

Health Care Utilization and Attitudes Survey: Understanding Diarrheal Disease in Rural Gambia

Debasish Saha,* Adebayo Akinsola, Katrina Sharples, Mitchell O. Adeyemi, Martin Antonio, Sayeed Imran, Momodou Jasseh, Mohammad J. Hossain, Dilruba Nasrin, Karen L. Kotloff, Myron M. Levine, and Philip C. Hill

Medical Research Council (MRC) Unit, The Gambia; Centre for International Health, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, Dunedin, New Zealand; Center for Vaccine Development, University of Maryland, Baltimore, Maryland

Abstract. Diarrheal disease causes ~1.34 million deaths per year among children under 5 years of age globally. We conducted a Health Care Utilization and Attitudes Survey of 1,012 primary caregivers of children aged 0–11, 12–23, and 24–59 months randomly selected from a Demographic Surveillance population in rural Gambia. Point prevalence of diarrhea was 7.7% (95% confidence interval [CI] = 6.1–9.8); 23.3% had diarrhea within the previous 2 weeks. Caregivers of 81.5% of children with diarrhea sought healthcare outside their home, but only 48.4% of them visited a health center. Only 17.0% (95% CI = 12.1–23.2) of children with diarrhea received oral rehydration solution (ORS) at home. Abbreviated surveys conducted on six occasions over the subsequent 2 years showed no change in prevalence or treatment-seeking behavior. Diarrhea remains a significant problem in rural young Gambian children. Encouraging care-seeking behavior at health centers and promoting ORS use can reduce mortality and morbidity in this population.

INTRODUCTION

Diarrheal disease remains the second leading cause of mortality among children under 5 years of age globally, causing an estimated 1.34 million deaths per year.¹ More than 80% of these deaths occur in Asia and Africa (46% in Africa alone). There is a lack of community-based surveillance to provide accurate prevalence and incidence rates in sub-Saharan Africa.² Particularly in rural Africa, hospital-based data have limitations with respect to representing the true burden of disease and identifying associated risk factors.³ Indeed, many deaths from diarrheal disease are likely to occur in the community and are often not recorded in death registries. Verbal autopsy remains the only way to ascertain the cause of death, and it has well-described limitations.^{4,5}

Studies conducted in sub-Saharan Africa indicate that primary caregivers display poor perception and knowledge about the signs of dehydration and dysentery and the appropriate management of these conditions.^{6–10} As part of a multi-site collaboration on the burden and etiology of childhood diarrhea, we conducted a Health Care Utilization and Attitudes Survey (HUAS) in The Gambia in a rural population under demographic surveillance. We aimed to identify the point prevalence of diarrhea in children under 5 years of age, the proportion with diarrhea in the previous 2 weeks, and the proportion taken to healthcare facilities and other providers. We recorded primary caregivers' knowledge of diarrhea and their perceptions and attitudes to the illness.

MATERIALS AND METHODS

Study site. This study was undertaken in the Upper River Region (URR) in The Gambia (Figure 1). The Gambia has approximately 1.5 million people; 17% are under 5 years old. The URR, with an approximate population of 200,000, has one major town, Basse, but is otherwise typical of rural

Africa. The temperature varies between 15°C and 40°C. There are distinctive dry (November to April) and wet (May to October; mean annual rainfall = 876 mm) seasons.

The mean per capita income of The Gambia is US \$440 per annum, below the average in sub-Saharan Africa (US \$1,165).¹¹ The economy relies heavily on agriculture, and most of the people are subsistence farmers. Three ethnic groups predominate: Mandinka, Fula, and Sarahulleh. Malaria is endemic in the URR, but human immunodeficiency virus (HIV) prevalence is low (less than 2%). Surveys of the Expanded Program on Immunization indicate high (over 95%) immunization coverage. Most of the villages are served by the public water supply system piped to a communal tap shared by households. However, many households rely on bore holes and deep tube and open wells, because the public supply is unreliable.

Demographic surveillance, population, and sample. The Basse Health and Demographic Surveillance System (BHDSS) was established on the south bank of the River Gambia. The BHDSS population within the 1,084-km² study area resides within 223 villages across two districts that are served by one major government health center and five smaller primary health centers. The total population at the start of the study period was 136,793, and the under 5 years child population was 21,445 (15.7%), including 4,649 aged 0–11 months, 4,398 aged 12–23 months, and 12,398 aged 24–59 months. We randomly selected 1,140 children in the under 5 years age group for this cross-sectional survey, including 400 aged 0–11 months, 370 aged 12–23 months, and 370 aged 24–59 months.

Ethical approval. The study was approved by the Joint Ethics Committee of the Gambian Government and Medical Research Council and The Institutional Review Board (IRB) of the University of Maryland, Baltimore, MD.

Questionnaire and survey methods, sample size, and data management. A detailed description of the standardized questionnaire and survey methods, sample size calculation, data entry and management, and statistical analysis methods is given in the overview paper by Nasrin and others¹² in this supplement. Analysis was carried out using the survey modules in STATA 12.0 and R for quintiles and censored data analysis. We calculated both the point and period prevalence.

* Address correspondence to Debasish Saha, Centre for International Health, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, Dunedin, New Zealand. E-mail: debu_saha@hotmail.com

