

Home Management of Childhood Diarrhoea in a Poor Periurban Community in Dominican Republic

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ABSTRACT

The purpose of this study was to identify local knowledge and practices of, and barriers to, the home management of childhood diarrhoea in a poor periurban district of the Dominican Republic. In total, 582 caregivers of children aged five years and younger were interviewed using a structured questionnaire. Forty-six percent of the caregivers reported that one of their children had experienced diarrhoea within the last month. There was high reported use of ORS and knowledge of its preparation and principal function. However, there were many obstacles to its use. Other concerns included high rates of dietary restrictions during diarrhoea, positive view of the use of antibiotics, poor knowledge of preparation of sugar-salt solutions, and low attention given to clinical indicators as reasons for seeking professional treatment. Health-promotion efforts should target these areas of concerns to further improve the management of childhood diarrhoea in this district.

Key words: Diarrhoea; Knowledge, attitudes, practice; Diet; Oral rehydration solutions; Child; Dominican Republic

INTRODUCTION

Diarrhoea continues to substantially contribute to high rates of morbidity and mortality among young children in the Dominican Republic. Actual rates of mortality among children due to diarrhoea are difficult to pin down because of high rates of under-registration of deaths of infants and children (1). Among registered deaths in the Dominican Republic, intestinal infectious diseases are the most prevalent cause of death (16%) of children aged 1 to 4 year(s) and the second most common cause of death (15%) of infants aged less than one year (1). Twenty percent of children aged less than five years were reported to have had diarrhoea within two weeks prior

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to the 2000 Multiple Indicator Cluster Survey (MICS) conducted in the Dominican Republic as part of the End Decade Assessment (2). In addition, diarrhoea is one of the most common reasons for medical consultation, emergency treatment, and hospitalization in the Dominican Republic (1).

Proper home management can reduce morbidity and mortality due to diarrhoea. Factors of particular importance include prevention of dehydration during diarrhoeal episodes through the use of oral rehydration solution (ORS), support of nutritional status through the continuation of an adequate diet, and the avoidance of harmful practices (3). Problems in each of these areas have been reported from other districts. Difficulties with the use of ORS and sugar-salt solutions (SSS) include inaccurate preparation, administration of inadequate quantities, and the failure to use them at all (4-6). Potentially detrimental dietary restrictions during diarrhoeal episodes have been noted in several countries (7-9). Other potentially harmful practices, including fluid

restrictions (8-9) and excessive use of antibiotics (10) have also been reported.

There is a lack of information on the home management of diarrhoea cases in the Dominican Republic, except for some recent general survey data. The MICS 2000 study reported that 28% of children with diarrhoea received ORS packets, and 22% received increased fluid plus continued feeding (2). According to the 1996 ENDESA/Demographic Health Survey, 39% of all diarrhoeal episodes were treated with some form of oral rehydration solution (1). Unfortunately, more detailed information was not reported, which would provide direction for future health-promotion efforts. Besides, region-specific practices were not reported which would likely better inform regional health-promotion efforts. Local information may be useful in better tailoring health-promotion efforts to aid in decreasing morbidity and mortality due to childhood diarrhoeal illness. Such an approach is helpful in developing targeted interventions for improving parenting practices (11).

The purpose of this study was to identify local knowledge and practices of, and barriers to, the home management of childhood diarrhoea in a poor periurban district of the Dominican Republic. The focus was on rehydration solutions, dietary practices, and other responses to diarrhoea. This information could inform regional health-promotion efforts.

MATERIALS AND METHODS

Setting

The study site comprised four poor barrios (neighbourhoods) within the district of Los Alcarrizos, which is located on the outskirts of Santo Domingo, the capital of the Dominican Republic. These four barrios were chosen for two reasons: (i) a local child malnutrition clinic frequently receives referrals from these communities, and (ii) local health-promotion groups had chosen these communities for health-education interventions. In addition, a poor periurban district was selected due to the importance of these communities, given their size and growth in the Dominican Republic and the rest of the developing world and the high rate of health problems within such areas (12-14).

These barrios are relatively new communities varying from two to ten years at the time of the study. These were predominately settled by squatters. The

majority of the communities have variably treated piped water that is inconsistent in its delivery. Most people had built their own pit-latrines and dispose of garbage by burning or throwing into nearby ravines. These communities are within walking distance from the main street in the district, which has a wide variety of stores, including several pharmacies. The district has two public-health clinics, a private missionary hospital, and a number of private medical clinics.

