Assessment of knowledge, attitude, and practice of child caregivers towards oral rehydration salt and zinc for the treatment of diarrhea in under 5 children in Gondar town

Dawit Kumilachew Yimenu^a, Asmamaw Emagn Kasahun^b, Mohammed Chane^a,
Yeelshaddai Getachew^a, Biruktawit Manaye^a, Zemene Demelash Kifle^{c,*}

^a Department of Social Pharmacy, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

^b Department of Pharmaceutics, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

^c Department of Pharmacology, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

ARTICLE INFO

Keywords:

Attitude
Diarrhea
Knowledge
Oral rehydration salt
Practice
Zinc

ABSTRACT

Background: Diarrhea is the second-largest cause of death in under-five children, killing an estimated seven hundred sixty thousand children in Africa each year. This study aimed to assess the knowledge, attitude & practice of child caregivers towards oral rehydration salt and zinc use for the treatment of diarrhea in under 5 children in Gondar town, Amhara regional state, Ethiopia.

Methods: Institutional based cross-sectional study was conducted at the pediatrics outpatient department of the University of Gondar comprehensive specialized hospital. Data was collected using a structured questionnaire and were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 20. Frequencies and percentages were used to describe descriptive data and the results were presented using tables and figures. Both binary and multivariable logistic regression analyses were conducted to test for association between the different variables.

Results: A total of 306 caregivers were participated in the study. The majority of them 269(87.9%) defined diarrhea as the occurrence of watery or loose stool three and more times a day. Almost all caregivers but a few 297(97.1%) believed that diarrhea is a series problem of childhood. Caregivers' educational level, occupational status, and sex were significant factors associated with their knowledge about Oral Rehydration Salt and zinc ($P \leq 0.05$), while occupational status was the only significant factor associated with their attitude ($P \leq 0.05$). Female caregivers were found 2.8 times more practical about Oral Rehydration Salt and zinc utilization for diarrheal management compared to male counterparts (AOR = 2.875(1.319,6.263)). Similarly, employed caregivers were 2.9 times more to have good practice than unemployed caregivers (AOR = 2.927(1.533,5.587)). **Conclusion:** There was good knowledge, attitude, and practice about Oral Rehydration Salt and zinc consumption among child caregivers in Gondar. Regular educational strategies aimed at improving child caregivers' awareness of diarrhea disease management and utilization of Oral Rehydration Salt and Zinc tablets are advised.

1. Background

Diarrhea is defined as, "the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual)".^{1,2} It can be acute or chronic, and blood may be present, as in dysentery. Diarrhea can be caused by a variety of reasons, including bacterial, protozoal, and viral illnesses, such as rotavirus, cholera, and typhoid enteritis, all of which are transmitted by the fecal-oral route. It

could also be non-infectious, such as food indiscretions or digestive issues and problems of mal-digestion and mal-absorption.³

Diarrheal disease (DD) is still a major public health issue around the world, coming in second only to pneumonia as a cause of death in children under the age of five. Approximately 1.5 million people die each year as a result of it all over the world.⁴ It is also the leading cause of death among children in Ethiopia. Diarrheal illness affects 13.3% of children under the age of five, according to the EDHS 2012. In 2007,

* Corresponding author. Department of Pharmacology, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, P.O. Box: 196, Gondar, Ethiopia.

E-mail address: zeme2010@gmail.com (Z.D. Kifle).

<https://doi.org/10.1016/j.cegh.2022.100998>

Received 16 January 2022; Received in revised form 3 February 2022; Accepted 10 February 2022

Available online 16 February 2022

2213-3984/© 2022 The Authors. Published by Elsevier B.V. on behalf of INDIACLEN. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Ethiopia's child mortality rate was 199 per 1000 live births, or around one out of every five deaths. It's treatable as well as preventable.⁵

