






Research



Childhood diarrhoea: a cross-sectional survey on maternal knowledge, hygienic practices and use of oral zinc for home management in a Nigerian community

 Ifeoma Peace Okafor,  Olufunsho Tope Akinyemi,  Barine Nene Wika-Kobani,  Tope Olubodun,  Ugochukwu Timothy Eze

Corresponding author: Ifeoma Peace Okafor, Department of Community Health and Primary Care, College of Medicine, University of Lagos, PMB 12003 Lagos, Lagos, Nigeria. ipokafor@cmul.edu.ng

Received: 16 Feb 2022 - **Accepted:** 19 May 2022 - **Published:** 15 Jun 2022

Keywords: Childhood diarrhoea, oral zinc, knowledge, practice, home management, oral rehydration solution, Nigeria

Copyright: Ifeoma Peace Okafor et al. Pan African Medical Journal (ISSN: 1937-8688). This is an Open Access article distributed under the terms of the Creative Commons Attribution International 4.0 License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article: Ifeoma Peace Okafor et al. Childhood diarrhoea: a cross-sectional survey on maternal knowledge, hygienic practices and use of oral zinc for home management in a Nigerian Community. Pan African Medical Journal. 2022;42(123). 10.11604/pamj.2022.42.123.33829

Available online at: <https://www.panafrican-med-journal.com//content/article/42/123/full>

Childhood diarrhoea: a cross-sectional survey on maternal knowledge, hygienic practices and use of oral zinc for home management in a Nigerian community

Ifeoma Peace Okafor^{1,&}, Olufunsho Tope Akinyemi¹, Barine Nene Wika-Kobani², Tope Olubodun², Ugochukwu Timothy Eze²

¹Department of Community Health and Primary Care, College of Medicine, University of Lagos, PMB

12003 Lagos, Lagos, Nigeria, ²Department of Community Health, Lagos University Teaching Hospital, Lagos, Nigeria

&Corresponding author

Ifeoma Peace Okafor, Department of Community Health and Primary Care, College of Medicine, University of Lagos, PMB 12003 Lagos, Lagos, Nigeria

Abstract

Introduction: diarrhoea is the second leading cause of morbidity and mortality in young children. The aim was to assess maternal knowledge, hygienic practices and home management (HM) of diarrhoea with oral rehydration therapy (ORT) and oral Zinc in children aged 6-23 months in western Nigeria. Predictors of good knowledge and practice were also assessed. **Methods:** this was a community based analytic cross-sectional study. Multistage sampling was used to select mothers of children 6-23 months of age. Data were collected using pre-tested, interviewer administered questionnaires and analyzed using SPSS version 20. Bivariate analysis and multiple logistic regression for predictor variables were done. Level of significance was set at 0.05. **Results:** three hundred and seventy one (371) respondents were interviewed (mean age 30.4 ± 5.02 years). 305 (82.2%) had good knowledge of diarrhoeal diseases, 208 (56.1%) had good knowledge of home management of childhood diarrhoea, 274 (73.9%) had good maternal hygienic practices and 161 (61.2%) of the 263 mothers who had managed diarrhoea in their children, had good practice. Only 34 (12.9%) of them used Zinc tablets and 11 (32.4%) did not complete the full course. Maternal age 30-39 years predicted good knowledge (AOR 3.19 CI 2-6.05). Predictors of good home management practices were: maternal age 30-39 years (AOR 2.78 CI 1.44-5.37), >40 years (AOR 5.55 CI 1.54-20.01) and younger age of the index child, 6-11 months (AOR 4.83 CI 2.29-10.18). **Conclusion:** mothers had poor knowledge of the role of Zinc supplementation in childhood diarrhoea and use of Zinc tablets for diarrhoea was very low. Community based health education should be carried out.

Introduction

Diarrhoea is one of the childhood preventable and treatable diseases. It is one of the leading causes of death among children less than five years. Nearly one in five child deaths is due to diarrhea [1]. A risk factor for diarrhoea diseases is the hygiene practice

of mother/ care givers because hygienic practices play an important role in the prevention of infectious diseases. Most transmissions occur in domestic domain which is the child's principal habitat thus changes in hygienic behaviours can prevent diarrhoeal diseases [2].

Oral rehydration therapy was introduced in 1975 and it has reduced mortality from diarrhoea significantly [3]. Oral rehydration solution (ORS) is a mode of treatment which is cheap, acceptable, affordable, safe and can be used in any environment [3]. It has been the cornerstone of management of diarrhea in order to prevent diarrhea-related morbidity and mortality in developing countries but there has been little progress towards this trend in the last decade [3]. Since this treatment can be successfully applied at home, it is important that mothers should have the knowledge of uses and preparation at home [3]. Zinc supplementation could help reduce the duration and the severity of diarrhea [4,5] and therefore has an additional benefit over ORS in reducing child mortality [4]. Zinc deficiency is also prevalent among young children in developing countries that have a poor diet and high exposure to gastrointestinal parasites. It is associated with a dysfunctional immune system, growth retardation, and a high risk of morbidities, such as diarrhoea and acute respiratory infections and, subsequently, is responsible for 14% of diarrhoeal deaths among children between 6 months and 5 years of age in Latin America, Africa, and Asia [6]. Zinc supplementation during acute diarrhoea is currently recommended by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). It could help reduce the duration and the severity of diarrhea [7].

Every year, millions of diarrhea cases progress to severe episodes or death, a high proportion of which occurs in the first two years of life and declines as the child gets older [1,8]. Diarrhoea is more prevalent in developing world largely due to lack of safe drinking water, sanitation and hygiene, as well as poorer overall health and nutritional factors [1]. About 90% of diarrhoeal deaths

