

Mothers' knowledge practices in home management of childhood diarrhea in kano state: a cross sectional study

Zainab Sa'id Sa'ad

University of Malaya, Kuala Lumpur

Kazi Enamul Hoque

University of Malaya, Kuala Lumpur

Bello Magaji Arkilla

Usman DanFodio University, Sokoto, Nigeria

Abstract: Diarrhea and other diarrheal diseases such as cholera, pose great health problems and continue to be a major cause of child morbidity and mortality among children under 5 in Nigeria. This study aims to assess the knowledge and practice of women receiving non-formal education on prevention and management of childhood diarrhea in their homes. Using a structured questionnaire, a survey was carried out among 109 women studying in adult and non-formal education schools in Kano state. Respondent's demographic information was collected alongside health knowledge and home practices subsequently tabulated using percentages and mean scores. The correlation between health knowledge and home practices was also calculated to determine association. The study reveals that the majority of the 109 women interviewed had high knowledge of both Diarrhea and ORS (Mean: General Knowledge - 1.08, In-depth Knowledge - 1.47). The bivariate analysis indicates a significant moderate positive association between knowledge of Diarrhea/ORS and home preventive practices ($r = .590$, ($p = 0.00$) further supported by the results of the linear regression indicates that knowledge accounts for a significant predictor of women's Diarrhea/ORS home practices $R^2 = .342$ $F=57.106$, ($p < .05$). In accordance with the result, important aspects of both diarrhea and ORS need to be addressed explicitly and with rigour in the health education curriculum since the majority of the students are married with children.

Keywords: non-formal education, health knowledge, prevention and management of childhood diarrhea

Background

Diarrhea is the second largest killer of children under the age of five (U5), after pneumonia, especially in developing countries (WHO, 2013; UNICEF, 2013; UNICEF, 2009, WHO, 2006; Ruxin, 1994). The World Health Organisation estimates that, yearly, 760,000 children die of diarrhea (WHO, 2013) globally and 9% of these deaths occur among children under the age of two in SSA and Asia (UNICEF, 2014).

In Nigeria, diarrhea and other diarrheal diseases, such as cholera, pose great health problems (Iyun & Oke, 2000), and continue to be a major cause of child morbidity and mortality (Olawuyi, Egbewale, Anifalaje & Okochi, 2004). Children aged five and below, suffer an average 4.5 diarrheal episodes yearly culminating into reports of about 70 million cases (Olawuyi, et. al., 2004). The disease accounts for 27% of all infant morbidity and 24% infant mortality rates, causing a yearly death toll of 1.5 million children in Nigeria (Olakunle, 2012) leading to an annual death estimate of over 160,000 (Parashar et al., cited in Tagbo, et al., 2014).

Diarrheal diseases, such as cholera and dysentery, are very common in Northern Nigeria and Kano (WHO, 2012). With more than 200 deaths per 10,000 live births Kano has the highest U5MR in northern parts of Nigeria (NPC & ICF, 2014). According to this report, Northern states have a higher U5MR as compared to the Southern states of the country, with 60 deaths per 10, 000 live births.

A common cause of cholera lies in the consumption of contaminated water or food (Adagbada et al., 2012). The majority of households in most parts of Northern Nigeria rely on water from wells or water sold by street vendors as their source of drinking water (Hutin, 2003). Outbreaks in Kano can spread to neighbouring states, such as the 2010 outbreak which spread to other northern states, resulting in 781 deaths 3,000 casualties. Therefore, to provide a multisectoral approach in cutting down on the number of diarrheal cases in the state, the adult and non-formal education schools (NFE), catering mostly for married women with young families, teach Health Education, where ORS is taught as a first aid measure to managing diarrhea at home. This is supported by the adoption of the skill-based health policy (SHP) geared towards “influencing health knowledge, attitude, values, beliefs, skills and behaviours” (FME, 2006). The SHP is a component of the School Health Policy implemented in Nigeria in 2006, further supporting the goal of the NFE which is to provide ‘functional literacy’ to its students. Functional literacy is hereby defined as an individual’s capacity to seek and utilize information or knowledge in a particular context (UNESCO, 2005; Nutbeam, 2000).

The promotion of women's literacy programmes has been a significant part of national educational endeavours in Nigeria (Samah & Ndaej, 2013). Policies that address women's education are derived and streamlined from various policy commitments - global, regional and national levels, cutting across various issues such as education and health e.g. Health for All; Sustainable Development and Empowerment, Economic Empowerment and Development Strategy (FME, 2006; Ukpore, 2009).

Dehydration is the most severe threat posed by diarrhea due to loss of micronutrients through liquid stools, vomit, sweat, urine and breathing (WHO, 2013) and lack of proper nutritional intake and absorption (WHO, 1993). Morbidity and mortality caused by severe dehydration are completely preventable and treatable using a simple and inexpensive solution of Oral Rehydration Salts which is taken orally or through intravenous drip (WHO, 2013, Lenters et al., 2013; UNICEF, 2012; Mengistie et al., 2012; WHO, 2006; CDC, 1992). Thus, administering ORS, which is simple to implement, is required immediately from the onset of diarrhea, starting from home (WHO, 2009). ORS therapy is recommended alongside continued feeding, with breast milk and other recommended home fluids (Ogbo, et al., 2014; WHO, 2009; Leung, et al., 2006).

More than a million child deaths that occurred in the 1990's could have been prevented by using ORT alone (UNICEF, 2012). But despite the importance and success of using ORT in home therapies of managing child diarrhea, currently, indications from various countries reveal a decline in knowledge on the appropriate use of ORT in home management of child diarrhea (UNICEF, 2012). In Nigeria, despite studies showing that mothers are aware of ORS, its use is not done exclusively but in conjunction with other therapies (Ene-Obong et al., 2000) such as antibiotics/drugs (Adabgada, et al., 2012; Ogbo et al., 2014; Uchendu et al., 2011; Asakitikpi, 2010 & Olawuyi et al.; 2004) and herbal/traditional medicine (Othero, 2008).

