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Health Care-Seeking Behavior for Childhood Diarrhea in Mirzapur, Rural Bangladesh

Sumon K. Das, Dilruba Nasrin, Shahnawaz Ahmed, Yukun Wu, Farzana Ferdous, Fahmida Dil Farzana, Soroar Hossain Khan, Mohammad Abdul Malek, Shames El Arifeen, Myron M. Levine, Karen L. Kotloff, and Abu S. G. Faruque*

International Center for Diarrheal Disease Research, Bangladesh (icddr,b); Center for Vaccine Development, University of Maryland School of Medicine, Baltimore, Maryland

Abstract. We evaluated patterns of health care use for diarrhea among children 0–59 months of age residing in Mirzapur, Bangladesh, using a baseline survey conducted during May–June 2007 to inform the design of a planned diarrheal etiology case/control study. Caretakers of 7.4% of 1,128 children reported a diarrheal illness in the preceding 14 days; among 95 children with diarrhea, 24.2% had blood in the stool, 12.2% received oral rehydration solution, 27.6% received homemade fluids, and none received zinc at home. Caretakers of 87.9% sought care outside the home; 49.9% from a pharmacy, and 22.1% from a hospital or health center. The primary reasons for not seeking care were maternal perception that the illness was not serious enough (74.0%) and the high cost of treatment (21.9%). To improve management of childhood diarrhea in Mirzapur, Bangladesh, it will be important to address knowledge gaps in caretakers' assessment of illness severity, appropriate home management, and when to seek care in the formal sector. In addition, consideration should be given to inclusion of the diverse care-giving settings in clinical training activities for diarrheal disease management.

INTRODUCTION

Diarrhea remains a leading cause of childhood mortality in developing countries. In an effort to inform strategic planning for prevention and management of diarrheal illnesses, the Global Enteric Multicenter Study (GEMS)[1] was designed to elucidate the etiology and consequences of moderate-to-severe diarrheal disease (MSD) among children 0–59 months of age residing in South Asia and sub-Saharan Africa, where more than 80% of the deaths occur.[2] Seven field sites located in countries with moderate to high child mortality were selected to participate in GEMS, including Mirzapur, Bangladesh.[3] Although Bangladesh has enjoyed remarkable gains in economic development, education, and health over the past two decades, ~47 million people (almost one-third of the population) live below the international poverty line.[4] Compared with urban communities, rural areas in Bangladesh continue to experience higher rates of poverty, under-five mortality, diarrhea, and malnutrition.[5] In 2011, it was estimated that 42.7% of children < 5 years of age living in rural Bangladesh had moderate or severe stunting and 38.7% were underweight.[5]

Each GEMS site performed a 3-year case/control study of MSD among children seeking care at sentinel health centers (SHCs) and hospitals; neighborhood children without diarrhea served as controls.[3,6,7] To characterize the geographically defined population of children 0–59 months of age that would serve as the catchment area for the GEMS SHCs, and the sampling frame for random selection of matched controls from the community, each site maintained an active demographic surveillance system (DSS). Repeated surveys of care-seeking for diarrheal illnesses (at the SHCs and other formal and informal sectors) were performed among randomly selected, age-stratified samples of children in the DSS; these data allowed estimates of MSD incidence in the population derived from surveillance at the SHCs to be adjusted for children who sought care elsewhere.[3,7] Information also was collected in a baseline survey to characterize the caretakers' knowledge, attitudes, and practices when their children developed diarrhea and the occurrence and clinical features of the episodes. Herein, we report the results of the surveys conducted in Mirzapur.

