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SPECIAL THEME: INFECTIOUS DISEASES

Childhood diarrhoea management practices in Bangladesh: private sector dominance and continued inequities in care

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Background Monitoring for disparities in health and services received based upon gender, income, and geography should continue as renewed efforts to reduce under-five mortality are made in response to millennium development goal #4. The purpose of this survey was to provide a nationally representative description of current childhood diarrhoea management practices and disparities in Bangladesh.

Methods A nationally representative, cross-sectional, cluster-sample survey was carried out in randomly selected rural and urban populations across Bangladesh. The survey was completed over an 8 month period between November 2003 and June 2004.

Results A total of 7308 children with a prevalent diarrhoeal illness episode within 560 clusters were identified and enrolled in the survey. In 61% of the cases help was sought from a health care provider, with over 90% practicing in the private sector. Caretaker practice disparities favouring males and higher income households were identified. Significant trends ($P < 0.001$) favouring higher income households were found for having sought help from any provider or a licensed doctor and for treating their child with oral rehydration solution or an antibiotic. Female children in urban households were less likely to be seen by a licensed allopath, adj OR 0.73 (95% CI 0.57, 0.94). Among rural households gender disparities were limited to females being less likely to receive an antibiotic, adj OR 0.74 (95% CI 0.65, 0.86).

Conclusion Households seeking help from a health provider overwhelmingly utilize the private sector in Bangladesh. Gender inequities in the utilization of licensed providers and purchase of antibiotics, favouring males were identified. Findings suggest that higher income, urban households tend to practice greater gender discrimination. In order to better understand health dynamics in urban populations, in particular slum-dwellers, there is a need to disaggregate survey data by household location.

Keywords Diarrhoea, treatment, equity, disparities, gender, ORS, antibiotics, providers

Globally, diarrhoeal disease is the second leading cause of under-five mortality, accounting for ~2 million deaths per year.[1,2] The majority of these deaths can be prevented by the timely use of oral rehydration solution (ORS) and continued feeding, practices received by less than one-third of children in South Asia and sub-Saharan Africa.[3] Improved ORS coverage, utilization of qualified providers, and reduced disparities in recommended childhood diarrhoea management practices on the basis of gender, socioeconomic status, or where children live will be important outcomes to monitor as renewed efforts in response to millennium development goal #4 are made to reduce under-five mortality in developing countries by two-thirds by the year 2015.[4]

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In Bangladesh and other South Asian countries child survival, health services utilization, and expenditure inequities on the basis of gender, favouring males, have been well documented for several decades.[5–13] In relation to females, male children under the age of five have been found to have a lower probability of death[6–8] and are more likely to be taken to a health provider when ill.[8–12] Household expenditures on childhood illnesses are also biased in favour of males.[7,10,11] There are some indications that these disparities may be diminishing. For example, the latest Bangladesh Demographic and Health Survey (2004) found that 67% of under-five children with a diarrhoeal illness received ORS and there were no identified gender disparities.[13] Similarly, the rural demographic and health surveillance (DHS) site of the Centre for Health and Population Research in Matlab is now reporting no gender differences in the use of ORS or health-seeking practices.[14] Similar findings have been reported in Kerala, India.[15]

The purpose of this survey was to provide detailed, nationally representative information from caretakers managing a prevalent case of childhood diarrhoea. This included household management practices, utilization of health services, illness expenditures, and disparities in relation to gender, income status, and geography. In order to identify varied patterns of practice and equity by geographic location the survey was stratified by rural, urban (district municipalities) and inner-city slum and non-slum populations. The results of this survey will provide a baseline from which to monitor changes in practices as zinc is introduced throughout Bangladesh as a treatment for childhood diarrhoea.

Methods

Study design

A nationally representative, cross-sectional, cluster-sample survey was carried out in randomly selected rural and urban populations across Bangladesh. The surveys were completed over an 8 month period between November 2003 and June 2004.

Sampled populations

The population of Bangladesh was sub-grouped under three strata: city corporations, district municipalities, and rural (Figure 1). Bangladesh is divided into six divisions and each division is administratively subdivided into districts, the number ranging from 4 to 17 per division. Using a proportionate probability random sampling procedure one district in each division was selected. The two largest cities in Bangladesh, Dhaka and Chittagong, were purposively selected as the city corporations. Sampling clusters within each division or city corporation were selected as follows:

1. District municipalities: The municipal administrative centres of the randomly selected districts were chosen and within each municipal centre 20 clusters were selected. Clusters

