19) 0.910

Children covering a distance of more than 4 miles and aged less than 2 years were more likely to receive prior treatment compared to children aged less than 2 years coming from a distance of ≤4 miles. Vomiting and fever were reported significantly more upon presentation to the facility by the children who were from >4 miles compared to their counterparts from shorter distance (see Table 2). In multivariate model, children aged <2 years, had electricity in the household, vomiting and fever were significantly associated factors with longer distance of the facility from home for children who received initial treatment before coming the KWMCH after controlling for other covariates (see Table 2).

Table 2. *Characteristics of under-5 children received prior treatment and household distance from home to KWMCH in rural Bangladesh*

Indicators	Distance of the facility from home		X^2 value	Unadjusted OR (95% CI) p-value	Adjusted OR (95% CI) p-value
	>4 miles; n=986 (%)	≤4 miles; n=933 (%)			
Socio-economic status					
Age (0-23 months)	835 (85)	726 (78)	14.47	1.58 (1.24, 2.00) <0.001	1.62 (1.26, 2.09) <0.001
Male sex	623 (63)	554 (59)	2.77	1.17 (0.97, 1.42) 0.096	1.15 (0.95, 1.39) 0.151
Maternal literacy	881 (89)	839 (90)	0.11	1.06 (0.78, 1.44) 0.735	1.04 (0.76, 1.42) 0.815
Under-5 children in the household (≥2 children)	260 (26)	233 (25)	0.42	1.08 (0.87, 1.32) 0.517	1.10 (0.88, 1.38) 0.397
Number of household members (≥6 people)	411 (42)	407 (44)	0.66	0.92 (0.77, 1.11) 0.416	0.92 (0.75, 1.13) 0.404
Father stayed outside of household	206 (21)	204 (22)	0.22	0.94 (0.75, 1.18) 0.643	1.01 (0.79, 1.29) 0.930
Presence of electricity	686 (70)	720 (77)	13.74	0.68 (0.55, 0.83) <0.001	1.59 (1.23, 2.05) <0.001
Monthly family income (≥100 US$)	571 (58)	574 (62)	2.45	0.86 (0.71, 1.04) 0.117	1.15 (0.91, 1.45) 0.246
Wealth index					
Poor	245 (26.3)	245 (24.8)	0.43	1.08 (0.87, 1.33) 0.511	-
Lower middle class	150 (16.1)	151 (15.3)	0.16	1.06 (0.82, 1.37) 0.691	1.02 (0.76, 1.37) 0.898
Middle class	187 (20.0)	195 (19.8)	0.01	1.02 (0.81, 1.28) 0.929	1.08 (0.81, 1.44) 0.589
Upper middle class	188 (20.2)	186 (18.9)	0.43	1.09 (0.86, 1.37) 0.513	1.27 (0.93, 1.74) 0.135
Rich	163 (17.5)	209 (21.2)	4.02	0.79 (0.62, 0.99) 0.044	1.18 (0.81, 1.72) 0.386
Nutritional status					
Stunted (<-2.00 SD)	136 (14)	147 (16)	1.32	0.86 (0.66, 1.11) 0.251	0.73 (0.53, 1.01) 0.055
Underweight (<-2.00 SD)	216 (22)	194 (21)	0.29	1.07 (0.85, 1.34) 0.589	1.29 (0.91, 1.82) 0.148
Wasted (<-2.00 SD)	148 (15)	134 (14)	0.11	1.05 (0.81, 1.37) 0.736	0.93 (0.66, 1.30) 0.655
Clinical features					
Duration of diarrhea (≥3days)	323 (33)	303 (33)	0.01	1.01 (0.83, 1.23) 0.933	1.08 (0.88, 1.32) 0.468