worldwide are attributed to unsafe water, inadequate sanitation and poor hygiene [9]. In Nigeria, diarrhoea prevalence rate is 18.8% and is one of the worst in sub-Saharan Africa and above the average of 16%. Annually, it accounts for over 16% of child deaths and an estimated 150,000 deaths mainly amongst children under five years [10]. The year 2015 was a target year for achievement of some global health resolutions and commitments yet the set goals were not met. Goal 4 of Millennium Development Goals was to reduce child mortality and target 4 A was to reduce child mortality by two-thirds between 1990 and 2015 [11]. The global health community called out diarrhoea control as critical to achieving Millennium Development Goal 4 (MDG 4) since diarrhoea is the second leading cause of death in under-fives [11]. However, this goal was not met even as the Sustainable Millennium Goals took off in 2015. One of the targets of the Sustainable Development Goal 3 (SDG 3) is to reduce the under-5 mortality to at least as low as 25 per 1,000 live births [7]. Nigeria still has a long way to go. Under 5 mortality rate was 128 deaths per 1000 live birth in the 2013 NDHS though it dropped significantly from 201 deaths per 1000 live births recorded in 2003 and further to 109 by 2015 [11], but we did not achieve two-third reduction of under 5 mortality of MDG 4 which was 64 deaths per thousand [11] and are yet to achieve under 5 mortality of 25 per 1,000 livebirths of the SDG 3. As a leading cause of death in under-fives, diarrhoea control is critical to achieving SDG 3 [7]. A number of studies have documented the existence of relationship between certain behavioural practices at the family level and increased incidence of diarrhoea among children thus primary prevention of diarrhoea through hygiene intervention. This is based on reducing faeco-oral transmission of pathogens and includes improved sanitation and hygiene education. Behavioural factors are important in determining the uptake and sustainable adoption of sanitation and hygienic practices. While water, sanitation and hygiene interventions are potentially highly efficient, their effectiveness in part depend on behavioural change and context [12].

In areas where the prevalence of Zinc deficiency or the prevalence of malnutrition is high, Zinc may be of benefit in children aged six months or more. In children older than six months, Zinc supplementation may shorten the average duration of diarrhoea by around half a day and probably reduces the number of children whose diarrhoea persists until day seven. In children with signs of malnutrition the effect appears greater, reducing the duration of diarrhoea by around a day [7]. Despite the establishment that ORS is the primary reason for the substantial reduction in morbidity and mortality from diarrhoea in children in developing countries, the use of ORS has lagged for many reasons. Often time the role, benefits and method of preparation of ORS are not emphasized by health workers thus mothers do not know the right method of preparation ORS and do not understand the need to give ORS to the child [12]. This study set out to assess maternal knowledge of diarrhoea and its management, their hygienic practices, Zinc supplementation in home management of diarrhoea in children aged 6-23 months and predictors of good knowledge and practice in Southwest Nigeria.

Methods

Study design and setting: this was a community based analytic cross-sectional study conducted from May to October 2014. This study was conducted in Osodi-Isolo Local Government Area (LGA) in Lagos State, Southwest Nigeria. It is further divided into two Local Council Development Areas (LCDAs) namely Isolo and Ejigbo. It is a densely populated area with a mix of high and low socio-economic strata. Isolo LCDA has seven wards. Major source of water supply is bore hole and well. Open dumping, burning and controlled tipping are the methods of refuse disposal. There are seven Primary Health Centres and a General hospital in Isolo. Women and children form a considerable portion of the population.

Study population and eligibility criteria: study population comprised mothers of young children in the study area. Only mothers whose last child was

between 6-23 months of age and who had been resident in the study area were included in the study. Mothers who could not respond to questions appropriately due to illness or temporary visitors were excluded.

Sample size calculation: a minimum sample size was calculated using the Cochran formula for descriptive studies

$$N = \frac{Z^2pd}{d^2}$$

Where Z is the standard normal deviate at 95% confidence level (1.96), 'p' represents the proportion of mothers who used SSS at home 31% [13], 'q' is 1-p and 'd' is the acceptable margin of error (5%). This gave a minimum sample size of 330. Ten percent was added to make up for non-response and incomplete questionnaires and then rounded up to 370 (371 questionnaires administered).

Sampling methodology: multistage probability sampling was used to select the respondents who participated in the study. At each stage, simple random sampling technique was employed. First, three wards were selected out of the seven wards, each having about 70 streets. The total sample size was allocated equally to the three selected wards (approximately 124 respondents each). This was followed by the initial selection of a street from each ward from the current list of streets obtained from the LGA. Next was selection of the houses. The total number of houses on each selected street was assessed on the field. The starting point was determined by simple random sampling, and then moved in consecutively higher numbers. The final stage was the selection of eligible respondents from the houses. Only one mother meeting the inclusion criteria was selected from each house. If there were more than one, only one was selected by simple random sampling (balloting) and interviewed. As the interview of respondents progressed, houses on the selected street got exhausted, and subsequently, more streets were selected by simple random sampling. This process

continued until the desired sample size was achieved.

Data collection instrument: data collection was done with the aid of structured, interviewer-administered, questionnaires considered suitable by face validation done by Community Health Physicians. The questionnaire sought information on the respondents' sociodemographic characteristics, household water supply and sanitation and details of the index child. Other questions were on knowledge of diarrhoeal diseases in general and prevention in children, knowledge of home management of diarrhoea including the role of ORS and Zinc. Lastly, respondents were interviewed on their hygienic practices and their management practices including the use of ORT and Zinc with regards to the last diarrhoeal episode in the index child.

Variables

Independent variables include respondents' socio demographic and economic characteristics such as age, marital status, educational level, employment status and number of children. Others include household variables such as size, water supply and sanitation, and details of the index child, like age (in months) and sex. Primary dependent variables include those on knowledge of diarrhoeal diseases in general and prevention in children, knowledge of home management of diarrhoea including the role of ORS and oral Zinc. Some of these variables on knowledge are: "What is the meaning of diarrhoea?", "What are the causes of diarrhoea?", "What is the major complication of diarrhoea?", "How can childhood diarrhoea be prevented?", "What can be used/done in the home management of childhood diarrhoea?", "How is salt sugar solution (SSS) prepared?", "How is ORS reconstituted?", and "What are the roles of SSS/ORS and Zinc supplementation in the management of childhood diarrhoea?".

Other dependent variables include those on maternal hygienic practices and their management practices including the use of ORT and Zinc with

regards to the last diarrhoeal episode in the index child. Some examples are: “How often do you wash your hands with soap and water before feeding the child?”, “How often do you wash your hands with soap and water after use of toilet?”, “How do you dispose your child’s faeces?”, “What do you use to feed your child?”, “Where do you prepare your child’s food?”, “What is the source of your child’s drinking water?” among others. Dependent variables on diarrhoea management practices include: “What method(s) did you use in treating your child at home during the last episode of diarrhoea?”, “If you used Zinc tablets, did you complete the course of treatment?”, “If No, why did you stop?”.

