

Predictors of Under-Five Caregivers' Utilization of Co-Packaged Zinc and Oral Rehydration Salts for Childhood Diarrhea in East Wollega Zone, Western Ethiopia

Dufera Rikitu Terefa , Adisu Tafari Shama 

Department of Public Health, Institute of Health Sciences, Wollega University, Nekemte, Ethiopia

Correspondence: Dufera Rikitu Terefa, Wollega University, P.O.Box: 395, Nekemte, Ethiopia, Tel +251-922260706, Email duferarikitu24@gmail.com; duferar@wollegauniversity.edu.et

Introduction: Diarrhea morbidity and mortality remain child health and economic burdens in low resource settings. In Ethiopia, diarrheal disease treatment service utilization remains very low. However, evidence on the level of utilization of zinc bundled with ORS among under-five caregivers' was not addressed.

Objective: The study aimed to identify predictors of under-five caregivers' utilization of co-packaged zinc and oral rehydration salts for childhood diarrhea in East Wollega Zone, Western Ethiopia, in 2022.

Methods: The study design used was a community-based cross-sectional study that was conducted among 540 randomly selected participants from April 1 to 30, 2022. Data were collected using interviewer-administered semi-structured questionnaires. It was entered into Epi-data version 3.1 and analyzed using SPSS version 26. An adjusted odds ratio along with a 95% confidence level was estimated, and a P value <0.05 was considered to declare the statistical significance in the multivariable analysis.

Results: About 39.6% of under-five caregivers' had utilized co-packaged zinc and oral rehydration salts for their childhood diarrhea at least once in the last 12 months. Having family size less than 5 [AOR and 95% CI = 5.72 (2.93, 11.15)]; heard about the co-pack [AOR and 95% CI = 9.52 (4.95, 23.68)]; perceived health status for the recent episode as poor [AOR and 95% CI = 5.90 (2.58, 15.96)] and medium [AOR and 95% CI = 2.20 (1.02, 4.83)]; perceived severity for recent episodes [AOR and 95% CI = 4.48 (1.36, 14.76)] and being community-based health insurance non-member [AOR and 95% CI = 2.28 (1.34, 6.90)] were statistically associated with co-packaged zinc and ORS utilization.

Conclusion: The study found that co-packaged zinc and oral rehydration salt utilization was low. Family size, heard about the co-pack, perceived health status, perceived severity, and CBHI membership were predictors of co-packaged utilization of zinc and ORS. Hence, concerned bodies in the health system should have devoted to maximize its uptake.

Keywords: diarrheal diseases, utilization, zinc and ORS co-pack, Ethiopia

Plain Language Summary

Diarrhea morbidity and mortality remain child health and economic burdens in low-resource settings. In Ethiopia, despite increased health service coverage, diarrheal disease treatment service utilization remains very low. Hence, evidence on the level of co-utilization of zinc and oral rehydration salt among under-five caregivers' was not addressed. It was aimed to identify predictors of under-five caregivers' utilization of co-packaged zinc and oral rehydration salts for childhood diarrhea in the East Wollega Zone, Western Ethiopia in 2022.

The study found that co-packaged zinc and oral rehydration salt utilization was low. Hence, different health offices and health institutions in the health system have to work toward maximization of its uptake by strengthening health education and health information dissemination services.

Introduction

Diarrhea is defined as when there are at least three loose, liquid, or watery stools a day and when the caretakers consider this to be increased stool frequency or liquidity. It is caused by microorganisms rather than genetic mutations.¹ It affects productivity and health conditions, which directly or indirectly lead to catastrophic health expenditures.² Acute watery, acute bloody (dysentery), and persistent were the three clinical types of diarrhea identified by the WHO.³ The acute one can take hours or even days, while the persistent one can last up to 14 days. This can predispose them to various health conditions such as dehydration and malnutrition and even lead to child mortality within a few years.⁴

Treatment of diarrheal disease is critical to meeting global health development targets, reducing maternal and child mortality, and achieving sustainable development goals.⁵ Based on this, zinc and ORS supplementation and continued feeding were recommended for an acute diarrheal disease treatment as they prevent disease and reduce the duration of illness and its recurrences.⁶

Oral rehydration salt (ORS) is the cornerstone of diarrhea treatment in low-resource settings. Also, in July 2019, WHO added co-packaged ORS plus zinc to essential medical lists and encouraged countries to prioritize the co-pack in their expenditures, procurement and supply, and training of health-care providers.⁷ Oral rehydration salts (ORS) and zinc tablet co-packaging are cost-effective treatments for childhood diarrhea that minimize risk, duration, and severity.^{7,8}

Bundling (co-packaging) of zinc with ORS may encourage their combined use and enhance access to and utilization of the treatment of diarrhea in a single child.⁹ Many countries in the developing world, including Kenya, Uganda, Zambia, Nigeria, Benin, Cambodia, and Guatemala, have initiated co-packaging of zinc and ORS for diarrhea treatment. Likewise, in Ethiopia, with the support of the Micronutrient Initiative (MI), the Pharmaceutical Fund and Supply Agency (PFSA) has launched the distribution of the bundled products in the country.⁸