* Address correspondence to Abu S. G. Faruque, Center for Nutrition and Food Security (CNFS), International Center for Diarrheal Disease Research, Bangladesh (icddr,b), 68 Shaheed Tajuddin Ahmed Sarani, Mohakhali, Dhaka 1212, Bangladesh. E-mail: gfaruque@icddrb.org

MATERIALS AND METHODS

Study area and study population. Mirzapur is a rural subdistrict of Bangladesh that covers 374 km^2 in Tangail district (Figure 1). It is located 60 km (2 hours by car on a paved road) north of the capital city, Dhaka. The Mirzapur DSS, established in 2007, comprises ~240,000 individuals living in 58,300 households who are visited every 4 months to update births, deaths, and migrations. Residents rely mainly on tube wells for drinking. Approximately half of the households use improved sanitation (either ventilated improved pit latrines or pour flush toilets), and 60% have electricity. Men are mostly engaged in agriculture (mainly rice and jute), or daily wage labor, often abroad, whereas women work mainly in the home. There are three main seasons: summer (March–June), monsoon (June–October), and winter (October–March). Flooding is common during the monsoons. Bus, motorized and cycle rickshaws are the main forms of transportation. The DSS is served by Kumudini Hospital, a 750-bed nonprofit private referral hospital located in the central urban union of Mirzapur. This hospital was identified as the only SHC for case enrollment in the case/control study. A detailed overview of the study methods is presented elsewhere in this supplement and summarized briefly below.[8]

Sampling procedure. For each survey, a new sample of 370 to 450 children in each of three age strata (0–11 months, 12–23 months, and 24–59 months) was randomly selected from an updated DSS database, with the aim of enrolling ~333 per age stratum. Children who could not be located because of death, migration, or identity error, and those > 59 months of age were deemed ineligible and were replaced with the next randomly selected child in the same age stratum. The child was considered a non-respondent if the primary caretaker could not be located after three attempts.

Data collection. A baseline health care utilization and attitudes survey (HUAS) was conducted in May–June 2007 followed by an abbreviated survey, designated "HUAS-lite,"

