

Original Research Article

Evaluation of the awareness and utilization of oral rehydration salt and zinc in managing diarrhoea among under-five children in Oyo State, Nigeria

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ABSTRACT

Background: Nigeria ranks as one of the countries with the highest negative consequences of diarrhoea in sub-Saharan Africa. The aim of the study was to evaluate the awareness and utilization of ORS and zinc in managing diarrhoea among under-five children (U5C) in Oyo state, Nigeria.

Methods: Data was obtained from a cross-sectional survey (n=1154) as well as focus group discussions among mothers/caregivers of U5C and key informant interviews in Oyo state. Descriptive, bivariate and multivariate logistic regression analyses were performed.

Results: Nine of every ten caregivers were aware of the use of ORS/zinc for managing diarrhoea cases. Prevalence of ever-use of ORS/zinc for managing diarrhoea cases was 5.4% while the prevalence of having diarrhoea recently was 6.2% (71/1154). Of the 71 mothers whose U5C recently had diarrhoea, 41 (57.7%) used ORS/zinc to manage a recent episode of diarrhoea. Adjusted odds of using ORS/zinc to manage diarrhoea was 2.64 (aOR=2.64; 95%CI: 1.18-10.27) times higher among children who are the first births than those with fourth or higher birth order. The adjusted odds of using ORS/zinc to manage diarrhoea was 9 times (aOR= 9.15; 95%CI: 1.99-34.47) higher among mothers aged 20 to 24 years than those aged 30 to 39 years.

Conclusions: Despite the high level of awareness of use of ORS and zinc in managing diarrhoea, ever-utilization is low but recent use by three-fifths of caregivers is fair. There is a need for Oyo state ministry of health and other stakeholders to promote the use of ORS and zinc in managing diarrhoea.

Keywords: Barriers to utilization, Diarrhoea, Nigeria, Unavailability, Unaffordability

INTRODUCTION

In 2016, diarrhoea was reported as the 5th major child killer and has been reported as the 9th global leading cause of death - responsible for about 9% of the fatality rate among under-five children (U5C).¹⁻³ The diarrhoea mortality rate in U5C was highest in SSA and South Asia.² In particular, Nigeria ranks as one of the highest countries with the burden of diarrhoea among the sub-Saharan Africa (SSA) countries. The prevalence of

diarrhoea related deaths in Nigeria was estimated at 18.8%. This is clearly above the SSA's average of 16% (WHO, 2017).

Over 200,000 children in Nigeria die each year from diarrhoea-related illness, and most communities in the country have seen diarrhoea-related deaths as of 2018.⁴ This happened despite the recommendation of the UNICEF and WHO recommendation that oral rehydration salt (ORS) and zinc should be used to treat

the disease in infants and U5C.⁵ A very low proportion of victims of diarrhoea were given the drugs, while others received suboptimal products like antibiotics and anti-diarrhoeas and in some cases, some children who had diarrhoea received no treatment.⁶⁻⁹ The poor utilization has been ascribed to limited knowledge, high cost and availability of these drugs.⁶⁻⁹

The burden of under-five morbidities and mortalities resulting from diarrhoea can be reduced significantly by at least 75% if the recommended treatment options by WHO and UNICEF are adequately taken. The recommendation was that a child having the symptoms of diarrhoea must be given oral rehydration therapy (ORT) and paediatric zinc sulphate dispersible tablets (zinc) within 24 hours of such notice.⁵ The ORT consists of fluid extracted from ORS packets or pre-packaged liquid and government-recommended home fluids (RHF). While the ORS and RHF could be used to treat and prevent diarrhoea-related dehydration, oral zinc shortens the duration and the degree of severity of diarrhoea.^{6,10} Literature is replete that most of these mortalities are preventable.^{11,12}

The utilization of ORS/zinc for the management of diarrhoea varied both globally and in African continent. While 66% was reported in South Africa, 57.6 was found in Tanzania, 73.3% in Kazakhstan and 54.3% in Lesotho.¹³ Only a third of the mothers in an India study used ORS for treating diarrhoea among U5C.¹⁴ Carvajal-vélez et al. had found a median of 38% prevalence of ORS use for the management of diarrhoea among 12 countries in Africa-Burkina Faso, Burundi, Cameroon, Cote d'Ivoire, Dr Congo, Ethiopia, Mali, Niger, Nigeria, Sierra Leone, Tanzania, and Uganda.¹⁵

Theoretical framework

We adopted the Andersen's behavioural model (BM) for this study.^{16,17} The framework posited that factors that influence health care utilization are interrelated across environmental characteristics, individual characteristics, individual health behaviour and perceived health outcomes. According to Andersen, three main groups of factors (predisposing factors, enabling factors and the needs factors) affect health uptake.^{16,18} The predisposing factors are the socio-cultural attributes of people that exist before their sickness. This consist of; social structures including education, employment, nationality, interpersonal organizations, social collaborations and interactions and culture; health beliefs which include attitudes, qualities, values and information that individuals have concerning and towards the wellbeing framework in their domain and demographic structure such as age and gender.

The enabling factors are the logistics involved in obtaining care. It includes personal and family factors which the means, knowledge and ability to access healthcare, poverty, health insurance, source of care,

travelling, extent, degree, quality and nature of social connections and interactions. Community factors such as availability of health care practitioners and facilities, response time and waiting time; and possible additions such as genetic factors and other psychological characteristics.¹⁷

The need factors are the most cogent reasons and causes for the utilization of healthcare services. It covers functional and health problems that propel the need for health care services. Andersen stated that a perceived need for a health care service will help to understand the pattern of health care seeking and how patients adhere to medication.

On the other way, the evaluated need will help determine the kind and volume of treatment provided to a patient after he/she has been seen by a provider. The perceived need describes how individuals see their overall health and functional state, in addition to how they experience manifestations of ailment, agony, worries, anxieties and stresses over their wellbeing and whether they judge their issues to be of adequate significance and magnitude to seek health assistance. The evaluated needs are based on health care providers' judgement on patients' status and need for medical care.¹⁹

The Andersen model has been utilized widely in examining the use of health care services.²⁰ Babitsch et al confirmed that the ABM has been utilized in several areas of health outcomes services. The theoretical framework is based on the Anderson framework for the use of healthcare services.¹⁷ It has been cited in different literature. Therefore, mothers/guardians' decision to use zinc/ORS in the management of diarrhoea among U5C in Oyo state, Nigeria may be influenced by different factors including the external environment, predisposing, enabling, needs, personal health practices factors and one's perceived health status as well as other external factors. In this study, the main exposure variable is the use of a health facility that is linked to the external environment, both the predisposing factors and the enabling factors and the need factors.