The bundling of zinc and ORS can be implemented in two ways. Ready-made centrally bundled products can be distributed to the health institutions (central bundling), or the products can be dispatched and health workers do the bundling at the health institution level (health center (HC) level bundling). Nevertheless, a comparative cost-effectiveness analysis (CEA) has not been made.⁸

Co-packaged ORS and zinc could offer significant utilization management and be more cost-effective for over-the-counter use and home treatment as compared to separately packaged products. In fact, one of the studies conducted in our country, Ethiopia, showed a significant improvement in adherence to the treatment of diarrheal episodes at home as a result of co-packaging zinc and ORS with instructions.^{8,10}

Also, the bundling of zinc and ORS has various public health benefits, such as improved adherence to its combined therapy, adherence to or preparation of its individual components, health-care worker dispensing practices, increased uptake and coverage, a reduction in inappropriate antibiotic prescription and utilization, and increased utility for the service receiver.^{6,9}

Even though the bundling of these drugs was vital in the treatment of diarrhea for under-five children the prevalence was minimal in various countries as in Bangladesh, 49%; Tanzania, 18%; Nigeria, 10% and Sudan, 15%.¹¹ According to a study conducted in Ethiopia, about seven out of ten caregivers had utilized this bundled drugs.¹⁰ Also, the Ethiopian EDHS-2016 report indicated that only 17% received a combination of ORS and zinc.¹²

Although studies have been conducted elsewhere, they mostly revealed specific interventions, either on zinc or ORS, only¹¹ than focusing on the recently implemented co-packaged zinc and ORS. Also, they did not address the gaps at the community level rather than institution-based and some are focusing on EDHS data, which did not address the community problems exhaustively. Therefore, to fill these gaps, this study aimed to identify predictors of under-five caregivers' utilization of co-packaged zinc and oral rehydration salts for childhood diarrhea in the East Wollega Zone, Western Ethiopia, in 2022.

Methods

Setting

This study was done in the East Wollega Zone, Western Ethiopia, from April 1 to 30, 2022. East Wollega Zone is located in the western part of Oromia, and the town of Nekemte is 333 kilometers west of Addis Ababa. The zone has an area of 21,980 million sq.km with the geographical coordinates of approximately 7° 40'N latitude and 36° 50'E longitude and an altitude of 500–2600m above sea level. There are three climatic zones: low (41.9%), middle (53.17%), and high land (4.9%) with a temperature range of

22–28°C and average annual rainfall of 1000–1200mm³ in this zone. It is bounded on the east by West Shewa and Jimma zones, on the west by West Wollega zone, on the north by Amhara Regional State, and on the south-west by Buno Bedele zone. The total population of the zone in 2021/22, as projected from 2007, was 1,585,215 with a male-to-female ratio of 1.1:1.

Administratively, the zone has a total of seventeen districts, nine of which are currently supported by the Nutrition International Project.

Study Design and Population

Design

In this study, a community-based cross-sectional study design was used to identify predictors of under-five caregivers' utilization of co-packaged zinc and oral rehydration salts for childhood diarrhea in the East Wollega Zone, Western Ethiopia, in 2022.

Population

Source Population

The source population consisted of all households in East Wollega Zone with under-five children who had diarrhea in the last year, and the study population consisted of all selected households with under-five children who had diarrhea in the last year among selected districts in the zone.

Eligibility Criteria

All households whose under-five children had diarrhea in the last one-year period and who lived in the area for greater than a year were included, and under-five children's mothers or caregivers who were sick at the time of data collection were excluded from the study.

Sample Size and Technique

A single population proportion formula was used to calculate sample size, and the proportion of zinc and ORS co-packaged utilization among under-five children was taken at 67.1%.¹⁰ Then, the final sample of 560 was obtained by considering 5% margins of error, a design effect of 1.5, and a 10% non-response rate.

For this, a multi-stage sampling procedure was used. In the first stage, four districts (40%) were randomly selected using a lottery method from nine nutrition international project-supported districts in the zone.¹³ In the second stage, all Kebles, the sub-section of districts, were listed for each selected district, and among them, a total of 12 Kebles (3 Kebles per district) were selected for the study based on the WHO health facility assessment tool.^{13,14} Following that, diarrheal disease records were obtained from each health facility in each Kebles' catchment area, as well as diarrheal disease data from health posts. Again, eligible households were listed from the health post registration books, and the households' numbers were mentioned and used. Following that, it was allocated proportionally to each kebele per district and collected from the respondents using systematic random sampling. Finally, 540 samples (143 from Sasiga, 137 from Bilo Boshe, 121 from Gobu Sayo, and 139 from Sire districts) were obtained from these four selected districts.