Oral rehydration therapy has become the cornerstone of treating diarrhea not only because of its effectiveness in rehydration but also in the effective maintenance of patients with moderate and severe dehydration (WHO/UNICEF, 2009; CDC, 1992). Women are the key recipients and end users of health education (Lee, Tsai, Tsai & Kuo, 2012) who have the power to make a positive impact in utilizing and disseminating it to the society at large. Their multiple contributions to the society are seen not only in their reproductive roles but in their productive roles. They are not only consumers but equally important providers of health care (WHO, 2009). Therefore, a woman's health literacy is a crucial factor in determining her ability to adopt proper health promotion and preventive behaviors both for herself and her children (Lee et al., 2012; Shieh & Halstead, 2009). Without adequate health knowledge it becomes difficult if not impossible for a woman to make a

positive health contribution towards the development of herself and her family. Therefore, to achieve this aim, maternal education is vital as it bears a significant impact on child wellbeing and survival (Ogbo et al., 2014).

Methodology

This study was conducted across all the 8 NFE secondary schools (women centers) in Kano State - City Women Center, Goron Dutse, Gwale, Fagge, Giginyu, Hotoro, Unguwa Uku and Gandun Albasa. Data were collected from 109 women from a base population of 335 students who have just completed the last part of Post Literacy (PL) (regarded as the final year of NFE primary school) where ORS forms part of their health education topics. Diarrhea was added as a variable due to its close connection with ORS and its appearance in the Health Education Curriculum section of 'Communicable diseases' and 'Personal Hygiene'.

Stratified sampling was used to select the PL section as the target population because the two variables studied here, Diarrhea and ORS, are taught to women in the final year of this level. Data were collected from these students who were just settling into the first year of secondary school. This was found appropriate to ensure that all students have fully completed the PL. In addition, an inclusion and exclusion criteria were added to avoid sampling error - inclusion of unrepresentative sample, otherwise termed a biased sample (Ary et al., 2010). This was necessitated due to the fact that a variety of diverse students join the continuing education secondary schools from heterogeneous educational backgrounds, settings, and states which can contaminate the sample.

Inclusion Criteria

- ✓ Students who completed any ANFE women centre in Kano
- ✓ Women who graduated from Post literacy in July 2014
- ✓ Married/divorced students
- ✓ Students with children below the age of five

Exclusion Criteria

- ✓ Students who did not complete the ANFE Post literacy in Kano State
- ✓ Women who graduated from Post Literacy before the year 2014
- ✓ Unmarried students
- ✓ Women who were married/divorced with children above the age of five.

A self-designed structured questionnaire, with three sections and a total of 48 close-ended items, was developed to gather demographic information, mother's knowledge and home preventing practices on Diarrhea/ORS. Each section had two parts answered using the response option 'Yes' and 'No' and

a five-point Likert scale ranging from “1-Strongly agree to 5 - Strongly disagree.

To establish the validity and reliability of the questionnaire, a pilot study was conducted at City Women Centre Kano State, using 30 students, which established the internal consistency using the Cronbach Alpha reliability coefficient as 0.915. This is in line with what Chua (2013) asserts, that a satisfactory Cronbach Alpha coefficient should be between 0.65-0.95. After the pilot study, some questions in the Hausa version of the questionnaire were amended for further clarity. Also, the wordings used to translate the Likert scale had to be changed because most of the students had never participated in any type of research and the few who have were used to the ‘Yes’ and ‘No’ type of response options.

To avoid measurement error relating to the characteristics of the students, who had low literacy and were unfamiliar with filling out questionnaires and using the Likert scale, an interview survey was resorted to. In an interview survey the researcher reads out the questions to the participants and records their responses (Creswell, 2012). Prior to filling out the questionnaires, students’ consent was asked for and guidelines on using the Likert scale were explained to them. Response options were written on the blackboard, for easy reference by the students, as the researcher read the questions to them. With the aid of two research assistants, the questionnaire was administered during the interview sessions, completed in batches of 3-5 students per session of 30 minutes each.

Permission was obtained from the Agency for Mass Education headquarters in Kano to carry out this research. Student confidentiality and anonymity was stressed as part of the ethical values of this research process. No names or personal information were taken from the students and, as a sign of appreciation, a token of pens was given to each student who participated in both the pilot study and main data collection phase.

Statistical Analysis

Data analysis was done using SPSS statistical package version 21. The analysis was done in two parts using both descriptive and inferential statistic according to the type of research questions. Respondent’s demographic characteristics such as age, marital status, the number of children below the age of five and reasons for joining the ANFE schools was first analysed and tabulated. Two sections with two questions on Diarrhea/ORS were analyzed using univariate analysis. These questions focused on finding out what the women have learned regarding Diarrhea/ORS and were summarized using simple descriptive statistics such as frequency, mean and standard deviation. After checking the data for normality using the histogram, (Vickers, 2005)

parametric statistic using Pearson correlation and linear regression were further applied.

Pearson correlation was used to measure the relationship between the dependent and the independent variables in the study. These are on questions five & six, which test the relationship between knowledge of Diarrhea/ORS (IV) and practices (DV), Knowledge of Diarrhea/ORS and teaching of health education (DV). Subsequently, a linear regression test, which is more advanced than Pearson in showing causal-and-effect relationship (Ary et al., 2010) was applied to measure the impact of the independent variables on the dependent variables on the same two questions. The interpretation of the mean scores was based on Salleh (2013) interpretation but in the reverse order, as the Likert scale used in this research reads from strongly agree-1 to Strongly Disagree-5 instead of from Strongly Agree-5 to Strongly Disagree-1, here also, the reverse of Salleh's ranking was used. Therefore, 0.00-0.99 is very high; 1.00-1.99 is High; 2.00-2.99 is Moderate; 3.00-3.99 is very Low and lastly, 4.00-5.00 is Very Low.