Sample

Every fifth house along each road and path in each selected barrio was visited. If at least one child aged five years or younger lived in the selected house and a primary caretaker was available for an interview, this caretaker was invited to participate in the interview. If a primary caretaker was not presently available or if there was no one at home, the house would be visited up to two further times in an attempt to conduct an interview.

The sampling process resulted in visits to 863 houses. Of these, 266 did not have any children aged less than five years. If a household did not have a child aged less than five years, the research assistant went to the subsequent 5th home, i.e. the 10th home. Twelve houses were visited repeatedly, but no one was encountered. The remaining 597 households were eligible for the interview, but 14 (2.3%) refused or had no available primary caregiver for interview, and one caregiver completed less than half of the interview, leaving 582 (97.5% of total eligible) who completed the interview. Data were collected in 1996.

We have previously reported on this sample with regard to their diarrhoea-prevention practices (15).

Measures

The primary instrument was a structured interview developed by the present investigator. All interviews were conducted by one of two Dominican women who had experience in community health and had some university education. The interview covered demographics, history of child diarrhoea, practices and knowledge of, and barriers to, treatment of diarrhoea. Prior to inquiring about diarrhoea, the caregivers were given a standard definition of diarrhoea for the purposes of this study, that is, "the child has loose stools 3 or more times a day."

The questionnaire included closed and open-ended questions. An example of a closed question was, "When a child has diarrhoea, is it better to stop or continue: all

solid foods, breastmilk, canned/powdered milk, greasy foods, beans, rice, and juice?" The closed questions employed to assess dietary changes and barriers to ORS use were developed following a clinic-based study that was conducted one year prior to this study (16). We took the most frequent responses to open questions from this previous study to construct the closed questions for this study.

An example of an open question was, "In what cases of diarrhoea should you go to the doctor?" For all open questions, the research assistant transcribed all responses given by the caregiver. When the caregiver stopped giving spontaneous responses, she was asked if there were any additional responses until she indicated no. Each novel response was assigned a new number and entered into the database. The author reviewed each category with a Dominican health worker who had lived and worked in this district for many years to determine which responses could be combined in a meaningful way.

Mid-arm circumference of the index child was obtained using insertion tapes obtained from Teaching Aids at Low Cost (TALC) in the United Kingdom.

Analysis of data

Data were analyzed with SPSS PC version 10.1. Chi-square with Yates correction, Student's *t*-test, and Spearman correlation were used for bivariate analyses. Logistic regression was used for multivariate analyses. Given multiple statistical testing, relationships significant only at *p* values of less than 0.01 and 0.001 were considered.

Ethics

The study was approved by Proyecto Ninos/Centro de Salud Clinic in Los Alcarrizos. Verbal consent was obtained from each of the primary caregivers who participated in the interview.

RESULTS

Sociodemographics

The mothers of young children constituted 84.5%, grandmothers 9.6%, aunts, fathers, older sisters, and others 5.8% of the 582 participants. Sociodemographic characteristics of the participating caregivers are given in Table 1.

The index child—one child aged five years or younger selected randomly from each household—was 29 (SD 18) months old. The average mid-arm circumference of index

children aged one year or greater was 155 mm, with 3.6% of these children having measures below 135 mm, a

Table 1. Sociodemographic characteristics of caregivers of children

Characteristics	Mean (SD)	Range	No.
Age (years)	29.5 (10.1)	14-76	581
Formal education (years)*	5.6 (3.6)	0-13	582
Family income/month (peso)†	2,313 (1,658)	0-15,000	308
Household items‡	3.2 (1.4)	0-5	582

* Education beyond 12 years was coded as 13
 † The substantial missing data are due to many caregivers reporting not knowing family income (Note: 17 peso is approximately equal to 1 US dollar)
 ‡ Sum of having a toilet (83%), water tap (75%), television (70%), radio (58%), and refrigerator (37%). Correlation coefficient between total household items and reported income is 0.158 (*p*<0.01)

cut-off level for malnutrition. Twenty-five percent of the caregivers reported death of at least one of their live-born children.

History of diarrhoea

Forty-six percent of the caregivers reported that one or more of their child(ren) had had diarrhoea during the month prior to the interview (Table 2). Eighty-one percent reported that one of their children had ever had a problem with diarrhoea.

