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Original Article

Childhood diarrhoea in southwestern Nigeria: Predictors of low osmolarity ORS and zinc use among mothers

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الملخص

أهداف البحث: يوصف الإسهال على أنه سبب رئيسي للوفيات بين الأطفال في البلدان محدودة الموارد. توجد مؤلفات قليلة جدا حول العوامل التي تؤثر على الوعي واستخدام أملاح الإمهاء الفموي منخفضة الأسمولية ومكملات الزنك في علاج إسهال الأطفال بين الأطفال دون سن الخامسة في جنوب غرب نيجيريا. ولذلك أجريت هذه الدراسة في لاغوس، نيجيريا.

طرق البحث: باستخدام تصميم المسح المقطعي، تم اختيار 336 أم لأطفال دون سن الخامسة باستخدام إجراء أخذ عينات متعدد المراحل. تم جمع البيانات باستخدام استبانة تم اختبارها مسبقا وشبه منظمة بواسطة المحاور. واستخدمت الأساليب الإحصائية الوصفية والاستنتاجية لتحليل البيانات.

النتائج: 10.4٪ من الأمهات كن على دراية بأملاح الإمهاء الفموي منخفضة الأسمولية بينما 6.5٪ استخدمنه. كان 53.3٪ على دراية بمكملات الزنك بينما استخدمها 42٪ على الإطلاق. تأثر الوعي بأملاح الإمهاء الفموي بالمستوى التعليمي (نسبة الأرجحية 2.017) وعمر الطفل (نسبة الأرجحية 2.257)؛ بينما تأثر الوعي بمكملات الزنك بمتوسط الدخل الشهري (نسبة الأرجحية 1.582). ارتبط مستوى استخدام أملاح الإمهاء الفموي بالمستوى التعليمي والوعي؛ أما استخدام الزنك فقد ارتبط بالحالة الاجتماعية والوعي.

الاستنتاجات: بالمقارنة مع مكملات الزنك، كان الوعي واستخدام Lo-ORS ضعيفًا بين الأمهات. يجب تكثيف التوعية حول هذه المواد بين الأمهات والعاملين الصحيين من أجل تعزيز استخدامها وبالتالي المساعدة في سد الفجوة بين تغيير السياسات والفعالية.

الكلمات المفتاحية: الوعي؛ إسهال؛ العلاج بالسوائل؛ العلاج بأملاح الإمهاء الفموي؛ الزنك

Abstract

Objectives: Diarrhoea is a leading cause of mortality among children in resource-limited countries. However, very scarce literature exists regarding the factors influencing the awareness and use of low osmolarity oral rehydration salts (Lo-ORS) and zinc supplementation in the management of childhood diarrhoea among mothers of children under 5 years of age in southwestern Nigeria. This study, performed in Lagos, Nigeria, aimed to address this lack of knowledge.

Methods: Through a cross-sectional survey design, 336 mothers of children under 5 years of age were selected through a multi-stage sampling procedure. Data were collected with a pretested, semi-structured interviewer administered questionnaire and analysed in SPSS version 23. Descriptive and inferential statistical techniques were used for data analysis.

Results: A total of 10.4% of the mothers were aware of Lo-ORS, whereas 6.5% had ever used it; 53.3% were aware of zinc supplementation, whereas 42% had ever used it. Awareness was influenced by educational level (AOR: 2.017; 95% CI: 1.123–3.626) and the age of the child (AOR: 2.257; 95% CI: 1.237–4.117) for Lo-ORS, and by average monthly income (AOR: 1.582; 95% CI:

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1.144–2.187) for zinc supplementation. The utilisation level was associated with educational level ($p = 0.039$) and awareness ($p < 0.001$) for Lo-ORS, and with marital status ($p = 0.018$) and awareness ($p < 0.001$) for zinc supplementation.

Conclusion: Awareness and use of Lo-ORS was poorer than that of zinc supplementation among the mothers. Efforts to promote awareness regarding these treatments among mothers and health workers should be intensified to promote their use and help bridge the gap between policy change and effectiveness.