Rehydration using oral rehydration salts (ORS) solution is an important part of treating diarrhea.⁶ During episodes of diarrhea, rehydration therapy is an essential step to save children's lives. Every year, however, millions of children die as a result of a failure to adequately replace the fluid. Oral rehydration therapy (ORT) for diarrhea could prevent over 1.5 million fatalities per year or 15% of all deaths in children under the age of five.⁷ Diarrhea morbidity and mortality can be reduced with proper home management. Dehydration owing to a loss of fluids and electrolytes is thought to be the cause of 60–70% of diarrhea-related deaths. Knowledge of the causes of diarrhea and the accompanying warning indicators among caregivers, as well as the prevention of dehydration during diarrheal episodes through the use of Oral Rehydration Salts, are all important factors.^{8,9}

In developing countries, diarrheal illnesses remained the second leading cause of death in children under the age of five. Diarrhea is also a major killer of children in Ethiopia, making it a severe public health issue. Every year, an estimated 73,700 children under the age of five years die because of diarrhea.¹⁰

Oral Rehydration Salts solution and zinc uses a component of child survival strategy. However, available studies and information provided limited or inadequate knowledge to increase Oral Rehydration Salts solution and zinc use. This is study will provide information on determinants of Oral Rehydration Salts solution and zinc use aimed at guiding health providers & policymakers in improving childhood morbidities and mortalities due to diarrhea. Thus, this study aimed to assess the knowledge, attitude & practice of child caregivers towards oral rehydration salt and zinc use for the treatment of diarrhea in under 5 children in Gondar town, Amhara regional state, Ethiopia.

2. Method and materials

2.1. Study design, period, and area

A descriptive study was conducted at the university of Gondar comprehensive specialized hospital. The hospital is located in Gondar city, North West Ethiopia. It is located 737 km away from the capital city of Ethiopia. It is one of the most prestigious hospitals in the country currently serving about seven million people in the catchment area. The study was conducted from August 07/2021 to September 10/2021.

Source population: All caregivers living in Gondar town having under 5 children.

Study population: All under-five child caregivers in Gondar town that fulfill the inclusion criteria.

Inclusion and Exclusion criteria: The inclusion criteria includes those under-five child caregivers in Gondar town that presented to the pediatric outpatient department of the University of Gondar specialized hospital during the study period, and those volunteers to participate in the study. However, the exclusion criteria include those under-five child caregivers that were unable to communicate freely with the data collectors due to medical conditions and/or language barriers.

2.2. Sample size determination

The sample size was calculated by using single population proportion formula with the following assumption. Prevalence of caregiver's knowledge of ORS 74.4%, based on the finding of a study conducted in Wolaita Sodo town in 2016,¹¹ the margin of error of 5%, and confidence interval of 95%.

$$n = (Z \alpha/2)^2 P (1-P) / d^2$$

Where, n = the sample size, Z = Critical value = 1.96, P = Prevalence = 74.4%, d = Margin of error = 5%

$$n = (1.96)^2 \times 0.744(1-0.744) / (0.05)^2 = 292$$

By adding a non-response rate of 5% the final sample size was 306.

2.3. Data collection methods and procedure

A structured, interviewer-administered questionnaire was used for data collection. The questionnaire was adapted from previous studies and modified to fit the current study setup.^{11–14} First, the English version of the questionnaire was prepared. Then it has been translated to the Amharic version (local language) then back to English. The questionnaire consisted of four parts. The first part contains questions about the socio-demographic characteristics of caregivers and their dependents. The second part consisted of eleven questions to assess the knowledge of the participants. The third and fourth parts consist of six and nineteen questions to assess the attitude and practice of the study participants.

Dependent variables: Knowledge, Attitude, and Practice of the child caregivers on ORS and Zinc utilization.

Independent variables: Caregiver's factors (Sociodemographic and work-related characteristic; age, sex, level of education, marital status, religion, occupation etc ...), Child related factors (Demographic characteristics; age of the child, breastfeeding, sex, number of under-five children etc ...), Other factors (Partner's occupation, educational status, income etc ...).