The external environmental factors consist of the type of residence (rural and urban) and region (North, South, Central). The predisposing factors are made up of the mother's current age, parental educational attainment, religion, access to media, child sex, birth order and mother's employment status. The enabling factors were made up of the mother's autonomy to decide health care utilization, distance to the health facility and household wealth index.

The child's age was used to measure the need factor.²¹ A similar framework has been used in literature.²² This study, therefore, evaluated the level of awareness of mothers and factors associated with the utilization of use of ORS and zinc in managing diarrhoea among U5C in Oyo State, Nigeria.

METHODS

Study design

A cross-sectional study design involving both qualitative and quantitative data was used. Questionnaires were used for the quantitative study while focus group discussion (FGD) and key informant interviews (KII) were used to collect the qualitative data.

Study location

This study was carried out in the Oyo State of Nigeria using a case study approach whereby the researcher actively engages the stakeholders during the research. Oyo state has the highest burden of diarrhoea in South-West Nigeria (Figure 1). One of every under 5 children in Oyo state experienced diarrhoea within two weeks.²³ The state has one tertiary hospital, 3 secondary hospitals and over 500 primary health facilities.

Study population

The study population consisted of U5C in regular households in the Oyo State of Nigeria. The study sample were mothers of the U5C in selected households across the state for the quantitative and the qualitative study.

Sampling strategy

The sampling was a multi-stage cluster sampling. The most current (2006) Nigeria National population and housing census for Oyo State was used as the sampling frame. The EAs are the clusters and are the primary sampling unit in this study. At the first stage, 2 LGAs were randomly selected from the LGAs in each senatorial district, then 5 clusters each were randomly selected from the selected LGAs. In the third stage, 25 households were randomly selected in each cluster, however, a household must have at least one under-five child to be selected. Households with no U5C were skipped. Finally, one under-five child each was selected from the already selected households that have more than one under-five child. Mothers of U5C currently or who had any other ailment besides diarrhoea within two weeks before the survey would not participate in the study. Further exclusion criteria were mental disorders or neuropsychological factors which could impede the capacity of the mothers to answer interview questions. The Two FGD and four KII participants were purposively sampled.

Variables

The conceptual framework that guided the choice of explanatory variables is shown in (Figure 2). The outcome variable is use of Zinc/ORS and management of diarrhoea among under 5 children. Guided by the theoretical and conceptual frameworks, the explanatory

variables included sociodemographic characteristics, housing characteristics, household wealth tertiles etc. Full details are shown in Table 1. The guide for qualitative data contained questions on policies relating to the management of diarrhoea, knowledge, practices and availability of ORS and zinc in health facilities and attitudes of health personnel towards the prescription of ORS and zinc for management of diarrhoea among U5C.

Data management and statistical analysis

A total of 1,154 mothers and guardians were interviewed for the quantitative study. Data were collected using a pretested semi-structured interviewer-administered questionnaire. Qualitative data was collected using FGD, KII and document reviews in Nigeria. Data was analysed in STATA version 17 while the qualitative data was analyzed in Nvivo 15. Basic descriptive statistics comprising mean, standard deviation, proportions, rates, ratios, and confidence intervals were used to summarize quantitative data and other categorical data. Bivariate tests of association between the dependent variable (utilization of ORS/Zinc) and the independent variables were carried out using chi-square tests. Statistical significance was considered at $p=0.05$.

RESULTS

Of the 1,154 mothers/guardians who participated in the study, 14 (1.2%) were aged 15 to 19 years, 2160 (13.9%) were aged 20 to 24 years, while 324 (28.1%) were aged 25 to 29 years. The majority, 1,118 (96.9%), of the respondents were living with a sexual partner or currently married. A total of 946 respondents (82.0%) are from male-headed households. About three quarters (845 (73.2%)) resided in the urban areas while only 56.3% had no problem with distances to getting healthcare services. About 73% of the respondents could correctly identify the symptoms of diarrhoea while 6% of the children had a recent episode of diarrhoea (Table 1).

Knowledge of symptoms of diarrhoea among mothers/guardians

On the correct description of symptoms of diarrhoea, 839 (72.7%) had good knowledge (Table 1). The characteristics that are significant with correct knowledge of symptoms of diarrhoea are marital status (p value=0.006), partner's education (p value=0.047), health care autonomy (p value=0.000), and having a problem with distance to healthcare services (p value=0.000). The outcome of the FGD and KIIs showed that the discussants have a good knowledge of the symptoms of diarrhoea. According to the FGD, most of the discussants described what diarrhoea is. A mother aged 45 years, speaking Yoruba language, the predominant local language in the study area stated that; "It is "igbegbuuru". Meaning watery stool" (Female, 45, FGD 1). This description was further explained by a younger mother aged 24 years in the second FGD.

Table 1: Distribution of study participants by maternal characteristics, knowledge of symptoms, recent episode, and level of awareness of the use of ORS/zinc for managing diarrhoea