Keywords: Awareness; Diarrhoea; Low osmolarity ORS; Use; Zinc

Introduction

Diarrhoeal disease has been a leading cause of global morbidity and mortality, particularly among children in resource-limited countries.[1] The disease accounts for approximately 18% of child deaths and 13% of disability adjusted life years.[2] Worldwide, approximately 3.5 billion cases of acute diarrhoea and 3.2 episodes per child occur each year in children under 5 years of age.[3] In Africa, variations in childhood diarrhoeal morbidity and mortality have been reported, with the highest case fatality rates in Benin, Lesotho, Mali, Nigeria, and Sierra Leone.[4] In Nigeria, with a prevalence rate of 18.8%, the disease accounts for an estimated 150,000 deaths yearly among children under 5 years of age. Its status as the second leading killer disease of children under 5 years of age provides an alarming reminder of the susceptibility of Nigerian children.[5]

Dehydration and electrolyte imbalance are the crucial reasons for death from diarrhoea. Because water makes up a greater proportion of their body-weight, children are at greater risk of life-threatening dehydration than adults. They also use more water over the course of a day, owing to their higher metabolic rates, and their kidneys are less capable of conserving water than older children and adults.[6] Apart from dehydration and electrolyte imbalance, extended and recurrent episodes of diarrhoea frequently lead to stunting and growth failure in early childhood. Consequently, malnutrition further leads to recurrent diarrhoea, and the cycle continues.[7]

To fight against dehydration due to diarrhoea among children under the age of 5 years, the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) encouraged the use of oral rehydration salt (ORS) solutions in 1978. Although this measure decreased the mortality rate among children younger than 5 years of age from 4.5 to 1.8 million annually, diarrhoea still remained the second leading cause of death in children under 5 years of age.[2,8,9]

Consequently, the WHO introduced low osmolarity ORS and zinc supplementation in 2004, to further lessen the morbidity and mortality associated with diarrhoea. Low osmolarity ORS with diminished concentrations of sodium and glucose is associated with fewer unscheduled intravenous fluid infusions, lower stool volume, and less acetone vomiting than standard ORS, and is recommended for treating adults and children.[10] Zinc significantly decreases the severity and duration of diarrhoea in small children, particularly in developing countries.[11,12]

With adequate coverage and proper use of zinc supplementation and ORS, more than 75% of all diarrhoea deaths have been estimated to be preventable; thus, many developing countries have complied with including low osmolarity ORS and zinc supplementation in their diarrhoea management policies.[13] However, despite the evidence of its benefit, little progress has been made in the widespread introduction of low osmolarity ORS and zinc for diarrhoea treatment in Nigeria; therefore, Nigeria still has a high prevalence of diarrhoea leading to deaths among children under 5 years of age.[14]

To our knowledge, little literature is available regarding the factors influencing the awareness and use of low osmolarity ORS and zinc supplementation in diarrhoea management among mothers of children under 5 years of age in southwestern Nigeria. This study was performed to address the lack of studies in this area.

Materials and Methods

Study location

The Oshodi-Isolo local government area (LGA), an urban local government, is one of the 20 LGAs in Lagos State, southwestern Nigeria. Located in the Lagos West senatorial district, it is made up of 11 wards and covers a land area of 45.0 km^2. It is bounded by Ikeja (LGA) to the north, Surulere (LGA) to the south, Mushin (LGA) to the northeast, and Alimosho (LGA) to the west. Its population was estimated to be 629,061 in the national census in 2006.[15] The people are predominantly Yoruba, but other ethnic groups also reside in the LGA. The LGA has at least one primary health centre located in each ward.

Study design

This was a cross-sectional survey conducted among mothers 21–45 years of age with children under 5 years of age.

Sample size determination

On the basis of the assumption of a 95% level of confidence, and 28.8% of mothers having good knowledge of ORS in diarrhoeal management according to a previous study,[16] we used Cochran's formula for calculating single proportions[17] to determine a minimum sample size of 315. To compensate for improperly filled questionnaires, we

increased the calculated sample size by 5%, but a total of 336 respondents were eventually interviewed.

Sampling technique

The multistage sampling technique was used to recruit participants. Four of eleven wards were chosen through simple random sampling in the first phase. Ten streets were selected from each of the selected wards by balloting in phase two. In the third phase, eight or nine houses were selected from each of the selected streets through systematic sampling. From each selected house, an eligible respondent who gave consent to participate was interviewed.

Data collection tool/psychometric properties

We used a semi-structured pre-tested questionnaire adapted from the USAID toolkit for the collection of survey data on the correct use of paediatric zinc as a treatment for diarrhoea. The questionnaire was pre-tested in Mushin LGA, Lagos state. The face and content validity was ensured by an epidemiologist, a statistician, and experts in the field of study. The reliability of the instrument was tested, and a Cronbach alpha value of 0.73 was obtained.