Study Variables

The outcome variable was the use of co-packaged zinc and oral rehydration salt (ORS). Socio-demographic related factors (age, sex, marital status, family size, educational status, occupation, residence, and household's monthly income); caregivers or mothers' awareness and practice-related factors (frequency of feeding, home fluid given since diarrhea started, duration of child supplementation, duration of diarrhea stopped after treatment, type of withheld food or fluid, perceived cause of illness, duration of illness, and illness episodes); health seeking behavior, access, and quality-related factors (perceived health status, cause of illness, illness episode(s), perceived severity, seeking treatment, seeking advice, sources of information, history of hospitalization, distance from nearby health facilities, perceived quality of service and satisfaction level, and health insurance membership status) were independent variables.

Operational Definitions

Utilization: This is when an individual actually acts on his demand or need and receives health services (preventive, promotive, curative, and rehabilitative).^{15,16}

Co-Packaged Zinc and ORS Utilization: is the use of services by U5-child caregivers, at least one child in the household, at least once, for the purpose of preventing and curing health problems, promoting health and well-being, or obtaining information about one's health status and prognosis from public health facilities regarding diarrheal diseases treatment with co-packaged Zinc and ORS in the previous one year, as determined by a close-ended binary question. If they have received the drugs from health facilities, it was answered as "yes", and if they have not, it was answered as "no".¹⁰

Zinc and ORS Co-Package: is a bundle containing zinc sulfate and oral rehydration salt, which can be prepared in different forms for supplementation, such as; Central bundling: Pre-bundled 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, ORS and a bundling pouch that had an instructional message distributed to the health facilities, and bundling was made by the health workers while administering the treatment and the status quo: zinc and ORS were co-administered without bundling.⁸

Perceived severity of illness: An individual's self-opinion that a disease condition or bad health state and its consequences are categorized into mild, moderate, and severe.⁸

Instrument and Procedures

Data was gathered from child caretakers using a questionnaire administered via interview. It was adapted by a review of different literatures^{10,17} and the tool consists of socio-demographic and economic variables; caregivers' or mothers' awareness of and practice-related variables; health-seeking behavior; access and quality-related variables.

Quality Assurance

Prior to data collection, data collectors and supervisors received translation and re-translation of the questionnaire, as well as orientation. The questionnaire was then pre-tested on 5% (28 people) of the total sample.

Data Analysis Procedure

Epi-Data 4.6 and SPSS version 26 were used for data entry and analysis, respectively. Cross-tabulations and frequencies were used to check for missing values of variables and to describe the study population in relation to relevant variables. Then, bi-variable logistic regression analysis was used to look at the association between dependent and independent variables. A P-value less than 0.25 was used as a cut-off point to consider a candidate for the multivariable model. 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, a variable with a P value of <0.05 was considered significant in a multivariable model. Also considered were an adjusted odds ratio and a 95% confidence interval.

Ethical Approval

An appropriate research ethical clearance was obtained from the institutional review board of Wollega University with a reference number of IRB/205/2022, and a permission letter was also obtained from the East Wollega zonal health department. All participants provided informed consent. The tool was prepared anonymously, and the data was presented in aggregated statistics. Generally, the Declaration of Helsinki was used.

Results

Socio-Demographic and Economic Variables

About five hundred forty respondents participated, yielding a 96.4% response rate. The participants were mainly ranged from 18 to 29 years, 260 (48.1%) with the mean of (30.88±SD = 5.29). The majority of them were married, 494 (91.5%) and rural residents, 454 (84.1%). Regarding educational status, about 244 (45.2%) of them had attended their primary education (grade 1–8).

Table I Characteristics of the Participants on the Study Predictors of Under-Five Caregivers' Utilization of Co-Packaged Zinc and Oral Rehydration Salts for Childhood Diarrhea in East Wollega Zone, Western Ethiopia, in 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 ^a	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%)
	Laborer	11 (2.0%)
	Others ^b	22 (4.1%)
Educational Status	Unable to read and write	88 (16.3%)
	Read and write	54 (10.0%)
	Primary education (1–8)	244 (45.2%)
	Grade 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%)

(Continued)

Table 1 (Continued).

Variables	Categories	Frequency (%)
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%)

Notes: ^aCatholic, Wakefata, ^bStudents, government employee.

Abbreviation: ETB, Ethiopian Birr.

About 227 (42.0%) of them had greater than or equal to five people per household, and 317 (58.7%) of them had a monthly income of 1651 to 3200 Ethiopian Birr (Table 1).

Caregivers' or Mothers' Awareness and Practice Related Factors

About 493 (91.3%) participants reported that their child had diarrhea in the last 12 months, and among them, about 269 (49.8%) had 4–6 days of diarrhea and 472 (87.4%) had fever in the last 12 months. Episode wise, among the studied participant's household, their child had on average experienced diarrhea once, 121 (22.4%); twice, 235 (43.5%); and three times or above, 142 (26.3%). For the majority (477, 88.3%), the diarrhea was characterized as watery diarrhea and as remedial action; about 168 (31.1%) of them gave to drink more; breast feed more, 291 (53.9%), eat more 206 (38.1%), 185 (34.3%) of the mothers gave much less to drink and 148 (27.4%) breast feed less in the recent episodes of the illness.