Results

A total of 109 women participated in the survey with a response rate of about 99.9%. Table 1 shows a summary of the respondent's characteristics.

Socio-Demographic Characteristics

Table 1. Women's Socio-Demographic Statistics (n-109)

	Frequency (n)	Percentages (%)
Age		
18-24	10	9.2
25-34	49	45.0
35-44	39	35.0
Over 45	11	10.1
Marital Status		
Married	88	80.7
Divorcee	4	3.7
Widow	17	15.6
Have children under the age of five		
Yes	88	80.7
No	21	19.3
Reasons for joining adult education		
To learn to read and write only	14	12.8
Because my friend is attending	Nil	Nil
To learn how to take care of my family better	3	2.8
To learn to read and write and to better ways to take care of my family	91	83.5
Number for each item may not add up to the total number of the study population due to missing values		

Approximately 69% of the women studying in the centre are within their childbearing years - 25-34 years (49%), 18-24 years (10%) and 35-44 years (10%). This is further reflected in the evidence of the women's marital status (88%) where all of the married women had children below the age of five years, a crucial age where children die of incidences of diarrhea. Most of the women (83.5%) have joined the ANFE centre with the dual motive of learning how to read and write in conjunction with learning better ways to take care of their families. Only a small number have joined with the sole motive of learning to read and write (12.8%) or only to learn better ways to take care of their families (2.8%).

Participants' Knowledge

A summary of women's knowledge of Diarrhea/ORS is presented in Table 2 and 3. Table 2 shows that women had a good general knowledge of Diarrhea/ORS (Mean = 1.08). The majority of women knew that proper management of diarrhea at home reduces the risk of suffering and death among children (95.4%), children under the age of five years are more prone to the dangers of diarrhea (90.8%) and that diarrhea is a communicable disease (81.7%).

Table 3 shows in-depth analysis of knowledge on Diarrhea/ORS - causes of diarrhea, signs of dehydration and ORS use. Cumulatively the women were found to have a high in-depth knowledge represented by an average mean of 1.47. Almost all the respondents knew that diarrhea can be caused by: eating with unclean hands (99.2%), feeding babies with dirty utensils (99%), eating unwashed fruits and vegetables (95.4%), uncooked foods (92.7%) and babies eating dirty toys/objects during teething (91.2%). But on responding to the question on whether not warming food thoroughly can cause diarrhea in children, about one-third of the respondents (33.9%) were "undecided", which signifies that they are not aware that this is another possible cause of diarrhea. The majority of women (96.3%) had a misconception on "teething" as a cause of diarrhea in children. Signs of a dehydrated child were clearly recognized by the women, as the majority of them were able to recognize the loss of skin elasticity (95.4%), sunken eyes (90.9%) and passage of dark colored urine (80.7%) as vital signs of dehydration.

The majority of the respondents were well informed regarding the benefit and use of ORS in management of child diarrhea at home because, 94.5% of respondents knew the function of ORS is to replace body fluids, 98.2% agree that ORS solution is no longer useful after 24hrs, therefore, should be discarded, 83.6% knew that a child suffering from diarrhea should be fed more liquid foods (83.6%) and 94.4% knew that a child having diarrhea coupled with vomiting should be fed ORS slowly.

Table 4 presents findings on mothers' First Aid provision of ORS in the home. Over two thirds of the respondents (77.1%) kept a packet of ORS at home for emergency purposes. The majority of the respondents (88.1%) use pre-mixed ORS and a considerable number of them (69.7%) also use home-prepared ORS. This signifies that the women alternate between the two methods with pre-packaged ORS being more frequent. About two-thirds of the respondents (64.0%) used cooled boiled water to mix the ORS while about one-third (34.9%) did not boil the water they used to prepare the ORS.

The findings reported in table 5 presents the findings on what type of water mothers used to prepare ORS, their initial response is in managing a child with diarrhea at home; and how they ensured their children are practising the necessary personal disease preventive measured through adequate hygiene practices both from the perspective of the child and that of the mother. On describing which type of water was utilized by the mothers to prepare ORS, sachet water (72%) (packaged in polythene bags popularly known as pure water in Nigeria) and bottled water (50.5%) remain the commonest water types used in preparing ORS solution. About one-third (31.6%) also reported using tap water and less than that percentage (23.9%) used water sold by street vendors.

Table 2. Women's General knowledge on Diarrhea/ORS use Variables

	Yes	No	No Response	Mean (SD)	IOM
Diarrhea is a communicable disease?	89 (81.7%)	18 (16.5%)	2 (1.8%)	1.15 (0.40)	High
Proper management of diarrhea at home reduces the risk of morbidity and mortality.	104 (95.4%)	5 (4.6%)	0 (0%)	1.05 (0.21)	High
Diarrhea is more dangerous in children under the age of five	99 (90.8)	7 (6.4%)	3 (2.8%)	1.04 (0.30)	High