Characteristics	N (%)	Knows diarrhoea symptoms	Recently had diarrhoea	Aware of ORS/Zinc
Maternal age (years)				
15-19	14 (1.2)	10 (71.4)	0 (0.0)*	9 (64.3)*
20-24	160 (13.9)	118 (73.8)	11 (6.9)	143 (89.4)
25-29	324 (28.1)	231 (71.3)	31 (9.6)	302 (93.2)
30-39	525 (45.5)	386 (73.5)	23 (4.4)	476 (90.7)
40-49	131 (11.4)	94 (71.8)	6 (4.6)	115 (87.8)
Marital status				
Never married	20 (1.7)	15 (75.0)*	1 (5.0)	16 (80.0)
Living with sexual partner	1118 (96.9)	818 (73.2)	70 (6.3)	1013 (90.6)
Formerly	16 (1.4)	6 (37.5)	0 (0.0)	16 (100.0)
Maternal education				
None	172 (14.9)	128 (74.4)	3 (1.7)*	120 (69.8)*
Primary	201 (17.4)	139 (69.2)	10 (5.0)	181 (90.0)
Secondary+	781 (67.7)	572 (73.2)	58 (7.4)	744 (95.3)
Partner education				
None	193 (17.3)	155 (80.3)*	4 (2.1)*	148 (76.7)*
Primary	155 (13.9)	109 (70.3)	7 (4.5)	137 (88.4)
Secondary+	767 (68.8)	553 (72.1)	59 (7.7)	727 (94.8)
Religion				
Catholic	536 (46.4)	396 (73.9)	32 (6.0)	485 (90.5)
Islam	618 (53.6)	443 (71.7)	39 (6.3)	560 (90.6)
Tribe				
Hausa/Fulani	55 (4.8)	40 (72.7)	3 (5.5)	39 (70.9) *
Yoruba	946 (82)	694 (73.4)	65 (6.9)	891 (94.2)
Igbo	20 (1.7)	17 (85.0)	1 (5.0)	20 (100.0)
Others	133 (11.5)	88 (66.2)	2 (1.5)	95 (71.4)
Sex of household head				
Male	946 (82)	682 (72.1)	58 (6.1)	858 (90.7)
Female	208 (18)	157 (75.5)	13 (6.3)	187 (89.9)
Household wealth tertiles				
Lowest	385 (33.4)	268 (69.6)	20 (5.2)	312 (81.0)*
Middle	385 (33.4)	280 (72.7)	23 (6.0)	365 (94.8)
Highest	384 (33.3)	291 (75.8)	28 (7.3)	368 (95.8)
Media				
No	174 (15.1)	129 (74.1)	10 (5.7)	153 (87.9)
Yes	980 (84.9)	710 (72.4)	61 (6.2)	892 (91.0)
Drinking water source				
Unimproved	329 (28.5)	93(71.7)	21(6.4)	295(89.7)*
Improved	825 (71.5)	222(73.1)	50(6.1)	775(93.9)
Open defecation				
No	702 (60.8)	507 (72.2)	49 (7.0)	666 (94.9)*
Yes	452 (39.2)	332 (73.5)	22 (4.9)	379 (83.8)
Covered by health insurance				
No	1138 (98.6)	827 (72.7)	69 (6.1)	1029 (90.4)
Yes	16 (1.4)	12 (75.0)	2 (12.5)	16 (100.0)
Health care autonomy				
Respondent	128 (11.4)	60 (46.9)*	5 (3.9)*	121 (94.5)
Both	636 (56.8)	519 (81.6)	32 (5.0)	576 (90.6)
Spouse alone	355 (31.7)	240 (67.6)	33 (9.3)	316 (89.0)
Problem with distance to healthcare				
Not a big problem	650 (56.3)	410 (63.1)*	60 (9.2)*	601 (92.5)*
Big problem	504 (43.7)	429 (85.1)	11 (2.2)	444 (88.1)

Continued.

Characteristics	N (%)	Knows diarrhoea symptoms	Recently had diarrhoea	Aware of ORS/zinc
Type of place of residence				
Urban	845 (73.2)	624 (73.8)	62 (7.3)*	789 (93.4)*
Rural	309 (26.8)	215 (69.6)	9 (2.9)	256 (82.8)
Total	1154 (100)	839 (72.7)	71 (6.2)	1045 (90.6)

*Significant association at 5% X² test

“Diarrhoea is when a child stools continuously for several days and the stool has water” (Mother, 24, FGD 2). However, another mother with a child of two years claimed that she doesn’t know what diarrhoea is. She claimed that her child never had it so she doesn’t know what it is. “Diarrhoea? I don’t know what it is. My child never had anything like that” (Mother, 19, FGD 2).

Prevalence of diarrhoea among U5C

Of the 1154 respondents, only 71 had diarrhoea within two weeks before the data collection, indicating overall prevalence of 6.2% (Table 1). The characteristics that were significant with likelihood of diarrhoea are maternal age (p value=0.026), maternal education (p value=0.015), partner’s education (p value=0.010), health care autonomy (p value=0.015), and having problem with distance to healthcare services (p value=0.000) and place of residence (p value=0.006). Both the participants in the KII and FDG agreed that diarrhoea is common in the area. A 53-year-old medical director who works in a secondary-level hospital in Ibadan stated that he treats at least 8 children per week for diarrhoea. “Yes, diarrhoea is common in this area. I treat at least 8 cases of diarrhoea every week” (Medical Doctor, 53, KII 1). His assertions were further confirmed by the director of child care, Oyo State ministry of health, Ibadan. He stated that diarrhoea is a common childhood disease in the area and that government encourages mothers to report occurrences of diarrhoea to the nearest hospital as soon as it is noticed. “Yes, the government is aware of the problem of diarrhoea among under-five children in the state. The government encourages mothers to report occurrences of diarrhoea to the nearest hospital as soon as it is noticed” (Director, MoH, 45, KII 4).

Awareness of the use of ORS/zinc for managing diarrhoea cases among U5C

The overall level of awareness of the use of ORS/zinc for managing diarrhoea cases among U5C was 90.6%. The level was 64.3% among the mothers aged 15 to 19 years, 89.4% among mothers aged 20 to 24 years, 93.2% among mothers aged 25 to 29 years, 90.7% among those aged 30 to 39 years and 87.8% among those aged 40 years or more. Also, all the formerly married women claimed to be aware of the use of ORS/zinc compared with 80.0% among the never married and 90.6% among those living with sexual partners (Table 1). Most discussants in the two FGDs were unanimous in their agreement that they are aware that ORS could be used to treat and properly manage diarrhoea episodes among U5C. “I have heard

about ORS and zinc and have even used it before when my child had diarrhoea last year”, (Mother, 38, FGD 2). “I have bought it from a chemist near my house before. I have used it for my son when he was 3 and half years” (Woman, 32, FGD 1). Some of the respondents claimed that they have never heard about ORS and Zinc. “No, I don’t know ORS or zinc. I never hear about it” (Woman, 23, FGD 1). The officials from the Ministry of Health and the local hospitals claimed that ORS and zinc is well known in the state and that it is usually advertised, given and promoted among pregnant women in the study area. “Most people are aware of the need to use ORS and zinc to treat diarrhoea in Oyo state because we are always announcing it on radio and television” (Director, MoH, 45, KII 4). “We show it to all nursing mothers during our maternity meetings. The mothers are educated on how to use it. They are always reminded that they can get it from local chemists and shops when their children has diarrhoea” (Female Medical Doctor, 37 years, KII 2). Some of the discussants in the FGDs reported the use of ORS and zinc in managing diarrhoea episodes among U5C. “I have used ORS and zinc before when my child had diarrhoea last year”, (Mother, 38, FGD 2). “I have used it for my son, when he was 3 and half years” (Mother, 32, FGD 1). However, some of the respondents claimed that they have never used ORS and zinc to treat or manage diarrhoea. “No, I don’t know ORS or Zinc. So I never use am before” (Guardian, 44, FGD 1). “I have heard about it but I never use am, as none of my children had diarrhoea” (Mother, 18, FGD 2).