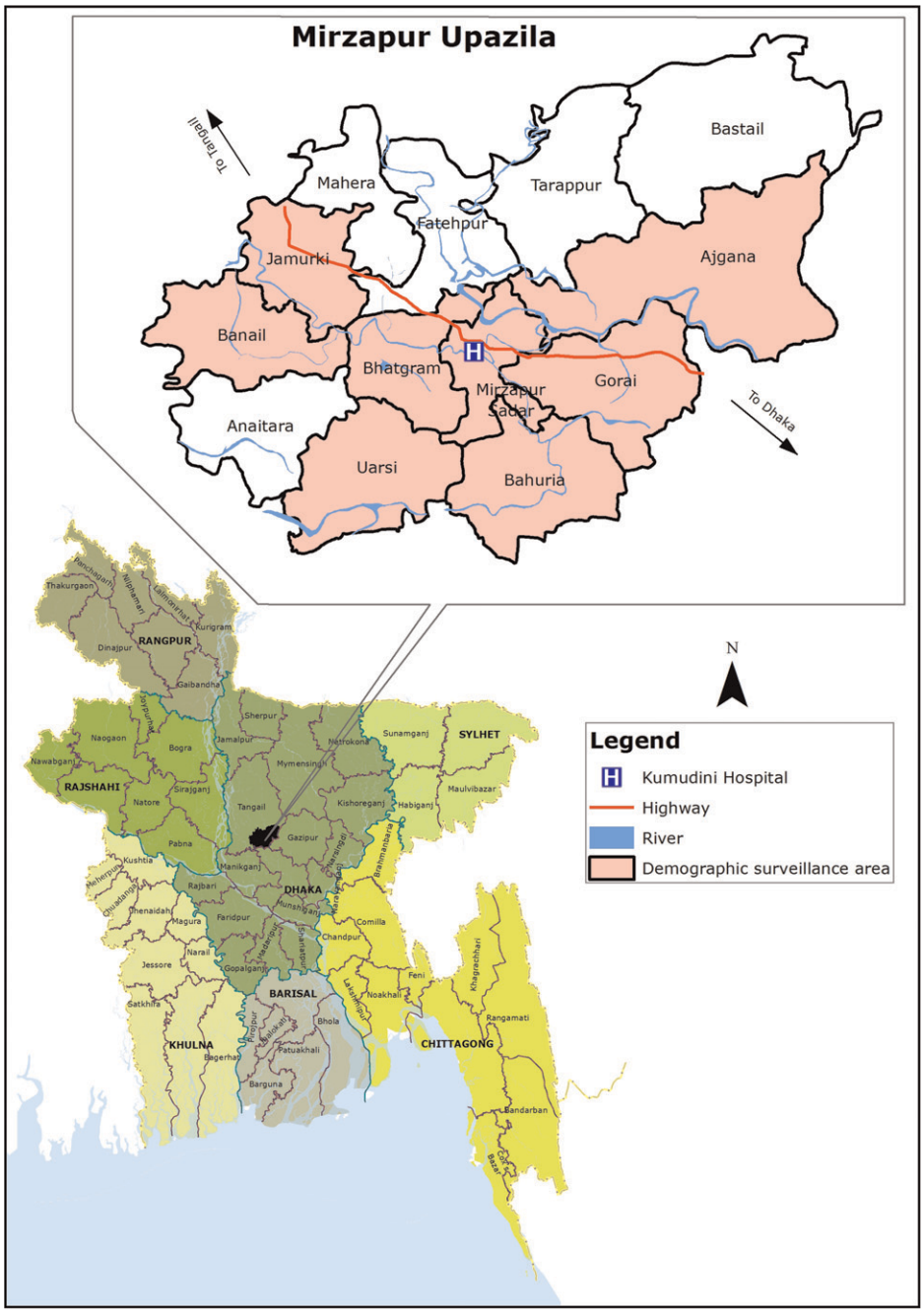

FIGURE 1. Map of the Demographic Surveillance System, Mirzapur, Bangladesh.

that was administered three times per year (total six surveys) in conjunction with the DSS rounds during the final 2 years of the case/control study (2009 and 2010). Both surveys were conducted in the home by trained interviewers using pretested, structured questionnaires that were administered to the selected child's primary caretaker in Bangla. Caretakers were asked whether the child had experienced diarrhea (three or more abnormally loose stools within a 24-hour period) during the previous 14 days. If so, they were queried about the nature and duration of the illness, how it was managed, and the type of health care sought. Information was solicited to determine whether the episode constituted MSD, defined as diarrhea associated with at least one of the following observations by the caretaker: sunken eyes (more than usual), wrinkled skin (an indicator of decreased skin turgor, visible blood in stool, hospital admission, or receipt of intravenous rehydration therapy). Dysentery was defined as presence of visible blood in the stool of a child with diarrhea. The baseline HUAS collected additional information about household and family structure, the cost of care, and the caretaker's knowledge, attitudes, and practices concerning diarrhea prevention and treatment. If the child had not experienced diarrhea during the previous 14 days, hypothetical questions were asked about the health care use anticipated for future diarrhea episodes that might occur.

Data outcomes and analysis. Case report forms were transmitted to a centralized Data Coordinating Center, as described elsewhere.[9] All statistical analyses were performed with SAS

version 9.3 (SAS Institute, Inc., Cary, NC). Sampling weights were used based on the number of children in each age–gender stratum in the DSS population.[8] Survey logistic regression was used to model separately for each outcome to evaluate the effect of specific variables and to control for confounding. Variables with $P < 0.05$ from the bivariate logistic regression were included into the multivariable models. We used a backward stepwise regression method to arrive at our final models. All variables that were significant at $P \leq 0.1$ remained in the models. Strengths of association were determined by estimating adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for each variable, controlling for the other variables in the model. Household wealth status was determined by calculating a wealth index based on asset ownership and home construction[8] and households were classified based on the wealth index quintiles: quintile 1 (poor), 2 (lower middle), 3 (middle), 4 (upper middle), and 5 (wealthy).

Ethical considerations. This study protocol was approved by The Institutional Review Board (IRB) of the University of Maryland, Baltimore, MD, and by the Research Review Committee (RRC) and Ethical Review Committee (ERC) of icddr,b. Informed written consent was obtained in the presence of a witness from mothers of each study participants before the formal interview. Original signed consent forms were stored confidentially and securely.

