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Sociodemographic and institutional determinants of zinc bundled with oral rehydration salt utilisation among under-five children with diarrhoeal diseases in East Wallaga zone, western Ethiopia: a community-based cross-sectional study

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ABSTRACT

Objective This study aimed to assess the sociodemographic and institutional determinants of zinc bundled with oral rehydration salt (ORS) utilisation among under-five children with diarrhoeal diseases in East Wallaga zone, western Ethiopia, in 2022.

Methods A community-based cross-sectional study was conducted among 560 randomly selected participants from 1 to 30 April 2022. Data were entered into EpiData V.3.1, then exported to the Statistical Package for Social Science (SPSS) V.25 for analysis. An adjusted OR (AOR) along with a 95% confidence level was estimated to assess the strength of the association, and a p value <0.05 was considered to declare the statistical significance.

Results About 39.6% of the participants had used zinc bundled with ORS for their children with diarrhoea at least once in the last 12 months. Being aged 40–49 years for mothers or caregivers (AOR 3.48, 95% CI 1.41, 8.53); merchant (AOR 4.11, 95% CI 1.73, 8.12); mothers or caregivers able to read and write (AOR 5.77, 95% CI 1.22, 11.67); visited secondary level (AOR 2.82, 95% CI 1.30, 6.10) and tertiary level health facilities (AOR 0.016, 95% CI 0.03, 0.97); degree and above (AOR 0.06, 95% CI 0.03, 0.12) and doctorate (AOR 0.13, 95% CI 0.04, 0.44) holder healthcare professionals were statistically associated with utilisation of zinc bundled with ORS.

Conclusion The study found that about two in five of the participants had used zinc bundled with ORS for their under-five children with diarrhoeal diseases. Age, occupation, educational status, level of health facilities visited and level of health professionals provided care were determinants of zinc bundled with ORS utilisation. So, health professionals at different levels of the health system have to enhance the maximisation of its bundled uptake.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This is the first study in the study setting and even in Ethiopia to assess the sociodemographic and institutional determinants of zinc bundled with oral rehydration salt (ORS) utilisation among under-five children with diarrhoea at the community level.
⇒ The cross-sectional nature of the study made it difficult to show the cause-and-effect relationship.
⇒ There might be a probability of recall bias.
⇒ Unable to generalise these findings to the whole under-five children with diarrhoeal disease treatment with zinc and ORS bundling because there might be patients admitted at health facilities.
⇒ It is difficult to compare these findings with those of other studies due to lack of literature.

BACKGROUND

Globally, diarrhoea is both a disease and an economic burden each and every year, with sub-Saharan African countries disproportionately affected by the illness and disease.[1]

Currently, nearly 1.7 billion cases of childhood diarrhoeal diseases account for one in nine child deaths, making diarrhoea the second leading cause of death and the leading cause of malnutrition in children under 5 years old across the globe.[2] It kills more than 5.2 million under-five children globally, and around 800 000 children die of diarrhoea and dehydration each year in Africa.[3] Of all child deaths from diarrhoea, 78% occur in the African and South-East Asian regions, which are also disproportionately burdened with infant and childhood HIV infections.[4] Sub-Saharan African countries share a significant proportion (42%), of which Ethiopia ranks fifth globally, as diarrhoea causes about one-fourth (20%–27%) of child deaths.[3]

Sub-Saharan African countries have made the least progress in the reduction of infant and child mortality. The two leading causes of mortality among children under 5 years of age in sub-Saharan Africa are pneumonia and diarrhoea, which accounted for 18% and 15% of deaths, respectively.[5]

Although Ethiopia has already achieved remarkable progress in reducing under-five mortality in recent decades, studies done in different parts of Ethiopia have shown that diarrhoea is still a major public health problem.[6] According to the Ethiopian Demographic and Health Surveys (EDHS) 2016, 12% of children under age 5 had diarrhoea.[7]

Different countries have incorporated zinc and oral rehydration salt (ORS) as an effective treatment combination in their policies since July 2019, when WHO added ORS-bundled zinc to its core Model List of Essential Medicines for Children and encouraged countries to prioritise the bundle in their expenditures, procurement and supply, and training of healthcare providers.[8] This recommended regimen of zinc bundled with ORS, along with continued feeding, is a safe, effective and inexpensive treatment for children, and 50% of diarrhoea deaths can be prevented.[9] In addition, Ethiopia's health policy stated that the Federal Ministry of Health included zinc as an essential drug that should be available at local health facilities and prescribed free of charge at the health post level in order to be easily accessible and given to the community since 2013.[10]