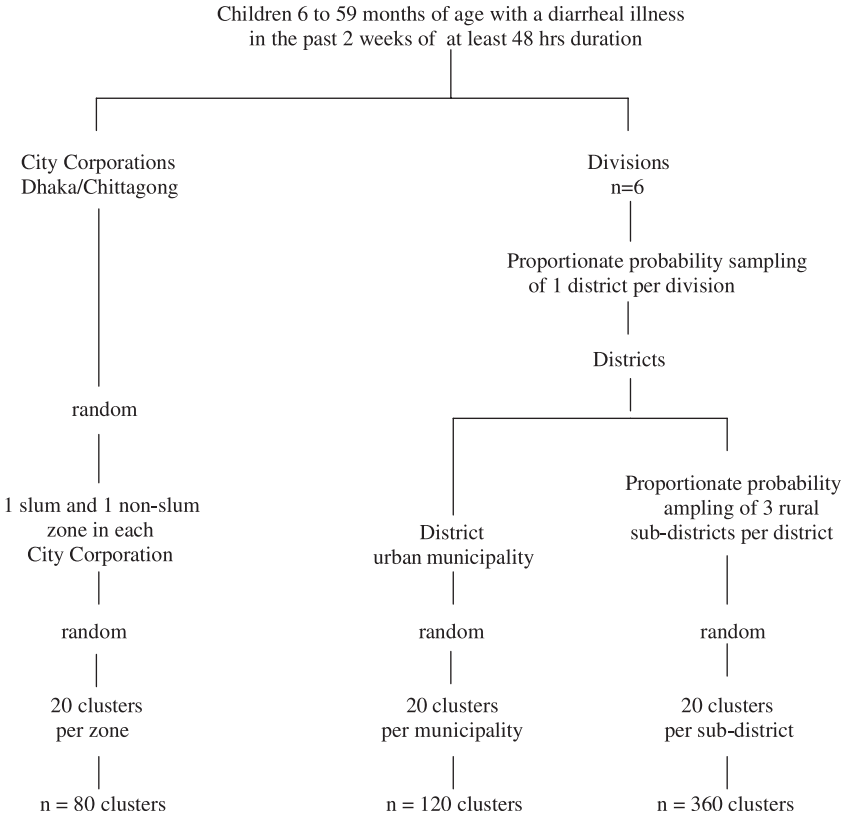

Figure 1 Summary of sampling frame for cluster selection

were derived from geographic population sampling units ('strata') within the municipality that were enumerated and then randomly selected.
2. Rural populations: Within the selected districts, all sub-districts were listed and then three selected, again using proportionate probability random sampling. Each sub-district represents a site from which 20 wards (usually made up of two to three villages) were randomly selected.
3. City corporations (CC): Each CC is subdivided into zones. Using probability proportionate sampling, a slum and non-slum zone in each CC was selected. In each zone 20 *mouzas* (census units) were randomly selected.

In each cluster, 15 cases of diarrhoea (history of a diarrhoeal illness in the past 2 weeks of at least 48 h duration) in children 6–59 months of age were identified by household survey using the modified WHO-EPI cluster survey selection procedures.[16]

Sample size estimation

The estimation of the number of clusters required to test within each strata (rural, urban municipal, and urban slum or non-slum CC populations) was based upon the detection of a minimum gender difference of 7% in the proportion treated by a licensed health care provider, with a 95% level of confidence, assuming the overall prevalence to be 20%. It was arbitrarily decided to survey 15 cases per cluster, with the rate of homogeneity (roh) set at 0.10. Using these parameters, the design effect (de) was calculated to be 2.4 [de = 1+(*n* − 1)roh]. Applying the estimation equation provided by Bennet *et al.*[16], 20 clusters per strata were determined to be required. The choice of a 7% minimal difference was based upon wanting to observe, as clinically significant, at least a one-third difference in the overall proportion of males and females treated by a licensed provider.

Measurement

In any household with a prevalent case of childhood diarrhoea, a 15 min interview was completed following verbal consent received from the primary caretaker. Questions covered host, illness, and socio-demographic characteristics followed by household diarrhoea management practices and expenditures on the identified case. Socioeconomic status was estimated by determination of a household asset score based upon ownership of consumer items, dwelling characteristics, toilet facilities used, and other household characteristics that are related to wealth status.[17] Each asset is assigned a weight generated through principal components analysis and then standardized scores assigned.[18] For any household all asset scores were summed and then sub-grouped into quartiles. The primary caretaker was also asked to estimate treatment expenditures for the illness. The interviews were conducted by trained interviewers unaware of the equity hypotheses to be tested.

Analyses

Data was entered and analysed using SPSS version 12.0. Absolute counts, proportions, and means with 95% confidence intervals were calculated. These and the regression analyses were completed using the STATA version 7 cluster survey program, which accounts for potential within-cluster homogeneity. The analyses were stratified by location of residence into rural, municipal, and city corporation households. The latter were further sub-grouped as predominantly slum or non-slum populations. For differences in categorical outcomes crude relative risks and 95% confidence intervals were determined. Multiple logistic regression models were tested for the prediction of health-seeking behaviours and antibiotic treatments received. Of particular interest was the identification of disparities in health-provider utilization, diarrhoea treatment practices, and illness expenditures by gender, asset quartile (household wealth), and geographic location of the household (rural, municipal, or city corporation). The hypotheses to be tested were that significant ($P < 0.05$) differences in the management of childhood diarrhoea favouring males, higher asset households, and urban populations would be found.

Results

A total of 7308 children with a prevalent diarrhoeal illness episode within 560 clusters were identified and enrolled in the survey, as summarized in Table 1. In all locations males were more likely to have a diarrhoeal illness. For external comparisons the study's design leads to a biased overestimation of the true diarrhoeal disease prevalence and duration, which are also reported in Table 1.[19] Internal comparisons indicate that the likelihood of a prevalent diarrhoeal illness was lowest among urban, non-slum households and the occurrence of prolonged diarrhoea (>7 days) was greatest within urban slum households, affecting one-quarter of the children identified (24.7%).