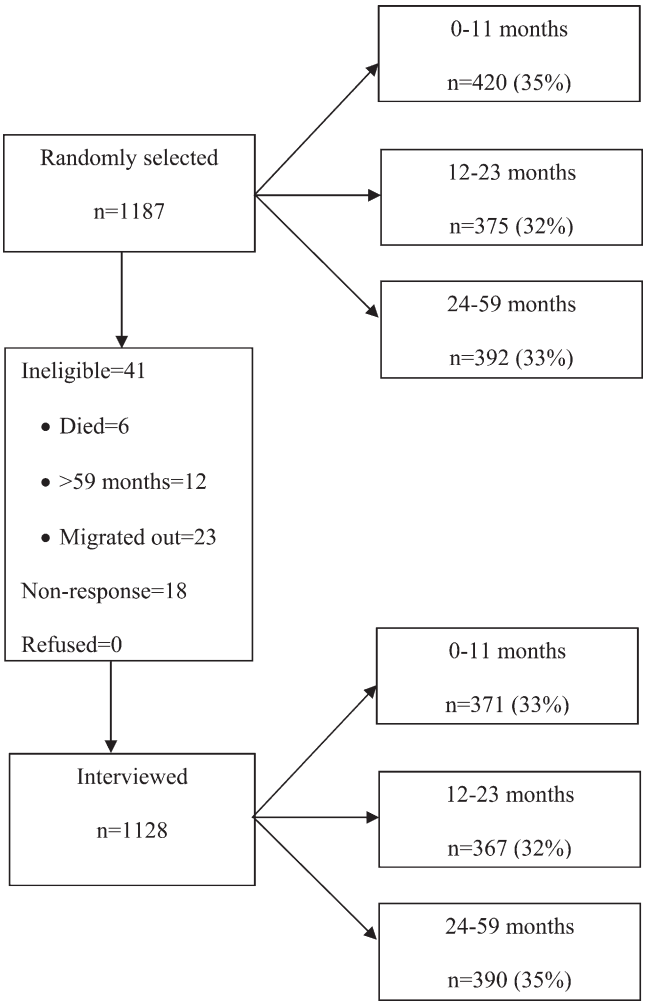

FIGURE 2. Baseline Health Care Utilization and Attitudes Survey Enrollment.

RESULTS

Baseline HUAS. A total of 1,128 primary caretakers were interviewed. The age distribution of the index child was as follows: 371 children aged 0–11 months, 367 children aged 12–23 months, and 390 children aged 24–59 months (Figure 2). There were 95 children (7.4%) who were reported to have experienced diarrhea within the previous 14 days. The most common features accompanying the diarrhea were dry mouth (84.8%), lethargy (77.8%), sunken eyes, more than usual (67.3%), and excessive thirst (69.8%). The caretaker observed blood in the child's stool in 24% of episodes.

The socio-demographic characteristics of all children enrolled and those who experienced diarrhea during the preceding 2 weeks are shown in Table 1. Nearly 40% of primary caretakers did not complete primary school; they cared for a mean of one child < 5 years of age. Most households had electricity (62%), but less than half owned a cell phone. Fathers lived abroad to access better employment opportunities in 28% of households. Weighted multivariate logistic regression, performed to identify factors that were associated with diarrhea during the previous two weeks, showed that older children were less likely to experience diarrhea compared with the younger children (adjusted OR = 0.98, 95% CI: 0.98–0.99), and girls were less likely to experience diarrhea than boys (adjusted OR = 0.57, 95% CI: 0.35, 0.91).

Nearly all caretakers (95.4%) cited consumption of clean food and water as the most effective measure for preventing childhood diarrhea, whereas hand washing (49.0%), improved nutrition (16.3%), proper disposal of human waste (5.7%), and breastfeeding (0.4%) were named less commonly. All caretakers believed that oral rehydration solution (ORS) is effective for treating diarrhea. Ninety-nine percent caretakers responded positively that vaccines could help to prevent childhood diarrhea.