Regarding information about zinc and ORS co-pack, one-fifth (20.7%) of them had information about it. Of these, the majority of them, 97 (86.6%), had obtained information from health workers. In terms of first choice of treatment, approximately 413 (82.9%) thought antibiotic syrup was the best option, while only 22 (4.4%) thought

Table 2 Caregivers' or Mothers' Awareness and Practice-Related Factors on the Study Predictors of Under-Five Caregivers' Utilization of Co-Packaged Zinc and Oral Rehydration Salts for Childhood Diarrhea in East Wollega Zone, Western Ethiopia, in 2022 (N = 540)

Variables	Categories	Frequency (%)
Had diarrhea in the last 12 months	Yes	493 (91.3%)
	No	47 (8.7%)
Day's child had diarrhea	1–3	31 (5.7%)
	4–6	269 (49.8%)
	>6	198 (36.7%)
Fever in the last 12 months	Yes	472 (87.4%)
	No	26 (4.8%)
Diarrhea Episodes	Once	121 (22.4%)
	Twice	235 (43.5%)
	Three times and above	142 (26.3%)

(Continued)

Table 2 (Continued).

Variables	Categories	Frequency (%)
Characteristics of diarrhea in the recent episode	Watery diarrhea	477 (88.3%)
	Bloody/Mucoid diarrhea	21 (3.9%)
Amount given to drink in the recent episodes of diarrhea	Much less	185 (34.3%)
	Somewhat less	81 (15%)
	About the same	64 (11%)
	More	168 (31.1%)
Did breast feed in the recent episodes of diarrhea	Breast feed more	291 (53.9%)
	Breast feed less	148 (27.4%)
	Breast feed about the same	59 (10.9%)
Amount to eat in the recent episodes of diarrhea	Much less	91 (16.9%)
	Somewhat less	110 (20.4%)
	About the same	60 (11.1%)
	More	206 (38.1%)
	Nothing to eat	25 (4.6%)
	Do not know	6 (1.1%)
Heard about zinc and ORS Co-pack	Yes	112 (20.7%)
	No	386 (71.5%)
Source of information for co-pack	Radio	5 (4.5%)
	TV	10 (8.9%)
	Health workers	97 (86.6%)
What did you think the 1st choice of treatment	Antibiotic syrup	413 (82.9%)
	Anti-helminthic syrup	41 (8.2%)
	Zinc tab	6 (1.2%)
	ORS	16 (3.2%)
	Zinc and ORS co-pack	22 (4.4%)
First treatment seeks at	Public health facilities	455 (91.4%)
	Private health facilities	43 (8.6%)
Source of co-pack	Public health facilities	404 (81.1%)
	Private health facilities	94 (18.9%)
Types of diarrhea Co-pack recommended	Watery diarrhea	428 (85.9%)
	Bloody or mucoid diarrhea	70 (14.1%)

zinc and oral co-pack was the best option. About 455 (91.4%) of them sought treatment from public health facilities. Of these, 404 (81.1%) received co-packs from these facilities, and the majority, 428 (85.9%), of the co-packs were recommended for watery diarrhea (Table 2).

Health Seeking Behavior, Access and Quality Related Factors

Regarding recent episodes of diarrhea among children in the responding households, the perceived health status was medium (208, 38.5%) and severe (333, 67.5%). But, over half of the studied participants did not know the cause of the child's illness, even for the most recent episode, and 273 (50.6%) of them began treatment after more than five days.

Health centers were the facilities where they mostly sought treatment (227, 76.9%) and sought advice (302, 55.9%). However, the advice they have received regarding giving zinc and ORS was accounted as 264 (48.9%). Also, 39 (7.2%) children have been hospitalized in the last 12 months among the studied households.

Regarding health-care access and quality-related variables, about 277 (51.3% of the participants) had a distance greater than or equal to 10 kilometers from the nearby health facilities. Also, respondents perceived that good quality and being satisfied by health-care professionals were accounted for at 390 (72.2%) and 356 (65.9%), respectively. Finally, 413 (76.5%) of the participants were Community-Based Health Insurance (CBHI) members (Table 3).

Table 3 Health Seeking Behavior, Access and Quality-Related Factors on the Study Predictors of Under-Five Caregivers' Utilization of Co-Packaged Zinc and Oral Rehydration Salts for Childhood Diarrhea in East Wollega Zone, Western Ethiopia, in 2022 (N = 540)

Variables	Categories	Frequency (%)
Perceived health status for recent episode of diarrhea	Poor	150 (27.8%)
	Medium	208 (38.5%)
	Good	182 (33.7%)
Know cause of child illness for recent episode	Yes	232 (47.1%)
	No	261 (52.9%)
Perceived severity for recent episode	Mild	132 (26.8%)
	Moderate	333 (67.5%)
	Severe	28 (5.7%)
Days after diarrhea began seek treatment	0–2	21 (3.9%)
	3–4	246 (45.6%)
	≥5	273 (50.6%)
Where most frequently seek treatment	Health centers	227 (76.9%)
	Community health workers	47 (15.9%)
	Other public sectors	5 (1.7%)
	Private clinics or providers	10 (3.4%)
	Friend or Relatives	6 (2%)
Where most frequently seek advice	Health center	302 (55.9%)
	Community health workers	57 (10.6%)
	Other public sectors	67 (12.4%)
	Private clinics or providers	114 (21.15%)

(Continued)

Table 3 (Continued).