Use of ORS/zinc for managing diarrhoea cases among U5C

The overall prevalence of ever-use of ORS/zinc for managing diarrhoea cases among U5C was 5.4% as shown in (Table 2).

The prevalence of ever-use of ORS/zinc for managing diarrhoea cases among U5C was 0.0% among the mothers aged 15 to 19 years, 8.1% among mothers aged 20 to 24 years, 10.5% among mothers aged 25 to 29 years, 2.3% among those aged 30 to 39 years and also among those aged 40 years or more. Also, none of the never-married and formerly married women claimed to have ever used ORS/zinc compared with 5.5% among those living with sexual partners. Some of the discussants in the FGDs reported the use of ORS and zinc in managing diarrhoea episodes among under-five children. “I have used ORS and zinc before when my child had diarrhoea last year”, (Mother, 38, FGD 2). “I have used it for my son, when he was 3 and half years” (Mother, 32, FGD 1).

Table 2: Prevalence of ever utilization of ORS/zinc for managing diarrhoea.

Characteristics	N	Ever used ORS/zinc N (%)	X ² , p value
Maternal age (years)			
15-19	14	0 (0.0)	0.000
20-24	160	13 (8.1)	
25-29	324	34 (10.5)	
30-39	525	12 (2.3)	
40-49	131	3 (2.3)	
Marital status			
Never married	20	0 (0.0)	0.348
Living with sexual partner	1118	62 (5.5)	
Formerly	16	0 (0.0)	
Maternal education			
None	172	1 (0.6)	0.009
Primary	201	11 (5.5)	
Secondary+	781	50 (6.4)	
Religion			
Catholic	536	36 (6.7)	0.213
Islam	618	26 (4.2)	
Tribe			
Hausa/Fulani	55	1 (1.8)	0.083
Yoruba	946	54 (5.7)	
Igbo	20	3 (15.0)	
Others	133	4 (3.0)	
Sex of household head			
Male	946	52 (5.5)	0.690
Female	208	10 (4.8)	
Household wealth tertiles			
Lowest	385	16 (4.2)	0.354
Middle	385	25 (6.5)	
Highest	384	21 (5.5)	
Media access			
No	174	10 (5.7)	0.812
Yes	980	52 (5.3)	
Drinking water source			
Unimproved	329	19(5.8)	0.000
Improved	825	43(5.2)	
Open defecation			
No	702	39 (5.6)	0.731
Yes	452	23 (5.1)	
Covered by health insurance			
No	1138	58 (5.1)	0.000
Yes	16	4 (25.0)	
Health care autonomy			
Respondent	128	5 (3.9)	0.002
Both	636	25 (3.9)	
Spouse alone	355	32 (9.0)	
Problem with distance to HF healthcare			
Not a big problem	650	45 (6.9)	0.008
Big problem	504	17 (3.4)	
Type of place of residence			
Urban	845	48 (5.7)	0.443
Rural	309	14 (4.5)	
Total	1154	62(5.4)	

*Significant at 5% level of Chi-square; HF Health facility

However, some of the respondents claimed that they have never used zinc and ORS to treat or manage diarrhoea. “No, I don’t know ORS or Zinc. So I never use am

before” (Guardian, 44, FGD 1). “I have heard about it but I never use am, as none of my children had diarrhoea” (Mother, 18, FGD 2).

Table 3: Distribution of ORS or Zinc utilization in diarrhoea management.

Characteristics	N	Used something	Used ORS	Used Zinc	Used either	Used both
		N (%)	N (%)	N (%)	N (%)	N (%)
Child age (months)						
0 to 6	8	5 (62.5)	3 (37.5)	2 (25.0)	4 (50.0)	1 (12.5)
7 to 23	37	24 (64.9)	23 (62.2)	15 (40.5)	25 (67.6)	13 (35.1)
24 to 59	26	10 (38.5)	12 (46.2)	5 (19.2)	12 (46.2)	5 (19.2)
Sex of child						
Male	41	24 (58.5)	21 (51.2)	15 (36.6)	23 (56.1)	13 (31.7)
Female	30	15 (50.0)	17 (56.7)	7 (23.3)	18 (60.0)	6 (20.0)
Birth order						
1	10	*9 (90.0)	7 (70.0)	*5 (50.0)	*7 (70.0)	5 (50.0)
2	18	11 (61.1)	10 (55.6)	9 (50.0)	13 (72.2)	6 (33.3)
3	23	13 (56.5)	15 (65.2)	5 (21.7)	15 (65.2)	5 (21.7)
4+	20	6 (30.0)	6 (30.0)	3 (15.0)	6 (30.0)	3 (15.0)
Dejure USC in HH						
1	27	18 (66.7)	12 (44.4)	11 (40.7)	14 (51.9)	9 (33.3)
2	35	16 (45.7)	19 (54.3)	7 (20.0)	20 (57.1)	6 (17.1)
3	9	5 (55.6)	7 (77.8)	4 (44.4)	7 (77.8)	4 (44.4)
Maternal age (years)						
20-24	11	9 (81.8)	*9 (81.8)	4 (36.4)	*9 (81.8)	4 (36.4)
25-29	31	14 (45.2)	19 (61.3)	9 (29.0)	21 (67.7)	7 (22.6)
30-39	23	13 (56.5)	8 (34.8)	8 (34.8)	9 (39.1)	7 (30.4)
40-49	6	3 (50.0)	2 (33.3)	1 (16.7)	2 (33.3)	1 (16.7)
Marital status						
Never married	1	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Living with sexual partner	70	38 (54.3)	38 (54.3)	22 (31.4)	41 (58.6)	19 (27.1)
Maternal education						
None	3	2 (66.7)	1 (33.3)	1 (33.3)	1 (33.3)	1 (33.3)
Primary	10	6 (60.0)	6 (60.0)	2 (20.0)	6 (60.0)	2 (20.0)
Secondary+	58	31 (53.4)	31 (53.4)	19 (32.8)	34 (58.6)	16 (27.6)
Partner education						
None	4	2 (50.0)	1 (25.0)	1 (25.0)	1 (25.0)	1 (25.0)
Primary	7	5 (71.4)	4 (57.1)	0 (0.0)	4 (57.1)	0 (0.0)
Secondary+	59	31 (52.5)	33 (55.9)	21 (35.6)	36 (61)	18 (30.5)
Religion						
Catholic	32	15 (46.9)	20 (62.5)	11 (34.4)	21 (65.6)	10 (31.3)
Islam	39	24 (61.5)	18 (46.2)	11 (28.2)	20 (51.3)	9 (23.1)
Tribe						
Others	6	4 (66.7)	4 (66.7)	3 (50.0)	4(66.7)	3 (50.0)
Yoruba	65	35 (53.8)	34 (52.3)	19 (29.2)	37 (56.9)	16 (24.6)
Sex of household head						
Male	58	29 (50.0)	31 (53.4)	*15 (25.9)	33 (56.9)	13 (22.4)
Female	13	10 (76.9)	7 (53.8)	7 (53.8)	8 (61.5)	6 (46.2)
Household wealth tertiles						
Lowest	20	12 (60.0)	10 (50.0)	7 (35.0)	10 (50.0)	7 (35)
Middle	23	12 (52.2)	13 (56.5)	7 (30.4)	14 (60.9)	6 (26.1)

Continued.