Despite these important benefits, access to ORS and zinc remains a challenge in low-resource settings, and the rate of bundling of both products was extremely low. Globally, about 55% of the highest burden countries had ORS and zinc coverage levels of 2% or less.[11]

It is recommended that under-five children should receive 10–14 days of zinc treatment for diarrhoea, and full coverage and utilisation of ORS and adjunct zinc supplementation could avert over 75% of all diarrhoea-related deaths. However, the study showed that the level of adherence to zinc supplementation was low.[12]

Bundling (copackaging) zinc with ORS may encourage their combined use and improve access to and utilisation of the treatment in children under the age of 5, but different studies around the world have found low utilisation. Hence, a study conducted on ORS use and its correlates in low-level care of diarrhoea among children under 36 months old in rural Western China indicated that the therapy rate of ORS was 34.62%.[13]

Of East African countries, studies conducted on zinc utilisation and associated factors indicated that Uganda had the highest prevalence of zinc utilisation (40.51%), whereas the Comoros had the lowest (0.44%). This study also revealed that utilisation of zinc was 18% in Tanzania, 10% in Nigeria, 15% in Sudan and 21.5% in Ethiopia.[14] This indicates that much needs to be done to increase its utilisation and reduce the impact of diarrhoea, a preventable cause of under-five mortality in the region.

Also, another study conducted in Ethiopia's Addis Ababa city showed that slightly over two-thirds (67.1%) of caretakers used zinc bundled with ORS during the recent diarrhoeal attack. This was higher than a study conducted in Nigeria (8.3%) and comparable to the Kenyan findings (67%).[15] The proportion of children under the age of 5 who received treatment for diarrhoea has risen from 13% in 2000 to 22% in 2005, 32% in 2011 and 44% in 2016, whereas the percentage of children who received no treatment has decreased from 42% in 2011 to 38% in 2016. According to the Ethiopian EDHS 2016 report, one in three children (33%) under age 5 with diarrhoea received zinc, and 17% received a combination of ORS and zinc. Antibiotics were given to 9% of children with diarrhoea, and two in five (38%) children with diarrhoea did not receive any treatment.[7]

In general, age, occupation, caregiver relationship with the child, type and level of health facilities visited, distance from health facilities and community-based health insurance membership were some of the determinants of zinc bundled with ORS utilisation among under-five children with diarrhoeal diseases studied.[12 15 16] Although these studies showed some variations, there were gaps in identifying sociodemographic and institutional determinants in this area specifically because these determinants are more vital in assessing utilisation of these bundled products than assessing these variables with other determinant factors together.

Moreover, to the best of the authors' knowledge, no prior studies have been conducted on the sociodemographics and institutional determinants of the utilisation of zinc-bundled ORS among under-five children with diarrhoeal diseases in the East Wallaga zone, western Ethiopia. Also, studies that have been conducted elsewhere have mostly revealed specific interventions, either on zinc or ORS only,[14] rather than focusing on the recently implemented copackaged zinc and ORS and particularly giving attention to its sociodemographics and institutional determinants. Therefore, to fill these gaps, this study aimed to assess the sociodemographics and institutional determinants of zinc bundled with ORS utilisation among under-five children with diarrhoeal diseases in the East Wallaga zone, western Ethiopia, in 2022.

METHODS AND MATERIALS

Study setting and period

The study was conducted in East Wallaga zone, Oromia region, western Ethiopia, from 1 to 30 April 2022. The zonal town, Nekemte, is located 333 km west of Addis Ababa, which is the capital city of Ethiopia. East Wallaga zone has an area of 21 980 million km^2 and is geographically bounded in the east by West Shewa and Jimma zones, in the west by West Wallaga zone, in the north by Horo Guduru Wallaga zone and Amhara regional state, and in the south west by Buno Bedele zone. Administratively, the zone has a total of 17 districts, and the total population

of the zone in 2021/2022, as projected from 2007, was 1 585 215 with a male to female ratio of 1.1:1.