2.4. Operational definition of terms

- **Caregiver:** A person who is responsible for a child.
- **Diarrhea:** the passage of three or more loose or liquid stools per day
- **Dehydration:** the loss of water from the body, as a result of diarrhea.
- **Good attitude:** who answer above the mean of the attitude question was considered as having a good attitude.
- **Good knowledge:** who answer above the mean of the Knowledge question was considered as having good knowledge.
- **Good practice:** who able to answer above the mean of the practice question was considered as having good practice
- **Oral Rehydration Therapy (ORT):** administration of recommended fluid by mouth to prevent or correct dehydration as a result of diarrhea.
- **Oral Rehydration Salt (ORS):** A Solution used for the replacement of water secondary to diarrhea.
- **Poor attitude:** who answer below the mean of the attitude question was considered as poor attitude.
- **Poor knowledge:** who answer below the mean of the knowledge question was considered as poor knowledge.
- **Poor practice:** who answer below the mean of the practice questions was considered as Poor practice.
- **Rehydration:** replacement of fluid.

2.5. Data quality management

To ensure the quality of the data the following activities were undertaken: careful design, translation, and retranslation of the questionnaire, close supervision of the data collection procedures, proper categorization and coding of the data, reviewing the collected data for accuracy and completeness by data collectors and supervisors, and by checking the recorded data. A pre-test of the questionnaire was also conducted on 5% of the total sample size before the actual data collection, and necessary amendments were made based on the feedback. The participants in the pre-test were excluded from the final study.

2.6. Data analysis

After data collection, each questionnaire was checked for completeness and consistency by data collectors. The collected data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 20. Frequencies and percentages were used to describe descriptive data and the results were presented using tables and figures.

Table 1

Distribution of socio-demographic variables of the study participants (caregivers and children).

Variable	Category	Frequency (N = 306)	Percentage %
Sex	Male	50	16.3
	Female	256	83.7
Age of caregiver in years	15–24	32	10.5
	24–35	212	69.3
	>35	62	20.3
Religion	Orthodox	238	77.8
	Muslim	54	17.6
	Catholic	0	0
	Protestant	12	3.9
	Other ^a	2	0.7
Level of education	No formal education	10	3.3
	Primary school	58	19.0
	Secondary school (9–12)	108	35.3
	Higher education/university/college	130	42.5
Residence	Rural	30	9.8
	Urban	276	90.2
Occupational status	Employed	160	52.3
	Searching for job/unemployed	29	9.5
Type of occupation	House wife	117	38.2
	Health worker	12	3.9
	Non health worker	148	48.4
Marital status:	Single	8	2.6
	Married	286	93.5
	Divorced	7	2.3
	Widowed	5	1.6
If married, what does your husband/wife do?	Governmental employee	114	37.3
	Private employ	83	27.1
	Merchant	55	18.0
	House wife	15	4.9
	Other ^b	19	6.2
What is the highest level of education he/she has attained?	No formal education	7	2.3
	Primary school	30	9.8
	Secondary school (9–12)	85	27.8
	Higher education/university/college	164	53.6
Type of profession	Health worker	21	6.9
	Non health worker	265	86.6
Monthly income	<1000	6	2.0
	1000–30000	60	19.6
	3000–5000	70	22.9
	>5000	170	55.6
Family size	< or equal to 3	77	25.2
	4 to 5	184	60.1
	>5	45	14.7
Relation of caregiver to the child	Mother	245	80.1
	Father	47	15.4
	Sister/brother	3	1.0
	Grandparent	9	2.9
Age of child	0–11 month	15	4.9
	12–23 month	47	15.4
	24–35 month	58	19.0
	36–47 month	95	31.0
	48–59 month	91	29.7
Sex of child	Male	163	53.3
	Female	143	47.7
For how long was your child on exclusive breastfeeding	Less than 6 months	49	16.0
	6 months	248	81.0
	Greater than 6 months	9	2.9
Is your child currently breastfeeding?	Yes	84	27.5
	No	222	72.5
How many children under five do you have in your house?	1	206	67.3
	2	99	32.4
	3 and above	1	0.3
	Yes	293	95.8

Table 1 (continued)

Variable	Category	Frequency (N = 306)	Percentage %
Does all of your children fully vaccinated?	No	13	4.2
	Other	2	0.7
Where do you take your child whenever s/he/they get diarrhea?	To health institution	305	99.7
	Traditional healer	1	0.3
	Didn't take s/he/ them to anywhere	-	-
	Other	-	-
Do you have health insurance?	Yes	91	29.7
	No	215	70.3
Did your child get diarrhea in the last two weeks?	Yes	76	24.8
	No	230	75.2
Did your child receive ORS solution in the last two weeks?	Yes	62	20.3
	No	244	79.7

^a Jewish.^b Student, Labor work.