Table 3. Women's In-depth knowledge on Diarrhea/ORS use Variables

	NR	SA	A	U	D	SA	M (SD)	IOM
Causes of Diarrhea								
Not warming cold food thoroughly before given a child can cause diarrhea in children	2 (1.8%)	68 (62.4%)	0 (0%)	37 (33.9%)	0 (0%)	2 (1.8%)	1.39 (0.71)	High
Given children half cooked food can cause diarrhea	1 (0.9%)	62 (56.9%)	39 (35.8%)	1 (0.9%)	1 (0.9%)	5 (4.6%)	1.58 (0.95)	High
Giving children unwashed fruits or vegetables can cause diarrhea	3 (2.8%)	63 (57.8%)	41 (37.6%)	1 (0.9%)	0 (0%)	1 (0.9%)	1.40 (0.65)	High
Eating with unclean hands causes diarrhea	1 (0.9%)	66 (60.6%)	42 (38.5%)	0 (0%)	0 (0%)	0 (0%)	1.38 (0.50)	High
Feeding baby with dirty utensils can cause diarrhea	1 (0.9%)	71 (65.1%)	37 (33.9%)	0 (0%)	0 (0%)	0 (0%)	1.33 (0.49)	High
Teething causes diarrhea in children	1 (0.9%)	76 (69.7%)	29 (26.6%)	1 (0.9%)	0 (0%)	2 (1.8%)	1.35 (0.70)	High
A baby eating its toys/other things during teething can develop diarrhea	1 (0.9%)	66 (60.6%)	33 (30.3%)	3 (2.8%)	0 (0%)	6 (5.5%)	1.57 (1.00)	High
Recognizing Signs of Dehydration								
Sunken eyes are signs of a dehydrated child	3 (2.8%)	66 (60.6%)	33 (30.3%)	5 (4.6%)	0 (0%)	2 (1.8%)	1.44 (0.79)	High
Skin inelasticity is a sign of a dehydrated child	1 (0.9%)	73 (67.0%)	31 (28.4%)	3 (2.8%)	1 (0.9%)	0 (0%)	1.36 (0.60)	High
Passage of dark coloured urine is a sign of dehydration	2 (1.8%)	58 (53.2%)	30 (27.55)	19 (17.4%)	0 (0%)	0 (0%)	1.61 (0.79)	High
ORS Use								
ORS/SSS is used for replacing lost body fluids	1 (0.9%)	63 (57.8%)	40 (36.7%)	4 (3.7%)	0 (0%)	1 (0.9%)	1.48 (0.68)	High
A child having diarrhea should be fed more liquid foods	1 (0.9%)	59 (54.1%)	32 (29.45)	7 (6.4%)	6 (5.5%)	4 (3.7%)	1.72 (1.06)	High
ORS should be fed to a vomiting child slowly	0 (0%)	60 (55.0%)	44 (40.4%)	3 (2.8%)	0 (0%)	2 (1.8%)	1.53 (0.73)	High
ORS solution should be discarded after 24 hours of preparation	1 (0.9%)	66 (60.6%)	41 (37.6%)	0 (0%)	1 (0.9%)	0 (0%)	1.39 (0.56)	High
Average Mean = 1.47								

Table 4. Mother's First Aid Practices

	Yes	No	No Response	M/ (SD)	IOM
For emergencies, I keep ORS pre-mixed pack at home	84 (77.1%)	21 (19.3%)	4 (3.7%)	1.16 (0.46)	High
I use home mixed SSS to treat my child's diarrhea	76 (69.7%)	32 (29.4%)	1 (0.9%)	1.28 (0.47)	High
I use pre-packed ORS to treat my child's diarrhea	96 (88.1%)	12 (11.0%)	1 (0.9%)	1.10 (0.332)	High
I use cooled, boiled water to mix ORS	70 (64.0%)	38 (34.9%)	1 (0.9%)	1.34 (0.49)	High

Table 5. Mothers Home Preventive Practices

	NR	SA	A	U	D	SA	M	IOM
To mix ORS, I use bottled water	3 (2.8%)	52 (47.7%)	3 (2.8%)	2 (1.8%)	20 (18.3%)	29 (26.6%)	2.65	Moderate
To mix ORS, I use pure water (sachet water)	6 (5.5%)	69 (63.3%)	10 (9.2%)	1 (0.9%)	13 (11.9%)	10 (9.2%)	1.78	High
To mix ORS, I use tap/well water	6 (5.5%)	28.4 (31%)	5 (4.6%)	1 (0.9%)	25 (22.9%)	41 (37.6%)	3.20	Low
To mix ORS, I use water sold by vendors	10 (9.2%)	23 (21.1%)	3 (2.8%)	2 (1.8%)	30 (27.5%)	41 (37.6%)	3.30	Low
My first response when my child has diarrhea is to start administering ORS	7 (6.4%)	59 (54.1%)	17 (15.6%)	1 (0.9%)	8 (7.3%)	17 (15.6%)	1.95	High
My first response when my child has diarrhea is to start administering herbal medicine	4 (3.7%)	20 (18.3%)	7 (6.4%)	1 (0.9%)	23 (21.1%)	54 (49.5%)	3.66	Low
My first response when my child has diarrhea is to give antibiotics	3 (2.8%)	47 (43.1%)	22 (20.2%)	0 (0%)	7 (6.4%)	30 (27.5%)	2.47	Moderate
To mix ORS, I use bottled water	3 (2.8%)	52 (47.7%)	3 (2.8%)	2 (1.8%)	20 (18.3%)	29 (26.6%)	2.65	Moderate
To mix ORS, I use pure water (sachet water)	6 (5.5%)	69 (63.3%)	10 (9.2%)	1 (0.9%)	13 (11.9%)	10 (9.2%)	1.78	High
To mix ORS, I use tap/well water	6 (5.5%)	28.4 (31%)	5 (4.6%)	1 (0.9%)	25 (22.9%)	41 (37.6%)	3.20	Low
To mix ORS, I use water sold by vendors	10 (9.2%)	23 (21.1%)	3 (2.8%)	2 (1.8%)	30 (27.5%)	41 (37.6%)	3.30	Low
My first response when my child has diarrhea is to start administering ORS	7 (6.4%)	59 (54.1%)	17 (15.6%)	1 (0.9%)	8 (7.3%)	17 (15.6%)	1.95	High
My first response when my child has diarrhea is to start administering herbal medicine	4 (3.7%)	20 (18.3%)	7 (6.4%)	1 (0.9%)	23 (21.1%)	54 (49.5%)	3.66	Low