Study design and population

Study design

A community-based cross-sectional study design was employed to assess the sociodemographic and institutional determinants of zinc bundled with ORS utilisation among under-five children with diarrhoeal diseases in East Wallaga zone, western Ethiopia.

Population

Source population

All households among selected districts whose under-five children had diarrhoea in the last 1-year period were the source population.

Study population

All selected under-five children who had diarrhoea in the last 12 months and their caregivers were the study population.

Eligibility criteria

Inclusion criteria

All households whose under-five children had diarrhoea in the last year and who had stayed for more than 1 year in the area were included in the study.

Exclusion criteria

Under-five children's mothers or caregivers who were sick at the time of data collection were excluded from the study.

Sample size and sampling technique

Sample size determination

The sample size was determined using a single population proportion formula by considering the following assumption: where the proportion of zinc bundled with ORS utilisation among under-five children of 67.1%[15] was taken. Also, by considering 5% margin of error, a design effect of 1.5 and a 10% potential non-response rate, the final sample size became 560.

Sampling techniques and procedures

A multistage sampling procedure was carried out. In the first stage, four districts (40%) were randomly selected using a lottery method from nine nutrition international project-supported districts in the zone.[17] In the second stage, all Kebles were listed for each selected district, and among them, a total of 12 (3 Kebles per district) were selected for the study as representative of the Kebles using a simple random sampling technique for each district based on WHO health facility assessment tool.[18 19] Then, after the selection of the Kebles to be included in the study, records of diarrhoeal diseases from each health facility in the catchments for each Keble and diarrhoeal disease data for under-five children were obtained from health extension workers. Keble is Ethiopia's smallest administrative division or unit, which is a subsection of the district. Households that could fulfil the inclusion criteria from these records were listed from the Master Family Index and family folders of the Community Health Information System registration books, and the households' numbers were obtained and used as a sampling frame. The sample size was then distributed to each Keble in proportion to the size of their household in each district. Finally, to obtain the final sample size, simple random sampling techniques were used to select households based on the allocated sample size of each Keble, and the data were collected from mothers or caregivers.

Study variables

Utilisation of zinc bundled with ORS was the outcome variable and the independent variables were: sociodemographic and economic-related variables (age of the caregivers or mothers, sex of caregivers or mothers, marital status, family size, educational status, occupation, residence, age of the child, sex of the child, caregiver relationship with child and household's monthly income); and institutional-related variables (place of treatment, types of health facility visited, level of health facilities, perceived quality of care by health professional, status of health professionals, availability of drugs or supplies in the facilities, perceived affordability of drugs, distance from nearby health facilities and health insurance membership status).

Operational definitions

Zinc and ORS bundling: a bundle containing zinc sulfate and ORS which can be prepared in different forms for supplementation, such as:

- *Central bundling*: prebundled zinc and ORS using a pouch that had an instructional message intended for improving the rational use of zinc-ORS treatment, distributed to health facilities.
- *Facility-level bundling*: zinc and ORS bundling pouch that had instructional messages distributed to the health facilities; bundling was made by the health workers while administering the treatment.
- *Status quo*: zinc and ORS are coadministered without bundling.[12]

Utilisation of zinc bundled with ORS: use of services by under-five children, at least one child in the household, at least once, from health facilities for the purpose of preventing and curing health problems, promoting health and well-being or obtaining information about one's health status and prognosis, regarding diarrhoeal disease treatment with zinc and ORS copacked in the previous year, which was answered by a closed-ended binary question (Yes/No). Based on this, if they had received the drugs from health facilities, it was answered as 'yes', and if not, it was answered as 'no'.[15]

Level of health facilities: healthcare facilities that provide various levels of care in accordance with Ethiopia's current health tier system (three-tier system) (health posts, health centres, hospitals).[20]

Data collection instrument and procedures

Data were gathered through face-to-face interviews with mothers or child caregivers using a semistructured, interviewer-administered, pretested questionnaire. It was adapted from a review of different literature[9 15] and modified to fit the local context. The tool was first prepared in English, translated to Afan Oromo, and then back translated to English by Afan Oromo and English language bachelor's degree holders to check for consistency. It consists of sociodemographic and institutional-related factors.

Data quality management

To maintain the quality of the data, different measures were undertaken before, during and after data collection. A preliminary translation and retranslation of the questionnaire was made to check for its consistency before the actual data collection. Training was given for all data collectors and supervisors on the objective of the study, the contents of the questionnaire, issues of maintaining confidentiality, informed verbal consent and interview techniques.