Variables	Categories	Frequency (%)
What advice did you received	Give Fluid	28 (5.2%)
	Give ORS	132 (24.4%)
	Give zinc	5 (0.9%)
	Give zinc and ORS co-pack	264 (48.9%)
	Give antibiotics	12 (2.2%)
	Give anti-diarrheal	16 (3.0%)
	Give more than usual of fluid	57 (10.6%)
	Give more than usual to eat	6 (1.1%)
	Take to clinic or hospitals	10 (1.9%)
	On prevention of diarrhea	10 (1.9%)
Source of information for advice	Radio	177 (32.8%)
	TV	97 (18.0%)
	Health worker	266 (49.3%)
Child hospitalization in the last 12 months	Yes	39 (7.2%)
	No	501 (92.8%)
Distance from health facilities	<10 kilometers	263 (48.7%)
	≥10 kilometers	277 (51.3%)
Perceived quality of health care by health care professionals	Good	390 (72.2%)
	Poor	150 (27.8%)
Satisfaction from quality of care of HCP	Satisfied	356 (65.9%)
	Not satisfied	184 (34.1%)
Status of CBHI membership	Member	413 (76.5%)
	Non-member	127 (23.5%)

Co-Packaged Zinc and ORS Utilization

The study showed that about 214 (39.6%) of under-five caregivers' had utilized co-packaged zinc and oral rehydration salts for their childhood diarrhea at least once in the last 12 months (Figure 1).

Predictors of Co-Packaged Zinc and ORS Utilization

Socio-demographic variables such as age of the respondents, occupation, family size, caregivers' or mothers' awareness, and practice-related variables such as having heard about zinc and ORS co-pack; health seeking behavior, access and quality-related variables such as; perceived health status for the recent episode, perceived severity for the recent episode, distance from a nearby health facility; and status of CBHI membership were associated with co-packaged zinc and ORS utilization on bi-variable analysis (Table 4).

Then, in a multivariable logistic regression analysis, variables such as family size, knowledge of zinc and ORS co-pack, perceived health status for recent episodes, perceived severity for recent episodes, and status of CBHI membership were found to be significantly associated.

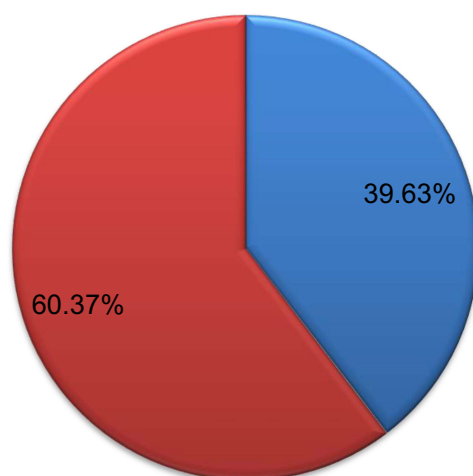


Figure 1 Co-packaged utilization of zinc and ORS among under-five children with diarrheal diseases in East Wollega zone, western Ethiopia, 2022 (N = 540).

From this analysis, family size was statistically significantly associated with co-packaged zinc and ORS utilization [AOR and 95% CI = 5.72 (2.93, 11.15)]. This meant that those with fewer than five children were 5.7 times more likely to use zinc and ORS co-pack than those with more than five children.

This study also showed that, heard about zinc and ORS co-pack was statistically strongly associated with co-packaged zinc and ORS utilization [AOR and 95% CI = 9.52 (4.95, 23.68)]. This indicated that the probability of utilizing co-packaged zinc and ORS among under-fives caregivers' who have heard about zinc and ORS co-pack were 9.5 times more likely to utilize it than their counterparts.

The perceived health status of the child for the recent episode was statistically associated with co-packaged zinc and ORS utilization: poor [AOR and 95% CI = 5.90 (2.58, 15.96)] and medium [AOR and 95% CI = 2.20 (1.00, 4.83)]. This revealed that the probability of utilizing co-packaged zinc and ORS among respondents' households who perceived their health status as poor and medium for recent episodes was 5.90 and 2.20 times, respectively, more likely to utilize it than its counterpart. Furthermore, co-packaged use of zinc and ORS was statistically associated with perceived severity for recent episodes [AOR and 95% CI = 4.48 (1.36, 14.76)]. This implied that the probability of utilizing co-packaged zinc and ORS among respondents' household who perceived their recent episodes as moderate was 4.4 times more likely to utilize it compared to its counterparts.

Finally, membership in community-based health insurance was associated to co-packaged zinc and ORS use [AOR and 95% CI = 2.28 (1.34, 6.90)]. This indicated that respondents' households with CBHI non-member were 2.2 times more likely to utilize co-packaged zinc and ORS than member households (Table 4).