Average Mean = 2.28

Table 6. Relationship between women's Diarrhea/ORS knowledge and home care practices

Variables	N	Pearson r	P value*
Knowledge of Diarrhea/ORS	109	.590	.000
Women's Preventive Practices on Diarrhea and use of ORS	109		

Table 7. Relationship between women's Diarrhea/ORS knowledge and home care practices (Linear Regression)

Variable	Unstandardized Coefficients	Std. Error	Standardized Beta	t value	Sig
Knowledge of Diarrhea/ORS	.855	.113	.590	7.557	.000
Variable	R	R Square	Adjusted R Sq.	F	Sig
Knowledge of Diarrhea/ORS	.590	.348	.342	57.106	.000

Table 8. Relationship between women’s knowledge of Diarrhea/ORS and teaching of Health Education

Variables	N	Pearson r	P value
Knowledge of Diarrhea/ORS	109	.009	.925
Teaching methods	109		

A variety of ways in which mothers usually respond to their children when suffering from diarrhea is also indicated in the study. The use of ORS was reported by the majority of mothers (69.7%) as their initial response followed by given children antibiotics (67.1%). About one-third (24.7%) still utilized herbal medicine, and more than half (57.8%) favoured taking their children to a local pharmacy, first. In totality, these findings indicate that women’s response to managing diarrhea in their homes was moderate (Average Mean = 2.28) due to the combination of multiple strategies. Through self-reports, the students also provided a glimpse into the type of hygiene training they gave their children at home which show that almost all the children wash their hands after toilet use (97.1%) and before eating (89.9%). The majority of mothers (91.7%) ensured warming food thoroughly and washing their fruits and vegetables (86.2%) before allowing their children to eat it.

Sources of Knowledge

In response to questions regarding ORS, the women center was the least mentioned (33.9%) as the majority of the women stated that they learned about ORS mainly through the media (81.6%), hospitals (75.2%) and printed materials (34.8%). Pearson correlation analysis between women’s knowledge on Diarrhea/ORS and teaching of health education in the women centre indicates a negligible relationship $r = .009$ ($p = .925$), hence statistically not significant. This further indicates an absence of a link between the women’s knowledge on Diarrhea/ORS and it’s the teaching as enshrined in the health education curriculum as designed by NMEC (NMEC & UNICEF, 2012). Also a simple linear regression analysis performed to predict women’s knowledge of Diarrhea/ORS (Dependent Variable) based on teaching of Diarrhea/ORS (Independent Variable) shows that teaching Diarrhea/ORS, does not successfully predict women’s knowledge of Diarrhea/ORS $\beta = .009$, $t = .095$, ($p > .05$).

Despite the teaching of Diarrhea/ORS does not account for a significant variance in women’s Diarrhea/ORS Knowledge $R^2 = .009$ $F = .009$, ($p = .925$), it nevertheless does not affect practice. Both analysis of the relationship between women’s knowledge of Diarrhea/ORS and home preventive practices against diarrhea and the correct use of ORS, using Pearson correlation ($r = .590$, ($p = 0.00$)) and Linear Regression $\beta = .590$, $t = 7.557$ ($p < .05$) were found to be statistically significant. Knowledge accounts for a significant variance in women’s Diarrhea/ORS practices $R^2 = .342$ $F = 57.106$, ($p < .05$).

Discussion

To the best of our knowledge, this study is the first to gather information on women's knowledge and practices regarding Diarrhea/ORS not only in Kano but also among students in non-formal education schools in the state. IJsselmuiden, et al. (2007) shedding light on health education in Africa, states that obtaining reliable information about public health education is difficult if not impossible. In Nigeria, studies that explore the relationship between health literacy and preventive health practices are at best scanty (Atulomoh & Atulomoh, 2012). In direct reference to the Skill-Based Health Education component of the School Health Policy programme, to date, there is no report on the assessment of the programme (Ademokun, et al., 2014). In addition to this, there is lack of any systematic standardized test put in place to examine the effectiveness of such health programme (Egbo, 2011; Adewale, 2009), further contributing to the paucity of information addressing women's health education, specifically in the NFE sector in Kano State further pushed the need for this study.

In this study, the majority of students, despite having only basic literacy skills, had very high knowledge of Diarrhea/ORS. Looking at the results, most women knew that managing diarrhea at home served as a focal point of reducing mortality and morbidity in children (95.4%). Managing childhood diarrhea at home is a simple method as long as mothers make the timely and correct response by early use of ORS, together with proper feeding, limits the need for hospitalization (Ciccarrelli, et al., 2013). A similar study among women in two large markets in Ibadan, Nigeria (Omokhodion et al., 1998) supports this finding. Thus, for the women to have a good perception of the crucial role ORS plays in managing childhood diarrhea in their homes before attempting to go to the hospital is the right step forward in home management of childhood diarrhea (Othero, et al., 2008).

Women also had in-depth knowledge concerning other aspects of diarrhea and ORS, including causes of diarrhea such as feeding babies with unclean hands or with dirty utensils and eating unwashed fruits and vegetables; signs of dehydration – sunken eyes, loss of skin elasticity and passage of dark colored urine. On the correct use of ORS, evidence shows that majority of the women had very high knowledge as they knew that the ORS solution should be discarded after 24 hours, the function of ORS in replacing lost fluids and how to feed a child having diarrhea and experiencing vomiting with ORS. These findings go contrary to the findings in Morang, a rural community in Nepal (Ansari et al, 2012), Gambia (Saha et al., 2013), in Bhopal, India (Mahor, 2013) and in Enugu, Nigeria (Adimora et al., 2011). In these studies, mothers were found to have poor knowledge on both diarrhea and their approaches to managing it by using ORS in their homes.