Both binary and multivariable logistic regression analyses were conducted to test for association between the different variables and a P-value of ≤ 0.05 was used to declare statistical significance at 95% Confidence Interval (CI).

3. Result

A total of 306 caregivers were participated in the study. The mean age of the caregivers was 31.5 [SD $\pm$ 7.4] and more than two-thirds of them 212 (69.3%) were found to be between 25 and 35 years. Of the total caregivers, 256 (83.7%) of them were females and 238 (77.8%) of them were Orthodox in Religion. About 296 (96.7%) of the participants have had a formal education in which 130 (42.5%) have a higher educational status. The majority of the caregivers 160 (53.3%) were employed and more than 90% of them were urban residents (Table 1).

Concerning partner's sociodemographic status, 164 (53.6%) of the caregivers reported that their partners have higher degree educational level (diploma/degree and above level). In occupational status of spouses, 114(37.3%) were public servants followed by 83(27.1%) of them being private employees. Among the employed spouses, 21(6.9%) were health workers. More than half of the caregivers 170 (55.6%) earn above 5000-birr monthly income and the majority of households 184 (60.1%) of were a family of four and five (Table 1).

The age of the children ranges from 0 to 59 months with a mean of 2.7 years [SD $\pm$ 1.21] and the majority 95 (31.0%) were between 36 and 47 months followed by 91 (29.7%) between 48 and 59 months. The majority of the children were males 163(53.3%). Most of the children 293(95.8%) were fully vaccinated and 248 (81.0%) were exclusively fed breast milk for six months (Table 1).

3.1. Knowledge of caregivers about diarrhea and its management

The majority of the participants 269 (87.9%) defined diarrhea as occurring when the stool was watery or lose more than three or more times and 21 (6.9%) participants indicated diarrhea as the presence of blood. Most caregivers 297(97.1%) believed that diarrhea as a series problem of childhood illness and 268(87.6%) knew the danger signs related to childhood diarrhea. About 257 (84.0%) of caregivers had awareness about different causes of acute diarrhea in which 219 (71.6%) reported it as caused by poor hygiene.

More than half of caregivers 157(51.3%) said ORS should be started soon after the first/second motion of watery stool noticed, followed by 118(38.6%) reported to be started after two days of watery stool. Almost half of caregivers 151(49.3) said ORS should be administered after each bowel motion and 113(36.9%) reported every hour (Table 2).

All study participants reported that they have heard about ORT packet, but only 242(79.1%) were answered correctly for replacement of

Table 2

Knowledge of caregivers about ORS and zinc usage for diarrheal disease management for under-five children in Gondar town, Amhara regional state, North West Ethiopia, 2021.