Discussion

The study aimed to identify predictors of under-five caregivers' utilization of co-packaged zinc and oral rehydration salts for childhood diarrhea in the East Wollega Zone, Western Ethiopia in 2022. Based on this, the study showed that 39.6% (35.6–43.9%) of under-five caregivers had utilized co-packaged zinc and oral rehydration salts for their childhood diarrhea at least once in the last 12 months.

This finding was higher than in other parts of the world, such as Nigeria (8.3%)¹⁸, among the 15 highest-burden countries where ORS and zinc coverage levels were accounted for as 2% or less,⁹ Sudan, where 18.9% and 14.8% of them had received ORS and zinc, respectively;¹⁹ and Ethiopia, where the 2016 EDHS reported that 17% had received a combination of zinc and ORS.¹² The variation could be due to socio-cultural and geographical differences, as well as the time frame for the studies and surveys conducted even within the study area. Also, for the current study, we have considered primarily rural and semi-urban households, whereas these studies have assessed primarily urban residences, and they were institutional-based studies. Additionally, this magnitude of co-packaged zinc and ORS use estimate is lower than the study done in Ethiopia.²⁰ The probable reasons might be due to an improvement in advocacy across the

Table 4 Predictors of Under-Five Caregivers' Utilization of Co-Packaged Zinc and Oral Rehydration Salts for Childhood Diarrhea in East Wollega Zone, Western Ethiopia, in 2022 (N = 540)

Variables		Co-Packaged Zinc and ORS Utilization		OR[95% CI] and P value	
		No N (%)	Yes N (%)	COR	AOR
Age of the respondent	18–29	162 (49.7%)	98 (45.8%)	I	I
	30–39	142 (43.6%)	90 (42.1%)	1.04 (0.72, 1.50)	1.24 (0.66, 2.36)
	40–49	22 (6.7%)	26 (12.1%)	1.9 (1.05, 3.63)	2.03 (0.61, 6.70)
Occupation	Farmer	148 (45.4%)	42 (19.6%)	I	I
	Housewife	136 (41.7%)	94 (43.9%)	2.43 (1.58, 3.75)	0.31 I (0.09, 1.01)
	Merchant	21 (6.4%)	66 (30.8%)	11.07 (6.08, 20.15)	2.08 (0.31, 16.38)
	Laborer	5 (1.5%)	6 (2.8%)	4.22 (1.22, 14.54)	3.59 (0.46, 2.39)
	Others ^a	16 (4.9%)	6 (2.8%)	2.11 (0.72, 6.15)	4.98 (0.23, 7.71)
Family Size	<5	152 (46.6%)	161 (75.2%)	3.47 (2.38, 5.08)	5.72 (2.93, 11.15)***
	≥5	174 (53.4%)	53 (24.8%)	I	I
Heard about zinc and ORS Co-pack	Yes	101 (3.8%)	112 (48.6%)	3.94 (1.36, 6.36)	9.52 (4.95, 23.68)***
	No	279 (96.2%)	107 (51.4%)	I	I
Perceived health status for recent episode	Poor	52 (16.0%)	98 (45.8%)	6.48 (3.99, 10.51)	5.90 (2.58, 15.96)***
	Medium	133 (40.8%)	75 (35.0%)	1.93 (1.23, 3.03)	2.20 (1.02, 4.83)*
	Good	141 (43.3%)	41 (19.2%)	I	I
Perceived severity for recent episode	Mild	52 (18.2%)	80 (38.5%)	I	I
	Moderate	216 (75.8%)	117 (56.3%)	0.35 (0.23, 0.53)	4.48 (1.36, 14.76)**
	Severe	17 (6.0%)	11 (5.3%)	0.42 (0.18, 0.96)	4.99 (0.33, 7.42)
Distance from health facility	<10KM	189 (58.0%)	74 (34.6%)	I	I
	≥10KM	137 (42.0%)	140 (65.4%)	2.61 (1.82, 3.73)	0.57 (0.30, 1.08)
Status of CBHI membership	Member	295 (90.5%)	118 (55.1%)	I	I
	Non-Member	31 (9.5%)	96 (44.9%)	3.03 (4.89, 12.23)	2.28 (1.34, 6.90)***

Notes: ^aStudents, government workers; *P-value <0.05; **P-value <0.01; ***P-value <0.001 and I = reference.

Abbreviations: AOR, adjusted odd ratio; COR, crude odd ratio; KM, kilometer.

health system of the nation, both in the government and non-government sectors, in promoting the service utilization of this intervention and other related diarrheal disease treatment intervention options, particularly giving attention at the primary health facility level as they are near to the community. Also, the current study is community-based, and there are huge time gaps after the previous study's data has been analyzed, and that study was based on the EDHS 2016¹², which is somewhat older than the current study. Expansion of various health facilities and adoption of various health system reform initiatives,²¹ particularly those that improve health-care access and services such as second-generation health extension programs²² that focus on promotive, preventive, curative, and rehabilitative health services, may have an indirect and direct impact on the current study.