Data analysis procedure

Data were entered into EpiData V.3.1 and exported to SPSS V.25 for statistical analysis. A descriptive analysis was used to describe the percentages and number of distributions of the respondents. A binary logistic regression analysis was performed on the independent variables and their proportions, and a crude OR was computed against the outcome variable. Finally, independent variables with a p value <0.25 were entered into the final multivariable logistic regression model to control for potential confounders and identify significant factors associated with the outcome variable. The adequacy of the model to fit the outcome variable with the predictors was checked using the Hosmer and Lemeshow test for goodness of fit. Finally, the adjusted ORs (AOR) along with a 95% CI were estimated to assess the strength of the association, and a p value <0.05 was considered to declare the statistical significance in the multivariable analysis.

Patient and public involvement

No patient was involved.

RESULTS

Sociodemographic and economic characteristics

In this study, a total of 540 respondents participated, resulting in a 96.4% response rate. Most of the participants were within the age range of 18–29 years (260, 48.1%), with a mean age±SD of 30.88±5.29. Females constituted 457 (84.6%) of the study participants. Majority of them belonged to Oromo ethnic group (520, 96.3%), were Protestant (439, 81.3%), married (494, 91.5%) and rural residents (454, 84.1%). In terms of educational attainment, approximately 244 (45.2%) had completed their primary education (Grades 1–8), followed by Grades 9–12 (122, 22.6%).

Of the studied participants, 227 (42.0%) had greater than or equal to five people per household. About 447 (82.8%) of the households had one to two children per household, and 270 (50.0%) of them were aged 12–23 months. Regarding their income, about 317 (58.7%) of them had a monthly income of 1651–3200 Ethiopian birr (ETB), with a mean monthly income±SD of ETB3509.13±2219.61 (table 1).

Institutional-related factors

In the previous 12 months, 195 (36.1%), 262 (48.5%) and 83 (15.4%) of them received treatment during their illness at home, public health facilities and private health facilities, respectively.

In terms of facilities visited, approximately 187 (34.6%), 319 (59.1%) and 34 (6.3%) of them had visited a health post, health centre and hospital, respectively. Also, the majority (84.3%) of the facilities they have visited were primary level health facilities. Most of the studied households (277, 51.3%)had a distance greater than or equal to 10 km from the nearby health facilities.

About 356 (65.9%) of the respondents were satisfied with the quality of care provided by healthcare professionals (HCP). Also, about 171 (31.7%) and 430 (79.5%) of them perceived that drugs were always available and affordable, respectively (table 2).

Utilisation of zinc bundled with ORS

The study showed that about 214 households (39.5%) of the participants had used zinc bundled with ORS for their under-five children with diarrhoea at least once in the last 12 months (table 1). Regarding duration of treatment or utilisation of the drugs, about 10 (4.7%), 54 (25.2%) and 150 (70.1%) of them had copack supplements for less than 7, 7–10 and 10–14 days, respectively. This implies that only 150 (70.1%) of them had received full doses of the copacks or bundles, and the majority of them (50, 78.2%) reported that diarrhoea had stopped being the reason for not taking the full dose.

Concerning the form of supplementation of zinc bundled with ORS, about 152 (71.0%), 27 (12.6%) and 35 (16.4%) were received from central bundling, facility-level bundling and status quo, respectively (figure 1). The duration of diarrhoea stopped after bundled supplementation was reported as immediately (65, 28.8%), after 1–3 days (138, 61.1%)and after 4–6 days (23, 10.2%) (table 3).