As seen in Table 2, the type of provider from whom help was sought for a childhood diarrhoeal illness varied considerably by location. Among those seeking help in urban, non-slum households, licensed allopaths (MBBS) were the most commonly utilized providers (34.4% of cases), while only 6.8% of rural children were seen by a licensed allopath. The dominant providers in urban slums were drug sellers (42.5%) and in rural households it was unlicensed allopaths (locally referred to as baby or village doctors) (40.9%). Among those who sought

Table 1 Summary description of children enrolled and diarrhoeal illness characteristics by location of child's household

	Location of household			
			City Corporation	
Characteristic	Rural 360 clusters *n* = 4049	Municipality 120 clusters *n* = 1972	Slum 40 clusters *n* = 646	Non-slum 40 clusters *n* = 640
Child				
Mean age in months (SD)	27.1 (14.4)	26.9 (14.9)	27.8 (14.6)	27.2 (14.8)
Gender				
% Male	51.9	53.6	53.9	56.1
% Female	48.1	46.4	46.1	43.9
Diarrhoeal illness				
2-week prevalence	0.24	0.21	0.21	0.15
% bloody	10.6	4.0	8.2	8.4
% greater than 7 days duration	18.1	18.7	24.8	18.3

help, in over 90% of the cases private sector providers were seen. NGO services are widespread in Bangladesh, nevertheless fewer than 1% of caretakers sought help from an NGO provider.

Table 3 compares the distribution of characteristics included in the analyses for the prediction of diarrhoea management practices between males and females in the different locations. In Tables 4 and 5 the results of univariate analyses for disparities in provider utilization and treatment practices are summarized, first by gender and second by asset quartile. Beginning with Table 4, a consistent disparity favouring males among the non-slum, city corporation households was found. This included a significantly increased likelihood of seeking services from any provider [difference 10.0% (95% CI 2.8, 17.2) $P = 0.006$] and, more specifically, a licensed allopath [difference 9.8% (95% CI 2.6, 16.9) $P = 0.03$]. In this same population, significantly greater direct cost expenditures were made on males [median difference 0.15 $US (95% CI 0.07, 0.23), $P < 0.0004$].

Table 5 summarizes the relation between practices and household asset scores. Whether located in a rural, municipal or city corporation, the upper asset quartile households were significantly more likely to utilize the services of a provider, in particular licensed allopaths (*P*-values for trend <0.001), and to have received ORS or an antibiotic (*P*-values ranging from 0.010 to <0.001). ORS administration was found to be in excess of 50% for urban municipality households, regardless of asset score. Within the city corporations, even the poorest households exceeded 70% ORS coverage for a childhood diarrhoea episode. With the exception of the highest quartile, ORS coverage was <50% for all rural children. Household illness expenditures were relatively uniform across all asset quartiles, with the exception of the wealthiest urban, 4th quartile, and poorest, 1st quartile, city corporation households.

Gender and asset quartiles were included in multiple logistic regression models for the prediction of seeking the services of a licensed (MBBS) doctor (Table 6) and having received an antibiotic (Table 7) for a child's diarrhoeal illness. These models were tested separately by location of the household and adjusted for parent education, father's occupation, duration of illness, presence of bloody stools, and the child's age. In rural settings, neither gender nor asset score were significant predictors of licensed doctor utilization, but they did significantly

Table 2 Caretakers' health provider seeking behaviours by location of household

	Location of Household			
	Districts		City Corporations	
Provider	Rural %	Urban %	Slum %	Non-slum %
Licensed allopath (MBBS)	6.8	22.8	14.2	34.4
Unlicensed allopath	30.9	12.5	18.0	12.5
Drug seller	9.6	14.4	24.5	17.3
Homeopath	10.6	10.4	4.3	3.8
Other	2.2	1.6	0.7	0.6
None	39.9	38.3	38.4	31.4
Sector[a]				
Private	93.7	85.5	93.7	87.4
Public	6.0	13.5	6.0	11.7
NGO	0.3	1.0	0.3	0.9

[a] among those who sought help from a provider.

Table 3 Summary distribution of potentially predictive exposures by location of households and gender of the child