Study variables

The independent variables were the respondents' socio-demographic characteristics, and the dependent variables were the use of low osmolarity ORS and zinc supplementation. Awareness of low osmolarity ORS and of zinc supplementation served as independent variables and dependent variables.

Data analysis

The data collected for the study were analysed in Statistical Package for Social Sciences (SPSS) version 23.0 for Windows, (IBM Corp., Armonk, N.Y., USA). Descriptive statistics based on frequencies and percentage distributions was calculated for categorical variables. The chi-square test and logistic regression were used for bivariate and multivariate analyses, respectively. A p-value <0.05 was considered statistically significant. Before the test for significance, the dataset was examined for multi-collinearity with the variance inflation factor diagnostic check. Multi-collinearity was absent with a variance inflation factor ranging from 1.0 to 1.1 for all independent variables and 3.1 for respondents' age, thus qualifying the variables for significance testing.

Table 1: Socio-demographic characteristics of the respondents.

Variables	Frequency (n = 336)	Percentage
Age of mother (in years)		
21–25	31	9.2
26–30	122	36.3
31–35	110	32.7
36–40	49	14.6
41–45	24	7.2
Mean ± SD	31.9 ± 5.11	
Marital status		
Married	320	95.2
Separated	4	1.2
Single	12	3.6
Ethnic group		
Yoruba	148	44.0
Igbo	89	26.5
Hausa	13	3.9
Others	86	25.6
Educational level		
No formal	8	2.4
Primary	41	12.2
Secondary	133	39.6
Tertiary	154	45.8
Occupation		
Unskilled	196	58.3
Manually skilled	44	13.1
Skilled	60	17.9
Professional	36	10.7
Average monthly income (in Naira)		
<10,000	14	4.2
10,000–<20,000	26	7.7
20,000–<50,000	208	61.9
≥50,000	88	26.2
Number of children		
1	43	12.8
2	124	36.9
3	109	32.4
4	38	11.3
≥5	22	6.6
Age of child (in years)		
1	65	19.3
2	113	33.6
3	82	24.4
4	63	18.8
≥5	13	3.9
Mean ± SD	2.6 ± 1.13	
Sex of child		
Female	176	52.4
Male	160	47.6

SD: standard deviation.

Results

A total of 336 questionnaires were administered, and all were properly filled and returned, thus resulting in a response rate of 100%. The socio-demographic characteristics of the respondents are shown in Table 1. Most (36.3%) respondents were 26–30 years old, with an average age of 31.9 ± 5.11 years. Most were married (95.2%), unskilled (58.3%), earned an average monthly income of 20,000–50,000 Naira (61.9%), and had two or three children (69.3%). A substantial proportion of respondents were members of the Yoruba tribe (44%) and had tertiary education (45.8%). Most of the children were girls (52.4%) 2–3 years of age (58%), with a mean age of 2.6 ± 1.13 years.

Table 2 displays the awareness and use of low osmolarity ORS/zinc supplementation among the mothers. Very few (10.4%) mothers were aware of low osmolarity ORS, whereas a high proportion (53.3%) were aware of zinc supplementation. In addition, only 6.5% and 42% of the mothers had ever used low osmolarity ORS and zinc supplementation, respectively.

The association between socio-demographic characteristics and awareness of low osmolarity ORS/zinc

Table 2: Awareness and use of low osmolarity ORS and zinc supplementation in the management of diarrhoea among respondents.

	Frequency	Percentage
Awareness		
Low osmolarity ORS		
Aware	35	10.4
Not aware	301	89.6
Total	336	100.0
Zinc supplementation		
Aware	179	53.3
Not aware	157	46.7
Total	336	100.0
Use		
Low osmolarity ORS		
Ever used	22	6.5
Never used	314	93.5
Total	336	100.0
Zinc supplementation		
Has ever used	141	42.0
Has never used	195	58.0
Total	336	100.0

supplementation among the mothers is presented in Table 3. Within the Yoruba ethnicity, only 11.5% of respondents were aware of low osmolarity ORS. In addition, a minority (16.9%) of mothers with tertiary education were aware of low osmolarity ORS. Most (93.8%) mothers with children 1–2 years of age were unaware of low osmolarity ORS. A high proportion (91.7%) of mothers who had never been married were unaware of zinc supplementation. In addition, 67.5% of the mothers with income below 20,000 Naira were not aware of zinc supplementation for the management of diarrhoea.

Table 4 shows the association between socio-demographic characteristics and the use of low osmolarity ORS/zinc supplementation among the mothers. Educational level ($p = 0.039$) and marital status ($p = 0.018$) were significantly associated with the use of low osmolarity ORS and zinc supplementation. Most (91.7%) of the unmarried mothers had never used zinc supplementation, whereas 89.6% of mothers with tertiary education had never used low osmolarity ORS for diarrhoea management in their children.