Responding to diarrhoea

Using rehydration solutions was the most common reply to an open question about how the caregiver responded to childhood diarrhoea (58.4%). Other responses included: taking the child to a doctor (33.7%), giving juice (23.9%), and using medicines (18.7%).

Dietary restrictions

The caregivers recommended multiple dietary restrictions in response to childhood diarrhoea (Table 2). Over 90% recommended stopping the use of 'greasy' foods, i.e. those prepared with a lot of vegetable-oil through frying. Approximately, half of the respondents recommended discontinuing powdered milk. Over one-third would stop the staples of rice and beans in the Dominican diet. Only 3% reported that they would suspend breast-feeding. Combining these restrictions, 95.4% of the respondents endorsed at least one food or beverage restriction, or if 'greasy' food restriction was not included the figure was 73.9%.

Oral rehydration solution

Ninety-percent correctly identified that one litre of water is required to prepare a package of ORS (Table 2). An additional 8% could not remember, while 1% reported use of more than 1 litre and 1% reported using ½ litre.

Sugar-salt solution

Twenty-one percent of the respondents reported that they had used a home-made SSS (Table 2). Eighty-eight percent of those using SSS also reported the use of ORS. No single standard formula is recommended in this study

Table 2. Relationship of practice, knowledge, and experience with diarrhoea to having heard of a health message about diarrhoea

Practice/knowledge/experience	Heard of health message				Total		χ^2
	Yes		No		No.	%	
	No.	%	No.	%			
Rehydration							
Used ORS	277	86.6	171	65.5	448	77.1	34.9 [†]
Used SSS	84	26.3	38	14.5	122	21.0	11.3*
Reported ORS's rehydrates	174	54.7	104	39.7	278	47.8	12.4 [†]
Reported 1 L required for ORS	307	95.9	213	81.6	520	89.5	29.9 [†]
Food restrictions							
Food with grease [‡]	293	91.6	241	92.0	534	91.8	0.0
Powdered milk	157	49.1	149	56.9	306	52.6	3.2
Beans	109	34.1	116	44.3	225	38.7	5.9
All solid foods	109	34.1	111	42.5	220	37.8	4.0
Rice	100	31.3	111	42.4	211	36.3	7.2*
Breastmilk	6	1.9	11	4.2	17	2.9	2.0
Juice	2	0.6	8	3.1	10	1.7	3.7
Adding other agents							
Coconut-oil	258	83.2	209	81.6	467	82.5	0.1
Tea	235	74.6	198	76.2	433	75.3	0.1
Antibiotics	239	75.6	178	69.5	417	72.9	2.4
History of child diarrhoea							
Child had recent diarrhoea	147	45.9	118	45.0	265	45.5	0.0
Child ever had diarrhoea	265	82.8	209	79.8	474	81.4	0.7

* p<0.01

† p<0.001

‡ Primarily referred to food with a lot of vegetable-oil, predominately from frying

To an open question, 47.9% responded that the function of ORS was rehydration or a replacement. Twenty-four percent thought that it directly impacted on diarrhoea, such as stopping it. Twenty-four percent reported that it helped nutritional state of the children or prevented malnutrition. Knowledge of rehydration function of ORS was related to having used ORS ($\chi^2=16.2$, p<0.001).

Seventy-seven percent reported that they had ever used ORS, including 82% of those reporting one of their children ever having problems with diarrhoea. Of those who used ORS, many endorsed factors that interfered with using ORS in all cases of diarrhoea (Table 3). The most common factor was that diarrhoea was not felt to be so watery or loose ('flojo') to require the use of ORS. Other common reasons included the refusal of child to drink ORS, or that there was insufficient money to buy the package.

community. However, one that is promoted by the most active health-education group in the area is 30-45 mL of

Table 3. Obstacles to using ORS in all cases of diarrhoea

Obstacle	No.*	%
Sometimes diarrhoea is not so watery	383	85.7
Sometimes the child refuses it	211	47.2
Sometimes there is no money to buy it	208	46.5
Sometimes the doctor does not indicate it	139	31.1
Sometimes the packet is not available	128	28.6
Sometimes it does not work well	90	20.1
Sometimes the caregiver forgets to use it	87	19.5

* Total no. of samples for these questions was 447, i.e. only those who reported ever having used ORS

sugar, 2.5 mL of salt, 2.5 mL of sodium bicarbonate, and the juice of half a lemon added to one litre of boiled

water as is promoted in one version of the manual titled "Where there is no doctor: a village healthcare handbook" (17).