Caretakers sought treatment outside the home for 84 of the 95 children who had diarrhea during the preceding 2 weeks (87.9%). Among the 11 caretakers who did not seek care, eight reported that the illness was not severe enough (74.0%) and two cited the high cost of treatment (21.9%). Common sources of treatment included pharmacies (49.9%) and a shop or market (29.5%). Approximately one-third of the children with diarrhea received care from a licensed provider (22.1%) visited a health center and 5.5% visited a private doctor) (Table 2). We included the variables in the multivariable model that showed association with seeking care from a licensed provider ($P < 0.05$) in bivariate analysis including gender, wealth index, mother as the primary decision maker for deciding the child's treatment, rice-water stool, presence of wrinkled skin, child exhibiting lethargy during diarrhea. We found that children were more likely to be taken to a licensed provider if they passed rice-water stools (aOR = 5.4, 95% CI: 1.46–19.69), exhibited lethargy (aOR = 4.9, 95% CI: 1.27–18.77), had a mother who was the primary decision maker (aOR = 6.0, 95% CI: 1.79–20.46), and were girls (aOR = 5.0, 95% CI: 1.62–15.37) (Table 3).

Details about home management of the illness were solicited. Most caretakers (61.3%) reported that they offered the child the same amount to drink as usual, whereas 27.9%

TABLE 1
Characteristics of study children and their households in the baseline Health Care Utilization and Attitudes Survey

Variables	All enrolled children (N = 1,128)	Children with diarrhea during preceding 14 days (N = 95)
	Mean (SD), range:	
Age of child (months)	22 (16), 0–55	18 (14), 1–55
Number of people in household	6 (3), 2–26	6 (3), 2–23
Number of sleeping rooms in household	2 (1), 1–14	2 (1), 1–8
Number of children < 5 years in household	1 (1), 1–5	1 (1), 1–4
Number of children reared by primary caretaker	1 (1), 1–3	1 (1), 1–3
	Number (weighted %*)	
Primary caretaker completed primary school	708 (62)	64 (67)
Girls	567 (51.0)	43 (38.7)
Wealth index		
Poor	230 (21)	18 (19)
Lower middle	226 (20)	23 (28)
Middle	221 (20)	16 (14)
Upper middle	229 (21)	17 (21)
Wealthy	222 (19)	21 (18)
Father living outside home	323 (28)	27 (32)
Household assets		
Finished floor	145 (13)	14 (14)
Electricity	692 (62)	58 (60)
Telephone	531 (46)	47 (45)

*Weighted according to age and sex distribution in the demographic surveillance system (DSS) population.

offered more than usual and 10.8% offered less than usual. Most caretakers (71.4%) offered their child the same or more than usual to eat, whereas 28.7% offered less food. Before seeking care from outside the home, 12.2% of caretakers gave their child ORS, no one administered zinc, and 27.6% provided homemade fluids including thin watery porridge made from maize, rice, or wheat, soup, sugar salt water solution, yogurt (Table 2). In weighted multivariate logistic regression analysis, children from wealthier households (aOR 2.3, 95% CI: 1.20–4.32) and those passing rice-water stools were more likely to receive ORS at home compared with those who did not pass rice-water stools (29.7% versus 8.5%, aOR 4.5, 95%

TABLE 2
Diarrheal prevalence in the 14 days preceding the interview, management and health-seeking behavior of caretakers from the baseline Health Care Utilization and Attitudes Survey*