The association between the awareness of and the use of low osmolarity ORS/zinc among the mothers is shown in

Table 3: Association between socio-demographic factors and awareness of low osmolarity ORS in the management of diarrhoea among respondents.

Variable	Low osmolarity ORS			Zinc		
	Aware	Not aware	p-value	Aware	Not aware	p-value
Age (years)						
≤30	13 (8.5)	140 (91.5)	0.37[a]	77 (50.3)	76 (49.7)	0.379[a]
>30	22 (12.0)	161 (88.0)		102 (55.7)	81 (44.3)	
Marital status						
Ever married	33 (10.2)	291 (89.8)	0.36[a]	178 (54.9)	146 (45.1)	0.004[a,*]
Never married	2 (16.7)	10 (83.3)		1 (8.3)	11 (91.7)	
Ethnic group						
Yoruba	17 (11.5)	131 (88.5)	0.004*	78 (52.7)	70 (47.3)	0.953
Igbo	5 (5.6)	84 (94.4)		46 (51.7)	43 (48.3)	
Hausa	5 (38.5)	8 (61.5)		7 (53.8)	6 (46.2)	
Other	8 (9.3)	78 (90.7)		48 (55.8)	38 (44.2)	
Educational level						
No formal	1 (12.5)	7 (87.5)	0.003*	3 (37.5)	5 (62.5)	0.839
Primary	3 (7.3)	38 (92.7)		22 (53.7)	19 (46.3)	
Secondary	5 (3.8)	128 (96.2)		72 (54.1)	61 (45.9)	
Tertiary	26 (16.9)	128 (83.1)		82 (53.2)	72 (46.8)	
Occupation						
Unskilled	19 (0.7)	177 (90.3)	0.17	108 (55.1)	88 (44.9.1)	0.161
Manually skilled	2 (4.5)	42 (95.5)		23 (52.3)	21 (47.7)	
Skilled	7 (11.7)	53 (88.3)		25 (41.7)	35 (58.3)	
Professional	7 (11.7)	29 (80.6)		23 (63.9)	13 (36.1)	
Average monthly income (in Naira)						
<20,000	4 (10.0)	36 (90.0)	0.055	13 (32.5)	27 (67.5)	0.007*
20,000–<50,000	16 (7.7)	192 (92.3)		111 (53.4)	97 (46.6)	
50,000 or above	15 (17)	73 (83)		55 (62.5)	33 (37.5)	
Number of children						
0–4	33 (10.5)	281 (89.5)	0.833	168 (53.5)	146 (46.5)	0.922
5–6	2 (9.1)	20 (90.9)		11 (50.0)	11 (50.0)	
Age of child						
1–2	11 (6.2)	167 (93.8)	0.016*	92 (51.7)	86 (48.3)	0.659
3–4	21 (14.5)	124 (85.5)		81 (55.9)	64 (44.1)	
5–6	3 (23.1)	10 (76.9)		6 (46.2)	7 (53.8)	

*$p < 0.05$.
[a] Yates' correction.

Table 4: Association between socio-demographic factors and use of low osmolarity ORS/zinc in the management of diarrhoea among respondents.