					Urban city corporations			
	Rural *n* = 4049		**Urban municipalities *n* = 1972**		**Slum *n* = 646**		**Non-slum *n* = 640**	
Predictive exposure	Male *n* = 2100	Female *n* = 1949	Male *n* = 1056	Female *n* = 916	Male *n* = 348	Female *n* = 298	Male *n* = 359	Female *n* = 281
Mean age of child (months)	27.5	26.6	27.6	26.3	27.8	27.8	28.2	25.8
Mean education of mother (years)	3.9	4	4.9	4.9	2.4	2.1	7.6	7.6
Household asset quartile: *N* (%)								
1 (lowest)	482 (23.0)	427 (21.9)	239 (22.6)	224 (24.5)	163 (46.8)	143 (48.0)	5 (1.4)	4 (1.4)
2	506 (24.1)	444(22.8)	286 (27.1)	238 (26.0)	156 (44.8)	134 (45.0)	18 (5.0)	18 (6.4)
3	582 (27.7)	579 (29.7)	258 (24.4)	239 (26.1)	29 (8.4)	21 (7.0)	149 (41.5)	118 (42.0)
4 (highest)	530 (25.2)	499 (25.6)	273 (25.9)	215 (23.5)	0	0	187 (52.1)	141 (50.2)
Father's occupation: *N* (%)								
Day labourer	499 (24.1)	489 (25.3)	149 (14.3)	127 (14.0)	61 (18.5)	58 (20.4)	2 (0.6)	5 (1.8)
Rickshaw puller	181 (8.7)	149 (7.7)	164 (15.7)	155 (17.1)	100 (30.4)	96 (33.7)	3 (0.8)	2 (0.7)
Skilled labourer/farmer	482 (23.2)	425 (22.0)	55 (5.3)	62 (6.9)	24 (7.3)	14 (4.9)	10 (2.8)	17 (6.1)
Small businessman	296 (14.3)	278 (14.4)	171 (16.4)	154 (17.0)	76 (23.1)	70 (24.6)	46 (12.9)	29 (10.5)
Teacher/service provider	350 (16.9)	329 (17.0)	232 (22.2)	207 (22.9)	42 (12.8)	28 (9.8)	181 (50.8)	142 (51.3)
Businessman	152 (7.3)	146 (7.6)	179 (17.2)	138 (15.2)	2 (0.6)	0	97 (27.2)	79 (28.5)
Other	144 (5.6)	115 (6.0)	93 (8.9)	62 (6.9)	24 (7.3)	19 (6.7)	17 (4.8)	3 (1.1)
Diarrhoea described as bloody: *N* (%)	235 (11.2)	199 (10.2)	94 (8.9)	84 (9.2)	26 (7.5)	27 (9.1)	30 (8.4)	24 (8.5)
Mean duration of diarrhoea (days)	5.7	5.6	5.6	5.6	6.7	6.3	5.9	5.8

Table 4 Childhood diarrhoea provider utilization and diarrhoea management practices by gender and location of household

	Rural $n = 4049$			**Urban municipalities** $n = 1972$			**Urban city corporations**					
							Slum $n = 646$			Non-slum $n = 640$		
Practice	Male	Female	Rate difference (95% CI)	Male	Female	Rate difference (95% CI)	Male	Female	Rate difference (95% CI)	Male	Female	Rate difference (95% CI)
Any provider seen, %	61.0	58.8	2.2 (−0.75, 5.2)	61.3	61.7	−0.40 (−4.7, 3.9)	64.2	58.7	5.5 (−1.6, 12.6)	74.1	64.1	10 (2.8, 17.2)[a]
Licensed provider seen, %	7.1	6.1	1.0 (−0.29, 2.3)	23.8	20.8	3.0 (−4.8, 10.8)	16.1	11.4	4.7 (−2.4, 11.8)	45.1	35.3	9.8 (2.6, 16.9)[b]
Received ORS, %	48.8	48.5	0.30 (−2.6, 3.2)	58.9	58.3	0.60 (−3.7, 4.9)	70.7	71.8	−1.1 (−8.2, 6.0)	80.8	82.9	−2.1 (−9.8, 5.6)
Received ORS and other dehydration fluids, %	59.2	59.5	−0.30 (−0.3.2, 2.6)	66.8	66.0	0.80 (−3.4, 5.0)	78.2	78.5	−0.30 (−7.4, 6.8)	85.2	87.2	−2.0 (−9.6, 5.6)
Received Antibiotics, %	35.9	30.7	5.2 (2.3, 8.1)[c]	39.7	37.3	2.4 (−2.0, 6.8)	40.2	34.6	5.6 (−1.5, 12.7)	58.2	46.3	11.9 (4.9, 18.9)[d]
Median expenditure on medications (US$)	0.40	0.37	0.03 (−0.01, 0.07)	0.45	0.40	0.05 (−0.002, .010)	0.32	0.29	0.3 (−0.05, 0.11)	0.58	0.43	0.15 (0.7, 0.23)[e]

[a] $P = 0.006$.
[b] $P = 0.03$.
[c] $P = <0.001$.
[d] $P = 0.003$.
[e] $P < 0.001$.

influence antibiotic treatment; females less likely [OR 0.74, (95% CI 0.65, 0.86), $P < 0.001$] and the upper quartile asset households more likely [OR 1.3 (95% CI 1.0, 1.6), $P = 0.021$] Among urban municipal households, both gender and household asset scores were significant predictors for licensed provider utilization, with females less likely [OR 0.73, 95% (CI 0.57, 0.94), $P = 0.013$] and the upper asset quartile more likely [OR 1.5 (95% CI 1.0, 2.3), $P = 0.034$]. Neither was a significant predictor of antibiotic use. Females from city corporation families were less likely to receive an antibiotic [OR 0.57 (95% CI 0.41, 0.81), $P < 0.002$].

Whether a rural, municipal, or city corporation household, younger age, longer duration of illness, and higher maternal education were consistently significant predictors of licensed provider utilization and antibiotic treatment. Appropriately, the occurrence of bloody diarrhoea was consistently associated with increased likelihood of antibiotic treatment. Overall, 52.0% of children with bloody diarrhoea received an antibiotic, as opposed to 35.2% who reported no blood in their stools (chi-square, $P < 0.001$).