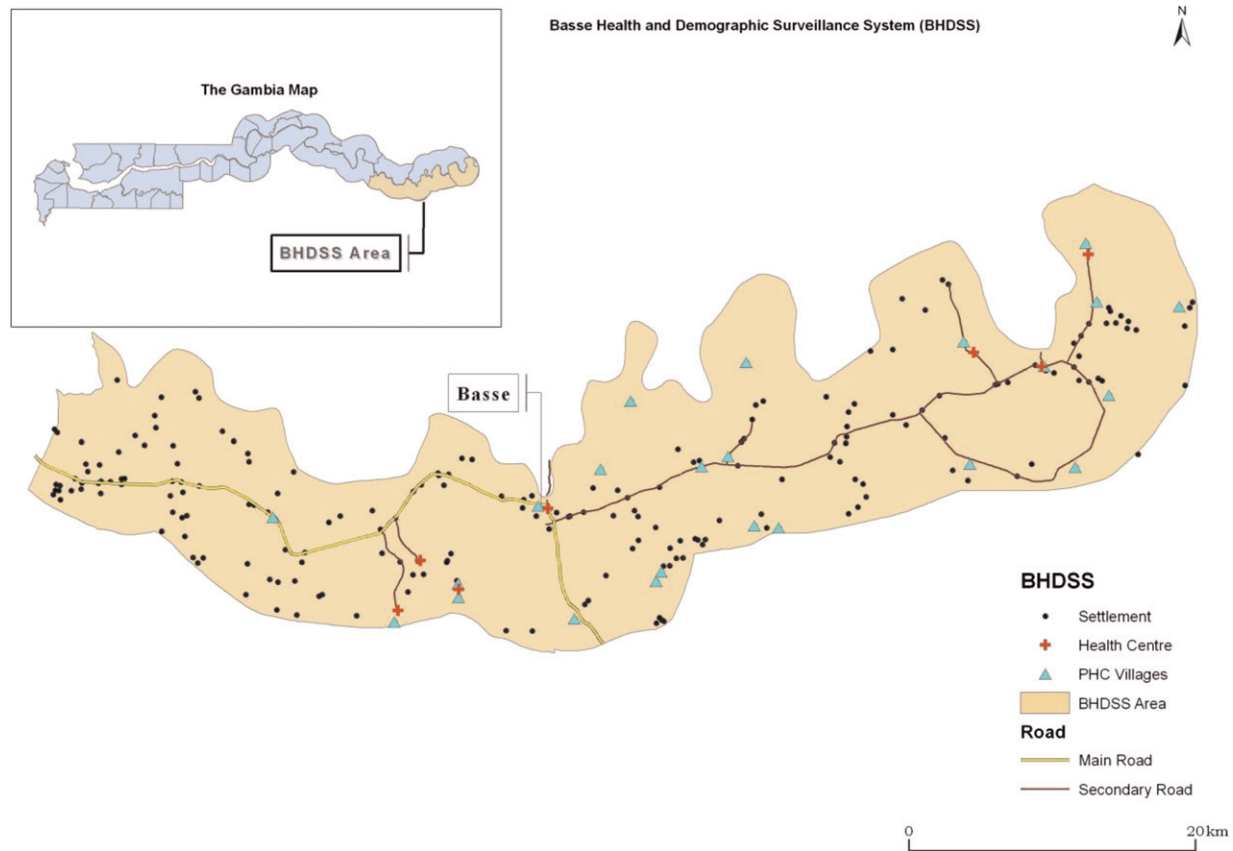


FIGURE 1. Map of The Gambia and the BHDSS.

Point prevalence was the proportion of children having diarrhea on the day of interview, whereas period prevalence referred to diarrhea during the 2 weeks preceding the interview. In calculating the overall percentages and 95% confidence intervals (CIs), age-specific sampling weights were used; the weights were defined from the Demographic Surveillance System (DSS) population and the number of HUAS participants for each combination of age group (0–11, 12–23, and 24–59 months) and sex.¹² χ^2 test was used to compare categorical variables. Poisson regression with jackknife standard errors was used to produce prevalence ratios and 95% CIs.

RESULTS

General characteristics. Completed interviews were conducted with primary caregivers of 1,012 children; five interviewees who were not the primary caregivers of the children were excluded. The various reasons why others could not be interviewed are summarized in Figure 2. There were 390 children in the 0–11 months age stratum, and there were 302 and 320 children in the 12–23 and 24–59 months age strata, respectively (Table 1). The proportion of male children was slightly over 50% in each age stratum (Table 1), similar to the distribution of the DSS population. Almost all of the primary caregivers were the mothers of the children, but the proportion decreased with increasing age stratum (99.5%, 98.3%, and 94.4%).

More than 70% of the primary caregivers had religious education only, and most households had few assets (Table 1).

The median numbers of people living in a household (defined as the number of people sharing the same cooking pot), sleeping rooms, and under 5-year-old children in a household were 20 (range = 3–125), 7 (range = 1–47), and 4 (range = 1–32), respectively.

The weighted point prevalence of diarrhea among the under 5-year-old children in the population was 7.7% (95% CI = 6.1–9.9). The numbers of children who had diarrhea at the time of the survey were 28 of 390 (7.2%) among the 0–11 months, 36 of 302 (11.9%) in 12–23 months, and 21 of 320 (6.6%) in 24–59 months groups; 258 of 1,012 surveyed children had diarrhea in the 2 weeks preceding the interview (weighted period prevalence of 23.3%; 95% CI = 20.5–26.5). The prevalence was higher in the 12–23 months age group (32.5%, 95% CI = 27.1–37.8) than the other two age strata (24.6%, 95% CI = 20.3–28.9 and 20.0%, 95% CI = 15.6–24.4 for 0–11 and 24–59 months groups, respectively; $P = 0.002$).

Perception and use of the healthcare facility. Figure 3 summarizes the knowledge of the primary caregivers regarding dehydration. Sunken eyes were frequently perceived (75.5%, 95% CI = 72.2–78.5), but less than one-half (46.1%, 95% CI = 42.4–49.7) of caregivers thought that dry mouth is caused by dehydration. Few (25.4%, 95% CI = 22.3–28.8) appreciated that decreased urination could be caused by dehydration.