Characteristics	N	Used something	Used ORS	Used Zinc	Used either	Used
		N (%)	N (%)	N (%)	N (%)	N (%)
Household wealth tertiles						
Highest	28	15 (53.6)	15 (53.6)	8 (28.6)	17 (60.7)	6 (21.4)
Media access						
No	10	7 (70.0)	6 (60.0)	3 (30.0)	7 (70.0)	2 (20.0)
Yes	61	32 (52.5)	32 (52.5)	19 (31.1)	34 (55.7)	17 (27.9)
Covered by health insurance						
No	69	38 (55.1)	36 (52.2)	21 (30.4)	39 (56.5)	18 (26.1)
Yes	2	1 (50.0)	2 (100.0)	1 (50.0)	2 (100.0)	1 (50.0)
Health care autonomy						
Respondent	5	*2 (40.0)	3 (60.0)	1 (20.0)	3 (60.0)	1 (20.0)
Both	32	25 (78.1)	17 (53.1)	14 (43.8)	20 (62.5)	11 (34.4)
Spouse alone	33	11 (33.3)	18 (54.5)	7 (21.2)	18 (54.5)	7 (21.2)
Problem with distance to healthcare						
Not a big problem	60	30 (50.0)	*29 (48.3)	16 (26.7)	32 (53.3)	*13
Big problem	11	9 (81.8)	9 (81.8)	6 (54.5)	9 (81.8)	6 (54.5)
Type of place of residence						
Urban	62	32 (51.6)	31 (50.0)	18 (29.0)	34 (54.8)	15 (24.2)
Rural	9	7 (77.8)	7 (77.8)	4 (44.4)	7 (77.8)	4 (44.4)
Total	71	39 (54.9)	38 (53.5)	22 (31.0)	41 (57.7)	19 (26.8)

*Significant at 5% level of chi-square; HF Health facility.

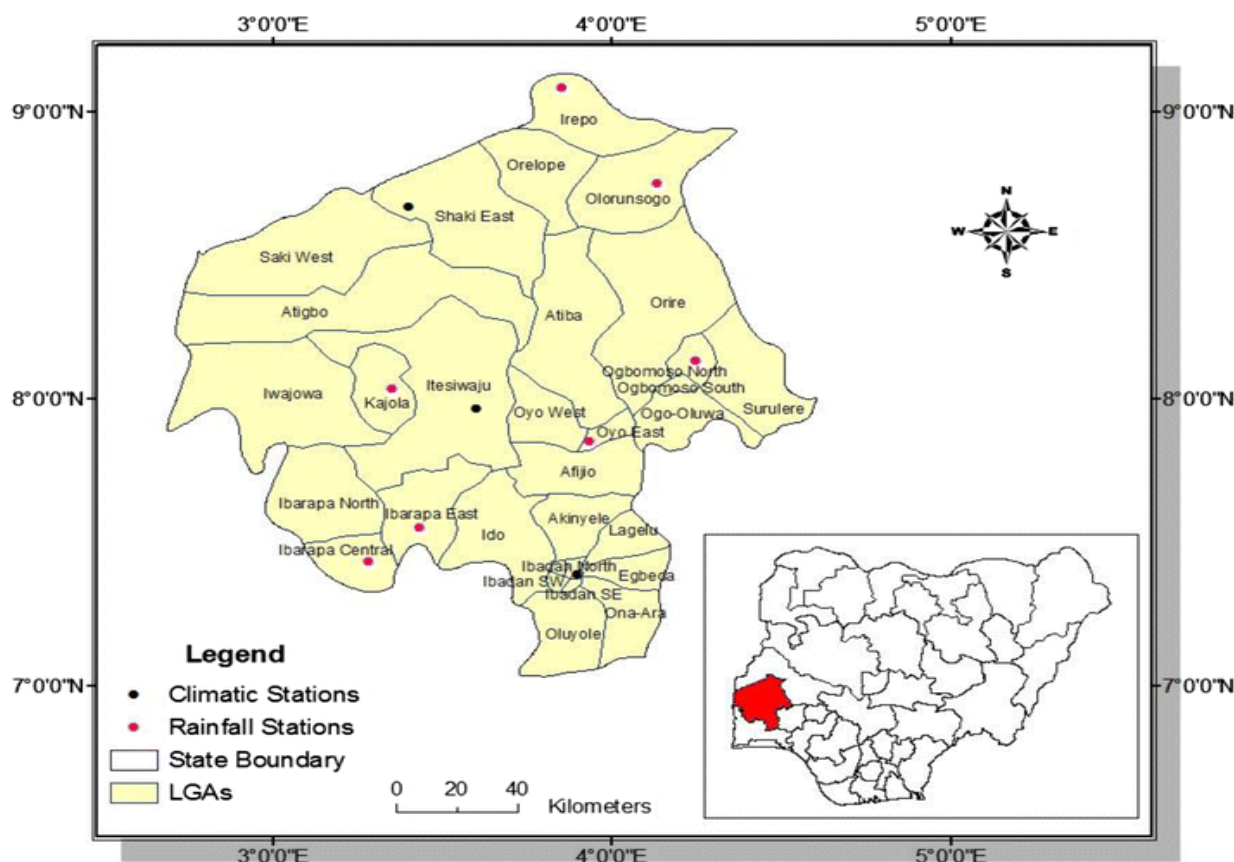


Figure 1: Map of Oyo state showing its location in Nigeria.