Discussion

Principal findings

This survey documents that throughout Bangladesh health-seeking behaviours for childhood diarrhoea are dominated by utilization of private sector providers. It is evident that unlicensed providers, whether 'village doctors', drug sellers, or homeopaths, continue to be the preferred source of care, in particular among the rural poor. It was also found that significant variation in the type of provider seen occurs by where the child lived. In Bangladesh licensed providers are predominantly allopathic doctors (MBBS), while unlicensed providers are typically individuals with minimal or no formal training who imitate the prescribing patterns of trained, qualified doctors. Unlicensed providers (allopaths, drug sellers, homeopaths) were visited in over 90% of rural and over 75% of inner-city slum cases when care was sought. Unexpectedly, it was found that urban, non-slum when compared with poorer rural and slum households, were twice as likely to seek services from the public sector.

Disparities on the basis of income in care seeking behaviour were identified in rural and urban populations. This was true for any provider as well as for a licensed allopath with significant trends ($P < 0.001$) favouring higher income households occurring throughout Bangladesh. When adjusted for host and illness characteristics, within urban households the most consistent predictors for seeing a licensed allopath were higher income, longer duration of illness, and higher education of mothers. In rural households, where access to licensed providers is much more restricted, the most important predictors were younger age of child, longer duration of illness, and mothers' education.

Gender disparities in provider utilization were not identified among rural households. When comparing female with male children, the crude estimates for seeking help from any provider or a licensed allopath favoured males from city corporation, non-slum households. These disparities disappeared when the analysis was adjusted for other predictors of utilization. In contrast, within urban municipal households females were

Table 5 Childhood diarrhoea provider utilization and diarrhoea management practices by asset quartile (1 lowest, 4 highest) and location of child's household

Practice	Rural n = 4049 asset quartile				*P*-value for trend	Urban municipalities n = 1972 asset quartile				*P*-value for trend	Urban city corporations n = 1286 Asset quartile				*P*-value for trend
	1	2	3	4		1	2	3	4		1	2	3	4	
Any provider seen, %	54.6	58.9	63.4	62.5	<0.001	55.7	60.3	61.2	69.4	<0.001	58.4	65.6	66.2	72.0	0.001
Licensed provider seen, %	5.2	5.9	5.6	10.4	<0.001	14.3	19.6	20.3	36.9	<0.001	12.4	17.8	35.6	43.0	<0.001
Received ORS, %	45.2	47.4	48.0	54.3	<0.001	52.7	56.3	58.6	66.2	<0.001	72.8	72.4	75.9	84.5	<0.001
Received ORS & other dehydration fluids, %	54.8	62.1	60.6	60.8	0.010	64.7	60.6	68.5	72.9	<0.001	77.2	82.0	83.4	88.5	0.001
Received antibiotic, %	29.6	26.5	34.1	42.3	<0.001	31.5	36.1	38.6	48.0	<0.001	35.2	42.6	47.3	55.5	<0.001
Median expenditure on medications (US$)	0.37	0.32	0.38	0.42	0.001	0.32	0.37	0.40	0.61	<0.001	0.29	0.39	0.43	0.56	<0.001

found to be 30% less likely to have been seen by a licensed allopath. No gender bias for provider utilization (licensed or unlicensed) was identified among the much poorer inner-city slum households.

With respect to total direct expenditures on a diarrhoeal illness, there was a consistent trend across all locations to spend more on male children; however, this only reached statistical significance among city corporation, non-slum households. A similar trend was found for purchase of an antibiotic and may explain the expenditure disparities. Receipt of an antibiotic is closely correlated with having seen a provider and, therefore, these two outcomes will share similar predictors. This included higher income and maternal education, longer duration of illness, and younger age. An additional predictor of antibiotic use, as would be desired, was the finding that children with bloody diarrhoea were twice as likely to receive an antibiotic.

Strengths and weaknesses

The primary strength of this survey is the representative sampling of households in all divisions of Bangladesh and the disaggregation of childhood diarrhoea management practices by location of the household, in particular the separation of city corportation slum and non-slum populations. A second strength is the survey's focus on childhood diarrhoea management and practices associated with an active or recent illness event. This allowed us to estimate actual, as opposed to hypothetical, rates of household practices. The choice to include only children with at least 2 days of diarrhoea has its advantages and disadvantages. This decision was taken in order to give caretakers time to make and act upon care-seeking decisions and to purchase treatments. This also avoided the inclusion of trivial, transient diarrhoeal episodes. On the other hand, the full spectrum of diarrhoeal illnesses is not represented in this survey and probably results in an overestimation of care seeking behaviour and treatment purchases. Cross-sectional surveys, such as ours, will tend to identify longer duration episodes and miss illnesses of shorter duration or lesser severity. These limitations will also tend to inflate our estimates of care-seeking and treatment practices.

The survey was powered to identify differences in care-seeking practices between rural and urban divisions (not reported in this paper) but not between the two sources of city corporation households. This explains the much larger sample size in the former, compared with the city corporation slum and non-slum households. Thus the survey is more prone to miss true disparities in practices among the city corporation households.