The group that reported using SSS attempted to recall the formula. Seventy-eight percent of this group reported using 1 litre of water, with an additional 15% providing an unquantifiable volume. Ninety-three percent reported sugar as a key ingredient, but the quantities varied from 1.25 mL to 120 mL with modes of 23% at 15 mL and 22% at 5 mL. Salt was reported by 93% with a range of 1.25 mL to 30 mL with a mode of 24.0% at 2.5 mL. Sodium bicarbonate was mentioned by 49%, with a range of 1.25 mL to 15 mL with no strong mode. Finally, the use of lemon or lemon-juice was mentioned by 64% of the respondents.

Other treatments

Coconut-oil was the most common additional agent recommended by 83% of the caregivers (Table 2). Herbal tea was recommended by 75%, while 73% recommended the use of antibiotics. In addition, 31% reported that they bought medicine for childhood diarrhoea from a pharmacy without a prescription.

The use of ORS was significantly associated with recommending the use of coconut-oil in the treatment of diarrhoea ($\chi^2=11.3$, $p<0.001$). In contrast, the use of ORS was not associated with the recommendation of caregivers to use tea or antibiotics.

When to go to a doctor

An open question was asked with regard to the ideas of caregivers as to which cases of diarrhoea should be taken to the doctor. The most common cases were those with prolonged diarrhoea, that is, lasting for three or more days (Table 4). Important clinic criteria, such as dehydration (4.1%) and malnutrition (1.2%), were infrequently mentioned.

Exposure to health education

The caregivers were asked if they had heard messages about prevention of diarrhoea. Although the question was about prevention, most diarrhoea-education efforts combine prevention and home-treatment lessons, and hence we used this as a proxy to exposure to general health education about diarrhoea. Fifty-five percent reported that they heard a message. Having heard a message was positively related to the use of ORS and SSS and knowledge about the preparation and rehydration function of ORS (Table 2). Having heard

the health message was also related to less food restrictions. However, having heard a health message was not related to whether the children had had diarrhoea.

Table 4. In which cases of diarrhoea should you go to the doctor?

Case	No.	%
Lasting for 3 days or more	274	47.1
A lot/too much/very strong	105	18.0
Very loose/watery	64	11.0
If it does not stop with anything	55	9.5
All cases/from the beginning	42	7.2
Frequency (more than 3 or 4 or 5 times/day)	38	6.5
If there is vomiting	25	4.3
If the child is dehydrated	24	4.1
If it is smelly and/or has phlegm	17	2.9
When it has blood	16	2.7
When the child has fever	12	2.1
In no case	12	2.1
When there is malnutrition	7	1.2

Relationship with sociodemographic factors

Having heard a health message on diarrhoea was related to having a higher level of formal education and a higher economic status (based on ownership of household items) (Table 5). Reporting the rehydration function of ORS was related to a younger age and a higher level of formal education of the caregiver of children. The use of ORS and knowing the proper amount of water for its preparation were not related to basic sociodemographic factors. In contrast, the use of SSS was related to an older age and a lower educational attainment of the caregiver of children.

Recommending the restriction of breast-feeding during diarrhoea was related to a higher educational attainment of the caregiver, while a lower educational attainment was related to recommending the use of tea. Older age of the caregiver was related to recommending the use of antibiotics.

Reported income was also compared with the same variables found in Table 5. The only significant relationship was that those who used SSS had a significantly lower reported monthly income ('used SSS,' $n=60$, $mean=1,752$, $SD=951$ vs 'did not use SSS,' $n=248$, $mean=2,448$, $SD=1,763$; $t=-4.191$, $df=170$, $p<0.001$).