However, despite women's knowledge of Diarrhea and ORS, some discrepancies exist, for example, on the causes of diarrhea, about one-third of them did not know that eating leftover foods that have not been thoroughly warmed can cause food poisoning which leads to diarrhea. Likewise, women had a misconception that teething is a cause of diarrhea.

Separate studies in Ethiopia (Mengistie et al., 2012) and Nigeria (Ene-Obong, et. al., 2000), showed that parental false belief in teething as a cause of diarrhea interferes with the timely use of ORS and proper diagnosis and management of other preventable and treatable diseases which share similar symptoms as those perceived to cause diarrhea in children, by mothers or caretakers (Adimora et al., 2011).

Teething is a normal physiological process of child growth and development. However, in many parts of the world there are many misconceptions and myths surrounding teething seen as a cause of health problems in young children leading to practices detrimental to children (Aliyu et al., 2015; Awadkamil, 2012). Studies in northern regions of Nigeria (Aliyu et al., 2015) and in Khartoum, Sudan (Awadkamil, 2012) indicate that symptoms such as diarrhea, fever, loss of appetite, drooling of saliva and vomiting are attributed to teething. In line with this is another study in Enugu, Nigeria which showed that fever (71.1%), watery stools (58.3%) and vomiting (35%) were the two most important symptoms associated with teething among nursing mothers. It is common practice among teething children to play with anything within their reach, inserting it in their mouths, possibly contributing to diarrhea as the child's immune system is not fully developed to ward off certain infections (Adullahi, 2010).

Regarding practices in preventing diarrhea and administering ORS at home, one of the important steps to initial response is by making ORS available at home for emergency purposes. This study showed that the majority of women are in the habit of keeping ORS as a first aid supply for emergency situations. This may be linked to the fact that most of the women surveyed are married, within their childbearing years i.e. 24 - 44yrs, and have children below the age of five. Pre-packaged ORS was the most dominant type of rehydration salts used by the women. However, a study in Kersa, Eastern Ethiopia, discovered that the possession of ORS at home by most mothers did not prompt them to use it (Mengistie, et al., 2012).

Water used for mixing the ORS came from different sources with the most being sachet water (72%) and bottled water (50.5%) alongside with other combinations, alternating between sachet water, tap water and/or water sold by vendors. The insufficiency of safe (Edema, et al., 2011) pipe-borne water supply in Nigeria has resulted in people depending on such sources of water

for their existence (Omalu, et al., 2010). In the light of these findings, what is of concern is that even though two-thirds of the mothers reported boiling water before they use it to mix ORS, a significant number (34.9%) did not boil their water. This is worrying considering a majority of them used sachet water which in Nigeria is mostly produced under various unhygienic conditions which do not comply to the standards set by WHO and NAFDAC (Omalu, et al., 2010) thereby making the water seriously unfit for human consumption (Edema et al., 2011). In recent years, Sachet water has become the major source of drinking water in many low and middle-income countries (Fisher et al., 2015), including Nigeria (Edema et al., 2011; Omalu, et al., 2010). In Nigeria, sachet water becomes contaminated from various sources such as production under unhygienic conditions, using untreated water, illegal production in unapproved premises (Antia et al., 2003), vendors' unhygienic practices and polluted environments (Omalu, et al., 2010). Sachet water in Nigeria has been found to include various contaminants of bacteria including: Salmonella and Escherichia coli (Edema, et al., 2011), Pseudomonas sp., Streptococcus sp., Bacillus sp., Klebsiella, oocysts of Cryptosporidia sp.; the main causal agents of typhoid and water-borne diseases (Omalu, et al., 2010). Hence, feeding a child with contaminated ORS water can only be counterproductive as it only worsens diarrhea (Antia, et al., 2003).

A laboratory analysis performed on Salt Sugar Solution (SSS) prepared by mothers attending a primary health care centre in Maiduguri, Nigeria showed the presence of E. Coli and S. Faecalis indicating a contamination with faeces which can also be found in water (Antia et al., 2003). In agreement to these findings, Edema et al., (2001) in a study on quality of commercial sachet water in South-western Nigeria, found that 87% was contaminated with Salmonella and/or Escherichia coli with a Salmonella count of between 2.12×10^1 and 2.20×10^1 , a mean value higher than the international recommended guidelines for safe drinking water. Vendors' practices in storage, transportation, and handling as being another source of contamination in sachet water has also been reported in a study by Egwari, et al. (2005). Their findings on sachet water hawked on the street of Lagos indicated that despite the water in itself being free of contamination, wastewater and surfaces of the sachets were greatly contaminated with Enteric pathogens and E. coli, resulting from the practices of vendors and customers. In agreement with these findings, Dada (2009) adds that even bottled water, often considered as a safer alternative, may also carry many risks, posing a public health concern. His analysis of both bottled and sachet water in Nsukka, show that the water meets the physical and chemical requirement by WHO and NAFDAC but still about 88% contained hidden microbiological contents that carry a huge public health risk.

Henceforth, it is very important to use clean, safe drinking water for mixing ORS because contaminated water in itself is a major cause of diarrhea in

children. Ninety percent (90%) of children who die from diarrhea is caused by contaminated water, poor hygiene and sanitation (UNICEF, 2013c). At the home level, WHO recommends boiling as an inexpensive and quick way of treating water to ensure its safety (WHO/UNICEF, 2009; Daniels, 1999). Thus, women should be taught the proper method of boiling water to ensure it is free from all contaminants and safe to use in mixing ORS. There is a strong need to emphasise and address the importance of using clean water to mix ORS in teaching women about the preparation of ORS.