Interpretation of findings

The disproportionately high utilization of the private sector for a childhood diarrhoeal illness occurs in spite of the fact that public services are free. This survey did not inquire about reasons for choosing a particular provider; however, earlier surveys have documented that use of public services is hindered by the unavailability of health providers and unofficial payments.[20] Unexpected was the finding that <1% of caretakers reported utilization of NGO services. These utilization patterns, in part, can be explained by the fact that private providers far outnumber the other sectors, are easily accessed, and are available at all hours of the day and late into evenings. In contrast, government or NGO clinics involve more complex registration procedures, longer waiting periods, and tend to operate within more restricted daytime hours. Furthermore, unless a child is perceived as severely ill, caretakers are seeking a treatment that will quickly cure their child and are less interested in the more extensive services the public and NGO sectors can offer. Drugs are more simply and efficiently obtained through private providers. Possible alternative explanations for low NGO utilization could be the selection of rural survey sites where, by chance alone, NGOs are not providing health services. There may also be some misclassification of NGO clinics among caretakers not able to distinguish between private and public sources of care.

The private sector preference of caretakers is consistent with other surveys conducted in Bangladesh, but is in sharp contrast to other countries in the region, where unlicensed providers are less frequently utilized.[21] As can be seen in Table 8, within South and South-east Asia considerable variation exists in the type of provider seen for a childhood diarrhoeal illness in urban populations.[22–24]. Relative to other Asian countries, in Bangladesh urban caretakers much more often utilize unlicensed providers. The decision not to seek help from a provider is relatively higher in Bangladesh than other countries in the region, with over one-third not seeking help from a provider but instead relying upon self-management of their child's

Table 6 Results of multiple logistic regression analysis for the prediction of seeking help from a licensed doctor (MBBS) for a childhood diarrhoeal illness[a]

					Urban city corporations			
	Rural n = 2424		Urban municipalities n = 1211		Slum n = 398		Non-slum n = 446	
Characteristic	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Gender								
Male	Ref.		Ref.		Ref.		Ref.	
Female	0.80 (0.61, 1.0)	0.096	0.73 (0.57, 0.94)	0.013	0.71 (0.43, 1.2)	0.174	0.77 (0.51, 1.2)	0.224
Asset quartile								
1 (lowest)	–		–					
2	1.1 (0.68, 1.7)	0.755	1.2 (0.84, 1.8)	0.286				
3	0.95 (0.63, 1.4)	0.800	1.2 (0.81, 1.8)	0.361	Not entered		Not entered	
4 (highest)	1.5 (1.0, 2.3)	0.034	2.2 (1.4, 3.4)	0.001				
Age (months)								
<12	Ref.		Ref.		Ref.		Ref.	
12–23	0.90 (0.63, 1.3)	0.570	0.91 (0.65, 1.3)	0.578	0.72 (0.36, 1.4)	0.352	0.74 (0.40, 1.3)	0.316
24–59	0.61 (0.43, 0.86)	0.005	0.57 (0.41, 0.79)	0.001	0.66 (0.35, 1.3)	0.211	0.54 (0.31, 0.91)	0.022
Duration of illness (days)								
<5	Ref.		Ref.		Ref.		Ref.	
5–7	1.3 (0.93, 1.8)	0.128	1.9 (1.4, 2.6)	<0.001	2.6 (1.2, 5.6)	0.022	1.2 (0.76, 2.0)	0.401
8+	1.8 (1.3, 2.7)	0.002	2.7 (1.9, 3.9)	<0.001	3.6 (1.5, 8.6)	0.003	2.6 (1.4, 4.7)	0.002
Mother's education (years)								
0	Ref.		Ref.		Ref.		Ref.	
1–4	0.87 (0.52, 1.5)	0.86	1.1(0.71, 1.7)	0.802	1.0 (0.48, 2.3)	0.920	1.1 (0.34, 3.3)	0.917
5	1.1 (0.74, 1.7)	0.611	1.2 (0.81, 1.8)	0.356	1.6 (0.79, 3.2)	0.196	2.1 (0.92, 4.7)	0.80
6–9	1.5 (1.0, 2.1)	0.045	1.5 (1.1, 2.2)	0.025	2.0 (1.0, 4.0)	0.063	2.3 (1.1, 4.6)	0.020
10+	2.9 (1.8, 4.8)	<0.001	1.9 (1.2, 3.0)	0.005	1.8 (0.54, 6.2)	0.332	4.0 (2.0, 8.2)	<0.001
Father's occupation								
Day labour	Ref.		Ref.		Ref.		Ref.	
Rickshaw puller	1.6 (0.86, 3.1)	0.133	0.78 (0.47, 1.3)	0.354	1.6 (0.76, 3.4)	0.216	Ref.	
Fisher/boatman/ painter/mason	1.7 (0.88, 3.5)	0.113	1.5 (0.79, 2.7)	0.225	1.6 (0.50, 5.3)	0.415	Ref.	
Farmer	1.6 (1.0, 2.6)	0.052	na	na	na	na	na	na
Driver/petty business	1.8 (1.1, 2.9)	0.021	1.2 (0.74, 1.9)	0.470	2.0 (0.95, 4.3)	0.069	1.2 (0.44, 3.4)	0.721
Teacher/service	2.0 (1.3, 3.3)	0.003	1.4 (0.85, 2.2)	0.200	2.2 (0.89, 5.4)	0.086	1.1 (0.48, 2.7)	0.774
Business/contractor	2.0 (1.2, 3.5)	0.014	1.1 (0.66, 1.8)	0.726	~	~	1.2 (0.48, 2.9)	0.739
Other	1.8 (0.94, 3.4)	0.074	0.99 (0.57, 1.7)	0.969	0.66 (0.17, 2.6)	0.553	0.95 (0.24, 3.8)	0.977
Bloody diarrhoea								
No	Ref.		Ref.		Ref.		Ref.	
Yes	0.86 (0.57, 1.3)	0.444	1.0 (0.72, 1.5)	0.826	1.5 (0.68, 3.1)	0.332	0.98 (0.47, 2.1)	0.967

~ n < 10; Ref. = referent category; na = not applicable.
[a] Among those who sought help from any provider.

diarrhoeal illness. Given the availability of low-cost ORS and the high proportion using it, this may be appropriate.