Primary caregivers believed that bloody diarrhea is a danger sign (85.6%, 95% CI = 82.9–88.0). The presence of fever was considered to be of concern by only 30.2% (95% CI = 26.9–33.7), whereas 61.0% believed that vomiting was of importance (95% CI = 57.3–64.5). A low proportion held the

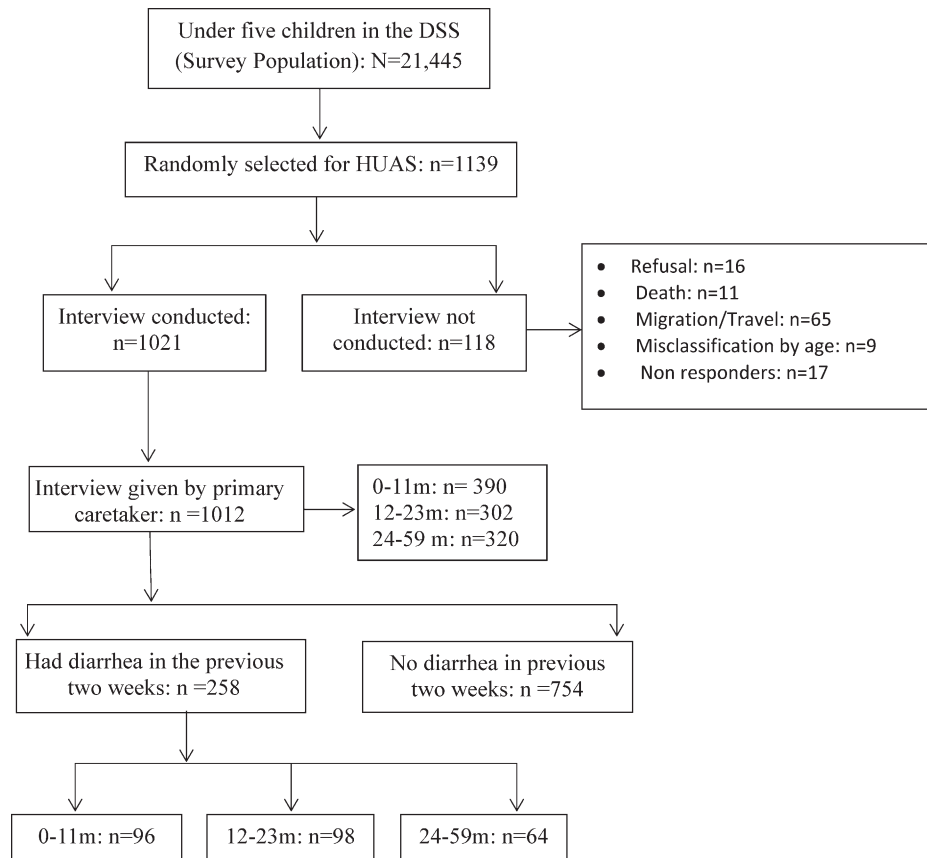


FIGURE 2. Survey flow chart.

belief that a large number of stools per day (27.1%, 95% CI = 24.0–30.5) or the presence of dehydration (10.3%, 95% CI = 8.2–12.9) was of notable concern.

One-third (33.4%, 95% CI = 30.0–36.9) of primary caregivers said that they would walk to the healthcare facilities if the child needed care for diarrheal illness; the rest said that they would use either commercial or private transportation. A smaller proportion (5.4%, 95% CI = 4.0–7.4) expressed unwillingness to attend any of the healthcare centers in the DSS. Less than one-half (39.9%, 95% CI = 36.4–43.6) thought that they could reach the health center of their choice within one-half of an hour. Mothers of 81.1% (95% CI = 78.0–83.8) of the children were the decision-makers for their child but seeking care at the health center could be delayed for financial reasons (17.8%, 95% CI = 15.2–20.8) and lack of transportation (34.4%, 95% CI = 31.0–38.1). Nevertheless, 55.9% (95% CI = 52.2–59.5) reported no difficulties in reaching a center of their choice.

Wariness, awareness, and attitudes to diarrhea. Overall, 57.7% (95% CI = 54.0–61.3) of primary caregivers were aware of under 5-year-old children suffering from watery diarrhea in the community; a similar proportion (62.9%, 95% CI = 59.3–66.4) thought that prevention was available. A higher proportion of the caregivers believed that death is more common in those children with bloody diarrhea versus watery diarrhea (13.8%, 95% CI = 11.5–16.5 versus 9.2%, 95% CI = 7.2–11.5 respectively). Relatively more caregivers were worried about their child suffering from watery stools (77.7%, 95% CI = 74.5–80.7) compared with their child having bloody diarrhea

(69.3%, 95% CI = 65.8–72.6). Important preventive methods, such as breastfeeding (14.7%, 95% CI = 12.4–17.4), adequate nutrition (16.4%, 95% CI = 13.8–19.3), and proper disposal of human waste (18.5%, 95% CI = 15.9–21.6), were perceived as such by relatively few primary caregivers. However, clean food and water (62.1%, 95% CI = 58.5–65.6) and hand washing (37.2%, 95% CI = 33.7–40.9) were acknowledged widely as the best methods of prevention. Some of the caregivers also believed that giving any medication (15.1%, 95% CI = 12.7–17.9) could prevent their children from having diarrhea. Primary caregivers believed that bloody diarrhea is both dangerous (71.6%, 95% CI = 68.1–74.8) and costly to treat (69.7%, 95% CI = 66.2–73.0). Only 6.7% (95% CI = 5.0–8.9) thought that a vaccine could be a way of preventing diarrhea; however, almost all caregivers thought that vaccines are important and would get one for their child if available. More than 90% believed that there is medication or treatment available for both watery and bloody diarrhea and that oral rehydration solution (ORS) is effective.

Diarrhea and healthcare use. The median duration of illness for 258 children with diarrhea was 5 days (range = 1–21). According to the primary caregivers, 25.9% (95% CI = 19.0–32.9) of the children had visible blood in their stool (Table 2) during the episode of diarrhea; 81.3% (95% CI = 75.9–86.3) had fever, and 31.5% (95% CI = 25.6–38.0) had vomiting. Blood was less visible in children 0–11 months (11.6, $P = 0.001$), vomiting was less common in the 24–59 months age group (20.3%, $P = 0.009$), and fever was more common in the 12–23 months age group (70.4%, $P = 0.007$).