Secondary dependent variables on respondents’ overall knowledge and practice were generated from aggregating scores from the primary variables and then graded. Overall knowledge of diarrhoea and home management was assessed in the following domains: knowledge of diarrhoeal diseases, knowledge of home management of diarrhoea, knowledge of role of oral rehydration and knowledge of role of Zinc supplementation in diarrhoea management. Each correct response was assigned one point, otherwise zero. Scores were converted to percentage and graded as poor if < 50% and good if $\geq 50\%$ [14]. Maternal hygienic practices were assessed based on their frequency of hand washing and other hygienic behaviour. The domains of behaviour covered were: disposal of human faeces, use and protection of water sources, water and personal hygiene, food hygiene, and domestic and environmental hygiene. Mothers were questioned on their practices of hand washing before feeding, after changing soiled clothing, after defaecation, among others. Responses of ‘always’ attract one point, otherwise zero. Other hygienic practices reported attracts one point each, otherwise, zero. A composite score was obtained, and 50% cut-off was used in grading into good or poor hygienic practices. Overall practice of home management was assessed using recommended practices namely: use of appropriate oral rehydration therapy, continued feeding,

appropriate breastfeeding practices and Zinc supplementation [15].

Quality assurance: three interviewers were recruited and received a one-day training on the objectives of the study, contents of the questionnaire, study process, study tool administration and ethical considerations. The training helped to minimize intra/inter-observer bias. The questionnaires were pre-tested in another LGA among a similar group of women and only slight adjustments were required.

Data analysis: data were processed and analyzed using Statistical Package for Social Sciences (SPSS) version 20.0. All questionnaires which were completely filled were analyzed (371). Quantitative data were summarized with mean, median and range and categorical variables with proportions. Chi-square tests were done and then variables were entered into a multiple logistic regression model, to ascertain predictor variables for good knowledge and practice. Level of significance was 5% (two-tailed $P \leq 0.05$).

Ethical consideration: ethical approval (ADM/DCS/HREC/APP/1971) was obtained from the Health Research Ethics Committee (HREC) of the Lagos University Teaching Hospital. Written informed consent was obtained from respondents prior to administration of questionnaires. Confidentiality was maintained throughout the study.

Results

Socio-demographic characteristics: a total of 371 mothers participated in the study; all were valid for analysis giving a response rate of 100%. Majority 184 (49.6%) were between 30 and 39 years, mean age \pm SD of the mothers was 30.41 ± 5.02 , 344 (92.7%) were married/cohabiting. Most 360 (97.0%) of the mothers had at least primary school education, and almost one-quarter were unemployed (Table 1).

Knowledge of diarrhoea: two hundred and sixty-six (60.9%) of the respondents correctly defined diarrhoea as passage of watery stool more than 3 episodes per day while 136 (36.7%) gave incorrect definition. Concerning the causes, 340 (91.6%) knew that diarrhoea can be caused by contaminated food and water while 192 (51.8%) wrongly attributed it to teething. Majority 209 (56.3%) of the mothers knew dehydration as the main complication of diarrhoea. Three hundred and forty-four (92.7%) were aware of ORS use in home management, 257 (69.3%) knew about SSS and 142 (38.3%) knew they should continue breastfeeding and giving other meals during diarrhoea episodes (Table 2).

The major source of information on preparation of ORS/SSS was health worker (76.8%). Majority 310 (83.6%) knew how to re-constitute ORS while 241 (65.0%) knew how to prepare SSS. About two-thirds 249 (67.1%) of the respondents knew the correct role of ORS/SSS in the management of childhood diarrhoea. About 50% of the mothers did not know the role of Zinc in diarrhoea management, 22.6% knew that it reduces severity of diarrhoea, 19.1% know that it reduces the duration of diarrhoea and its role in preventing further occurrences in the ensuing 2-3 months was known by only 9.4% of the mothers (Table 3). Majority 266 (82.2%) had good knowledge of diarrhoeal diseases, 208 (56.1%) had good knowledge of home management of childhood diarrhoea, 249 (67.1%) had good knowledge of role of oral rehydration, and 59 (15.9%) had good knowledge of the role of Zinc in childhood diarrhoea management. Overall, 270 (72.8%) had good knowledge of diarrhoeal diseases and its management (Table 3).

Hygienic practices: washing of child's hands before feeding was always done by some mothers 139 (37.5%), 173 (46.6%) of the mothers always washed their child's hands after defecation, 189 (50.9%) always washed their hands with soap and water before feeding their child, 218 (75.5%) of the mothers always washed their hands after use of toilet (Table 4). Sixty-two percent used water and soap to wash child's hands before feeding,

Majority, 324 (87.3%) of the women used cup and spoon to feed their child and 224 (60.4%) always prepared food on the table. Overall, majority 274 (73.9%) of mothers had good maternal hygienic practices (Table 5).

Home management of childhood diarrhoea: overall, commonest methods used at home were UNICEF ORS 170 (64.6%); antibiotics 137 (52.1%), SSS 73 (27.7%) and anti-diarrhoeal drugs 49 (18.6%). Only a few administered oral Zinc 34 (12.9%). Out of the 34 that used oral Zinc, 11 (32.4%) of them did not complete the 10-14 days course. Reasons given for stopping oral Zinc include: child got better, unpleasant taste, thought the child was to take fewer than 10 tablets and vomiting/refusal by child. UNICEF ORS was the commonest rehydration solution given 170 (64.6%). During the last episode of diarrhoea, less than two-thirds, 162 (61.6%) of women breastfed more often. Overall, more than one-third 102 (38.8%) had poor practices concerning home management of diarrhoeal diseases (Table 6).

Predictors of good knowledge and practice: on Table 7, multiple logistic regression showed that mothers aged 30 -39 years were about 3 times more likely to have good knowledge of childhood diarrhoea and its home management than mothers aged 20-29 years (AOR 3.48 CI 2.00-6.05). Higher maternal educational level predicted good knowledge (AOR 3.19 CI 1.36-7.47). Older maternal age predicted good home management practices. With age range 20-29 years as reference, older mothers had significantly higher odds of having good practices, 30-39 years (AOR 2.78 CI 1.44-5.37), >40 years (AOR 5.55 CI 1.54-20.01). Younger age of the index child, 6-11 months also predicted good home management practices regarding childhood diarrhoea (AOR 4.83 CI 2.29-10.18).