Determinants of zinc bundled with ORS utilisation

Some sociodemographic variables, such as the respondents' age, occupation, educational status, family size, the child's age in months and residence, as well as institutional variables, such as distance from a nearby health facility, level of health facility visited, level of HCPs providing care and status of Community Based Health Insurance (CBHI)

Table 1 Sociodemographic and economic characteristics of the participants on sociodemographic and institutional determinants of zinc bundled with ORS utilisation among under-five children with diarrhoeal diseases in the East Wallaga zone, western Ethiopia, 2022 (n=540)

Variables	Categories	Frequency (%)
Age of respondents	18–29	260 (48.1)
	30–39	232 (43.0)
	40–49	48 (8.9)
Sex	Male	83 (15.4)
	Female	457 (84.6)
Religion	Orthodox	60 (11.1)
	Protestant	439 (81.3)
	Muslim	38 (7.0)
	Others*	3 (0.6)
Ethnicity	Oromo	520 (96.3)
	Amhara	11 (2.0)
	Tigre	2 (0.4)
	Gurage	7 (1.3)
Marital status	Single	11 (2.05)
	Married	494 (91.5)
	Divorced	23 (4.3)
	Widowed	12 (2.2)
Occupation	Farmer	190 (35.2)
	Housewife	230 (42.6)
	Merchant	87 (16.1)
	Labourer	11 (2.0)
	Others†	22 (4.1)
Educational status	Unable to read and write	88 (16.3)
	Read and write	54 (10.0)
	Primary education (Grades 1–8)	244 (45.2)
	Grades 9–12	122 (22.6)
	Diploma	22 (4.1)
	Degree and above	10 (1.9)
Family size	<5	313 (58.0)
	≥5	227 (42.0)
Under-five children in the household (n)	1–2	447 (82.8)
	3–4	76 (14.1)
	5–6	15 (2.8)
	>6	2 (0.4)
Age of children (months)	6–11	162 (30.0)
	12–23	270 (50.0)
	24–59	108 (20.0)
Sex of child	Male	335 (62)
	Female	205 (38)
Relationship with child	Mother	452 (83.7)
	Father	16 (3)
	Grandmother	11 (2)
	Grandfather	16 (3)
	Auntie	16 (3)
	Sister/brother	29 (5.4)
Household's head	Male headed	506 (93.7)
	Female headed	34 (6.3)
Place of residence	Urban	86 (15.9)
	Rural	454 (84.1)
Monthly income (ETB)	1651–3200	317 (58.7)
	3201–5250	149 (27.6)
	5251–7800	52 (9.6)
	7801–10 900	10 (1.9)
	>10 900	12 (2.2)

*Catholic, Wakefata.
†Students, government employees.
ETB, Ethiopian birr; ORS, oral rehydration salt.

membership, were associated with zinc-bundled ORS use among children with diarrhoea in the study.

After controlling for confounders, a multivariable logistic regression analysis revealed that respondents' age, occupation, educational status, level of health facility visited and level of health professionals providing care were significantly associated.

From this multivariable logistic regression analysis, age was associated with the utilisation of zinc bundled with ORS (AOR 3.48, 95% CI 1.41, 8.53). This implied that the probability of using zinc bundled with ORS among household respondents whose ages ranged from 40 to 49 years was almost three times more likely to be used than that of those whose ages ranged from 18 to 29 years.

Regarding the occupation of the respondents, being a merchant was statistically strongly associated with zinc bundled with ORS (AOR 4.11, 95% CI 1.73, 8.12). This indicated that those who were merchants were four times more likely to use zinc bundled with ORS for their children than those who were farmers.

The educational status of the respondents was also strongly associated with zinc bundled with ORS for those who were able to read and write (AOR 5.77, 95% CI 1.22, 11.67). This revealed that respondents' households whose educational status was able to read and write were 5.7 times more likely to use zinc and ORS bundling than those whose educational status was unable to read and write.

The study indicated that respondents who had visited secondary level health facilities were 2.8 times (AOR 2.82, 95% CI 1.30, 6.10) more likely to use zinc bundled with ORS than those who had visited primary level health

Table 2 Institutional-related factors for the study on sociodemographic and institutional determinants of zinc bundled with ORS utilisation among under-five children with diarrhoeal diseases in the East Wallaga zone, western Ethiopia, 2022 (n=540)