TABLE 1
General characteristics of the survey respondents ($N = 1,012$)

	Age strata			Overall weighted percentage* (95% CI)
	0–11 months ($N = 390$)	12–23 months ($N = 302$)	24–59 months ($N = 320$)	
Sex (male)	213 (54.6)	165 (54.6)	166 (51.9)	51.2 (49.2–56.6)
Primary caregiver (mother)	388 (99.5)	297 (98.3)	302 (94.4)	96.1 (94.2–97.4)
Where does the mother live?				
In the household	388 (99.5)	298 (98.7)	306 (95.6)	96.9 (95.2–98.1)
Died	1 (0.3)	1 (0.3)	1 (0.3)	0.3 (0.08–1.2)
Abroad/outside household/unknown	1 (0.3)	3 (1.0)	13 (4.1)	2.7 (1.7–4.5)
Where does the father live?				
In the household	303 (77.7)	236 (78.1)	239 (74.7)	75.9 (72.6–79.0)
Died	6 (1.5)	2 (0.6)	11 (2.8)	2.5 (1.5–4.2)
Abroad/outside household/unknown	81 (20.8)	64 (21.2)	70 (21.9)	21.5 (18.7–24.7)
Primary caregiver's education				
Religious (Koranic) education only	287 (73.6)	215 (71.2)	229 (71.6)	71.9 (68.4–75.1)
No formal schooling	48 (12.3)	64 (21.2)	59 (18.4)	17.9 (15.2–21.0)
Attended primary and post-primary schools	55 (14.1)	23 (7.6)	32 (10.0)	10.2 (8.2–12.6)
Floor type				
Finished (vinyl strips/carpet/cement/etc.)	285 (73.1)	239 (79.1)	225 (70.3)	72.6 (69.1–75.8)
Natural (earth/sand/dung)	105 (26.9)	63 (20.9)	95 (29.7)	27.4 (24.2–30.9)
Household possessions				
Electricity	116 (29.7)	99 (32.8)	106 (33.1)	32.4 (29.1–36.0)
Television	95 (24.4)	81 (26.8)	77 (24.1)	24.8 (21.6–28.0)
Scooter/motorcycle	145 (37.2)	115 (38.1)	131 (40.9)	39.7 (36.1–43.4)
Radio	355 (91.0)	273 (90.4)	287 (89.7)	90.1 (87.6–92.1)
Bicycle	341 (87.4)	265 (87.7)	276 (86.3)	86.8 (84.0–89.1)
Car/truck	53 (13.6)	38 (12.6)	44 (13.8)	13.5 (11.2–16.2)
Telephone (mobile/non-mobile)	296 (75.9)	231 (76.5)	234 (73.1)	74.3 (70.9–77.4)
Refrigerator	41 (10.5)	34 (11.3)	35 (10.9)	10.9 (8.8–13.5)
Motorboat	0 (0)	1 (0.3)	0 (0)	0.07 (0.0–0.46)
None of the above	12 (3.1)	10 (3.3)	12 (3.8)	3.5 (2.4–5.2)
Diarrhea				
Diarrhea on the day of interview	28 (7.2)	36 (11.9)	21 (6.6)	7.7 (6.1–9.9)
Diarrhea in the preceding 2 weeks	96 (24.6)	98 (32.5)	64 (20.0)	23.3 (20.5–26.5)

Values are n (%) unless mentioned otherwise.

*Calculated using the sampling weights for age groups and sex.

Two hundred and ten children (81.5%, 95% CI = 75.1–86.6) were taken out of their home for treatment, but only 48.4% (95% CI = 41.2–55.7) of them were taken to a health center for care; the rest were taken to the other healthcare facilities. The median (range) number of days before seeking care was 3 (1–10) days. When primary caregivers sought care outside of their home, 33.6% (95% CI = 27.1–40.8) preferred to go to licensed practitioners, including pharmacists, and 28.5% (95% CI = 22.4–35.6) preferred unlicensed practitioners and friends. Only 7.1% (95% CI = 4.2–11.7) preferred a traditional healer.

Among various responses for why care was not sought ($N = 48$), 48.5% (95% CI = 32.2–65.1) thought that the child did not need it, and 24.3% (95% CI = 12.6–41.7) responded that the cost of treatment was too high; 5.2% (95% CI = 1.9–13.7) expressed unhappiness about the clinical service in the health centers.

Home and hospital management. With respect to treatment at home before seeking care, 43.0% (95% CI = 35.9–50.3) of children who had diarrhea were given no treatment at all. ORS was used by 17.0% (95% CI = 12.1–23.2) of caregivers, and 19.1% (95% CI = 14.0–25.4) of children with diarrheal

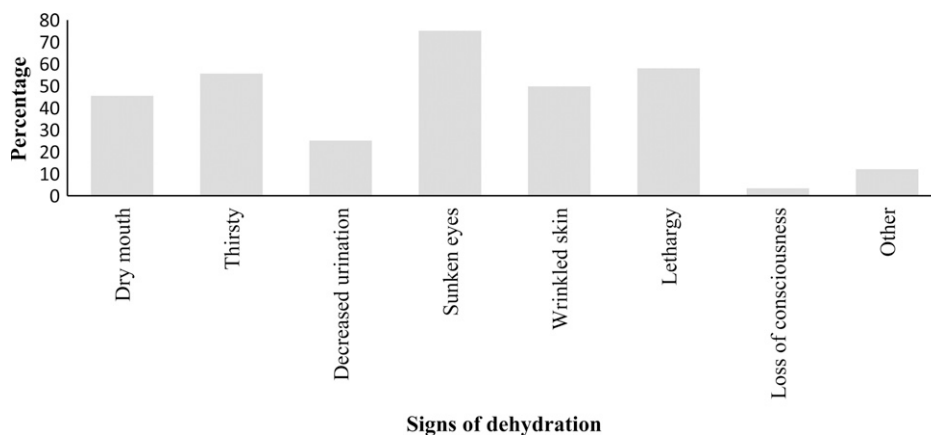


FIGURE 3. Primary caregivers' knowledge about signs of dehydration ($N = 1,012$).