Discussion

Many of the mothers knew the correct meaning of diarrhoea and could identify episodes of diarrhoea in their children. Similar results were found in the northcentral and Southeast regions of

Nigeria [3,16]. But in Benin, South-south region, only few (26%) of mothers who brought their children to the hospital on account of diarrhoea knew the correct definition of diarrhea [17]. In other countries like India and Ethiopia, most mothers also knew the meaning of diarrhoea [18,19].

Contaminated water and food as source of diarrhoea was commonly identified, also in slum areas in India (80%) [18], relatively higher than findings in Enugu, Iran, and Kenya [3,20,21]. The myth of 'teething' as a cause of diarrhoea was held by over half of the mothers (51.8%), in sharp contrast to what was observed in the Enugu study (3.9%) [3]. Such myths may have implications for prevention and control. Similar level knowledge in the domain of diarrhoea definition, causes and prevention, was reported in Sokoto, northwest Nigeria [22]. In Iran where health and social services have been disrupted for several years, only 3.7% had a good knowledge [20]. Proportion of mothers with good knowledge about home management of diarrhoea was similar to result from a predominantly urban part of eastern Ethiopia (Diredawa City) [19]. Conversely, much poorer knowledge was observed in studies done in northern Nigeria: Maiduguri (20%), [23] Katsina, Kebbi and Zamfara (<1%) [24]. Despite the health facility location of these studies, the very low literacy level of the respondents which is common in that region, was probably responsible for the very poor knowledge observed.

Though majority of our respondents knew ORS, only about a quarter (26.4%) knew about Zinc supplementation. In Northwestern Nigeria, 32% of the over 4,000 caregivers studied had heard of the use of Zinc in children but not all (84.3%) knew it was used in the treatment of diarrhea [24]. Less than 50% ORS awareness, and 0% Zinc knowledge were recorded in urban slum areas of Aligarh, India where the sanitation is poor and literacy level, very low [25]. In a health facility setting in Port Harcourt, Southern Nigeria, mothers' awareness of Zinc supplementation was equally poor (36.9%) [26]. This low knowledge of Zinc is worrisome despite

the establishment of its benefit for many years now. Mothers' knowledge of correct preparation of ORS was fairly high (65.0%) in contrast to reports from other studies [25-27]. This level is still sub-optimal.

Though many respondents knew the actual role of ORS/SSS which is to prevent dehydration, misconceptions about its use to stop or prevent diarrhoea were common. Mothers in Anambra, southeast Nigeria, (87.7%) [28] and Pakistan (95.94%) [29] had better knowledge in this regard. With regards to hygienic practices, low frequencies of child and maternal hand washing always with soap and water before feeding and after defecation were also reported in rural Vietnam [30] but higher rates in Diredawa, Ethiopia [19]. These sub-optimal hand hygiene practices facilitate the occurrence of childhood diarrhoea, especially as our results showed that overall, maternal hygienic practice was significantly associated with diarrhoea prevalence, thus supporting previous observations [30,31]. ORS use was much higher than SSS in this study, a common pattern in Central America and West Africa [32-34], but not in Kenya [13]. The higher level of usage of ORS might be attributed to its relatively easy re-constitution process. Some mothers used antibiotics for diarrhoeal episodes in their young children. This is a common practice reported in other parts of the country, Africa and beyond: Northern Nigeria (23.6%) [24], Kenya (36.7%) [35] and Dominican Republic (73%) [36], Burkina Faso [33] and Ghana [37]. A systematic review showed that harmful practices in the management of childhood diarrhoea were quite common [38]. Children were usually given other medications like anti-diarrhoeals and herbal mixtures among other things for diarrhoea. In Senegal, only 23.2% of mothers and caregivers interviewed had good management practices [39].

Only about one in ten mothers gave Zinc and two-thirds of them completed 10-14 days of the therapy. Probably these few women consulted health workers, and they were eager to see their children recover. In the Port Harcourt study, one

quarter of the caregivers used it [26]. In Rarieda, a rural poor area of Western Kenya, 67% used Zinc and 84% of them reported taking the full 10-day course [35]. These high rates were recorded following two years of sustained community intervention on Zinc treatment at home. In another poor area in Nairobi, Kenya, use of Zinc was very low [40]. In northwestern Nigeria, 75.5% adhered to a health centre-supplied 10-day course of Zinc treatment for 10 days and major reason for discontinuation were vomiting and refusal by child [24]. This goes in line with results from a systematic review which showed that oral Zinc increases the risk of vomiting [4]. In Kenya, none indicated that they stopped because of unpleasant taste or side-effects [40]. Efforts have been ongoing to scale-up use of ORS and Zinc in Nigeria [6] and a recent programme evaluation showed significant improvements [41].

Older mothers were more likely than younger ones to have good knowledge of childhood diarrhoea and its home management. Probably, the younger mothers do not have as much exposure as the older ones. In the Port Harcourt study, mothers' age and educational level significantly influenced knowledge [26]. Two separate Ethiopian studies with similar objectives showed no such association [42,43] but in the Addis Ababa location, participants' occupation was significantly associated with knowledge [43]. The significant role that having younger children played in imbibing good home management practices in our study, may be borne out of greater anxiety for the younger babies. The older children are presumably more resilient due to stronger immunity.

Strengths and limitations of study

Studies of this nature have largely been carried out at health facilities, but this one was done at the community level hence gives a better reflection of scientific evidence. Rigorous sampling methodology and quality assurance mechanisms were deployed for quality data. The study content is quite robust and covered numerous study variables. Due to the study design, causal

inferences cannot be made. Face to face interview makes room for possible false claims with regards to practice. In addition, there is higher chance of recall bias which could have been reduced by direct observation. More detailed studies could be conducted to ascertain other factors relevant in the sub-optimal management practices recorded.

Conclusion

Mothers had good knowledge of diarrhoea, but there was a knowledge gap for the role of oral Zinc. Home management practices for childhood diarrhoea were sub-optimal and oral Zinc was hardly used. To meet the SDG 3, health education on diarrhoea management (especially on the role of Zinc) for mothers at the community level are recommended.