Multivariate analysis

In addition to being related to having heard a health message, knowledge of rehydration function of ORS and

the use of SSS were related to sociodemographic factors. We assessed the relationship between these significant associations within a logistic regression model

The middle-income group (1,501 to 2,500 peso per capita per month) was less likely to use an SSS than the lowest-income group (0 to 1,500 peso). The group with a

Table 5. Relationship of practice, knowledge, and experience with diarrhoea to age, education, and economic status of caregiver

Practice/knowledge/experience	Age of caregivers		Education of caregivers		Economic status	
	Mean (SD)		Mean (SD)		Mean (SD)	
	Yes	No	Yes	No	Yes	No
Heard health message on diarrhoea	30.1 (9.0)	28.9 (11.3)	6.2 (3.6)	4.9 (3.4) [†]	3.4 (1.4)	3.0 (1.3) [†]
Rehydration						
Used ORS	29.4 (9.2)	30.0 (12.7)	5.6 (3.5)	5.8 (3.7)	3.2 (1.4)	3.3 (1.3)
Reported ORS's rehydrates	28.3 (7.4)	30.6 (12.0) [*]	6.5 (3.5)	4.8 (3.4) [†]	3.2 (1.4)	3.2 (1.3)
Reported 1 L required for ORS	29.6 (9.7)	29.5 (13.0)	5.7 (3.6)	4.9 (3.4)	3.2 (1.4)	3.0 (1.4)
Used SSS	33.8 (10.7)	28.4 (9.7) [†]	4.8 (3.6)	5.8 (3.5) [*]	3.1 (1.3)	3.2 (1.4)
Food restrictions						
Food with grease [‡]	28.2 (9.0)	29.7 (10.2)	5.2 (3.8)	5.6 (3.5)	2.9 (1.3)	3.2 (1.4)
Powdered milk	28.7 (8.6)	30.2 (11.3)	5.6 (3.7)	5.6 (3.5)	3.2 (1.4)	3.3 (1.3)
Beans	29.7 (10.3)	29.3 (9.9)	5.7 (3.5)	5.5 (3.6)	3.2 (1.4)	3.2 (1.3)
All solid foods	28.9 (9.2)	30.7 (11.5)	5.9 (3.5)	5.2 (3.6)	3.2 (1.4)	3.2 (1.2)
Rice	29.0 (9.4)	30.4 (11.2)	5.8 (3.5)	5.3 (3.6)	3.2 (1.4)	3.2 (1.3)
Breastmilk	29.4 (9.8)	32.8 (17.0)	5.7 (3.6)	3.2 (2.4) [*]	3.2 (1.3)	2.6 (1.5)
Juice	29.7 (10.1)	22.8 (7.6)	5.6 (3.7)	3.8 (3.0)	3.2 (1.4)	2.4 (1.1)
Adding other agents						
Coconut-oil	30.0 (10.3)	28.0 (9.6)	5.4 (3.5)	6.3 (3.5)	3.2 (1.4)	3.3 (1.3)
Tea	29.7 (10.6)	29.1 (8.5)	5.3 (3.5)	6.3 (3.6) [*]	3.2 (1.4)	3.3 (1.3)
Antibiotics	30.5 (10.3)	26.9 (9.1) [†]	5.7 (3.6)	5.4 (3.6)	3.3 (1.3)	3.0 (1.4)
History of child diarrhoea						
Child had recent diarrhoea	29.5 (11.1)	29.6 (9.2)	5.4 (3.4)	5.8 (3.7)	3.1 (1.4)	3.3 (1.3)
Child ever had diarrhoea	29.6 (10.2)	29.2 (9.6)	5.7 (3.5)	5.2 (3.9)	3.2 (1.4)	3.4 (1.2)

* p<0.01
[†] p<0.001
[‡] Primarily referred to food with a lot of vegetable-oil, predominately from frying

(Table 6). Having been exposed to a health message on diarrhoea remained significantly related to having used an SSS and knowledge of rehydration function of ORS.

moderate level of formal education (5 to 8 years) was significantly more likely to report knowledge of rehydration function of ORS than the group with a lower

Table 6. Logistic regression analysis of knowledge and practice of rehydration

Variable	Used SSS		Reported rehydration function of ORS	
	p value	Odds ratio	p value	Odds ratio
Heard health message on diarrhoea	0.007	2.45	0.008	1.60
Age of caregivers (years)				
14-19	reference	reference	reference	reference
20-39	0.047	4.09	0.447	0.76
40+	0.225	2.01	0.173	1.46
Education of caregivers (years)				
0-4	reference	reference	reference	reference
5-8	0.673	0.84	0.000	2.67
9+	0.997	1.00	0.036	1.52
Family income (peso/month)				
0-1,500	reference	reference	—	—
1,501-2,500	0.007	0.34		
2,501+	0.952	0.98		

level of education. Despite these significant relationships, the R^2 values were low for these models with values of 0.11 and 0.10 for SSS use and knowledge of rehydration function of ORS respectively.