TABLE 2

Reported stool characteristics, signs of dehydration, and types of diarrhea among the children who had diarrhea in the previous 2 weeks (N = 258)

	Age strata			Overall weighted percentage* (95% CI)	P
	0–11 months (N = 96)	12–23 months (N = 98)	24–59 months (N = 64)		
Male	60 (62.5)	54 (55.1)	35 (54.7)	56.3 (48.9–63.5)	0.585
Reported stool characteristics					
Max stool (3–6 times/day)	93 (96.9)	88 (89.8)	53 (82.9)	87.5 (81.2–91.9)	0.045
Blood in stool	11 (11.5)	35 (35.7)	17 (26.6)	25.9 (19.0–32.9)	0.001
Mucus/pus in stool	47 (49.0)	46 (46.9)	35 (54.7)	51.4 (44.1–58.7)	0.503
Watery stool	36 (37.5)	40 (40.8)	20 (31.3)	35.1 (28.5–42.3)	0.268
Signs of dehydration					
Decreased urination	32 (33.0)	43 (43.9)	24 (37.5)	38.5 (31.6–45.8)	0.398
Very thirsty	75 (78.1)	80 (81.6)	57 (89.1)	84.9 (79.3–89.2)	0.057
Dry mouth	45 (46.9)	55 (56.1)	33 (51.6)	51.9 (44.6–59.2)	0.306
Sunken eyes	68 (70.8)	73 (74.5)	50 (78.1)	75.7 (69.0–81.4)	0.546
Wrinkled skin	41 (42.7)	47 (48.0)	29 (45.3)	45.5 (38.3–52.9)	0.643
Diarrhea with					
Fever	89 (92.7)	69 (70.4)	53 (85.9)	81.3 (74.9–86.3)	0.007
Vomiting	41 (42.7)	44 (44.9)	13 (20.3)	31.5 (25.6–38.0)	0.009
Lethargy	52 (54.2)	53 (54.1)	28 (43.8)	48.6 (41.4–56.0)	0.156
Coma	5 (5.2)	5 (5.1)	1 (1.6)	3.2 (1.6–6.4)	0.323

Values are n (%) unless mentioned otherwise.
*Calculated using the sampling weights for age groups and sex.

illness were given some kind of homemade fluid before being taken outside the home for care. A few caregivers (9.7%, 95% CI = 6.2–14.9) reported giving antimicrobials to their children at home. They were generally reluctant to give food during an episode of diarrhea; 72.5% (95% CI = 65.4–78.5) gave their children less than the usual amounts to eat. However, 63.9% (95% CI = 56.7–70.5) gave their child more than usual volumes to drink. Among the children with diarrhea, 3.0% (95% CI = 1.3–6.9) were admitted to a healthcare facility. Among those children attending a healthcare facility, ORS was given to 55.1% (95% CI = 44.6–65.1), and injectable medicines were given to 43.7% (95% CI = 33.6–54.3); 18.6% (95% CI = 12.0–27.9) were given antimicrobials. Caregivers of 2.7% (95% CI = 0.7–9.8) of children with diarrhea reported that their child had received intravenous fluids. None of the caregivers reported receiving zinc from any treatment facilities.

Predictors of diarrhea and healthcare-seeking behavior.

Regression was used to identify possible predictors of diarrhea and the decision to seek treatment at a health facility; we considered biologically plausible and logical independent variables first and then constructed multivariate models (Table 3). Children under 2 years of age were more prone to have diarrhea than children ages 2 years and over, with a prevalence ratio (PR) of 1.4 (95% CI = 1.1–1.9, P = 0.005). Among the three age strata, the 12–23 months age group was most likely to suffer from diarrhea (PR = 1.3, 95% CI = 1.0–1.64, P = 0.042). Male child, primary caregivers' level of education, overcrowding, and socioeconomic status were not significant predictors of diarrhea in either the univariate or multivariate models.

Among children with diarrhea in the previous 2 weeks, neither the child's age nor sex were predictors of seeking treatment at a health facility (Table 4). Children having watery diarrhea were more likely to be taken to a health center (PR = 1.2, 95% CI = 1.0–1.3, P = 0.011). Among the signs of dehydration, dry mouth, lethargy, and diarrhea with fever and vomiting were found to be significant predictors of seeking treatment at a health facility. However, in a multivariate analysis, none of these predictors remained significant.

HUAS-lite. We analyzed the information obtained from the interview of 3,124 and 3,180 primary caregivers of under

5-year-old children in two consecutive years. The survey showed the period prevalence of diarrhea to be 22.8% (712/3,124) and the weighted prevalence to be 19.9% (95% CI = 18.4–21.4) in 2009. The survey showed the period prevalence of diarrhea to be 22.6% (720/3,180) and the weighted prevalence to be 18.9% (95% CI = 17.5–20.4) in 2010. The primary caregiver of 44.8% (95% CI = 39.7–50.0) of the children who had diarrhea in the previous 2 weeks took them to a health center within the DSS in year 1 of the study, whereas 48.2% (95% CI = 42.9–53.6) did so in year 2. Among those children who had diarrhea, 45.8% (95% CI = 41.8–49.9) and 41.8% (95% CI = 37.7–45.9) in 2 consecutive years were reported to have moderate-to-severe diarrhea (MSD) based on the signs perceived by the primary caregivers. Only about one-quarter (25%, 95% CI = 20.3–30.4) and 26.5% (95% CI = 21.1–32.7)

TABLE 3

Assessment of putative risk factors for diarrhea in 1,012 study children

	PR	95% CI	P
Age < 2 years	1.4	1.1–1.9	0.005
Sex (male)	1.1	0.9–1.5	0.311
Primary caregiver's education:	1.2	0.9–1.6	0.340
religious (Koranic) education			
More than 21 people residing in the household for the last 6 months	1.1	0.9–1.4	0.426
More than seven sleeping rooms in the household	1.0	0.8–1.4	0.743
More than three under 5-year-old children in the household	1.1	0.8–1.4	0.727
More than two under 5-year-old children under the care of the primary caregiver	0.9	0.6–1.5	0.746
Floor type: non-cemented	1.0	0.7–1.3	0.953
Household has electricity	0.9	0.7–1.2	0.448
Household has television	1.0	0.7–1.3	0.902
Household has motorcycle	0.9	0.7–1.2	0.616
Household has radio	0.9	0.6–1.4	0.624
Household has bicycle	0.9	0.6–1.3	0.447
Household has car	1.0	0.7–1.4	0.871
Household has telephone	1.0	0.7–1.3	0.858
Household has refrigerator	0.9	0.5–1.3	0.510

The PRs estimate the prevalence of diarrhea in the previous 2 weeks for children with each characteristic (compared with the prevalence in those children without the characteristics).