What is known about this topic

- *Diarrhoea is a common cause of morbidity and mortality among young children in LMICs;*
- *Cost-effective management/interventions include oral rehydration therapy and Zinc tablets;*
- *Use of these interventions has lagged over the years.*

What this study adds

- *Mothers had poor knowledge of oral Zinc and its role in diarrhoea management;*
- *Older maternal age and younger age of child predict good diarrhoea management practices.*

Competing interests

The authors declare no competing interests.

Authors' contributions

IPO was involved in the conception, design, analysis, interpretation of data, drafting of the manuscript and substantive revision. OTA was involved in the conception, design, acquisition,

analysis, interpretation of data and drafting and revision of the manuscript. BNW, TO and UTE were involved in analysis, interpretation of data and substantive revision of the manuscript. All authors read and approved the final manuscript.

Acknowledgments

Our appreciation goes to all field workers for their assistance in data collection, and to all mothers who participated in the study. We also thank the Chairman and Medical Officer of Health, Isolo LCDA for giving us the necessary assistance during data collection.

Tables

Table 1: socio-demographic characteristics of respondents

Table 2: respondents' knowledge of diarrhoeal diseases and home management of childhood diarrhea

Table 3: respondents' knowledge of ORS/SSS and their overall knowledge grade

Table 4: hand hygiene practices

Table 5: food hygiene practices

Table 6: home management of childhood diarrhoea

Table 7: factors associated with knowledge of diarrhoea and home management practices

References

1. UNICEF/WHO. Diarrhoea: why children are still dying and what can be done. Accessed 16 July 2014.
2. Curtis V, Cairncross S, Yonhi R. Review: Domestic hygiene and diarrhoea- pinpointing problem. *Tropical medicine and international health*. 2000;5: 22-3 doi: 10.1046/j.1365-3156.2000.0051x. **PubMed** | **Google Scholar**
3. Adimora GM, Ikefuna AN, Ilechukwu G. Home management of childhood diarrhoea: Need to intensify campaign. *Niger J Clin Pract*. 2011;14(2): 237-41. DOI: 10.4103/1119-3077.84028. **Google Scholar**
4. Lazzerini M, Wanzira H. Oral Zinc for treating diarrhoea in children. *Cochrane Database Syst Rev*. 2016 Dec 20;12(12): CD005436. doi: 10.1002/14651858.CD005436.pub5. **PubMed** | **Google Scholar**
5. Patel A, Mamtani M, Dibley MJ, Badhoniya N, Kulkarni H. Therapeutic value of Zinc supplementation in acute and persistent diarrhoea: a systematic review. *PLoS One*. 2010 Apr 28;5(4): e10386. doi: 10.1371/journal.pone.0010386. **PubMed** | **Google Scholar**
6. Kung'u JK, Owolabi O, Essien G, Aminu FT, Ngnie-Teta I, Neufeld LM. Promotion of Zinc tablets with ORS through child health weeks improves caregiver knowledge, attitudes, and practice on treatment of diarrhoea in Nigeria. *J Health Popul Nutr*. 2015 Mar;33(1): 9-19. **Google Scholar**
7. UNDP. Goal 3: Good health and well-being. Accessed 30 August 2020.
8. Christa L F, Igor R, Li Liu, Harish N, Evropi T, Zulfiqar AB. Global burden of childhood pneumonia and diarrhoea. *The Lancet*. 2013; April; 381(9875)1405-1416. **Google Scholar**
9. CDC. Diarrhea: Common Illness, Global Killer. Accessed 16 July 2014.
10. UNICEF. Launch of hand washing campaign in Abuja. www.unicef.org/nigeria/media_2364.html. Accessed 17 July 2014.
11. UNICEF. Diarrhoeal disease, Current status and progress. New York, USA. 2015.
12. Kadam DM, Hadaye R, Pandit D. Knowledge and practices regarding oral rehydration therapy among mothers in rural area of Vasind, India. *Nepal Med Coll. J* 2013 Jun;15(2): 110-112. **PubMed** | **Google Scholar**
13. Blum LS, Oria PA, Olson CK, Breiman RF, Ram PK. Examining the use of oral rehydration salts and other oral rehydration therapy for childhood diarrhea in Kenya. *Am J Trop Med Hyg*. 2011 Dec;85(6): 1126-33. doi: 10.4269/ajtmh.2011.11-0171. **PubMed** | **Google Scholar**