Increased disease severity has been demonstrated to be associated with decreased maternal education.[25] Our finding that children of mothers with a grade four or less education are two to four times less likely to be seen by a licensed provider indicates greater efforts need to be made to reach these families and improve access to higher-quality care. These findings also strengthen the important link between health and education and the anticipated benefits of increasing education attainment among females.

Regarding gender disparities in help-seeking behaviours, our findings are not consistent with those of the most recent Bangladesh demographic and health survey (DHS), based upon 2004 data, which did not identify a gender bias in utilization of health services. These findings were not stratified by location of residence. When stratified, as in our survey, the results suggest that greater gains in gender equity have

Table 7 Results of multiple logistic regression analysis for the prediction of a child receiving an antibiotic for a diarrhoeal illness

					Urban city corporations			
	Rural n = 4049		Urban municipalities n = 1972		Slum n = 646		Non-slum n = 640	
Characteristic	OR (95% CI)	*P*-value	OR (95% CI)	*P*-value	OR (95% CI)	*P*-value	OR (95% CI)	*P*-value
Gender								
Male	Ref.		Ref.		Ref.		Ref.	
Female	0.74 (0.65, 0.86)	<0.001	0.88 (0.73, 1.1)	0.187	0.82 (0.58, 1.2)	0.253	0.57 (0.41, 0.81)	0.002
Asset quartile								
1 (lowest)	Ref.		Ref.					
2	0.87 (0.70, 1.1)	0.232	1.1 (0.84, 1.5)	0.449				
3	1.1 (0.91, 1.4)	0.267	1.1 (0.81, 1.4)	0.585	not entered		not entered	
4 (highest)	1.3 (1.0, 1.6)	0.021	1.1 (0.79, 1.5)	0.568				
Age (months)								
<12	Ref.		Ref.		Ref.		Ref.	
12–23	0.99 (0.82, 1.3)	0.916	1.1 (0.83, 1.5)	0.492	1.1 (0.67, 1.8)	0.709	1.5 (0.92, 2.5)	0.105
24–59	0.57 (0.47, 0.70)	<0.001	0.79 (0.61, 1.0)	0.087	0.70 (0.44, 1.1)	0.113	0.81 (0.52, 1.3)	0.367
Duration of illness (days)								
<5	Ref.		Ref.		Ref.		Ref.	
5–7	1.9 (1.6, 2.2)	<0.001	2.0 (1.6, 2.5)	<0.001	2.0 (1.3, 3.1)	0.002	2.4 (1.6, 3.5)	<0.001
8+	3.1 (2.5, 3.8)	<0.001	2.8 (2.1, 3.8)	<0.001	3.4 (2.0, 5.6)	<0.001	4.5 (2.7, 7.5)	<0.001
Mother's education (years)								
0	Ref.		Ref.		Ref.		Ref.	
1–4	1.0 (0.79, 1.3)	0.924	1.3 (0.92, 1.9)	0.143	1.2 (0.74, 2.0)	0.413	1.6 (0.58, 4.4)	0.372
5	1.3 (1.1, 1.6)	0.005	1.4 (1.0, 1.8)	0.049	1.8 (1.1, 3.0)	0.016	2.3 (1.1, 4.5)	0.021
6–9	1.4 (1.1, 1.7)	0.001	1.6 (1.2, 2.2)	0.001	1.4 (0.81, 2.6)	0.216	2.4 (1.3, 4.4)	0.005
10+	2.3 (1.7, 3.3)	<0.001	2.3 (1.6, 3.3)	<0.001	3.4 (1.2, 11.4)	0.019	3.1 (1.7, 5.9)	<0.001
Father's occupation								
Day labour	Ref.		Ref.		Ref.		Ref.	
Rickshaw puller	1.5 (1.1, 2.0)	0.015	0.98 (0.68, 1.4)	0.921	1.3 (0.81, 2.0)	0.343	Ref.	
Fisher/boatman/ painter/mason	1.1 (0.81, 1.6)	0.447	1.7 (1.0, 2.6)	0.035	4.0 (1.9, 8.5)	<0.001	Ref.	
Farmer	1.6 (1.3, 2.0)	<0.001	na	na	na	na	na	na
Driver/petty business	1.8 (1.4, 2.3)	<0.001	1.4 (1.0, 2.0)	0.059	1.9(1.1, 3.1)	0.014	0.35 (0.11, 1.1)	0.067
Teacher/service	2.1 (1.6, 2.6)	<0.001	1.8 (1.3, 2.7)	0.001	1.8 (1.0, 3.4)	0.053	0.81 (0.29, 2.3)	0.625
Business/contractor	2.3 (1.7, 3.1)	<0.001	2.0 (1.3, 2.9)	0.001	~	~	0.73 (0.25, 2.1)	0.510
Other	2.0 (1.4, 2.7)	<0.001	1.4 (0.9, 2.1)	0.165	0.82 (0.43, 1.7)	0.557	1.8 (0.43, 7.6)	0.450
Bloody diarrhoea								
No	Ref.		Ref.		Ref.		Ref.	
Yes	1.6 (1.3, 2.0)	<0.001	2.3 (1.6, 3.1)	<0.001	2.0 (1.1, 3.5)	0.019	2.2 (1.1, 4.2)	0.021

~ n < 10; Ref. = referent category; na = not applicable.