Number of stool passed (>10 times)/24hrs	436 (44)	369 (40)	4.11	1.21 (1.01, 1.46) 0.042	1.15 (0.95, 1.39) 0.151
Presence of blood in stool	231 (23)	246 (26)	2.06	0.85 (0.69, 1.06) 0.151	1.02 (0.79, 1.32) 0.866
Vomiting	615 (62)	508 (54)	12.08	1.39 (1.15, 1.67) <0.001	1.26 (1.03, 1.54) 0.028
Fever (>37.8ºC)	190 (19)	138 (14)	6.47	1.38 (1.07, 1.76) 0.010	1.42 (1.10, 1.83) 0.007
Some or severe dehydration	119 (12)	100 (11)	0.74	1.14 (0.85, 1.53) 0.390	1.04 (0.77, 1.39) 0.814
		Etiologic agents			
Rotavirus	392 (40)	307 (33)	9.43	1.34 (1.11, 1.63) 0.002	1.17 (0.95, 1.45) 0.149
Shigella	131 (13)	136 (15)	0.56	0.90 (0.69, 1.17) 0.452	1.07 (0.80, 1.44) 0.657
ETEC	31 (3)	30 (3)	0.00	0.98 (0.57, 1.68) 0.967	0.91 (0.54, 1.54) 0.734
Vibrio cholerae	18 (2)	20 (2)	0.11	0.85 (0.43, 1.69) 0.736	0.88 (0.46, 1.70) 0.706

Among the children who received treatment at *KWMCH*, only male sex was significantly associated with longer distance both in univariate as well as multivariate analysis (see Table 3).

Table 3. *Characteristics of under-5 children received treatment directly at KWMCH and household distance from home to KWMCH in rural Bangladesh*

Indicators	Distance of the facility from home >4 miles; n=158 (%)	≤4 miles; n=247 (%)	X^2 value	Unadjusted OR (95% CI) p-value	Adjusted OR (95% CI) p-value
		Socio-economic status			
Age (0-23 months)	131 (83)	195 (79)	0.73	1.29 (0.75, 2.24) 0.393	1.30 (0.72, 2.32) 0.382
Male sex	107 (68)	137 (56)	5.54	1.68 (1.09, 2.61) 0.018	1.97 (1.26, 3.09) 0.003
Maternal literacy	139 (88)	212 (86)	0.22	1.21 (0.64, 2.29) 0.638	0.69 (0.35, 1.35) 0.276
Under-5 children in the household (≥2 children)	41 (26)	56 (23)	0.40	1.20 (0.73, 1.950) 0.525	1.54 (0.89, 2.67) 0.122
Number of household members (≥6 people)	59 (37)	107 (43)	1.19	0.78 (0.51, 1.20) 0.276	0.67 (0.40, 1.12) 0.126
Father stayed outside of household	32 (20)	54 (22)	0.07	0.91 (0.54, 1.53) 0.793	1.07 (0.60, 1.93) 0.817
Presence of electricity	102 (65)	178 (72)	2.21	0.71 (0.45, 1.11) 0.137	1.35 (0.75, 2.43) 0.318
Monthly family income (≥100 US$)	84 (53)	138 (56)	0.19	0.90 (0.59, 1.37) 0.666	0.96 (0.55, 1.68) 0.896
		Wealth index			
Poor	59 (23.9)	32 (20.3)	0.54	1.24 (0.74, 2.07) 0.463	-
Lower middle class	33 (13.4)	15 (9.5)	1.03	1.47 (0.74, 2.95) 0.309	1.45 (0.65, 3.24) 0.360
Middle class	51 (20.6)	30 (19.0)	0.08	1.11 (0.65, 1.89) 0.779	0.78 (0.40, 1.53) 0.471
Upper middle class	50 (20.2)	42 (26.6)	1.86	0.70 (0.43, 1.15) 0.172	0.63 (0.31, 1.27) 0.196
Rich	54 (21.9)	39 (24.7)	0.29	0.85 (0.52, 1.40) 0.591	0.84 (0.35, 2.03) 0.70
		Nutritional status			
Stunted (<-2.00 SD)	20 (13)	50 (20)	3.37	0.57 (0.31, 1.04) 0.066	0.59 (0.29, 1.20) 0.143
Underweight (<-2.00 SD)	29 (18)	56 (23)	0.84	0.77 (0.45, 1.30) 0.359	1.16 (0.55, 2.46) 0.690
Wasted (<-2.00 SD)	18 (11)	36 (15)	0.59	0.75 (0.39, 1.43) 0.441	0.66 (0.30, 1.46) 0.306
		Clinical features			
Duration of diarrhea (≥3days)	32 (20)	39 (16)	1.04	1.35 (0.78, 2.34) 0.308	1.59 (0.90, 2.80) 0.107
Number of stool passed (>10 times)/24hrs	31 (20)	46 (19)	0.01	1.07 (0.62, 1.82) 0.904	1.07 (0.61, 1.86) 0.820
Presence of Blood in stool	71 (45)	134 (54)	2.98	0.69 (0.45, 1.05) 0.084	0.77 (0.48, 1.23) 0.270
Vomiting	60 (38)	78 (32)	1.48	1.33 (0.85, 2.06) 0.223	1.53 (0.95, 2.47) 0.082
Fever (>37.8ºC)	31 (20)	42 (17)	0.29	1.19 (0.69, 2.05) 0.592	1.23 (0.69, 2.19) 0.493
Some or severe dehydration	16 (10)	21 (9)	0.14	1.21 (0.58, 2.52) 0.706	1.37 (0.63, 2.96) 0.424
		Etiologic agents			
Rotavirus	21 (13)	36 (15)	0.06	0.89 (0.48, 1.65) 0.804	0.63 (0.32, 1.23) 0.171
Shigella	20 (13)	41 (17)	0.88	0.73 (0.39, 1.34) 0.347	0.83 (0.43, 1.61) 0.583
ETEC	7 (4)	8 (3)	0.12	1.38 (0.44, 4.30) 0.726	1.58 (0.51, 4.87) 0.425
Vibrio cholerae	2 (1)	6 (2)	0.21	0.51 (0.07, 2.86) 0.490	0.30 (0.05, 1.74) 0.179