14. Raji MO, Abdullahi U , Raji IA, Oladigbolu RA , Kaoje AU, Awosa KJ. Caregivers' knowledge, home treatment of diarrhoea disease and predictors of child diarrhoea disease in a semi urban community of Sokoto, North-west, Nigeria. *Journal of Public Health and Epidemiology*. 2017;9(2): 16-23. DOI: 10.5897/JPHE2016.0889. **Google Scholar**
15. World Health Organization, Dept of Child and Adolescent Health and Development, UNICEF. Clinical management of acute diarrhea. WHO/UNICEF joint statement, Geneva: WHO. 2004. **Google Scholar**
16. Muslim OJ, Giwa A, Okoro NR, Giwa HB. Evaluation of mothers' knowledge and attitudes of oral rehydration therapy in childhood diarrhoea. *Bulletin of Pharmaceutical Research*. 2018;8(2): 157. DOI: 10.21276/bpr.2018.8.2.2. **Google Scholar**
17. Iduoriyekemwen NJ, Osarogiagbon OW. Maternal knowledge of practices that cause diarrhoea and diarrhoeal disease prevention. *Kanem Medical Journal of Sciences*. 2011;5(2): 50-56. **Google Scholar**
18. Chaudhary P, Basu S, Dzeyie AK, Gulla S, Khade S, Patel A *et al*. Knowledge, Attitude and Practice of Mothers regarding Diarrhoeal Illness in Children under Five Years of Age: A Cross Sectional Study in an Urban Slum of Delhi, India. *J Commun Dis*. 2014;46(3): 13-21. **Google Scholar**
19. Workie HM, Sharifabdilahi AS, and Addis EM. Mothers' knowledge, attitude and practice towards the prevention and home-based management of diarrhoeal disease among under-five children in Diredawa, Eastern Ethiopia, 2016: a cross-sectional study. *BMC Pediatr*. 2018;18(1): 358. doi: 10.1186/s12887-018-1321-6. **PubMed | Google Scholar**
20. Khalili M, Mirshahi M, Zarghami A, Rajabnia M, Farahmand F. Maternal Knowledge and Practice Regarding Childhood Diarrhoea and Diet in Zahedan, Iran. *Health Scope*. 2013; 2(1): 20-24. DOI : 10.17795/jhealthscope-9885. **Google Scholar**
21. Othero DM, Orago ASS, Groenewegen T, Kaseje DO, Otengah PA. Home Management of Diarrhoea among Under fives in a Rural Community in Kenya: Household Perceptions and Practices. *East African Journal of Public Health*. 2008; 5(3): 142-146. doi: 10.4314/eajph.v5i3.38992. **PubMed | Google Scholar**
22. Abiola AOA, Ndaman AL, Idris SH, Jiya NM, Ibrahim MTO. Home management of childhood diarrhoea among mothers in Sokoto, Nigeria. *Tropical Journal of Health Sciences*. 2010;17(1). DOI: 10.4314/tjhc.v17i1.52801. **Google Scholar**
23. Mustapha MG, Ifah SS, Garba MA. Knowledge, Attitude and Practices of Mothers on Home Management of Childhood Acute Watery Diarrhoea in Maiduguri, Borno State, Nigeria. *Niger Med J*. 2008; 49(1): 5-8. **Google Scholar**
24. Ogunrinde OG, Raji T, Owolabi OA, Anido KM. Knowledge, attitude and practice of home management of childhood diarrhoea among caregivers of under-5 children with diarrhoeal disease in Northwestern Nigeria. *J Trop Pediatr*. 2012;58(2): 143-146. **PubMed | Google Scholar**
25. Shah MS, Ahmad A, Khalique N, Afzal S, Ansari MA, Khan Z. Home-based management of acute diarrhoeal disease in an urban slum of Aligarh, India. *J Infect Dev Ctries*. 2012;6(2): 137-42. doi: 10.3855/jidc.1374. **PubMed | Google Scholar**
26. Okoh BAN, Alex-Hart BA. Home Management of Diarrhoea by Caregivers Presenting at the Diarrhoea Training Unit of a Tertiary Hospital in Southern Nigeria. *British Journal of Medicine & Medical Research*. 2014; 4(35): 5524-5540. DOI: 10.9734/BJMMR/2014/11340. **Google Scholar**
27. Greenland K, Chipungu J, Chilengi R, Curtis V. Theory-based formative research on oral rehydration salts and Zinc use in Lusaka, Zambia. *BMC Public Health*. 2016;16: 312 DOI 10.1186/s12889-016-2984-2. **PubMed | Google Scholar**

28. Ukegbu AU, Ukegbu PO. Mothers' knowledge, perception and practices of home management of childhood diarrhoea in a rural community in Anambra State, Nigeria. *Niger J Nutri Sci.* 2010; 31(2). <http://dx.doi.org/10.4314/njns.v31i2.63907>.
Google Scholar
29. Sultana A, Riaz R, Ahmed R, Khurshid R. Knowledge and Attitude of Mothers Regarding Oral Rehydration Salt. *Journal of Rawalpindi Medical College.* 2010; 14(2): 109-111. **Google Scholar**
30. Takanashi K, Chonan Y, Quyen DT, Khan NC, Poudel KC, Jimba M. Survey of Food-hygiene Practices at Home and Childhood Diarrhoea in Hanoi, Viet Nam. *J health popul Nutr.* 2009; 27(5): 602-611. doi: 10.3329/jhpn.v27i5.3636. **PubMed | Google Scholar**
31. Agustina R, Sari TP, Satroamidjojo S, Bovee-Oudenhoven IMJ, Feskens EJM, Kok FJ. Association of food-hygiene practices and diarrhoea prevalence among Indonesian young children from low socioeconomic urban areas. *BMC Public Health.* 2013;13: 977. **PubMed | Google Scholar**
32. Uchendu UP, Emodi IJ, Ikefuna AN. Pre-hospital management of diarrhoea among caregivers presenting at a tertiary health institution: implications for practice and health education. *African Health Sciences.* 2011; 11(1): 41-47. **Google Scholar**
33. Wilson SE, Ouédraogo CT, Prince L, Ouédraogo A, Hess SY, Rouamba N. Caregiver recognition of childhood diarrhoea, care seeking behaviors and home treatment practices in rural Burkina Faso: a cross-sectional survey. *PLoS One.* 2012;7(3): e33273. doi: 10.1371/journal.pone.0033273. **PubMed | Google Scholar**
34. Becker-Dreps S, Zambrana LE, Reyes D, Vilchez S, Weber DJ. Household management of childhood diarrhoea: a population-based study in Nicaragua. *J Health Popul Nutr.* 2014; 32(1): 149-154. **PubMed | Google Scholar**
35. Otieno GA, Bigogo GM, Nyawanda BO, Aboud F, Breiman RF, Larson CP *et al.* Caretakers' perception towards using Zinc to treat childhood diarrhoea in rural western Kenya. *J Health Popul Nutr.* 2013 Sep;31(3): 321-329. doi: 10.3329/jhpn.v31i3.16823. **PubMed | Google Scholar**
36. McLennan JD. Home Management of Childhood Diarrhoea in a Poor Periurban Community in Dominican Republic. *J Health Popul Nutr.* 2002; 20(3): 245-254. **PubMed | Google Scholar**
37. Marianne El-Khoury, Banke K, Sloane P. Improved Childhood Diarrhoea Treatment Practices in Ghana: A Pre-Post Evaluation of a Comprehensive Private-Sector Program. *Glob Health Sci Pract.* 2016 Jun 20; 4(2): 264-275. doi: 10.9745/GHSP-D-16-00021. **Google Scholar**
38. Carter E, Bryce J, Perin J, Newby H. Harmful practices in the management of childhood diarrhoea in low- and middle-income countries: a systematic review *BMC Public Health.* 2015;15: 788. DOI 10.1186/s12889-015-2127-1. **PubMed | Google Scholar**
39. Thiam S, Sy I, Schindler C, Niang-Diène A, Faye O, Utzinger J *et al.* Knowledge and practices of mothers and caregivers on diarrhoeal management among under 5-year-old children in a medium-size town of Senegal. *Acta Trop.* 2019 Jun;194: 155-164. doi: 10.1016/j.actatropica.2019.03.013. **PubMed | Google Scholar**
40. Mukiira C, Ibisomi L. Health care seeking practices of caregivers of children under 5 with diarrhoea in two informal settlements in Nairobi, Kenya. *J Child Health Care.* 2015 Jun;19(2): 254-64. doi: 10.1177/1367493513508231. **PubMed | Google Scholar**
41. Lam F, Abdulwahab A, Houdek J, Adekeye O, Abubakar M, Akinjeji A *et al.* Program evaluation of an ORS and Zinc scale-up program in 8 Nigerian states. *J Glob Health.* 2019 Jun; 9(1): 010502. doi: 10.7189/jogh.09.010502. **PubMed | Google Scholar**