	0–59 months	0–11 months	12–23 months	24–59 months
No. interviewed	**1,128**	**371**	**367**	**390**
N (%) Any diarrhea	95 (7.4)	36 (9.8)	39 (10.6)	20 (5.5)
N (%) Moderate-to-severe diarrhea (MSD)	73 (5.5)	27 (7.3)	32 (8.8)	14 (3.9)
No. with diarrhea	**95**	**36**	**39**	**20**
N (%) with the following criteria for MSD				
Dysentery	26 (24.2)	11 (27.7)	11 (28.1)	4 (19.8)
Hospitalized	2 (1.3)	1 (2.1)	1 (2.7)	0
Received intravenous rehydration	0	0	0	0
Sunken eyes	63 (67.3)	23 (63.3)	26 (66.9)	14 (69.8)
Wrinkled skin	14 (13.0)	6 (16.6)	6 (15.5)	2 (9.4)
N (%) sought care from outside home	84 (87.9)	32 (90.0)	35 (89.8)	17 (85.4)
N (%) who received the following treatments at home before seeking care				
Offered usual or more than usual to eat	70 (71.4)	31 (86.6)	26 (66.9)	13 (65.6)
Offered more than usual to drink	25 (27.9)	6 (17.8)	13 (33.1)	6 (30.2)
Oral rehydration solution	13 (12.2)	6 (16.6)	5 (12.8)	2 (9.4)
Homemade fluid	29 (27.6)	11 (32.3)	14 (35.9)	4 (19.8)
Zinc	0	0	0	0
Antibiotics	1 (2.4)	0	0	1 (5.2)
No. who sought care	**84**	**32**	**35**	**17**
N (%) seeking care who choose the following:				
Pharmacy	40 (49.9)	12 (37.0)	19 (53.9)	9 (54.9)
Remedy from a shop/market	27 (29.6)	10 (29.6)	13 (37.5)	4 (24.4)
Unlicensed provider	22 (21.1)	13 (39.5)	7 (20.0)	2 (11.0)
Licensed private practitioner	4 (5.5)	2 (7.3)	1 (3.0)	1 (6.1)
Any health center	21 (22.1)	7 (22.2)	11 (31.6)	3 (15.8)
Sentinel Health center	15 (14.9)	5 (14.9)	8 (23.0)	2 (9.7)
No. who received care at the health center	**21**	**7**	**11**	**3**
N (%) who received the following treatment at the health center				
Oral rehydration solution	17 (75.6)	6 (83.0)	9 (81.8)	2 (61.4)
Antibiotics	13 (62.1)	2 (22.3)	9 (81.8)	2 (69.3)
Zinc	9 (45.8)	4 (55.3)	3 (27.7)	2 (61.4)

*Percentages are weighted according to age and sex distribution in the demographic surveillance system (DSS) population.

TABLE 3

Factors associated with seeking care for diarrhea from a licensed provider in the baseline Health Care Utilization and Attitudes Survey, by weighted multivariate logistic regression analysis*

Variable	n/*N*	Weighted (%)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Gender				
Boy	9/52	15.2	–	–
Girl	16/43	38.6	3.5 (1.15, 10.60)	5.0 (1.62, 15.37)
Mother determines care seeking				
No	15/72	17.6	–	–
Yes	10/23	40.2	3.1 (0.99, 9.97)	6.0 (1.79, 20.46)
Rice water stools				
No	16/77	18.2	–	–
Yes	9/18	52.7	5.0 (1.42, 17.54)	5.4 (1.46, 19.69)
Lethargy				
No	3/19	9.9	–	–
Yes	22/76	28.4	3.6 (0.88, 14.72)	4.9 (1.27, 18.77)

*CI = confidence interval.

CI: 1.11–18.54). After seeking care from a hospital or health center, 75.8% received ORS, and 45.9% received zinc.

HUAS-lite. A total of 6,567 children participated in the six HUAS-lite surveys conducted during 2009 and 2010 (Table 4). The distribution of participants by stratum, from youngest to oldest, was 2,109 (32%), 2,218 (34%), and 2,240 (34%). There were 191 children (2.3%) reported to have an episode of diarrhea within the preceding 14 days; the 14-day prevalence of diarrhea was higher in the 0–11 month and 12–23 month strata (3.5% and 3.7%, respectively) compared with the oldest stratum (1.5%). Nearly half of the diarrhea episodes (48.1%) met criteria for MSD; the 2-week prevalence of MSD was higher in the 0–11 month and 12–23 month strata (1.6% and 1.9%, respectively) compared with the oldest stratum (0.7%).

As shown in Table 4, round-to-round variations were seen in the 14-day prevalence of any diarrhea (2.1% to 4.5%) and MSD (0.4% to 2.3%). Although the rounds did not correspond directly with seasons, there appeared to be peaks coinciding with the winter and spring seasons in January–April of both years. Caretakers reported seeking care from the SHC for 16.8% of any diarrhea and 29.3% of MSD episodes. The frequency of care seeking for MSD was highest in the youngest age stratum (38.3%) compared with the middle (22.6%) and oldest (27.2%) strata.