4. Discussion

In South Asian region, a multitude of healthcare providers exists, ranging from specialized modern facilities with trained physicians to traditional practitioners whose health-care practices are based on traditional believes [15, 16]. Perceptions of quality and manner of treatment and communication can override costs when it comes to provider preference in Bangladesh [17]. Expenditures (fees for care providers, cost of medicine), dependency on cultivation and accessibility have been reported to be the most important factors influencing health care seeking behavior [17, 18]. Additionally transport cost, travel time, and distance (covering long distance by irregular transportation system in poor road condition) are strong barriers to care-seeking at facility for young children in

rural Bangladesh [18]. The present study demonstrated some important findings. Firstly, distance between household and *KWMCH* was an obstacle for seeking care in health facility, which also influenced parents to get prior treatment at community level. Secondly, children aged less than 2 years got more attention to receive prior treatment at home; which was also often associated with long distance that needs to be travelled. The resemble findings from another study, that pointed out age of the children, and type and severity of illness as determinants for consulting the health care providers [19]. Other studies also reported that gender in addition to age, played a significant role in decision making for seeking treatment due to certain illnesses [18, 20, 21] which was also true for present study.

In the current study, children with vomiting and purging >10 times per day 2 times more likely sought prior treatment at home before coming to hospital. Presence of fever and vomiting with diarrhea associated with prompt healthcare seeking behavior of children reported in Guatemala [22]. On the other hand, children with fever and vomiting, living too far received care in the health facility (*KWMCH*) compared to those who resided closed by; was also analogous with another study [23]. A previous study in Bangladesh reported that, over one third of the study participants (38%) opted for community healthcare provider as they were in vicinity to their home [24]. Treatment was sought in a hospital two or three days after appearance of sign or symptoms of a disease like fever or gastro intestinal upset, unless patients became lethargic [18]. In the present study, children reported in the healthcare facility 3 days after the onset of diarrhea along with fever and vomiting. Whether, children had blood in stool, their parents were more likely reported to the health facility rather than seeking treatment at the community level. Thus, presence of blood in stool was considered as more severe form of disease that needs early treatment and proper care by skilled and experienced professionals especially in health care facility. Researchers suggested that, perception of families about the effectiveness of treatments in curing or alleviating specific symptoms, along with their perceptions of severity, are likely to affect care seeking from health care providers or reporting to health facilities [22, 23]. It was also observed that, distance between household and health facility and severity of presenting features of diarrhea influenced parents to get prior treatment from somewhere else other than health facility. However, we do not have detailed information about the type of health care they visited for receiving prior treatment.