42. Mekonnen GK, Mengistie B, Sahilu G, Mulat W, Kloos H. Caregivers' knowledge and attitudes about childhood diarrhoea among refugee and host communities in Gambella Region, Ethiopia. *J health popul nutr.* 2018;37: 24. **PubMed | Google Scholar**
43. Desta BK, Assimamaw NT, Ashenafi TD. Knowledge, Practice, and Associated Factors of Home-Based Management of Diarrhoea among Caregivers of Children Attending Under-Five Clinic in Fagita Lekoma District, Awi Zone, Amhara Regional State, Northwest Ethiopia, 2016. *Nurs Res Pract.* 2017;2017: 8084548. DOI: 10.1155/2017/8084548. **PubMed | Google Scholar**

Table 1: socio-demographic characteristics of respondents

Variable (n=371)	Frequency	Percentage (%)
Age (years)		
20-29	165	44.5
30-39	184	49.6
>40	22	5.9
Mean ± SD	30.4 ±5.02	
Marital status		
Single/never married	11	3.0
Married/co-habiting	344	92.7
Separated/divorced/widowed	16	4.3
Level of education		
None	11	3.0
≥ Primary	360	97.0
Employment status		
Unemployed	98	26.4
Employed	273	73.6
Tribe		
Yoruba	169	45.6
Non - Yoruba	202	54.4
Household size		
1-3	102	27.5
4-6	236	63.6
≥7	33	8.9
Median(range)	4 (1-10)	
Number of children		
1-2	239	64.4
2-4	117	31.5
5-6	15	4.0
Median(range)	2 (1-6)	
Age of last child (in months)		
6-11	155	41.8
12-17	116	31.3
18-23	100	27.0
Mean ±SD	13.30± 5.22	
Sex of last child		
Male	159	42.9
Female	212	57.1

Table 2: respondents' knowledge of diarrhoeal diseases and home management of childhood diarrhoea

Variable (n = 371)	Frequency	Percentage (%)
Meaning of diarrhoea		
Correct	226	60.9
Incorrect	136	36.7
Don't know	9	2.4
Causes of diarrhoea*		
Contaminated water and food	340	91.6
Poor sanitation	255	68.7
Teething	192	51.8
Sugary food	168	45.3
Normal diet	26	7.0
Over eating	51	13.7
Too much heat	56	15.1
Breastfeeding during pregnancy	86	23.2
Don't know	8	2.2
Major complications of diarrhoea		
Dehydration	209	56.3
Vomiting	72	19.4
Loss of appetite	48	12.9
Don't know	37	10.0
Others	5	1.3
Methods of diarrhoea prevention*		
Avoidance of contaminated water	337	90.8
Good maternal hygiene	295	79.5
Good Child hygiene	311	83.8
Good environmental hygiene	308	83.0
Prompt treatment of infections	114	30.7
Reducing sugary food intake	143	38.5
Regular use of ORS	137	36.9
Eating well cooked food	159	42.9
Avoiding contaminated food	292	78.7
Immunization (Rotavirus)	89	24.0
Don't know	4	1.1
Home management*		
Oral rehydration solution	344	92.7
Salt sugar solution	257	69.3
Continuing breastfeeding/other food	142	38.3
Zinc	98	26.4
Antibiotics	172	46.4
Herbs	75	20.2
Don't know	6	1.6

Table 3: respondents' knowledge of ORS/SSS and their overall knowledge grade	
Source of information about ORS/SSS preparation*	Frequency (%)
Health worker	285 (76.8)
Friends	58 (15.6)
Family members	70 (18.9)
Instructions on ORS packet	40 (10.8)
Media	46 (12.4)
Others	1 (0.3)
Preparation of SSS	
Correct	241 (65.0)
Incorrect	24 (6.5)
Don't know	106 (28.6)
Re-constitution of ORS	
Correct	310 (83.6)
Incorrect	5 (1.3)
Don't know	56 (15.1)
Role of ORS/SSS *	
Prevents dehydration/rehydrates the child	249 (67.1)
Stops diarrhoea	148 (39.9)
Prevents diarrhoea	70 (18.9)
Don't know	7 (1.9)
Others	33 (8.9)
Role of oral zinc *	
No effect	7 (1.9)
Reduces the severity	84 (22.6)
Reduces the duration of diarrhoea	71 (19.1)
Prevents dehydration	42 (11.3)
Prevents further occurrences in the ensuing 2-3months	35 (9.4)
I don't know	187 (50.4)
Overall knowledge of diarrhoea and home management of childhood diarrhoea	
Variable (n=371)	
Knowledge of diarrhoeal diseases (meaning, causes, complications & prevention)	
Good	305 (82.2)
Poor	66 (17.8)
Knowledge of home management of diarrhoea	
Good	208 (56.1)
Poor	163 (43.9)
Knowledge of role of oral rehydration	
Good	249 (67.1)
Poor	122 (32.9)
Knowledge of the role of zinc in diarrhoea management	
Good	59 (15.9)
Poor	312 (84.1)
Overall knowledge grade	
Good	270 (72.8)
Poor	101 (27.2)

Table 4: hand hygiene practices

Variable (n=371)	Never (%)	Sometimes (%)	Frequently (%)	Always (%)
Hand wash of child before feeding	56 (15.1)	85 (22.9)	91 (24.5)	139 (37.5)
Maternal hand wash after changing child's soiled clothing	7 (1.9)	75 (20.2)	77 (20.8%)	212 (57.1)
Hand wash of child after defecation	48 (12.9)	82 (22.1)	68 (18.3)	173 (46.6)
Maternal hand wash before feeding child	11 (3.0)	93 (25.1)	78 (21.0)	189 (50.9)
Maternal hand wash after defecation	2 (0.5)	34 (9.2)	55 (14.8)	280 (75.5)
Feeding child with left-over food	283 (76.3)	77 (20.8)	7 (1.9)	4 (1.1)
Warming of leftover food (n=88)	10 (11.4)	25 (28.4)	15 (17.0)	38 (43.2)