DISCUSSION

The reports of the caregivers suggest that diarrhoea in young children was quite common in the study district. It is difficult to compare rates between studies due to different methodologies, such as definition of diarrhoea, time period covered, and sampling method. Nevertheless, our value is higher than the value of 20.1% obtained in the recent MICS 2000 (2). It is unlikely that the difference in time—two weeks vs one month recall—could account for this large difference. Another factor may be the use of a different denominator, which in this study, was children in the household vs only one identified child. Our value is child diarrhoea per household. However, this also may not be a major factor, given that we found an almost identical rate (47%) in a more recent study in the same district but where we asked about a single specific index child per household. Perhaps, the largest contributing factor is the high-risk environment of this sample, that is, living in a poor periurban community. This highlights the concern over using national estimates that may serve to obscure substantial inter-regional variations within a country.

In addition to concerns about the high rate of diarrhoea, there are concerns about several aspects of community management of childhood diarrhoeal illness. Of particular concern are dietary restrictions, positive endorsement of antibiotics, low attention to clinical indicators for seeking professional assistance in managing diarrhoea, number of barriers endorsed for ORS use, and poor preparation of SSS.

The restriction of diets of children during diarrhoea is a concern because restriction may not be required and may compromise their health. Current professional recommendations are against dietary restrictions for childhood diarrhoea, with some caution for infants, severely-malnourished or dehydrated children, or those exclusively consuming non-human milk (18-20). Restrictions of diet may be particularly detrimental in cases where diets of children are already marginal as is the case in the study communities (21). The high rates of food restrictions observed in our study may be consistent with actual practice in cases of diarrhoea as the MICS 2000 study reported that, in only 22.4% of

cases of childhood diarrhoea did children receive increased fluids and continued feeding (2).

The most common restriction in this study sample was the reduction in the use of 'greasy' foods, primarily referring to foods fried in vegetable-oil. Some groups, such as the American Pediatric Association (20), the recommended to avoid 'fatty food,' but scientific evidence for this suggestion is limited. The concern in this setting is the possible reduction in calories in diet of children that may not be replaced by other foods and that there may not be any clinical advantage to this restriction.

A second area of restriction is in the use of powdered cow's milk, which may be an important part of a diet of children in this district due to early introduction of non-human milk and early weaning (21-22). This restriction is inconsistent with the current recommendation to continue non-human milk in childhood diarrhoea (18-19,23).

Another area of concern is the suggestion by more than one-third of the caregivers that they would restrict rice and/or beans which are core components of the main meal of a day in this district. Restricting rice and beans during diarrhoea has also been described in Nigerian samples (7-8). Again, there is a concern over the loss of calories and nutrients, given that these are food staples in the local diet. It seems particularly inappropriate to restrict rice, given the successful use of rice-containing diets in the management of diarrhoea (24-25). In addition, rice is listed as one of the complex carbohydrates that may be better tolerated in refeeding according to the American Pediatric Association (20).

There are also concerns about the various remedies employed to treat diarrhoeal episodes. Although herbal teas may provide a safe supply of liquid, given that the water is boiled, the teas do not include any salts, and their use may compete with the more balanced rehydration fluids, such as ORS. Also of concern is the popularity of antibiotics despite health-promotion efforts in the area discouraging their use except for specific conditions, such as *Shigella*-associated dysentery (3). Their popularity is of particular concern because antibiotics can, at times, be obtained from pharmacies without a prescription and, therefore, bypass the potential role that physicians could play in limiting inappropriate use of antibiotics. Problematic antibiotic use in other communities has been reported (26). In contrast, the addition of coconut-oil may be helpful, given that it is

rich in medium-chain triglycerides that may be easily absorbed (27).

Another area of concern is the factors prompting the caregivers to seek medical care for a diarrhoeal episode. The most frequent factors appear to emphasize characteristics of diarrhoea, e.g. duration, rather than the clinical status of the child, e.g. dehydration. This suggests a lack of appreciation of critical risk factors for morbidity and mortality of children. Similarly, a study in Mexico found that seeking treatment was not related to signs of dehydration but was in response to other characteristics, such as duration of diarrhoea (28). An important caveat for the results of our study was that the responses were tabulated from open questions. It is anticipated that if the mothers were directly asked about a series of scenarios, higher rates of treatment-seeking would have been mentioned for certain characteristics, such as blood in the stool.