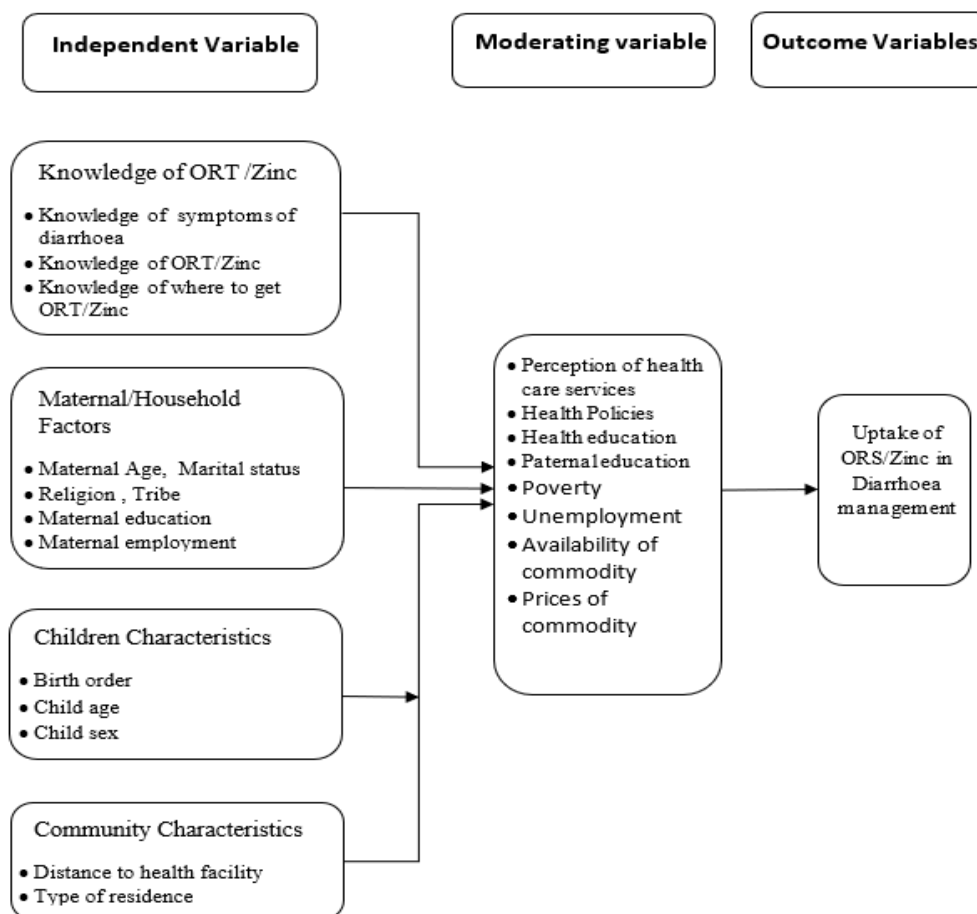


Figure 2: Conceptual framework for the study.

Table 4: Factors associated with the use of ORS in managing diarrhoea.

Characteristics	Crude Odds ratio (95% CI)	Adjusted Odds
Child age (months)		
0 to 6	2.74 (0.57-13.27)	-
7 to 23	1.43 (0.28-7.26)	-
24 to 59	Reference	-
Sex of child		
Male	Reference	-
Female	1.25 (0.48-3.21)	-
Birth order		
1	5.84 (1.84-28.53)	2.64 (1.18-10.27)
2	4.92 (1.77-11.07)	2.51 (0.37-8.86)
3	4.28 (1.21-10.81)	2.43 (0.53-11.07)
4+	Reference	-
Maternal age (years)		
20-24	8.44 (1.46-28.85)	9.15 (1.99-34.47)
25-29	3.97 (1.97-9.12)	3.82 (1.02-14.27)
30-39	Reference	-
40-49	0.94 (0.14-6.28)	0.37 (0.02-6.66)
Maternal education		
None	Reference	-
Primary	3.00 (0.20-45.24)	-
Secondary+	2.30 (0.20-26.75)	-

Continued.

Characteristics	Crude Odds ratio (95% CI)	Adjusted Odds
Religion		
Catholic	0.51 (0.20-1.33)	-
Islam	Reference	-
Tribe		
Others	Reference	-
Yoruba	2.19 (0.19-25.4)	-
Sex of household head		
Male	Reference	-
Female	1.02 (0.30-3.4)	0.91 (0.21 – 3.89)
Household wealth tertiles		
Lowest	Reference	-
Middle	1.30 (0.39-4.33)	-
Highest	1.15 (0.37-3.64)	-
Media access		
No	Reference	-
Yes	0.74 (0.19-2.87)	-
Health care autonomy		
Respondent	1.25 (0.18-8.49)	-
Both	0.94 (0.36-2.51)	-
Spouse alone	Reference	-
Problem with distance to HF healthcare		
Not a big problem	Reference	-
Big problem	4.81 (0.96-24.15)	0.07 (0.01-0.72)
Type of place of residence		
Urban	Reference	-
Rural	3.50 (0.67-18.20)	-

About half (54.9%) of the respondents claimed to have used something to manage diarrhoea recently. Thirty-eight of the 71 (53.5%) mothers who reported a recent episode of diarrhoea among their U5C claimed to have used ORS to manage the episode (Table 3). The prevalence of recent ORS use for male children was 51.2% and 56.7% among female children (p value=0.649) and higher $n=23$ (62.2%) among children aged 7 to 23 months compared with 37.5% and 46.2% for children aged 0 to 6 and 24 to 59 months respectively (p value=0.286). A total of 22 of the 71 mothers who reported a recent episode of diarrhoea among their U5C claimed to have used Zinc to manage the episode. Two thirds; 41 of the 71 (57.7%) mothers who reported a recent episode of diarrhoea among their U5C claimed to have used ORS or Zinc to manage the episode of diarrhoea.

The prevalence of recent use of either ORS or zinc use for male children was 56.1% and 60.5% among female children and $n=25$ (67.6%) among children aged 7 to 23 months compared with 50.0% and 46.2% for children aged 0 to 6 and 24 to 59 months respectively. Also, the use increased with a higher number of de jure members of each household with 51.9% for only 1 usual member, 57.1% for 2 usual members and 77.8% for 3 or more usual members of the households (Table 3). A total of 19 of the 71 (26.8%) mothers who reported recent episode of

diarrhoea among their U5C claimed to have used both ORS and zinc to manage the most recent episode of diarrhoea cases among U5C.