However, this finding was less than a study done in Kenya on the occurrence of diarrhea and utilization of zinc bundled with ORS among caregivers of children less than five years old, in which the study revealed 75%¹⁰ and also studies conducted in our country, Ethiopia, such as studies on zinc and Oral Rehydration Salts effectiveness, which reported a magnitude of zinc and ORS co-pack utilization of 67%⁸ and studies on the occurrence of diarrhea and utilization of zinc bundled with ORS in Addis Ababa, which accounted for two-thirds of the population.¹⁰ The probable

differences between these could be variations in the design of the study, in which some have used randomized controlled trials, and differences in the study settings, in which the previous study was based in a town where the majority of educated population groups were confined, and this might have a greater influence on the service utilization of the intervention.

Furthermore, this finding was supported by a study conducted in rural China (34.6%).²³ This similarity might be due to the fact that in both of the studies, the majority of them were considered low-level care for diarrhea among children under-five years old and have been based at the community level.

Family size, heard about zinc and ORS co-packs, perceived health status for the recent episode, perceived severity for the recent episode, and CBHI membership were predictors of co-packaged utilization of zinc and ORS.

The odds of utilizing co-packaged zinc and ORS to treat their under-five children with diarrheal disease were higher among respondents whose family size was less than five members per household. Studies done in Ethiopia support the current finding.^{20,24} This could be due to the attention and intention households with large family members might have, which might be low due to different socio-economic problems in both situations.

This study also showed that utilization was higher among mothers' or caretakers' of the children who had heard about zinc and ORS co-pack than those who had not. This finding was supported by a cross-sectional study done in Ethiopia on zinc utilization, which revealed that media exposure was one of the predictors of it. This implies that being exposed to all or either of the three media (radio, TV, and newspaper) increases the likelihood of zinc utilization.²⁴ Also, supported by a study done in Ethiopia, those who had heard about zinc were almost three times more likely to utilize it.²⁵ This could be due to the fact that the more knowledge an individual has, the better they can determine their demand for health service utilization.

With regard to perceived health status for recent episodes, the probability of utilizing co-packaged zinc and ORS among those respondents' households who perceived their health status as poor and medium for recent episodes was almost six and two fold higher than that of those who perceived it as good, respectively, and the probability of utilizing the co-pack among those who perceived the severity of the recent episodes as moderate was almost four fold to utilize it than those who perceived it as mild. These findings could be explained by those respondents who perceived their family as having poor health and severe might seek more treatment and care where they might additionally obtain health information from health-care professionals.

Despite various studies revealing that CBHI member households had utilized health services more than non-member households,^{26–28} this study showed that respondents whose households were CBHI non-members had utilized the co-pack two-fold more than their counterparts. The probable reason might be due to the moral hazard assumed by service seekers, CBHI members, to consume goods and services as compared to non-members, as they can change their behaviors after becoming members, even during a facility visit. In general, it had limitations such as the study's cross-sectional nature, which made it difficult to show cause and effect, and there was a possibility of recall bias.

Conclusion and Recommendation

The study found that the co-packaged utilization of zinc and oral rehydration salt was low. Family size, hearing about zinc and ORS co-packs, perceived health status, perceived severity of the most recent episode, and CBHI membership were all predictors of zinc and ORS co-package use. Hence, different health offices and health institutions in the health system have to work toward maximization of its uptake by strengthening health education and health information dissemination services. Finally, the authors recommend that further studies are required to assess the cost-effectiveness of an intervention using follow-up studies and different perspectives using strong study designs.

Acknowledgments

The authors want to acknowledge all the respondents, different levels of health offices, and facilities for their due cooperation and involvement during this work.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

All authors report no conflicts of interest in this work.