TABLE 4

Assessment of healthcare-seeking behavior of the primary caregivers when their child had diarrhea expressed as PRs ($N = 258$)

	PR	95% CI	P
Age 12–23 months	1.0	0.8–1.2	0.866
Age 24–59 months	1.0	0.9–1.2	0.554
Sex (female)	1.0	0.9–1.2	0.629
Blood in stool	1.0	0.8–1.2	0.758
Mucus/pus in stool	1.1	0.9–1.2	0.356
Watery stool	1.2	1.0–1.3	0.011
Decreased urination	1.0	0.9–1.2	0.991
Thirst	1.0	0.8–1.2	0.806
Dry mouth	1.2	1.0–1.4	0.013
Sunken eyes	1.2	1.0–1.5	0.054
Wrinkled skin	1.1	0.9–1.2	0.307
Fever	1.3	1.0–1.7	0.060
Vomiting	1.1	1.0–1.3	0.034
Lethargy	1.2	1.0–1.4	0.017
Coma	1.1	0.9–1.4	0.269
Mode of transportation: walking	1.0	0.9–1.2	0.553
Time to health facility: ≤ 30 minutes	1.2	1.0–1.3	0.022

The PRs estimate the proportion taken to a healthcare center among children with each characteristic (compared with those children without the characteristic).

of the children who had signs of MSD visited any of the health centers in the health and demographic surveillance area. In the health centers, ORS was given to 36.6% (95% CI = 32.8–40.6) and 37.9% (95% CI = 33.9–42.0) of the children as a treatment of diarrhea in 2009 and 2010, respectively.

DISCUSSION

This study provides baseline information on diarrheal illness in children from a largely rural West African population. The point prevalence of diarrhea in children under 5 years of age was 7.7%, signifying the magnitude of the disease burden. The primary caregivers in the households in the BHDSS have very low educational background and significant gaps in knowledge and perception of diarrheal illness and its management, which has been seen elsewhere.¹³ The study found a higher prevalence of diarrhea in children < 2 years of age, particularly among the 12–23 months age group compared with the 0–11 and 24–59 months age groups, similar to the findings in other African settings.^{14–16}

We asked caregivers about the World Health Organization (WHO) signs of dehydration.¹⁷ Only about one-half reported awareness of these signs, which was a common observation reported by other studies in Africa.¹⁸ This knowledge gap may delay the initiation of home management and seeking care at a health facility. Of the signs, only sunken eyes were well-recognized, although this feature can also be a sign of malnutrition. Despite distances of up to 25 km to a health facility from the farthest village and unreliable transportation, more than one-half of the primary caregivers did not consider transportation to be a potential problem. Therefore, increasing the number of healthcare facilities may not be the most important solution with respect to diarrhea in young children in this community.

Despite a rural setting and an impoverished population, a great majority (82.2%) of caregivers sought care outside of their home. Less than one-half of the diarrhea cases were taken to health centers, indicating that facility-based surveillance would grossly underestimate disease burden. ORS was given by only 55.1% of caregivers, whereas the tendency to give medicine by injection shows, albeit misguided, enthusi-

asm to treat the diarrhea. The primary caregivers sought care at a health facility, on average, on day 3, and the median duration of diarrhea was 5 days, signifying generally delayed care-seeking behavior. Boys were not more likely to be taken to the health centers than girls, unlike the findings in some Asian and African settings,^{19,20} and healthcare use was similar across all three age strata. As expected, crowding was positively related to diarrhea, whereas having certain household assets (an indicator of economic wellbeing) showed an inverse relation. However, these findings were not statistically significant. A substantial proportion of children were brought to pharmacists/licensed practitioners and traditional healers/unlicensed practitioners.²¹ In The Gambia, registered nurses are the primary healthcare providers in the healthcare centers, and they are the only people who can operate a pharmacy and be licensed to practice modern medicine. Close proximity and the availability of instant advice and medication are thought to be the main reason for seeking care at these facilities. However, traditional healers use indigenous medicine and are not bound by any law. The attendance at traditional healers and unlicensed practitioners follows similar trends observed elsewhere in West Africa.¹⁰ Less than 5% of the children who had diarrhea in the previous 2 weeks were actually admitted to a healthcare facility for treatment, suggesting a lack of understanding of the progression and consequences of the disease among the primary caregivers. The most common reason for not seeking care was the caregiver's personal opinion (46.7%), whereas cost was also a prominent reason (28.9%), which has been seen in other similar settings.²²

Like other countries in Africa, ORS use was relatively low.^{23–25} Although primary caregivers thought that ORS is beneficial, very few of them used it before seeking care when their children had diarrhea. Women in this community are involved in many other household activities and farming, and it is possible that young children are generally not receiving optimal care and attention from these busy caregivers.⁷ Those caregivers who went to non-health facility providers were less likely to be prescribed ORS, which might be expected.^{26,27} Caregivers did display awareness that fluid replacement is the key measure to control adverse consequences of diarrhea (i.e., dehydration). The tendency to withhold food or introduce new items is common in Africa.²⁸ Unfortunately, zinc, proven to be effective in diarrhea management,²⁹ has not yet been widely promoted in The Gambia.

A multipronged approach is indicated to contain diarrheal illness in this setting and similar settings.³⁰ Primary caregivers are aware of the existence of the disease. They believe that treatment is available when a child suffers from diarrhea. Most understood the importance of clean food and water and washing hands.³¹ However, very few (< 20%) are aware of preventive measures, like nutrition, medication, breastfeeding, proper disposal of human waste, and vaccines. Maintenance of good food hygiene and preparation,³² adequate supply of potable water, and treatment of turbid water may improve diarrheal disease control in settings such as The Gambia.³³

We standardized the interview process through repeated training of the field workers, but there may have been some differences in filling of forms among interviewers. The signs of dehydration are subjective, making that variable at risk of measurement bias. It is possible that there was some information bias with respect to health-seeking behavior, because it is difficult to know for sure which providers are licensed.