Variables	Categories	Frequency (%)
Place of treatment during child illness	Home	195 (36.1)
	Public health facility	262 (48.5)
	Private health facility	83 (15.4)
Distance from health facilities (km)	<10	263 (48.7)
	≥10	277 (51.3)
Types of health facilities visited during recent episode	Health post	187 (34.6)
	Health centre	319 (59.1)
	Hospital	34 (6.3)
Level of health facilities visited during recent episode	Primary level	455 (84.3)
	Secondary level	69 (12.8)
	Tertiary level	16 (3.0)
Perceived quality of healthcare by healthcare professionals	Good	390 (72.2)
	Poor	150 (27.8)
Level of healthcare professionals provided care	Diploma	133 (24.6)
	Degree and above	340 (63.0)
	Doctor (GP)	31 (5.7)
	Paediatrician (specialist)	36 (6.7)
Perceived satisfaction from quality of care by HCPs	Satisfied	356 (65.9)
	Not satisfied	184 (34.1)
Perceived availability of drugs during facility visit	Always available	171 (31.7)
	Sometimes available	270 (50.0)
	Write prescription to outside	99 (18.3)
Perceived affordability of drugs for treatment	Affordable	430 (79.6)
	Not affordable	110 (20.4)
Status of CBHI membership	Member	413 (76.5)
	Not member	127 (23.5)

CBHI, Community Based Health Insurance; GP, general practitioner; HCP, healthcare professional; ORS, oral rehydration salt.

facilities, but the probability of using zinc bundled with ORS among respondents who had visited tertiary level health facilities was reduced by 98.4% (AOR 0.016, 95% CI 0.03, 0.97) as compared with their counterparts.

This study also found that for the degree and above (AOR 0.06, 95% CI 0.03, 0.12) and doctorate (general practitioners) (AOR 0.13, 95% CI 0.04, 0.44) holders, the level of health professionals providing care was statistically strongly associated with the utilisation of zinc bundled with ORS. This indicated that the likelihood of using zinc bundled with ORS was reduced by 40% and 87%,

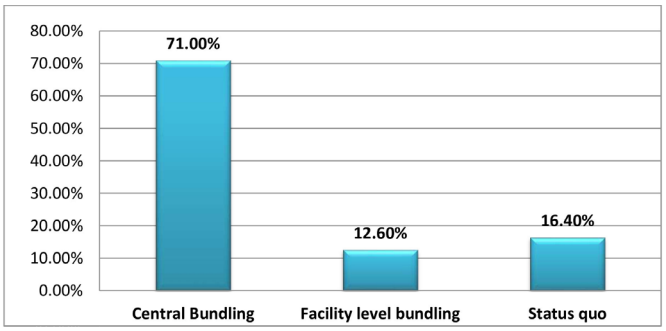

Figure 1 Forms of bundled supplementation among under-five children with diarrhoeal diseases in East Wallaga zone, western Ethiopia, 2022 (n=540).

respectively, among respondents treated by bachelor's degree and above and doctorate holder health professionals, when compared with diploma holder health professionals (table 4).

DISCUSSION

This study aimed to address sociodemographic and institutional determinants of zinc bundled with ORS utilisation among under-five children with diarrhoeal diseases. Based on this, the study showed that 39.6% (35.6%–43.9%) of the studied participants' households had used zinc bundled with ORS at least once in the last 12 months. This finding was higher than the study findings

Table 3 Utilisation of zinc bundled with ORS among under-five children with diarrhoeal diseases in the East Wallaga zone, western Ethiopia, 2022 (n=540)

Variables	Categories	Frequency (%)
Received zinc bundled with ORS at least once in the last 12 months	Yes	214 (39.6)
	No	326 (60.4)
Reason for not receiving bundle	Don't know where to obtain	56 (17.3)
	Don't know it should be given together	232 (71.8)
	Unsure how to administer	24 (7.4)
	Don't think it is effective	11 (3.4)
Duration of supplementation (days)	<7	10 (4.7)
	7–10	54 (25.2)
	10–14	150 (70.1)
Bundled utilisation for your child	Not full dose	64 (29.9)
	Full dose	150 (70.1)
Reason for not giving full dose	Vomiting	14 (21.8)
	Diarrhoea stopped	50 (78.2)
Duration of diarrhoea after bundled supplementation	Immediately	65 (28.8)
	After 1–3 days	138 (61.1)
	After 4–6 days	23 (10.2)

ORS, oral rehydration salt.