DISCUSSION

Diarrhea, which in the past was considered a major cause of child morbidity and mortality in Bangladesh,[10–13] was estimated to be responsible for only 2% of under-5 deaths in 2011,[5] compared with 10% in 1994.[14] During this same period, the diarrhea-specific mortality rate declined from 14 to 1 death per 1,000 live births. It is difficult to determine whether similar improvements in diarrheal incidence have occurred. Fourteen-day period prevalence estimates of diarrhea have been determined

TABLE 4

Prevalence of diarrhea in children and health care utilization trend over time (January 2009 to December 2010)*

	HUAS-lite round:					
Variable	1 (Jan–Apr 09)	2 (May–Aug 09)	3 (Sep–Dec 09)	4 (Jan–Apr 10)	5 (May–Aug 10)	6 (Sep–Dec 10)
	Number (%) with the following during the preceding 14 days, by age stratum:					
0–11 months (n)	332	364	351	347	382	333
Diarrhea	22 (6.6)	8 (2.2)	8 (2.3)	16 (4.5)	9 (2.3)	11 (3.3)
Diarrhea visiting SHC	7 (31.7)	3 (37.5)	1 (12.0)	4 (23.2)	0	2 (17.7)
MSD	8 (2.4)	6 (1.6)	5 (1.4)	8 (2.3)	1 (0.3)	6 (1.8)
MSD visiting SHC	5 (62.6)	2 (33.3)	1 (19.0)	3 (34.3)	0	2 (32.8)
Dysentery	0	4 (50.0)	2 (25.0)	0	1 (10.7)	2 (18.7)
Dysentery visiting SHC	0	0	0	0	0	0
12–23 months (n)	385	363	358	378	372	362
Diarrhea	22 (5.7)	8 (2.2)	15 (4.2)	24 (6.3)	9 (2.4)	4 (1.1)
Diarrhea visiting SHC	3 (13.5)	0	1 (6.2)	3 (12.5)	3 (33.1)	0
MSD	15 (3.9)	6 (1.6)	6 (1.7)	12 (3.2)	3 (0.8)	1 (0.3)
MSD visiting SHC	3 (19.9)	0	1 (15.6)	3 (25.0)	3 (100.0)	0
Dysentery	3 (13.9)	2 (25.2)	3 (20.3)	3 (12.5)	3 (33.1)	0
Dysentery visiting SHC	1 (34.9)	0	0	0	3 (100.0)	0
24–59 months (n)	392	359	365	373	395	356
Diarrhea	6 (1.5)	0	7 (1.9)	9 (2.4)	6 (1.5)	7 (1.9)
Diarrhea visiting SHC	0	0	1 (14.0)	1 (11.2)	2 (33.2)	1 (14.8)
MSD	3 (0.8)	0	4 (1.1)	4 (1.1)	1 (0.3)	3 (0.8)
MSD visiting SHC	0	0	1 (24.3)	1 (25.1)	1 (100.0)	1 (34.6)
Dysentery	1 (16.7)	0	1 (14.0)	1 (11.2)	1 (16.8)	3 (43.1)
Dysentery visiting SHC	0	0	1 (100.0)	1 (100.0)	1 (100.0)	1 (34.6)

*SHC = sentinel health center; MSD = moderate-to-severe diarrhea.

every 3–5 years since 1993 using representative national samples from the Bangladesh Demographic and Health Surveys; however, the seasonality of the data collection periods were not harmonized across surveys, therefore direct comparisons cannot be made. The most recent survey from July to December 2011 found a 14-day period prevalence of diarrhea that ranged from 2.6% to 6.0% among the seven districts of Bangladesh,[5] which is compatible with the 2.9% rate that we calculated over a 2-year period using serial HUAS-lite surveys (range 1.5% to 4.5% per survey over the 2009–2010 time period).