However, both the baseline HUAS and the HUAS-lite surveys revealed that less than one-half of the children were taken to the health center when they suffered from a diarrhea episode. ORS use remained the same over these time periods. Although the primary caregivers' perception of signs of dehydration may often be inaccurate, the presence of MSD based on these signs and reported by the caregivers failed to bring more than one-quarter of the children to the health centers. This finding again underscores the need to augment awareness of severity and consequences of diarrheal illness and teach prevention and improved home-based care through a well-orchestrated health education program.

Although our results may well be generalizable to a broader rural Africa context, there are some potential weaknesses. The study was conducted over a 4-week period, and the seasonality of diarrheal disease may have affected our point prevalence. However, we carried out an abbreviated survey version (HUAS-lite) on six subsequent DSS rounds, and the prevalence of diarrhea did not change significantly over time. We believe that the period prevalence from the HUAS-lite reflects the true estimate of the disease among the children less than 5 years of age in the community. The relatively higher prevalence noted in the initial survey could be because of the seasonal effect.

CONCLUSIONS

The findings of this study indicate a considerable point prevalence of diarrhea among under 5-year-old children in a defined population under demographic surveillance. Lack of knowledge in recognizing the early signs of dehydration and insufficient healthcare facilities and healthcare providers are key factors amenable to public health intervention. The government and health policymakers should consider providing more rural dispensaries and training more village health professionals to cater to the population. ORS, along with zinc, should be scaled up. ORS could be made available through both village health professionals and pharmacies, and a media campaign might accelerate its use.³⁴ Education should include training on preventive measures and home-based management of diarrhea.³⁵ There is also a need to continue community-based surveillance of diarrhea after effective control measures are put in place.

Received December 13, 2012. Accepted for publication March 19, 2013.

Published online April 29, 2013.

Acknowledgments: We acknowledge the hard work of the field workers in conducting the interviews. The nurse field coordinator Edrissa Sabally and the field supervisors Seedy Singateh, Abdoulie Manneh, and Alhagie Seedibeh were instrumental in training the field workers and performing quality control for the interviews. Ousman Bittaye and Salifou Sambou coordinated the subject tracing from the DSS link file. Special thanks go to the primary caregivers of under 5-year-old children in The Basse Demographic Surveillance System who kindly agreed to participate in this study. We are also thankful to the Regional Health Team (RHT) Basse for their cooperation and support in conducting this study successfully. Richard Adegbola provided guidance and facilitated organization and conduct of the study.

Authors' addresses: Debasish Saha and Philip C. Hill, Medical Research Council (MRC) Unit, The Gambia and Centre for International Health, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, Dunedin, New Zealand, E-mails: debu_saha@hotmail.com and philip.hill@otago.ac.nz. Adebayo Akinsola, Mitchell O. Adeyemi, Martin Antonio, Sayeed Imran,

Momodou Jasseh, and Mohammad J. Hossain, Medical Research Council (MRC) Unit, The Gambia, E-mails: bayoddoc2002@yahoo.com, adeyemimitchell@yahoo.com, mantonio@mrc.gm, msjj2003@gmail.com, mjasseh@mrc.gm, and jhossain@mrc.gm. Katrina Sharples, Centre for International Health, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, Dunedin, New Zealand, E-mail: katrina.sharples@otago.ac.nz. Dilruba Nasrin, Karen L. Kotloff, and Myron M. Levine, Center for Vaccine Development, University of Maryland, Baltimore, MD, E-mails: dnasrin@medicine.umaryland.edu, kkotloff@medicine.umaryland.edu, and mlevine@medicine.umaryland.edu.

REFERENCES

- Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, Jha P, Campbell H, Walker CF, Cibulskis R, Eisele T, Liu L, Mathers C, 2010. Global, regional, and national causes of child mortality in 2008: a systematic analysis. *Lancet* 375: 1969–1987.
- Pickering H, Hayes RJ, Tomkins AM, Carson D, Dunn DT, 1987. Alternative measures of diarrhoeal morbidity and their association with social and environmental factors in urban children in The Gambia. *Trans R Soc Trop Med Hyg* 81: 853–859.
- Goh Rowland SG, Lloyd-Evans N, Williams K, Rowland MG, 1985. The etiology of diarrhoea studied in the community in young urban Gambian children. *J Diarrhoeal Dis Res* 3: 7–13.
- Leach A, McArdle TF, Banya WA, Krubally O, Greenwood AM, Rands C, Adegbola R, de Francisco A, Greenwood BM, 1999. Neonatal mortality in a rural area of The Gambia. *Ann Trop Paediatr* 19: 33–43.
- Jaffar S, Leach A, Greenwood AM, Jepson A, Muller O, Ota MO, Bojang K, Obaro S, Greenwood BM, 1997. Changes in the pattern of infant and childhood mortality in upper river division, The Gambia, from 1989 to 1993. *Trop Med Int Health* 2: 28–37.
- Cogswell ME, Oni GA, Stallings RY, Brown KH, 1991. Sociodemographic and clinical factors affecting recognition of childhood diarrhea by mothers in Kwara State, Nigeria. *Soc Sci Med* 33: 1209–1216.
- Ibrahim MM, Aden AS, Omar HM, Wall S, Persson LA, 1994. Diarrhoea among children in rural Somalia. Maternal perceptions, management and mortality. *Ann Trop Paediatr* 14: 215–222.
- Akpede GO, Omotara BA, Gazali W, 1995. Severity signs of childhood diarrhoea in north eastern Nigeria. *J R Soc Health* 115: 164–174.
- Mwambete KD, Joseph R, 2010. Knowledge and perception of mothers and caregivers on childhood diarrhoea and its management in Temeke municipality, Tanzania. *Tanzan J Health Res* 12: 46–54.
- Babaniyi OA, Maciak BJ, Wambai Z, 1994. Management of diarrhoea at the household level: a population-based survey in Suleja, Nigeria. *East Afr Med J* 71: 531–535.
- World Bank, 2011. *World Development Indicators Database, World Bank, July 1, 2011*. Available at: <http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNIPC.pdf>. Accessed August 14, 2012.
- Nasrin D, Wu Y, Blackwelder WC, Farag TH, Saha D, Sow SO, Alonso PL, Breiman RF, Sur D, Faruque ASG, Zaidi AKM, Biswas K, Van Eijk AM, Walker DG, Levine MM, Kotloff KL, 2013. Health care seeking for childhood diarrhea in developing countries: evidence from seven sites in Africa and Asia. *Am J Trop Med Hyg* 89 (Suppl 1): 3–12.
- Ketsela T, Asfaw M, Belachew C, 1991. Knowledge and practice of mothers/care-takers towards diarrhoea and its treatment in rural communities in Ethiopia. *Ethiop Med J* 29: 213–224.
- Huttly SR, Blum D, Kirkwood BR, Emeh RN, Feachem RG, 1987. The epidemiology of acute diarrhoea in a rural community in Imo State, Nigeria. *Trans R Soc Trop Med Hyg* 81: 865–870.
- Hodges M, 1993. Diarrhoeal disease in early childhood: experiences from Sierra Leone. *Parasitology* 107 (Suppl): S37–S51.
- Kandala NB, Emima JB, Nzita PD, Cappuccio FP, 2009. Diarrhoea, acute respiratory infection, and fever among children in the Democratic Republic of Congo. *Soc Sci Med* 68: 1728–1736.