Table 5: food hygiene practices

Variables	Frequency	Percentage (%)
Items used for washing child hand before feeding		
Water only	85	22.9
Water and soap	230	62.0
Does not wash child's hand before feeding	56	15.1
How child's faeces is disposed		
Toilet	94	25.3
Dustbin	148	39.9
Open dumping	9	2.4
Toilet and dustbin	119	32.1
Others	1	0.3
Items used to feed child*		
Cup and spoon	324	87.3
Feeding bottle	71	19.1
Bare hand	19	5.1
Where child's food is prepared		
On the ground	16	4.3
Sometimes on the table	61	16.4
Frequently on the table	70	18.9
Always on the table	224	60.4
Source of child's drinking water		
Tap	38	10.2
Well	8	2.2
Borehole	98	26.4
Bottled water	143	38.5
Sachet water	84	22.6
Place of storage of child's drinking water		
Covered keg	45	12.1
Plastic bucket with cover	97	26.1
Uncovered keg/bucket	2	0.6
Uses bottled/ sachet water	227	61.2
Overall hygienic practices score		
Good hygienic practices	274	73.9
Poor hygienic practices	97	26.1

Table 6: home management of childhood diarrhoea		
Variable	Frequency	Percentage (%)
Child ever had diarrhea (n=311)		
Yes	263	70.9
No	108	29.1
Method(s) used at home during the last episode of diarrhoea *(n=263)		
Salt Sugar Solution (SSS)	73	27.7
ORS (Commercial packet)	170	64.6
Diastop (Antidiarrhoea)	49	18.6
Antibiotics	137	52.1
Herbal preparation	42	16.0
Zinc	34	12.9
Completed course of zinc therapy 10-14 days (n=34)		
Yes	23	67.6
No	11	32.4
Reasons for stopping oral zinc (n=11)		
Child got better	2	18.2
Unpleasant taste/ side effects	1	9.1
Thought the child was to take fewer than 10 tablets	1	9.1
Others	7	63.6
Rehydration solution used during the last episode (n=263)		
Salt sugar solution	73	27.8
ORS (Commercial packet)	170	64.6
Water only	10	3.8
None	3	1.1
Others	7	2.7
Feeding practices during the last episode of diarrhoea* (n=263)		
Breastfed more often	162	61.6
Gave usual meals	135	51.3
Stopped adding milk to cereal	61	23.2
Fed minimally to rest bowel	39	14.8
Gave plain dilute pap	79	30.0
Restricted fluid intake	19	7.2
Stopped/reduced breastfeeding	19	7.2
Withheld sugary foods	19	7.2
Overall practice of home management(n=263)		
Good	161	61.2
Poor	102	38.8

Table 7: factors associated with knowledge of diarrhoea and home management practices

	Overall knowledge of childhood diarrhoea and its home management					
	Poor (%)	Good (%)	p- value	AOR	95% CI	p-value
Age of mother (years)	n=101	n=270				
20-29	63 (38.2)	102 (61.8)	<0.001*	1		
30-39	29 (15.8)	155 (84.2)		3.48	2.00-6.05	<0.001*
>40	9(40.9)	13 (59.1)		1.10	0.37-3.26	0.864
Level of education						
No formal/Primary	14 (50.0)	14 (50.0)	0.005*	1		
≥Secondary	87 (25.4)	256 (74.6)		3.19	1.36-7.47	0.008*
Household size						
1-3	31 (30.4)	71 (69.6)	0.588	1		
4-6	60 (25.4)	176 (74.6)		1.11	0.61-2.02	0.738
≥7	10 (30.3)	23 (69.7)		0.54	0.17-1.74	0.305
Number of children						
1-2	67 (28.0)	172 (72.0)	0.463	1		
3- 4	32 (27.4)	85 (72.6)		0.94	0.51-1.74	0.840
5-6	2 (13.3)	13 (86.7)		3.27	0.50-21.49	0.218
Age of last child (months)						
6-11	40 (25.8)	115 (74.2)	0.850	1		
12-17	32 (27.6)	84 (72.4)		0.76	0.43-1.36	0.356
18-23	29 (29.0)	71 (71.0)		0.83	0.45-1.55	0.567
Home management practices regarding childhood diarrhoea						
	n=102	n=161				
Age of mother (years)						
20-29	49 (42.6)	66 (57.4)	0.474	1		
30-39	46 (35.1)	85 (64.9)		2.78	1.44-5.37	0.002*
>40	7 (41.2)	10 (58.8)		5.55	1.54-20.01	0.009*
Level of education						
No formal/Primary	9 (47.4)	10 (52.6)	0.425	1		
≥Secondary	93 (38.1)	151 (61.9)		2.01	0.67-6.03	0.213
Household size						
1-3	23 (33.8)	45 (66.2)	0.443	1		
4-6	67 (39.4)	103 (60.6)		0.81	0.40-1.67	0.573
≥7	17 (51.5)	16 (48.5)		0.61	0.17-2.25	0.459
Number of children						
1-2	54 (32.3)	113 (67.7)	0.017*	1		
3- 4	41 (49.4)	42 (50.6)		0.39	0.20-0.77	0.007*
5-6	7 (53.8)	6 (46.2)		0.24	0.05-1.20	0.082
Age of last child (months)						
6-11	21 (21.0)	79 (79.0)	<0.001*	4.83	2.29-10.18	<0.001*
12-17	46 (50.5)	45 (49.5)		0.90	0.46-1.77	0.775
18-23	35 (48.6)	37 (51.4)		1		
Sex of last child						
Male	41 (38.7)	65 (61.3)	0.977	1		
Female	61 (38.9)	96 (61.1)		0.98	0.56-1.72	0.941
Overall Knowledge						
Poor Knowledge	23 (38.3)	37 (61.7)	0.935	1		
Good knowledge	79 (38.9)	124 (61.1)		0.61	0.30-1.24	0.173
Maternal hygienic practices						
Poor	37 (47.4)	41 (62.6)	0.061	1		
Good	65 (35.1)	120 (64.9)		1.63	0.89-3.01	0.116

*Statistically significant, AOR Adjusted odds ratio, CI Confidence interval