Variable	Low osmolarity ORS			Zinc		
	Ever used	Never used	p-value	Ever used	Never used	p-value
Age (years)						
≤30	12 (7.8)	141 (92.2)	0.512[a]	59 (38.6)	94 (61.4)	0.296[a]
>30	10 (5.5)	173 (94.5)		82 (44.8)	101 (55.2)	
Marital status						
Ever married	21 (6.5)	303 (93.5)	1.000[a]	140 (43.2)	184 (56.8)	0.035[a,*]
Never married	1 (8.3)	11 (91.7)		1 (8.3)	11 (91.7)	
Ethnic group						
Yoruba	10 (6.8)	138 (93.2)	0.462	61 (41.2)	87 (58.8)	0.635
Igbo	3 (3.4)	86 (96.6)		34 (38.2)	55 (61.8)	
Hausa	1 (7.7)	12 (92.3)		7 (53.8)	6 (46.2)	
Other	8 (9.3)	78 (90.7)		39 (45.3)	47 (54.7)	
Educational level						
No formal	1 (12.5)	7 (87.5)	0.039*	3 (37.5)	5 (62.5)	0.49
Primary	2 (4.9)	39 (95.1)		14 (34.1)	27 (65.9)	
Secondary	3 (2.3)	130 (97.7)		53 (39.8)	80 (60.2)	
Tertiary	16 (10.4)	138 (89.6)		71 (46.1)	83 (53.9)	
Occupation						
Unskilled	13 (6.6)	183 (93.4)	0.193	86 (43.9)	110 (56.1)	0.275
Manually skilled	1 (2.3)	43 (97.7)		18 (40.9)	26 (59.1)	
Skilled	3 (5.0)	57 (95.0)		19 (31.7)	41 (68.3)	
Professional	5 (13.9)	31 (86.1)		18 (50.0)	18 (50.0)	
Average monthly income (in Naira)						
<20,000	2 (5.0)	38 (95.0)	0.104	11 (27.5)	39 (72.5)	0.098
20,000−<50,000	10 (4.8)	198 (95.2)		88 (42.3)	120 (57.7)	
50,000 or above	10 (11.4)	78 (88.6)		42 (47.7)	46 (52.3)	
Number of children						
0−4	20 (6.4)	294 (93.6)	0.958[a]	136 (43.3)	178 (56.7)	0.095[a]
5−6	2 (9.1)	20 (90.9)		5 (22.7)	17 (77.3)	
Age of child						
1−2	8 (4.5)	170 (95.5)	0.267	71 (39.9)	107 (60.1)	0.42
3−4	13 (9.0)	132 (91.0)		66 (45.5)	79 (54.5)	
5−6	1 (7.7)	12 (92.3)		4 (30.8)	9 (69.2)	

*$p < 0.05$.
[a] Yates' correction.

Table 5. Awareness was significantly ($p < 0.001$) associated with use of both substances: most (78.8%) of the mothers aware of zinc used it, whereas 62.9% of mothers aware of low osmolarity ORS used it in the management of diarrhoea in their children.

To isolate confounding factors, we used four logistic regression models to determine the awareness and use of low

Table 5: Association between awareness and use of low osmolarity ORS and zinc among respondents.

	Never used	Ever used	χ^2	p-value
Low osmolarity ORS				
Unaware	301 (100)	0 (0)	192.31	<0.001[a,*]
Aware	13 (37.1)	22 (62.9)		
Zinc				
Unaware	157 (100)	0 (0)	209.87	<0.001[a,*]
Aware	38 (21.2)	141 (78.8)		

χ^2: chi-square; *$p < 0.05$.
[a] Yates' correction.

Table 6: Predictors of the awareness and use of low osmolarity ORS/zinc among respondents.

	B	p-value	AOR	95% CI	
				Lower	Upper
Low osmolarity ORS awareness					
Ethnic group	0.010	0.944	1.010	0.755	1.352
Educational level	0.702	0.019*	2.017	1.123	3.626
Age of child	0.814	0.008*	2.257	1.237	4.117
Zinc awareness					
Marital status	−2.558	0.015*	0.077	0.01	0.612
Average monthly income	0.459	0.006*	1.582	1.144	2.187
Low osmolarity ORS use					
ORS awareness	21.846	0.992	3.07E+09	0	–
Educational level	−0.269	0.586	0.764	0.29	2.013
Zinc use					
Zinc awareness	34.091	0.993	6.39E+14	0	–
Marital status	14.555	0.996	2,095,692	0	–

*p-value < 0.05; B: coefficient of regression; AOR: adjusted odds ratio; 95% CI: 95% confidence interval.

osmolarity ORS and zinc supplementation among respondents (Table 6). The factors that were significant in the bi-variate (chi-square) analysis were incorporated into the various models. The awareness of low osmolarity ORS among the mothers was significantly influenced by educational level (AOR: 2.017; 95% CI: 1.123–3.626) and the age of the child (AOR: 2.257; 95% CI: 1.237–4.117). Whereas average monthly income was a more likely predictor (AOR: 1.582; 95% CI: 1.144–2.187) of the awareness of zinc supplementation, marital status was a less likely predictor (AOR: 0.077; 95% CI: 0.01–0.612). In addition, no factor predicted the use of both treatments among the mothers in this study.