Variable	Category	Frequency (N = 306)	Percentage %
What do you understand by diarrhea?	Frequent passing of watery stool (3 or more times)	269	87.9
	Frequent passing of non- watery stool	6	2.0
	Blood in stools	21	6.9
	Greenish stools	7	2.3
	Mucus in stool	3	1.0
	Other, specified	-	-
Do you think diarrhea is a serious child illness?	Yes	297	97.1
	No	9	2.9
What do you think are the causes of diarrhea?	Poor hygiene	219	71.6
	Food poisoning/contaminated food	242	79.1
	Contaminated water	201	65.7
	Teething	49	16.0
	Intestinal parasite	19	6.2
	Other ^a	2	0.7
	Yes	268	87.6
	No	38	12.4
Do you know any danger signs related to diarrhea in a child?	Becoming weak or lethargic frequent passing of diarrhea	218	76.8
	Repeated vomiting/ vomiting everywhere	107	37.7
	Fever and blood in stool	154	54.2
	Marked thirst of water	53	18.7
	Poor feeding	88	31.0
	Reduced urine output	13	4.6
	Other ^b	8	2.8
Do you think diarrhea is Preventable?	Yes	291	95.1
	No	15	4.9
The Purpose of ORS is?	To Stop diarrhea	53	17.3
	Reduce the duration of Diarrhea	9	2.9
	Replace the body salts, energy and water lost in diarrhea	242	79.1
	Prevents diarrhea	2	0.7
	I do not know	-	-
	Feeding bottle	49	16.0
	Cup and spoon	243	79.4
	Other ^c	14	4.6
	I do not now	-	-
How soon should the use of ORS Start?	After two days of watery stool	118	38.6
	After three days of watery stool	26	8.5
	Soon after the first/ second motion of watery stool noticed	157	51.3
	I do not know	5	1.6
Timing of ORS administration: It is given	Every hour	113	36.9
	After each bowel motion	151	49.3
	After vomiting	21	6.9
	To prevent diarrhea before it starts	16	5.2
	I don't know	5	1.6
Have you ever heard about zinc?	Yes	226	73.9
	No	80	26.1
The purpose of zinc is?	Doesn't have any purpose	9	2.9
	To decrease the diarrhea	158	51.6
	To prevent dehydration	45	14.7
	No idea	92	30.1
	Other	2	0.7

Table 2 (continued)

Variable	Category	Frequency (N = 306)	Percentage %
Where did you get information about ORS/Zinc?	Health facility	254	83.0
	Family	11	3.6
	Friend	4	1.3
	Media	24	7.8
	I'm a health professional myself	7	2.3
	Other ^d	6	2.0
	Total	360	100

ORS: Oral Rehydration Salt.

^a Transferred from sick person.

^b Eye ball-sucking.

^c Nasogastric tube.

^d Reading Instruction.

water loss and prevention of dehydration. Most participants 226 (73.9%) reported that they also heard about zinc and 158(51.8) indicated that zinc is used to decrease diarrhea followed by 45(14.7%) reporting it to be used for preventing dehydration. Respondents' knowledge about ORS was gained from health facilities 254(83%), followed by the media 24 (7.8%) (Table 2).

3.2. Attitude of child caregivers towards oral rehydration salt (ORS) and zinc

About 164 (53.6%) of the study participants thought that ORS is the mainstay of the treatment of diarrhea and 210 (68.6%) agreed that adding zinc in the treatment will improve the outcome. One hundred seventy 170(55.6%) participants thought Diarrhea can be effectively treated at home using salt and sugar solution. Only 48(15.7%) agreed homemade oral rehydration solution is equally effective as the ORS formulation provided at health facilities, 193(63.1%) disagreed and 65 (21.2%) were neutral. One hundred ninety-three (91.8%) of the study caretakers believed that feeding a child with diarrhea will not aggravate the disease. Moreover, two hundred ninety-six (96.7%) of the respondents believed that whenever the child gets diarrhea additional food and fluid should be given. (Fig. 1)

3.3. Diarrhea management practice of child care-givers

Of the total participants, 295(96.4%) had ever experienced ORS use, and 206(67.3%) participants had experienced zinc use. In addition, 190 (44.0%) of caregivers had the practice of giving rice water to their child with diarrhea, and 90 (20.8%) of the caregivers had the practice of giving salt and sugar solution. Among those who ever used ORS, 290 (94.8%) have the practice to use ORS only for 24 h once after it is reconstituted.