The use of ORS was reported to be relatively high in this sample. However, the use was not linked to the most recent episode; hence, the rate would not likely be so high for ORS use per episode of diarrhoea. The MICS 2000 study reported the rate of receiving an ORS packet for the recent episode of diarrhoea to be 28.0% (2). A lower rate per diarrhoeal episode may be a function of the many obstacles endorsed by the participants.

The most frequently-endorsed reason for not using ORS for each episode of diarrhoea was when the diarrhoea was not 'so watery.' It is suspected that this captures a broader attitude toward treatment of some diarrhoea that may not be viewed as very serious and may include dimensions other than being watery, such as stool frequency. This is consistent with a previous report that found that ORS was more likely to be used in diarrhoeal cases perceived to be more serious by the caregivers (29). Although ORS may not need to be initiated in all cases of diarrhoea, particularly mild cases where there is no dehydration, such evaluation requires a prediction of the course of diarrhoeal episode and the recognition of early signs of dehydration by the caregivers.

Cost may be another important barrier to regular use. Local health promoters report that free WHO-packages of ORS are less available for distribution. In addition, the cost of purchasing ORS from the local pharmacies has increased. At present, this can cost about 10 Dominican peso per packet (about US\$ 0.60) depending on the pharmacy.

The child refusing to drink ORS was also reported as a frequent barrier and might lead to early abandonment of its use. Unfortunately, in at least one study, adding a flavouring agent to ORS did not increase the volume consumed (30).

Availability was also reported as a problem in greater than a quarter of the cases. Unfortunately, this barrier was not pursued further as far as identifying key factors that impeded availability. Nevertheless, perceived availability is important as it is a significant predictor of use (31). Although SSS should be a cheaper and more readily-available alternative, present knowledge of the SSS formula is poor in this district.

It is also acknowledged that any use does not indicate proper use (6). Unfortunately, we did not collect adequate data to assess this variable. Encouraging is the high rate of knowledge with regard to the proper amount of water required for an ORS packet. In addition, there was a high percentage reporting the rehydration function of ORS to an open question suggesting relatively high understanding of ORS. Unfortunately, these knowledge measures do not necessarily predict actual ORS use as found in a multi-country study (6), although it did in this study.

There are important limitations to this study. First, it relied on retrospective self-reporting. Corroborative observational data would have been useful for such things as ORS use and dietary changes. One study found that observed changes in dietary practices during diarrhoeal episodes were not as substantial as that reported by mothers (32). Second, treatment questions were not tied to the most recent episode of diarrhoea, rather they were asked in general. Third, some questions were recommendations of the participants not actual practices, such as for dietary restrictions. Fourth, a social desirability bias may have played a role in self-reporting for certain questions, such as ORS use; hence, the reported values may be an over-estimate. However, social desirability is less likely to influence other responses, e.g. dietary changes; and the retrospective self-reporting nature of the data would not alter responses to knowledge-related questions. Fifth, there was a lack of inquiry into potential variation in practice by certain characteristics. For example, do dietary restrictions vary depending on the age of the child and/or the characteristics of diarrhoea? A study in a Nigerian sample found that food restriction patterns varied by the type of diarrhoea (8). However, there does not seem to be an extensive community sub-typing of diarrhoea in the

Dominican Republic. Finally, additional questions may also have been useful in determining specific details about ORS use, such as volume and duration of use.

Despite these limitations, the data indicate some priorities for health-promotion efforts. Recommended foci include increased emphasis on decreasing dietary restrictions, the limited role of antibiotics in most cases of diarrhoea, the need to attend to clinical signs as reasons to seek professional help, the proper preparation of SSS, and ideas on overcoming the barriers identified for ORS use. Particular attention to addressing perceived barriers may be especially important, given a more consistent relationship found between perceived barriers and reported health practices in this district in contrast to knowledge deficits as has been reported in previous studies (15,16). The mixed and mostly absent relationship of practice and knowledge to sociodemographic characteristics within this community suggests that there are no clear subgroups that should be targeted over others; so, a universal health-promotion approach may be most appropriate for this district.

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