Table 8 Regional differences in choice of health provider for treatment of diarrhoea in young children in urban households

	Bangladesh		Vietnam	Indonesia	India
Type of provider	urban	urban slum	urban[18]	urban slum[19]	urban slum[20]
Licensed physician, health facility	25	14	42	58	42
Drug seller, pharmacist	16	25	48	9	16
Unlicensed provider, traditional healer, homeopaths	22	23	3	9	6
Self-treated	37	38	7	25	35

been made in rural Bangladesh, whereas in urban areas licensed provider utilization discrimination in favour of males continues to occur.

Overall, the use of ORS in Bangladesh is considerably higher than what is reported in other low-income Asian countries and in sub-Saharan Africa.[26] The urban–rural disparities in ORS use found in this survey are not consistent with the Bangladesh DHS data for 2004, where it is reported that 82% and 73% of urban and rural children, respectively, received one or the other. Given that our survey was restricted to children with at least 2 days of illness, it would be expected to be biased in favour of higher ORS use, yet our estimates among rural households are one-third lower. In Bangladesh, as a policy of the Ministry of Health and Family Welfare, ORS is recommended and home prepared oral rehydration therapies discouraged. Given the widespread knowledge of ORS, its availability over the counter and distribution throughout Bangladesh at a price of <7 cents US per sachet, the reasons for the urban–rural disparities are unclear and require more focused study. In rural settings, other home-made ORTs are still used and, when combined with ORS, overall coverage reaches 60%. It should be noted that the rural coverage rate, while lower than DHS data, represents an improvement over prior non-government surveys and is comparable with areas where NGOs have conducted targeted ORT campaigns.[27,28]

In Bangladesh, as in other South Asian countries, seeking help from a provider is primarily driven by a caretaker's expectation that their child requires a drug treatment and ORT has not been sufficient.[29,30] If not prescribed a treatment, the visit is considered to have been a waste of time. The treatment prescribed is predominantly an antibiotic, but other medications include antihelminthics, antidiarrhoeals, antihistamines, and vitamins.[31–34] The one UNICEF/WHO recommendation for use of an antibiotic is the occurrence of bloody diarrhoea.[35] In this survey antibiotics were prescribed to triple the number of children reported to have had bloody diarrhoea. The disparity in antibiotic prescribing habits favouring the higher-income households can be explained by their greater purchasing power. It may also be the case that we have underestimated the proportion of lower-income families purchasing an antibiotic. In an attempt to increase correct reporting, caretakers were asked to show the interviewer what had been purchased. If they no longer had the drug, they were shown photo-cards of the more commonly prescribed antibiotics. Nonetheless, there were instances where an unidentified drug was reported to have been given.

Unanswered questions

This survey was undertaken to describe diarrhoea management practices prior to a national scale up in Bangladesh of zinc as a treatment, in line with recent revisions to WHO/UNICEF guidelines for the treatment of childhood diarrhoea.[35] What impact the introduction of zinc will have on other practices is unknown. Of particular concern will be the continued use of ORS and the hoped for reduction in the sale of antibiotics. This will be monitored in subsequent, post-roll-out, coverage surveys.

Conclusions

Diarrhoea remains a highly prevalent illness in children under 5 years of age in all parts of Bangladesh. Households seeking help from a health provider overwhelmingly utilize the private sector in Bangladesh. The majority of children are receiving ORT; however, use continues to be significantly lower in rural populations. Gender inequities in the utilization of licensed providers and purchase of antibiotics, favouring males, were identified. These disparities do not occur uniformly throughout Bangladesh, with distinct patterns identified that suggest higher-income, urban households tend to practice the greatest degree of gender discrimination. As urban populations, in particular slum dwellers, continue to increase in size, the greater will be the need to disaggregate survey data by household location and slum vs non-slum sites, in order to better monitor health trends and equity unique to rural, urban, and mega-city populations.

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KEY MESSAGES

- The private health sector in Bangladesh overwhelmingly services childhood diarrhoeal illness.
- Disparities in diarrhoeal illness management, favouring males and children from higher income households, continue to exist in Bangladesh but vary by rural–urban location and slum vs non-slum populations.
- Future monitoring of disease burden and health care practices in urban, developing country populations should be stratified by slum and non-slum settings.

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Commentary: Child health surveys: the equity dimension

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Larson and colleagues[1] make an important contribution to the literature on inequities in child health in Asia, by providing evidence of marked gender and socioeconomic bias in diarrhoea management in Bangladesh. Their findings speak