About 288(94.1%) of caregivers prepared ORS correctly by adding one ORS sachet to 1000 ml of water while. The majority of the respondents 102(33.3%) used previously boiled and cooled water to prepare ORS solution, while 190(62.1%) use highland water. After reconstitution, only 99 (32.4%) of caregivers gave the solution after the passage of every loose stool, while most of them 147(48.0%) gave six and above times per day. (Fig. 2)

One hundred eighty-one (59.2%) respondents gave zinc per day and 117(38.2%) administer it correctly for 10–14 days. More than half 163 (53.3%) of caregivers stored ORS Sacket/zinc tablet on a shelf followed by 82(26.8%) inside a bag or an object. Most of the participants reported that they dispose of unused ORS Sacket 245(80.1%) and zinc tablet 226 (73.9%) in the waste disposal area. (Table 3)

Of the total 306 caregivers, 199(65%) of them had good knowledge, and 257(84.0%) them had a good attitude about the management of diarrhea and use of ORS and zinc. In addition, 187 (61.1%) of them were found to have good practice of diarrhea management and ORS/Zinc

Table 3

Practice of under-five child caregivers towards diarrheal disease management using ORS and zinc in Gondar town, Amhara region, North West Ethiopia, 2021.

Variable	Category	Frequency (306)	Percentage %
What do you feed your child on diarrhea?	Breast milk only	14	4.6
	Breast milk + infant formula	25	8.2
	Complementary feeding only	152	49.7
	Complementary feeding plus breast milk	99	32.4
	Normal family diet	15	4.9
	Other ^a	1	0.3
Have you ever given oral rehydration salt to your child?	Yes	295	96.4
	No	11	3.6
Have you ever given Zinc to your child?	Yes	206	67.3
	No	100	32.7
What type of home-made oral solution do you give to your child with diarrhea?	Sugar and salt solution	90	20.8
	Salt with water	5	1.2
	Juice	29	6.7
	Soup	59	13.7
	Rice water	190	44.0
	Other ^b	5	1.2
	I do not give anything	54	12.5
After how long the diarrhea started do you give ORS and zinc to your child?	The same day	134	43.8
	Second day	142	46.4
	Third day	14	4.6
	Fourth day	2	0.7
	I do not know	14	4.6
How do you prepare ORS?	1 sachet of ORS -300 mls (3 coke bottle) of water	2	0.7
	1 sachet of ORS -500 mls (1 small size of mineral bottle)	10	3.3
	1 sachet of ORS -750 mls (1 medium size of mineral bottle)	2	0.7
	1 sachet of ORS -1000mls (1 L of water)	288	94.1
	1 sachet of ORS -1500mls (1.5 L or large size of mineral of water)	1	0.3
	Other preparation ^c	3	1.0
Who taught you how to mix ORS solutions and how to administer zinc?	Friend/neighbor/relative	14	4.6
	Health provider	266	86.9
	Media	8	2.6
	Read instruction myself	17	5.6
	Other ^c	1	0.3
	Once a day	8	2.6
How often should ORS be given?	2-3 times a day	24	7.8
	4-5 times a day	22	7.2
	6 & above times a day	147	48.0
	After the passing of every loose stool	99	32.4
	No idea	6	2.0
How much ORS solution should be given to a child with diarrhea?	As much as s/he can drink	279	91.2
	Coffee cup of 100 ml	10	3.3
	Don't know/can't answer	17	5.6
	Other (specify)	-	-
	24 h.	290	94.8
How long should the mixed ORS last?	48 h.	1	0.3
	72 h.	4	1.3
	Other ^d	11	3.6
	Previously boiled and cooled water	102	33.3
What water do you use to mix ORS solution?	Drinking water	13	4.2
	Any available water	1	0.3
	Highland water	190	62.1
	Daily	181	59.2
Zinc is given	Twice daily	16	5.2

Table 3 (continued)