The ability of caretakers to recognize signs and symptoms of severe illness is believed to be an important predictor of timely and appropriate care seeking in developing countries. In Mirzapur, for example, an intervention directed at improving maternal recognition of danger signs in their newborns resulted in substantial increases in timely use of qualified providers.[15,16] It is notable in our study that even though most caretakers reported that their children with diarrhea had associated signs of dehydration, the presence of these signs, with the exception of lethargy, was not associated with care seeking from a licensed provider. Although we did not determine whether signs of dehydration prompted caretakers to procure appropriate rehydration solutions from unlicensed providers, our observations suggest a need to further examine the ability of caretakers in Mirzapur to recognize signs of dehydration as a trigger for seeking treatment from providers trained in rehydration techniques. Rice watery stool (clear, watery stool with a vague fishy odor, containing flecks of mucus, like water from boiled rice) is considered as classical stool of cholera patients in rural Bangladesh. Passage of such stool is likely to prompt mothers to go to a licensed health care provider for perceived severity of illness. Households with the lowest resources require particular attention as they are often at greatest risk for ineffective health-seeking and negative outcomes for both the households' livelihood stability and the health of the child.[17] A concern in our study is the small proportion of families in Mirzapur for whom cost was an impediment to care seeking, even with the minimal fee (US$0.30) for registration and consultation at Kumundini Hospital.

The importance of reinforcing messages about diarrhea management is also supported by our findings. Even though nearly all caretakers sought care outside the home when their children had diarrhea, the majority (74%) did not consult a licensed health provider, a trend that is increasingly reported in Bangladesh.[18] Although our study does not permit an assessment of the adequacy of care provided at informal settings, we found that most children who received care from a hospital or health center were appropriately treated with ORS, and approximately half received zinc. These rates are compatible with other reports of zinc and ORS usage in rural Bangladesh.[5,19] Many children in the older age groups were also given antibiotics, which is not unexpected given the high incidence of dysentery that was observed in this study. In contrast, management of the illness at home without guidance from licensed providers usually did not include offering more to drink, ORS or other recommended fluids, or zinc.

Several limitations of this study should be noted. The frequency of diarrhea might be underestimated as a result of difficulty in recalling events that occurred over a 14-day period. On the other hand, the frequency of dehydration and MSD that we found is higher than that usually observed in community-based studies. Over-reporting could have resulted from a tendency for caretakers to selectively recall more severe events or from an inability to accurately recognize the clinical signs. We did not attempt to capture ORS use after procurement at pharmacies or informal providers, and thus may have underestimated its frequency.

CONCLUSIONS

Our study illustrates a pattern of diverse health care-seeking behavior for children < 5 years of age in rural Mirzapur, Bangladesh. As a result, use of the SHCs for MSD was relatively low, which will impact the precision of future calculations of the population-based incidence of MSD in GEMS. We identified potential impediments to the timely access of appropriate treatment of diarrhea among young children. Our findings suggest that efforts to increase health-related knowledge and skills may be needed to facilitate caretakers' decisions about whether self-treatment is indicated, and if so, what regimen is appropriate, and when to seek care in the formal sector. In addition, consideration should be given to inclusion of the diverse care-giving settings in clinical training activities for diarrheal disease management.

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Authors' addresses: Sumon K. Das, Shahnawaz Ahmed, Farzana Ferdous, Fahmida Dil Farzana, Soroar Hossain Khan, Mohammad Abdul Malek, and Abu S. G. Faruque, Center for Nutrition and Food Security (CNFS), International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), E-mails: sumon@icddrb.org, shahnawz@icddrb.org, farzanaf@icddrb.org, fahmidaf@icddrb.org, soroar@icddrb.org, mamalek@icddrb.org, and gfaruque@icddrb.org. Dilruba Nasrin, Yukun Wu, Myron M. Levine, and Karen L. Kotloff, Center for Vaccine Development (CVD), University of Maryland School of Medicine (UMB), Baltimore, MD, E-mails: dnasrin@medicine.umaryland.edu, wu@medicine.umaryland.edu, mlevine@medicine.umaryland.edu, and kkotloff@medicine.umaryland.edu. Shames El Arifeen, Centre for Child and Adolescent Health, International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), E-mail: shams@icddrb.org.

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