Another significant finding of this study is that mothers were not consistent in their initial response to managing child diarrhea at home by using ORS alone. This indicates that women were not using the correct method of treating initial bouts of diarrhea at home by using ORS first and alone. Another possibility is that they might start off with ORS but continue to use other combination of antibiotics, herbal medicines at various stages of the disease concomitantly with ORS. Whichever the case may be indicated, a lack of adherence to the correct initial response technique was detected, as about two-third reported using ORS (69.7%) and antibiotics (67.1%), pharmacy visits (57.8%) and about one-fourth used herbal medicines (24.7%). This act of combining various therapies has been observed in both Kenya (Othero, 2008) and Nigeria (Ene-Obong et al., 2000). Mothers choose to combine both modern and traditional medicine in order to derive maximum therapeutic advantage (Othero, 2008) thereby increasing the chances of harming a patient (Ene-Obong et al., 2000). The combination of different therapies springs from mothers' beliefs which influence their decision to use ORS (Asakitikpi; 2010).

Some studies found that even where mothers knew the benefits of ORS in replacing lost fluids, they were not keen on using it because they believed it was not useful in stopping diarrhea (Asakitikpi; 2010), had an unfriendly taste and is poorly tolerated by children (Abdinia, 2014; Rasania, et al., 2005). The risk of this harmful practice is further aggravated by the actions of health professionals who prescribe drugs without adequate testing to ensure what type of diarrhea it is (Ogbo, et al., 2014, Seyal & Hanif, 2009) as different pathogen-causing diarrhea require different treatment approaches (Rehydration Project, 2014). Moreover, this culture of prescribing antibiotics by doctors and health professionals has misguided mothers' correct practice of treating diarrhea in Northwestern, Iran (85%) (Abdinia, 2014) in Lahore, Pakistan (42.2%) (Seyal & Hanif, 2009) and in Enugu, Nigeria (80%) (Uchendu, et al., 2011), where women cling to the use of antibiotics with the belief that it is effective in managing pediatric diarrhea. A research in Lagos on pharmacist management of acute diarrhea indicated that despite knowing the appropriate WHO guidelines for managing diarrhea, the majority of the pharmacists (85%) did an inaccurate assessment of acute diarrhea and there were greater prescriptions for antibiotics, adsorbents, antimicrobials and antispasmodics than of ORT (Ogbo, et al., 2014).

Antibiotics are not essentially part of the interventions needed in managing acute diarrhea due to their limited usefulness (CDC, 1992), except in severe cases (Adabgada, et al., 2012) like dysentery and cholera (Seyal & Hanif, 2009). Clinical, epidemiological and laboratory tests (CDC, 1992) have to be obtained before prescriptions are made because of the growing concern that the misuse and abuse of antibiotics is leading to antibacterial-strain resistance (Ciccarrelli, et al., 2013). Adabgada, et al. (2012) highlights that this is a serious situation in developing countries where people obtain these drugs easily outside the health centres, in the absence of proper authorization and monitoring, and administer them in incomplete doses and within an insufficient timeframe. CDC (1992) warns that emphasis on antidiarrheal drugs shifts away focus from using ORS and appropriate nutrition in the home management of pediatric diarrhea, also adding to the unnecessary burden of medical bills. Correct use of home treatment, first aid or initial response using ORS cannot be overemphasized as it is the epic centre of reducing diarrheal morbidity and mortality (CDC, 1992). Therefore, it is pertinent for mothers to get it right from the word go on initial response to managing diarrhea at home.

On the part of ensuring proper hygiene training in the family, it is encouraging to note that the respondents took the issue of hand washing seriously and the majority ensured that their children washed their hands before meals (89.9%) and after using the toilet (97.1%). Bearing in mind that fecal-oral route is another major route of transmitting diarrhea (CDC, 2014; Black, 1997), this is very important as hand washing is a key intervention strategy effective in minimizing the transmission of diarrhea (Talaat et al., 2011) and other gastrointestinal diseases (Aiello, et al., 2008). Hand washing alone, even with simple non-antibacterial soaps (Aiello, et al., 2008) reduces the incidence of diarrhea by about 50% (CDC, 2013). Teaching children early hand washing habits is an important aspect of mother's responsibility in ensuring children are brought up with the proper hygiene training that will last a lifetime thereby reducing the risk of transmission and spread of diseases leading to mortality and morbidity in communities. This is the ultimate goal of health promotion and is facilitated through the teaching of health education in schools. Mothers also adhered to other practices of warming food and washing raw fruits and vegetables before allowing their children to consume them only a slight percentage did not find this to be necessary with those not bothering to wash fruits exceeding those not caring to warm food thoroughly. Both factors are equally important in preventing diarrhea, but the issue of lack of proper washing of fruits and vegetables before direct consumption has attracted the attention of researchers because it is a leading source of cholera which poses a serious risk to public health (Abakpa et al., 2013; Adagbada et al., 2012). In Kano state, which is plagued by seasonal outbreaks of cholera (WHO, 2012) incidences of cholera have

been associated with the consumption of contaminated food and water (Adagbada et al., 2012).

An account by Abakpa et al. (2013) provides an overview of the commercial irrigation system practiced by farmers in Kano state. He mentions that Kano, famously known for farming, has a strong practice of irrigation farming. Farmers engage in the production of perishable vegetables such as lettuce, tomatoes, onions, cabbage, carrot, green pepper peas, garden egg etc. The major sources of irrigation water utilized in crop production include streams, rivers, wells, untreated water from urban drainage systems and wastewater from industries such as tanneries and textiles further coming into contact with domestic and human waste. All these sources are known to contaminate water used for producing foods and seafood (Adagbada et al., 2012). Abakpa et al. (2013) study on five irrigation farms in Kano shows the water used to grow the vegetables, coming from different sources, was neither suitable for human consumption nor for irrigation without prior treatment. Vegetables harvested from these plants were found to be highly contaminated with microbes exceeding the microbiological limits. Therefore, a strong recommendation put forward was a strong emphasis for the public to ensure that all vegetables are properly cleaned and disinfected prior to consumption. During the investigation, though students were only asked whether they ensured fruits and vegetables were cleaned properly before allowing their children to eat them, a number of women provided additional insight into the method they used to wash their food and vegetables, either by using salt and water or vinegar and water solution. Thus, upon the recommendation of Abakpa et al (2013) on ensuring the cleanliness of fruits and vegetables before consumption shows the need for the appropriate method of achieving this to be included it in the women's health education curriculum.