17. WHO, 2005. *The Treatment of Diarrhoea: A Manual for Physicians and Other Senior Health Workers*. Available at: <http://whqlibdoc.who.int/publications/2005/9241593180.pdf>. Accessed August 16, 2011.
18. Kaatano GM, Muro AI, Medard M, 2006. Caretaker's perceptions, attitudes and practices regarding childhood febrile illness and diarrhoeal diseases among riparian communities of Lake Victoria, Tanzania. *Tanzan Health Res Bull* 8: 155–161.
19. Burton DC, Flannery B, Onyango B, Larson C, Alaii J, Zhang X, Hamel MJ, Breiman RF, Feikin DR, 2011. Healthcare-seeking behaviour for common infectious disease-related illnesses in rural Kenya: a community-based house-to-house survey. *J Health Popul Nutr* 29: 61–70.
20. Sur D, Manna B, Deb AK, Deen JL, Danovaro-Holliday MC, von Seidlein L, Clemens JD, Bhattacharya SK, 2004. Factors associated with reported diarrhoea episodes and treatment-seeking in an urban slum of Kolkata, India. *J Health Popul Nutr* 22: 130–138.
21. Biritwum RB, Asante A, Amoo PK, Gyekye AA, Amisshah CR, Osei KG, Appiah-Poku YA, Welbeck JE, 2004. Community-based cluster surveys on treatment preferences for diarrhoea, severe diarrhoea, and dysentery in children aged less than five years in two districts of Ghana. *J Health Popul Nutr* 22: 182–190.
22. Breiman RF, Olack B, Shultz A, Roder S, Kimani K, Feikin DR, Burke H, 2011. Healthcare-use for major infectious disease syndromes in an informal settlement in Nairobi, Kenya. *J Health Popul Nutr* 29: 123–133.
23. Dabis F, Breman JG, Roisin AJ, Haba F, 1989. Monitoring selective components of primary health care: methodology and community assessment of vaccination, diarrhoea, and malaria practices in Conakry, Guinea. ACSI-CCCD team. *Bull World Health Organ* 67: 675–684.
24. Edet EE, 1996. Fluid intake and feeding practices during diarrhoea in Odukpani, Nigeria. *East Afr Med J* 73: 289–291.
25. Foster SO, Spiegel RA, Mokdad A, Yeanon S, Becker SR, Thornton JN, Galakpai MK, 1993. Immunization, oral rehydration therapy and malaria chemotherapy among children under 5 in Bomi and Grand Cape Mount counties, Liberia, 1984 and 1988. *Int J Epidemiol* 22 (Suppl 1): S50–S55.
26. Igun UA, 1994. Reported and actual prescription of oral rehydration therapy for childhood diarrhoeas by retail pharmacists in Nigeria. *Soc Sci Med* 39: 797–806.
27. Igun UA, 1994. The knowledge-practice gap: an empirical example from prescription for diarrhoea in Nigeria. *J Diarrhoeal Dis Res* 12: 65–69.
28. Jinadu MK, Odebiyi O, Fayewonyom BA, 1996. Feeding practices of mothers during childhood diarrhoea in a rural area of Nigeria. *Trop Med Int Health* 1: 684–689.
29. Fischer Walker CL, Aboubaker S, Van de Weerd R, Black RE, 2007. Zinc for diarrhoea management in Sub-Saharan Africa: a review. *East Afr Med J* 84: 441–449.
30. Mekasha A, Tesfahun A, 2003. Determinants of diarrhoeal diseases: a community based study in urban south western Ethiopia. *East Afr Med J* 80: 77–82.
31. Borghi J, Guinness L, Ouedraogo J, Curtis V, 2002. Is hygiene promotion cost-effective? A case study in Burkina Faso. *Trop Med Int Health* 7: 960–969.
32. Barrell RA, Rowland MG, 1979. Infant foods as a potential source of diarrhoeal illness in rural West Africa. *Trans R Soc Trop Med Hyg* 73: 85–90.
33. Crump JA, Otieno PO, Slutsker L, Keswick BH, Rosen DH, Hoekstra RM, Vulule JM, Luby SP, 2005. Household based treatment of drinking water with flocculant-disinfectant for preventing diarrhoea in areas with turbid source water in rural western Kenya: cluster randomised controlled trial. *BMJ* 331: 478.
34. Kenya PR, Gatiti S, Muthami LN, Agwanda R, Mwenesi HA, Katsivo MN, Omondi O, Surrow A, Juma R, Ellison RH, Cooper G, Andel van FG, 1990. Oral rehydration therapy and social marketing in rural Kenya. *Soc Sci Med* 31: 979–987.
35. Othero DM, Orago AS, Groenewegen T, Kaseje DO, Otengah PA, 2008. Home management of diarrhoea among underfives in a rural community in Kenya: household perceptions and practices. *East Afr J Public Health* 5: 142–146.