Discussion

Despite being in an urban location, only approximately one-tenth (10.4%) of the respondents in this study were aware of low osmolarity ORS. Better awareness levels have been documented in recent studies in southwestern Nigeria, northern Nigeria, and India.[18–20] In addition, awareness of low osmolarity ORS was influenced by the mothers' educational level and the age of the child. In contrast to traditional ORS, for low osmolarity ORS, there is a paucity of literature supporting this finding. Nonetheless, this result is consistent with findings from a study in Port Harcourt, southern Nigeria, where the level of education has been found to be a factor associated with awareness of low osmolarity ORS.[21]

Zinc supplementation lessens the severity, extent, and occurrence of diarrhoea in children. However, only approximately half (53.3%) of the mothers in this study were aware of zinc supplementation in the management of diarrhoea, and this awareness was influenced by average monthly income. Higher levels of awareness have been document in studies conducted in southeast Nigeria (62.2%) and Ghana (70%),[22,23] and lower levels of awareness have been observed in surveys in southwestern Nigeria, northwest Nigeria, and Bangladesh.[18,24,25] In contrast to the findings in this study, educational level was associated with the awareness of zinc supplementation in the management of diarrhoea in a study in Enugu, Nigeria.[22]

The use of low osmolarity ORS among mothers of children under 5 years of age in this study was very low. Only approximately 6.5% had ever used low osmolarity ORS, whereas approximately nine in ten mothers had used regular ORS before. This low use was unsurprising, given that only approximately one in every ten mothers was even aware of this treatment. Awareness and educational level were associated with the use of low osmolarity ORS in this study. Similar findings have been observed in Abeokuta, southwestern Nigeria, where the awareness, knowledge, and availability of ORS have been found to influence its use.[18] A preference for traditional treatment options is a suggested but unverified factor across four states in northwest Nigeria.[19] The availability of different compositions of ORS and brands on the market has been found to be responsible for use in India.[20]

In this study, approximately four in ten mothers had actually used zinc in the management of diarrhoea. This result is consistent with findings among Ghanaian mothers[22] but dissimilar to those from previous studies in Mali and Ethiopia, where higher levels of use have been reported.[26,27] In addition, lower levels of use have been observed in other studies in the southwest and south of Nigeria and East Africa.[18,28,29] Awareness and marital status were associated with the use of zinc supplementation in this study, and its use was higher among the mothers who were married and those who were aware of this treatment. Relatedly, knowledge regarding zinc for diarrhoea management has been found to determine its use in Abeokuta, Nigeria.[18] Media exposure has also been found to predict its use in Ghana and India,[30,31] whereas the mother's educational level has been reported to influence its use in a previous study in Ethiopia.[32]

Awareness was a common factor associated with the poor use of low osmolarity ORS and zinc supplementation in this study. Healthcare workers in health centres are usually responsible for disseminating such information to mothers or caregivers whenever they come to access care. A recent survey in Imo state, southeast Nigeria, has identified knowledge gaps as key factors underlying the use of low osmolarity ORS and zinc supplementation among health care providers.[33] These findings might not indicate a complete lack of health education activities in the area surveyed, but they do suggest that the message content, delivery approaches, and tools could have played important roles in creating the observed lack of knowledge.

Further research is necessary to reveal why zinc supplementation appears to be more commonly and better used than low osmolarity ORS among mothers, even though the two treatments were introduced at the same time.

Conclusion

We concluded that mothers of children under 5 years of age in Oshodi-Isolo LGA, Lagos, were largely unaware of low osmolarity ORS, and most of them had never used it. However, approximately half the mothers were aware of zinc supplementation, and two-fifths had actually used it in the management of childhood diarrhoea. Although awareness of low osmolarity ORS was significantly influenced by the mothers' educational status and the age of child, the average monthly income determined the awareness of zinc supplementation. In addition, awareness was the only common factor associated with the use of both treatments.

Urgent action must be taken to promote awareness and education of mothers of children under 5 years of age and of community health workers regarding the importance of low osmolarity ORS and zinc supplementation in the management of diarrhoea. Such measures would greatly increase their awareness and use, thereby decreasing the morbidity and mortality from diarrhoeal diseases among children. The findings of this study should also help health system decision-makers bridge the gap between policymaking and implementation.

Limitations of the study

This study has several limitations. First, the setting of this study does not allow for generalisation of our findings to all other mothers of children under 5 years of age in southwest

Nigeria, given that only one local government area was studied, which was in an urban location. Second, the measure of use was based on respondents' recall, thus potentially leading to recall bias. Nonetheless, the study outcomes add additional knowledge to the small corpus of research in this field.

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Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

All procedures performed were in accordance with the ethical standards of the Lagos University Teaching Hospital Ethics and Research Committee, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Authors contributions

EOA, FAO, and BOA designed the study. OEA performed the data analysis, to which EOA contributed. All authors were involved in the literature searches. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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