The prevalence among male children was 31.7% and 20.0% among female children (p value=0.271) and 35.1% among children aged 7 to 23 months compared with 12.5% and 19.2% for children aged 0 to 6 and 24 to 59 months respectively (p value=0.234). The unadjusted odds of using ORS/zinc in managing diarrhoea was 6 times (OR=5.84; 95% CI: 1.84-28.53), 5 times (OR=4.92; 95% CI: 1.77-11.07), and 4 times (OR=4.28; 95% CI: 1.21-10.81) more likely among mothers whose child had first, second and third birth order respectively than those with fourth or higher birth orders (Table 4). The odds of using ORS/zinc in managing diarrhoea was 8 times (OR=8.44; 95% CI: 1.46-28.85) among mothers aged 20 to 24 years and 4 times (OR=3.97; 95% CI: 1.97-9.12) among children of mothers aged 25 to 29 years than those aged 30 to 34 years.

In the multivariable model, while controlling for other variables, the adjusted odds of using ORS/zinc to manage diarrhoea was 2.64 (aOR=2.64; 95% Confidence Interval (CI): 1.18-10.27) times higher among children who are the first births (first-order) than those with fourth birth order or higher. The adjusted odds of using ORS/zinc to manage diarrhoea was 9 times (aOR=9.15; 95% CI: 1.99-34.47) higher among mothers aged 20 to 24 years and

3.82 times (aOR= 3.82; 95% CI: 1.02-14.27) higher among mothers aged 25 to 29 years than those aged 30 to 39 years. The adjusted odds of using ORS/zinc to manage diarrhoea was lower (aOR=0.07; 95% CI: 0.01-0.72) among children whose mothers had no big problem accessing healthcare services compared with those that problems getting to health care facilities.

DISCUSSION

This study was designed to evaluate the knowledge of the symptoms of diarrhoea, awareness, utilization and factors associated with the utilization of use of ORS/zinc in managing diarrhoea among U5C in Oyo state, Nigeria. The results showed a very high level of knowledge of the symptoms of diarrhoea and awareness of the use of ORS/zinc for managing diarrhoea cases among U5C. Nine of every ten women interviewed claimed to have heard about the use of ORS/zinc for managing diarrhoea. The level varied by maternal age, maternal education, partner's education, tribe, household wealth tertiles, open defecation, and having a problem with distance to healthcare services and place of residence. The result in this study was comparable with what exists in the literature.²⁴⁻²⁶ Similarly, Riaz et al found that a good percentage of mothers had good knowledge of the purpose of ORS use (78%).²⁴ The authors found that only 39% of mothers had good knowledge about the use of zinc for managing diarrhoea. They reported that the level of awareness of the use of ORS and zinc varied by the respondents' characteristics.²⁴ The current study showed a huge disparity in the level of awareness of ORS/zinc as means of treating diarrhoea increased by educational attainment and by having health insurance coverage.

The two medical doctors interviewed stated that they prescribed ORS and zinc for diarrhoea management. This aligned with the reports of Omuemu et al. that two-thirds of the 168 health care workers who participated in the study were aware of zinc supplementation but specific knowledge of zinc supplementation in the management of childhood acute diarrhoea was poor.²⁶ Omuemu et al. reported that all but one of the participants prescribed zinc in addition to ORS.²⁶

While the overall prevalence of ever-use of ORS/zinc for managing diarrhoea cases among U5C stood at less than 6%, the current utilization among mothers whose children had diarrhoea within two weeks preceding the data collection was 54%. It is worth noting that 45% of the mothers whose children had diarrhoea within two weeks preceding the data collection did not use anything to treat the diarrhoea episode. This is very worrisome as this constitutes a great risk to the health of the vulnerable U5C. A similarly low level of diarrhoea management using ORS and zinc has been reported. For instance, Akinyemi et al. reported only 34% utilization of ORS for diarrhoea management, while Riaz et al found that a good percentage of mothers in their study initiated the use of ORS (68%).^{24,26} Compared with the findings that a total

of 22 of the 71 mothers who reported recent episodes of diarrhoea among their U5C claimed to have used Zinc to manage the episode, and 27% combining both ORS and Zinc, Akinyemi et al. reported only 2% for Zinc and a lowly 1% for joint utilization of both.²⁷ Also, Riaz et al found that the daily administration of Zinc was only done by one of every five of the mothers in their study.²⁴ Carvajal et al in a study entitled "diarrhea management in children under five in sub-Saharan Africa" reported that the prevalence of good diarrhoea management is low in 11 of the 12 countries included in the analysis except for Sierra Leone.¹⁵

The study showed that the prevalence varied from 17% in Cote d'Ivoire to 38% in Niger and 67% in Sierra Leone.¹⁵ The prevalence of ever use of ORS/zinc for managing diarrhoea cases was significantly associated with the level of awareness of the use of ORS/zinc for managing diarrhoea cases among U5C were maternal age, maternal education, partner's education, health insurance, healthcare autonomy, and having a problem with distance to healthcare services. However, the only significant characteristics associated with the current prevalence of use of ORS in managing diarrhoea cases among U5C were maternal age and having problems with getting to healthcare centres. Similar assertions have been made in the literature. Just as found in the current study, although insignificant, utilization of ORS and zinc in managing diarrhoea increased with mothers' educational attainment, Riaz et al found that more educated mothers had higher utilization of ORS and zinc.²⁴

Similarly, Akinyemi et al found higher utilization among urban dwellers, people with unimproved sources of water, household wealth quintile.²⁷ However, due to the low power of the models as a result of the limited sample size, as the data of only the 71 mothers whose children had a recent episode of diarrhoea were eligible for inclusion in the models, only a few variables were significant in the multivariable model, while controlling for other variables. These significant characteristics are the ages of the children, the mothers' age, and whether the mothers had problems accessing healthcare services compared with those that had problems getting to health care facilities. Only 71 of the 1154 study participants in the quantitative arm reported an episode of diarrhoea within the two weeks that preceded the data collection.

Hence only these participants were included in the models. This resulted in wide confidence intervals and made some well-known influencers of the uptakes of ORS to be insignificant. Another limitation is recall bias. However, a major strength of this study is the combination of both qualitative data and quantitative data.

Strengths and limitations

A major strength of this study is the combination of both qualitative data and quantitative data. The outcome of the

KIIs and the FGDs in the qualitative aspect of the study design gave credence to the outcomes of the quantitative arm. However, only 71 of the 1154 study participants in the quantitative arm reported an episode of diarrhoea within the two weeks that preceded the data collection. This resulted in wide confidence intervals and made some well-known influencers of the uptakes of ORS to be insignificant. Also, the responses were based on respondents' ability to correctly recall past events, this might have caused bias. However, the efforts were made by interviewers to aid the respondents to provide accurate responses.