Regarding the relationship between mothers' knowledge of Diarrhea/ORS and its teaching in the women centre, the relationship was negligible ($r = .009$, $p = .925$). Even though diarrhea is implicitly treated in the NFE health education curriculum under the section of 'Communicable diseases' and 'Personal Hygiene', only direct questions on the relationship between ORS and teaching were asked because it is explicit in the curriculum under the First Aid section. Over half of the respondents said they were not taught anything on ORS. Nevertheless, despite the relationship being statistically insignificant, the presence of a relationship shows there could be room for improvement. Also, upon looking at the result of the linear regression further indicating that even though women's knowledge on Diarrhea/ORS is high, the teaching of health education in NFE is not responsible for this knowledge ($r = -.009$) as over half of them (58.7%) said they were not taught this topic. Women gained knowledge about ORS and diarrhea through the media and hospitals as their main sources of information. It is common for women who regularly listen to radio programmes to gain adequate information about ORS

and its proper use in the home management of pediatric diarrhea (Rasania, et al., 2005). Ghasemi, et al. (2013) has also confirmed the role of media in educating mothers on ORS in a study conducted in Kashan, Iran. Hospitals, health care workers, on the other hand are also important sources as majority of the students who have young children below the age of five and are still within their childbearing years (88% respectively). Similar accounts by Mahor (2013) show that in Bhopal, India many of the mothers obtained their information about ORS from the advice of health-care providers.

Of all these methods of information, teaching in NFE schools can be regarded as the best because it has other advantages that cannot be accomplished by other methods. For example, even though health workers and hospitals are good sources of information about diseases, educational intervention programmes delivered in hospitals have not been found to be effective (Ghasemi et al., 2013). This is probably due to the limited time and other responsibilities that the health workers, who are responsible for delivering the health talks, have to attend to (Mohammed, 2007).

A critique of learning through the media is that media learning is regarded as informal learning (Okedara cited in Usman, 2009) which has limitations in e.g. direct face-to-face learning. Unlike in a school or classroom setting where there could be lengthy discussions between the learner and facilitator on questions or misconceptions that require further clarity. Even though media programmes have call-in-sessions, time may not be enough to attend to questions from a holistic dimension which is required to solve the problem. This is essential because health is intertwined with other social and economic aspects that determine health which need to be addressed as well. The essence of face-to-face learning is recognized and forms a crucial part of the "Literacy by Radio" (another program under the NFE initiatives) project implemented in Nigeria where students after listening to the radio programmes are expected to meet up with the facilitator in class once a week in order to discuss the progress of the teaching and learning (Borode, 2011).

Conclusion

A woman's health behaviour has an immediate impact on the health of her family (Lee et al, 2012). Improvements in child survival are seen as a direct consequence of female education no matter the initial circumstance, cultural, socio-economical or public services; and even if the quality of schooling experience was unsatisfactory (Levine and Rowe, cited in Martin, Molina & Fernandez, 2015). Therefore, a woman's health literacy is a crucial factor is determining her ability to adopt proper health promotion and preventive behaviours both for herself and her children (Lee et al., 2012; Shieh & Halstead, 2009; Smith, 1997). Without adequate health knowledge it becomes difficult, if not impossible, for a woman to make a positive health

contribution towards the development of herself and her family. Thus, the promotion of women's literacy programmes has been a significant part of national educational endeavors in Nigeria (Samah & Ndaej, 2013).

Education stands as the basis for the full promotion of women (Samah & Ndaej, 2013). Literacy education opens the doors for women to become decision-makers about themselves, their families and the community, thereby contributing to national development (Samah & Ndaej, 2013). Schools worldwide are the main instruments used in harmonizing and achieving the goals of the public health sector (St Leger, 2001) as they possess the capacity to reach out to the wider population (Moronkola, 2012; Naidoo & Wills 2000). Through their commitment, they can enable individuals to acquire knowledge and skills enabling them to participate fully in shaping the policies and practices that have an impact on their health (St Leger, 2001). Based on the study findings, women have high knowledge on Diarrhea/ORS but their disease preventive practices were found to be moderate. The expectation was that this knowledge was learned from the health education taught in the NFE schools. However, in reality learning came from other sources, most prominently the media and hospitals. The fact that the health education curriculum contained these topics but did not correlate with students' responses on receiving classroom instruction in these areas raises some alarm. Because the success of health promotion as the broader framework of improving health in the society depends on the school, through successful teaching and learning of health education, the results obtained in this study were not encouraging.

Results obtained here suggest that the teachers/schools are not contributing as much as they are required to in relation to the goals of the Skill-Based Health Education aimed at "influencing health knowledge, attitude, values, beliefs, skills and behaviors" (FME, 2006), aimed at fighting diseases based on many international policies such as MDG's, HFA, UBE, and EFA. Therefore, for the teaching of health education to be effective, the government has to strengthen its monitoring and evaluation of teaching and learning practices in adult and non-formal schools in Kano state. Other possible areas to look into include the issue of poor funding which has been highlighted across vast literature as a serious problem that hinders the successful implementation of programmes in NFE schools.

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