References

1. UNICEF. Diarrhea: why children are still dying and what can be done; 2009.
2. Anand S, Mandal S, Patil P, et al. Pathogen-induced secretory diarrhea and its prevention. *Eur J Clin Microbiol Infect Dis*. 2016;35(11):1721–1739. doi:10.1007/s10096-016-2726-5
3. Laura M, Lamberti M. *Evaluating a childhood diarrhea management program in Uttar Pradesh, Gujarat and Bihar, India: determinants of diarrhea prevalence, recall, care-seeking and treatment* [Doctoral dissertation]. Johns Hopkins University; 2014.
4. Merrie Y, Tegegne M, Munaw M, et al. Prevalence and associated factors of visual impairment among school-age children in Bahir Dar City, Northwest Ethiopia. *Clin Optom*. 2019;11:135–143. doi:10.2147/OPTO.S213047
5. Practice AGB. Increasing the use of ORS and zinc through the private sector; 2015.
6. Macdonald V, Addo-yobo J, Foundation MG, et al. Progress over a decade of zinc and ORS scale-up; 2016.
7. World Health Organization. WHO recommended ORS and zinc for treatment of diarrhea. Oral rehydration solution (ors) + zinc co-pack. who.2019; 2019.
8. Gebremedhin S, Mamo G, Gezahign H, et al. The effectiveness bundling of zinc with Oral Rehydration Salts (ORS) for improving adherence to acute watery diarrhea treatment in Ethiopia: cluster randomised controlled trial. *BMC Public Health*. 2016;16(1):1–10. doi:10.1186/s12889-016-3126-6
9. Ambler G, Castle B. Proposal to include an additional listing of co- packaged ORS and zinc for management of diarrhea in children on the WHO Model List of Essential Medicines for Children Application authors; 2019.
10. Solomon H, Jemal H, Agajie LB. Occurrence of diarrhea and utilization of zinc bundled with ORS among caregivers of children less than five-years in Addis Ababa, Ethiopia. *J Public Heal Epidemiol*. 2018;10(9):348–355. doi:10.5897/JPHE2018.1029
11. Yeshaw Y, Worku MG, Tessema ZT, et al. Zinc utilization and associated factors among under-five children with diarrhea in East Africa: a generalized linear mixed modeling. *PLoS One*. 2020;15(12):1–11. doi:10.1371/journal.pone.0243245
12. CSA. Federal Democratic Republic of Ethiopia demographic and health survey 2016 key indicators report. The DHS Program ICF. Rockville, Maryland, USA; 2016.
13. Sambo LG, Chatora RR; World Health Organization Regional Office for Africa. Tools for assessing the operationality of District Health systems; 2003;.
14. Ashagre and Netsanet. Predictors of willingness to participate in health insurance services among the community of Jimma Town, Southwest Ethiopia. *Health Serv Insights*. 2014;1(7):31–37.
15. Access O. Re-revisiting Andersen's behavioral model of health services use: a systematic review of studies from. *GMS Psycho Soc Med*. 2012;9:1–15.
16. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav*. 2010;36(1):1–10. doi:10.2307/2137284
17. Banke K Toolkit for the collection of survey data on the correct use of pediatric zinc as a treatment for diarrhea; 2011.
18. Ogunlesi T, Olowonyo M, Runsewe-Abiodun T. Pre-hospital use of oral rehydration therapy and zinc and the risk of dehydration in childhood diarrhoea. *Br J Med Med Res*. 2017;21(8):1–8. doi:10.9734/BJMMR/2017/33648
19. Omer S, Mohamed O, Osman M, et al. Access to oral rehydration solution and zinc supplementation for treatment of childhood diarrhoeal diseases in Sudan. *BMC Res Notes*. 2020;2020:1–4.
20. Kassa SF, Alemu TG, Techane MA, et al. The co-utilization of oral rehydration solution and zinc for treating diarrhea and its associated factors among under-five children in Ethiopia: further analysis of EDHS 2016. *Patient Prefer Adherence*. 2022;2022:16–1713.
21. Federal Ministry of Health of Ethiopia. Health sector transformation plan II (2020/21–2024/25); 2021. Available from: <https://e-library.moh.gov.et/library/wp-content/uploads/2021/07/HSTP-II.pdf>. Accessed March 24, 2023.
22. Gooding K, Harb J, Binci M, et al. Evaluation of the Second Generation Health Extension Programme's impact on health post capacity to prevent, prepare for and respond to shocks in selected areas of Ethiopia; 2020. Available from: <https://www.opml.co.uk/files/Publications/A2241-maintains/maintains-ethiopia-research-plan-final-website-version.16.6.21.pdf?noredirect=1>. Accessed March 24, 2023.
23. Gao W, Yan H, Wang D, et al. Oral rehydration salt use and its correlates in low-level care of diarrhea among children under 36 months old in rural Western China. *BMC Public Health*. 2013;13(1):1. doi:10.1186/1471-2458-13-238
24. Teshale AB, Liyew AM, Tesema GA Factors associated with zinc utilization for the management of diarrhea in under-five children in Ethiopia; 2020.
25. Azage M, Haile D. Factors affecting healthcare service utilization of mothers who had children with diarrhea in Ethiopia: evidence from a population based national survey. *Rural Remote Health*. 2015;15(4):1–10.
26. Ethiopian Health Insurance Agency. Evaluation of community-based health insurance pilot schemes in Ethiopia: final report. Addis Ababa, Ethiopia; 2015. Available from: <https://www.hfgproject.org/wp-content/uploads/2015/05/CBHI-Evaluation-5-2015.pdf>. Accessed March 24, 2023.
27. Kiwanuka SN, Ekirapa EK, Peterson S, et al. Access to and utilisation of health services for the poor in Uganda: a systematic review of available evidence. *Trans R Soc Trop Med Hyg*. 2008;102:1067–1074. doi:10.1016/j.trstmh.2008.04.023
28. Mebratie AD, Sparrow R, Yilma Z, Abebaw D, Alemu G, Bedi AS. The impact of Ethiopia's pilot community based health insurance scheme on healthcare utilization and cost of care. *Soc Sci Med*. 2019;20:112–119. doi:10.1016/j.socscimed.2018.11.003

Patient Preference and Adherence

Dovepress

Publish your work in this journal

Patient Preference and Adherence is an international, peer-reviewed, open access journal that focusing on the growing importance of patient preference and adherence throughout the therapeutic continuum. Patient satisfaction, acceptability, quality of life, compliance, persistence and their role in developing new therapeutic modalities and compounds to optimize clinical outcomes for existing disease states are major areas of interest for the journal. This journal has been accepted for indexing on PubMed Central. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/patient-preference-and-adherence-journal>