Most of the childhood diarrhea can be treated at household level by proper replacement of fluid and salt through ORS and continuing feeding in addition to zinc since the onset of episode [25, 26]. In the present study, two-third of the under-5 children received prior treatment (ORS, zinc and antibiotic), which indicated increased awareness of the mothers about management of diarrheal episodes of their children at household level. Diarrhea children; living more than 4 miles away from health facility (*KWMCH*), receiving more often antimicrobials, and were more frequently infected with rotavirus diarrhea. Most of the childhood diarrheal episodes were due to viruses, parasites, or food intolerance. None of which required antimicrobial therapy, except prolonged or complicated cases like severe cholera or shigellosis [27, 28]. The study results indicated frequent and irrational antimicrobials drug use in rural Bangladesh for infants and young children with diarrhea at household level as mentioned in earlier study [29]. This implies longer distance as barrier for seeking appropriate treatment for illnesses. Previous studies reported that approximately 50% of the diarrhea patients consult a village health care provider which reflected their belief that they received quality health care from them in rural Bangladesh [30, 31]. They were easily available and commonly utilized source of health care at the community level. Hence, educational programmmes to raise public health awareness should be launched to help the mothers to understand the disease process especially danger signs of diarrheal illnesses to seek care at facility level, and the difference between favorable and unfavorable courses of diarrheal episodes [32].

In the current study, no association between SES, family income of the previous month (≥100 US$) as well as education of mother and healthcare seeking behavior for her child was observed. However, access to electricity in the household was found more among children with shorter distance, which indicate that children from longer distance live in rural areas of Bangladesh are away from advanced technology. On the other hand, better socio-economic condition and higher level of maternal education has positive impact on better health status of children and also on their health care practices [20, 24, 33-36]. So, this finding implies that awareness of mother about diarrheal diseases and increasing number of healthcare providers at community level might contribute frequent visit to these easily accessible sources for health care [24]. At the same time, improvement of mode of communication like road construction, availability of fast moving vehicles and use of modern amenities like cell phone should be introduced as well to ensure optimal care seeking for childhood diarrhea in rural Bangladesh.

5. Limitations and Strengths

Several limitations in the current study should be mentioned. Data were collected on the basis of mothers' recall, so findings were subject to recall bias. Additionally, present study was conducted in a community of rural Bangladesh, thus we cannot generalize the findings to a larger population. Additionally, we do not have available information about the health care providers to whom children sought care before coming to the health facility. However, the study had several strengths, including a large sample size of unbiased study participants who reported from a distinct demographic surveillance system area as

well as quality performance of the diagnostic laboratory.

6. Conclusions

Longer distance from the health facility delays seeking appropriate medical care from the facility. Illnesses like fever, vomiting, and more stool frequency influence health care seeking behavior of mothers who traveled longer distance, visit the hospital, and seek medical treatment more often at the locality. However, presence of blood in stool influence parents in reporting directly to the health facility.

Abbreviations

Centre for Nutrition and Food Security (CNFS); Demographic Surveillance System (DSS); Enterotoxigenic Escherichia coli (ETEC); International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b); *Kumudini Womens' Medical College and Hospital* (KWMCH); Oral rehydration solution (ORS), Principle Component Analysis (PCA); Swedish International Development Cooperation Agency (Sida), Socio-economic status (SES), Statistical Package for Social Sciences (SPSS).

Authors' Contributions

All authors (FF, SKD, SA, and ASGF) contributed to the design of the study, data collection and data entry. FF and ASGF performed the data analysis. FF drafted the manuscript. All authors critically reviewed and approved the manuscript.

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