CONCLUSION

Although there are high levels of awareness of the symptoms of diarrhoea among mothers in the study area and high levels of awareness of ORS and zinc in the management of diarrhoea but the utilization of ORS and zinc in the management of diarrhoea is low compared with the national average of 16.1% in 2018. Besides, some mothers cannot afford the commodity when it is unavailable in government hospitals. The associated factors with the utilization of these commodities are the children age, birth order, maternal age, maternal educational attainment, having a big problem accessing healthcare services and the places of residence of the children.

Recommendations

For adequate utilization of ORS and zinc for effective management of diarrhoea cases among U5C in the study area, there is need for quick and decisive steps to increase awareness and utilization of ORS and Zinc. The ministry of health and other stakeholders should review and strengthen the existing health education and promotion on the usefulness and effectiveness of ORS and zinc in managing diarrhoea. Policymakers should design evidence-based, community-feasible and community-suitable interventions to improve the utilization of ORS and zinc in managing diarrhoea.

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REFERENCES

1. GBD 2016 Diarrhoeal Disease Collaborators. Estimates of the global, regional, and National

morbidity, mortality, and aetiologies of diarrhoea in 195 countries: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet Infect Dis*. 2018;18:1211-28.

2. Gill CJ, Thea DM, Hibberd P. Diarrhoeal disease trends in the GBD 2015 study: optimism tempered by scepticism. *Lancet Infect Dis*. 2017;17:884-5.
3. Wilson ME. Global burden from diarrhea: decreasing but still a leading cause of death. *NEJM Journal Watch*. 2017;2017:1.
4. Benue State Government of Nigeria. Push Diarrhea Away. Shop Plus Project. Available at: <https://www.shopsplusproject.org/article/push-diarrhea-away-campaign-reaches-30000-benue-state>. Accessed on 5 March 2019.
5. Clinical Management of acute diarrhoea: WHO/UNICEF joint statement. Available at: <http://www.who.int/iris/handle/10665/68627>. Accessed on 5 March 2019.
6. Black RE. Progress in the use of ORS and zinc for the treatment of childhood diarrhea. *J Glob Heal*. 2019;9: 10-2.
7. Schroder K, Battu A, Wentworth L, Houdek J, Fashanu C, Wiwa O. Increasing coverage of pediatric diarrhea treatment in high-burden countries. *J Glob Heal*. 2019; 9:1-5.
8. Clinton Health Access Initiative. Zinc/ORS Scale-up in Nigeria. Available at: <https://www.clintonhealthaccess.org/>. Accessed on 5 March 2019.
9. Lenters LM, Das JK, Bhutta ZA. Systematic review of strategies to increase use of oral rehydration solution at the household level. *BMC Public Health*. 2013; 13(3): s28:1-8.
10. Lazzerini M, Wanzira H. Oral zinc for treating diarrhoea in children. *Cochrane Database Syst Rev*. 2016;12:CD005436.
11. Walker FCL, Rudan I, Liu L, Nair H, Theodoratou E, Bhutta ZA, et al. Global burden of childhood pneumonia and diarrhoea. *Lancet*. 2013;381:1405-16.
12. Diarrhoeal Disease. Available at: <http://www.who.int/mediacentre/factsheets/fs330/en/>. Accessed on 5 March 2019.
13. Onwukwe S, van Deventer C, Omole O. Evaluation of the use of oral rehydration therapy in the management of diarrhoea among children under 5: knowledge attitudes and practices of mothers/caregivers. *South African Fam Pract*. 2016;58:42-7.
14. Wagner Z, Shah M, Sood N. Barriers to use of oral rehydration salts for child diarrhea in the private sector: Evidence from India. *J Trop Pediatr*. 2015;61: 37-43.
15. Carvajal-vélez L, Amouzou A, Perin J, Maïga A, Tarekegn H, Akinyemi IA, et al. Diarrhea management in children under five in sub-Saharan Africa: does the source of care matter? A Countdown analysis. *BMC Public Health*. 2016;16:1-14.
16. Andersen RM. A behavioral model of families' use

- of health services. Research Series No. 25. Chicago, IL: Center for Health Service Publisher;1968.
17. Andersen RM. Revisiting the behavioral model and access to medical care: Does it matter?. *J Health Social Behav*. 1995;36:1-10.
 18. Wolinsky F. Seeking and Using Health Services. In: *The Sociology of Health*. 2nd ed. Belmont, Canada: Wadsworth; 1988.
 19. Aday L, Andersen RM. A framework for the study of access to medical care. *Health Serv Res*. 1974;9:208-20.
 20. Babitsch B, Gohl D, von Lengerke T. Das Verhaltensmodell der Inanspruchnahme gesundheitsbezogener Versorgung von Andersen re-revisited: Ein systematischer Review von Studien zwischen 1998-2011. *GMS Psycho-Social-Med*. 2012; 9:34-9.
 21. Cummings GG, Reid RC, Estabrooks CA, Norton PG, Cummings GE, Rowe BH, et al. Older persons' transitions in care (OPTIC): A study protocol. *BMC Geriatr*. 2012;12:42-7.
 22. Ghimire PR, Agho KE, Renzaho AMN, Dibley M, Raynes-Greenow C. Association between health service use and diarrhoea management approach among caregivers of under-five children in Nepal. *PLoS One*. 2018;13:e0191988.
 23. National Population Commission(NPC), ICF International. Nigeria Demographic and Health Survey 2018. Available at: <https://dhsprogram.com/>. Accessed on 5 March 2019.
 24. Riaz N, Tul Muntaha S, Qibtia M, Sohail S. Use of Zinc and Oral Rehydration Solution in Home Management of Diarrhea: Knowledge of Mothers attending a Tertiary Care Hospital. *J Islam Med Dent*. 2019;8:135-40.
 25. Lamberti LM, Fischer Walker CL, Taneja S, Mazumder S, Black RE. The Association between Provider Practice and Knowledge of ORS and zinc Supplementation for the Treatment of Childhood Diarrhea in Bihar, Gujarat and Uttar Pradesh, India: A Multi-Site Cross-Sectional Study. *PLoS One*. 2015; 10:e0130845.
 26. Omuemu VO, Ofuani IJ, Kubeyinje IC. Knowledge and use of zinc supplementation in the management of childhood diarrhoea among health care workers in public primary health facilities in Benin-City, Nigeria. *Glob J Health Sci*. 2012;4:68-76.
 27. Akinyemi IA, Fagbamigbe AF, Omoluabi E, Agunbiade OM, Adebayo SO. Diarrhoea Management Practices and Child Health Outcomes in Nigeria: Sub-National Analysis. *Adv Integr Med*. 2018;5:15-22.

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