Table 4 Factors that influence zinc combined with ORS utilisation among under-five children with diarrhoeal diseases in the East Wallaga zone of western Ethiopia in 2022 (n=540)

Variables	Zinc bundled with ORS utilisation		OR (95% CI) and P value	
	Non-used n (%)	Used n (%)	COR	AOR
Age of the respondent				
18–29	162 (49.7)	98 (45.8)	1	1
30–39	142 (43.6)	90 (42.1)	1.04 (0.72, 1.50)	1.46 (0.81, 2.63)
40–49	22 (6.7)	26 (12.1)	1.9 (1.05, 3.63)	3.48 (1.41, 8.53)**
Occupation				
Farmer	148 (45.4)	42 (19.6)	1	1
Housewife	136 (41.7)	94 (43.9)	2.43 (1.581, 3.75)	2.49 (0.27, 4.87)
Merchant	21 (6.4)	66 (30.8)	11.07 (6.08, 20.15)	4.11 (1.73, 8.12)***
Labourer	5 (1.5)	6 (2.8)	4.22 (1.22, 14.54)	2.79 (1.14, 14.45)
Others†	16 (4.9)	6 (2.8)	2.11 (0.72, 6.15)	2.71 (1.33, 11.18)
Educational status				
Unable to read and write	49 (15.0)	39 (18.2)	1	1
Read and write	20 (6.1)	34 (15.9)	2.13 (1.06, 4.276)	5.77 (1.22, 11.67)*
Primary education (Grades 1–8)	163 (50.0)	81 (37.9)	0.62 (0.37, 1.02)	0.29 (0.08, 1.04)
Grades 9–12	79 (24.2)	43 (20.1)	0.68 (0.39, 1.199)	0.14 (0.032, 0.65)
Diploma	10 (3.1)	12 (5.6)	1.50 (0.59, 3.85)	0.32 (0.03, 3.33)
Degree and above	5 (1.5)	5 (2.3)	1.25 (0.339, 4.65)	0.02 (0.00, 0.06)
Family size				
<5	152 (46.6)	161 (75.2)	3.47 (2.38, 5.08)	1.75 (0.08, 6.76)
≥5	174 (53.4)	53 (24.8)	1	1
Age of children (months)				
6–11	91 (27.9)	71 (33.2)	4.48 (2.42, 8.29)	1.91 (0.33, 13.87)
12–23	143 (43.9)	127 (59.3)	5.10 (2.85, 9.14)	2.07 (0.24, 19.72)
24–59	92 (28.2)	16 (7.5)	1	1
Place of residence				
Urban	41 (12.6)	45 (21.0)	1	1
Rural	285 (87.4)	169 (79.0)	1.85 (1.16, 2.94)	1.89 (0.38, 5.23)
Level of health facility visited				
Primary Level	290 (89.0)	165 (77.1)	1	1
Secondary level	31 (9.5)	38 (17.8)	2.15 (1.29, 3.59)	2.82 (1.30, 6.10)**
Tertiary level	5 (1.5)	11 (5.1)	0.44 (0.32, 0.86)	0.016 (0.03, 0.97)*
Level of health professionals provided care				
Diploma	27 (8.3)	106 (49.5)	1	1
Degree and above	264 (81.0)	76 (35.5)	0.07 (0.04, 0.12)	0.06 (0.03, 0.12)***
Medical doctor	15 (4.6)	16 (7.5)	0.27 (0.11, 0.61)	0.13 (0.04, 0.44)***
Paediatrician	20 (6.1)	16 (7.5)	0.20 (0.09, 0.44)	0.40 (0.13, 1.24)
CBHI membership status				
Member	295 (90.5)	118 (55.1)	1	1
Non-member	31 (9.5)	96 (44.9)	3.03 (4.89, 12.23)	2.24 (0.43, 11.71)

1=reference.
*P<0.05; **p<0.01; ***p<0.001.
†Students, government workers.
AOR, adjusted OR; COR, crude OR; ORS, oral rehydration salt.

from different corners of the world, as in Nigeria, 8.3%[21]; in Sudan, where only 18.9% and 14.8% of the children had received ORS and zinc supplements, respectively[22]; and in Ethiopia, where the EDHS 2016 reported that 17% of them received a combination of zinc and ORS.[7] The discrepancy might be due to sociocultural differences, study area differences and the time of study considered for those of the studies and surveys conducted even in the study area. Also, for the current study, we have considered primarily rural and semiurban households, whereas these studies have assessed primarily urban residences, and they were institutional-based studies. However, this study's finding was lower than the study conducted in Kenya, 75%.[15] Furthermore, the finding was lower than in both Ethiopian studies: on the effectiveness of bundling zinc with ORS, 67%[12]; and on the occurrence of diarrhoea and utilisation of zinc bundled with ORS among caregivers of children under the age of 5 in Addis Ababa, where it accounted for two-thirds.[15] The probable differences might be due to differences in the study design used, in which some of them have used randomised controlled trials, and differences in the study settings.

Also, this study's finding was in line with the study conducted in rural China at 34.6%.[13] This similarity might be due to the fact that in both of the studies, the majority of the cases were considered low-level care for diarrhoea among children under 5 years old.

Zinc bundled with ORS utilisation was statistically associated with variables such as respondent age, occupation, educational status, level of health facility visited and level of health professionals providing care.

The age of the mothers or caregivers was an important variable significantly associated with the utilisation of zinc bundled with ORS. This finding was in contradiction with a study conducted on ORS use and its correlates in low-level care of diarrhoea among children under 36 months old in rural Western China that indicated children in families with several preschool-aged children or those of the smaller age groups were less likely to receive ORS therapy against diarrhoea.[13] This could be due to sociocultural differences and differences in study settings, as well as the ages considered, with the Chinese study focusing on children under the age of 36 months.

Regarding the occupation of the respondents, merchants were more likely to use zinc bundled with ORS for their children with diarrhoea than those who were farmers. This might be explained by different reasons; the exhaustive nature of the work of the farmer in the study setting might force them to not give the drugs on time as needed and even to forget the drugs. Also, the opportunities that they might have to move from place to place, especially to urban areas, were minimal for farmers compared with merchants, which might have an influence on the utilisation of these drugs.

The educational status of the respondents was also strongly associated with the bundled utilisation. This revealed that the likelihood of using zinc combined with ORS was six times higher among those whose educational status allowed them to read and write than among those whose educational status did not allow them to read and write. A study conducted in Kebri Dehar town, Somali Region, Ethiopia, supported this finding.[23] Also, the higher the educational level, the more likelihood of utilisation of zinc was reported according to a study conducted in East Africa.[14] This could be due to the fact that education is the way of gaining knowledge, which could lead to an understanding of the utilisation of health services.

The level of health facility visited played a vital role in the utilisation of zinc with bundled ORS. A study conducted in Addis Ababa, Ethiopia, revealed that 56.6% of the respondents visited health facilities, and nearly all (93.9%) of the mothers or caregivers using public health facilities used health centres (ie, primary level health facilities). However, only 11.9% of them obtained ORS plus zinc supplementation.[5] This indicated that utilisation of zinc bundled with ORS was low at primary level health facilities, which was consistent with our study findings, which revealed that respondents who visited secondary level health facilities used zinc and ORS bundle three times more than those who visited primary level health facilities. This might be due to the similarity of the health system, and the higher the level of the health facility, the greater the capacity and skill of HCPs to understand and determine healthcare needs. However, in our study findings, at the tertiary level, health facility utilisation of zinc with bundled ORS showed a reduction. This might be due to the low number of referral cases associated with the specified disease. Finally, this study showed that a greater reduction in the utilisation of zinc bundled with ORS was observed among respondents who had been treated by bachelor's degree and above and doctorate holder health professionals than diploma holder health professionals. This could be due to alignment, utilisation and the ability to follow clinical treatment guidelines that might prevent higher level HCPs from providing services to service seekers.

CONCLUSION AND RECOMMENDATION

The study found that about two in five of the respondents had used zinc bundled with ORS for their under-five children with diarrhoeal diseases. Age of the respondents, occupation, educational status, level of health facilities visited and level of health professionals provided care were the variables statistically associated with utilisation of zinc bundled with ORS. So, health professionals at different levels of the health system have to enhance the maximisation of its bundled uptake. Additionally, health education and information dissemination services and awareness for the community to improve its utilisation should have to be strengthened at different levels of health facilities across different levels of HCPs.

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Ethics approval This study involves human participants and an appropriate ethical approval was obtained from the Institutional Review Board of Wallaga University, Institute of Health Sciences (reference number: IRB/205/2022) and a permission letter from East Wallaga Zonal Health Department. It was conducted in accordance with the Declaration of Helsinki. The tool was designed to be anonymous, and the result did not identify the personality of the respondents; rather, it was presented as aggregated statistics. The data were kept in a protected and safe location. Participants gave informed consent to participate in the study before taking part.

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