Variable	Category	Frequency (306)	Percentage %
Zinc is given for the duration of	Three times daily	10	3.3
	Four times daily	3	1.0
	I do not know	96	31.4
	Three days	21	6.9
	Five days	38	12.4
	Seven days	28	9.2
Do you think ORS price is expensive	10-14 days	117	38.2
	Other ^e	5	1.6
	I do not know	97	31.7
	Yes	20	6.5
	No	260	85.0
	I do not know	26	8.5
Where did you store the ORS sachet and Zinc tablet at home?	Inside refrigerator	24	7.8
	Shelf	163	53.3
	Inside the bag/object on the table	82	26.8
	Other ^f	31	10.1
Did you check/request the expiry date for the ORS and zinc tablet you purchased?	Yes	6	2.0
	No	219	71.6
Did you request for information regarding the use of ORS and zinc tablet from a health professional/ pharmacist whenever you purchased these products	Yes	87	28.4
	No	285	93.1
Where do you disposed unused ORS solution/ sachet?	Yes	21	6.9
	No	285	93.1
	Waste disposal area	245	80.1
	Toilet	31	10.1
	Under the ground	6	2.0
	Outside the compound	4	1.3
Where do you disposed unused zinc tablets?	Burn	4	1.3
	Other ^g	16	5.2
	Waste disposal area	226	73.9
	Toilet	26	8.5
	Under the ground	6	2.0
	Outside the compound	4	1.3
	Burn	6	2.0
	Other ^g	38	12.4

ORS: Oral Rehydration Salt.

^c prepare it with 2-L water.^a will not give any food.^b Lemon, water and salt solution.^c I'm health professional.^d More than 72 h.^e 1day,2 day.^f Drawer, Drug box.^g I will use it again.

utilization (Fig. 3).

3.4. Factors associated with caregivers knowledge towards ORS and zinc use in under-five children

In the bivariate analysis, a significant association was observed between the educational status of caregivers and their knowledge about ORS and zinc utilization for diarrheal disease case management. Highly educated (university, college) caregivers were 13.3 times more likely to have knowledge about ORS and zinc utilization than those who were not had formal education. (COR = 13.3(2.686, 66.193)). Caregiver's occupational status was among the socio-economic factors which were significantly associated with the knowledge of ORS and zinc usage on diarrheal disease case management. Caregivers with occupational status of employed were 2.949 times more likely knowledgeable about ORS and zinc utilization than those who were housewives. (COR = 2.949 (1.759, 4.943)). Caregivers with a monthly income of 3000–5000 were also found 14.444 times more likely knowledgeable about ORS and zinc utilization than those who were housewives (COR = 14.444(1.580,

Fig. 1. Attitude of caregivers towards Oral Rehydration Salt (ORS) and zinc use for diarrheal disease management in under-five children in Gondar town, Amhara regional state, North West Ethiopia, 2021.

Fig. 2. Attitude of caregivers regarding the frequency of Oral Rehydration Salt (ORS) administration for management of diarrhea in under-five children in Gondar town, Amhara region, North West Ethiopia, 2021.

132.0)).

In the multivariable regression analysis, caregivers' educational status, occupational status, and sex were the significant factors associated with the knowledge of ORS and zinc usage in diarrheal disease management. Female caregivers were found 2.804 times more knowledgeable than males ($P = 0.012$). In addition, caregivers who have had higher education were 6.293 times more knowledgeable ($P = 0.049$), and those employed caregivers were 2.313 times more knowledgeable ($P = 0.015$) than their counterparts, respectively (Table 4).

3.5. Factors associated with caregivers attitude towards ORS and zinc use in under-five children

In the bivariate analysis, a significant association was observed between the educational status of caregivers and their attitude about ORS and zinc utilization for diarrheal disease case management. Caregivers with high school education, and with higher education (college, university level) were 4.872 and 4.148 times more likely to have a good attitude about ORS and zinc utilization, respectively than those who had

no formal education level ($COR = 4.872(1.212, 19.591)$), ($COR = 4.148(1.065, 16.154)$). Similarly, employed caregivers were 2.144 times more likely to have a good attitude about ORS and zinc utilization than their counterparts ($COR = 2.144(1.108, 4.149)$) (Table 5).

In the multivariable regression analysis, however, only occupational status of the caregivers was significantly associated with their attitude. Employed caregivers were found to be 2.408 times more likely to have a good attitude about ORS and zinc utilization than unemployed respondents ($P = 0.041$) (Table 5).

3.6. Factors associated with care-givers practice towards use of ORS and zinc in under five children

In the binary logistic regression analysis, there was a statistically significant association between caregivers' educational level, occupational status, family size, and sex with their practice on ORS and zinc usage for diarrheal management at a P -value of ≤ 0.05 . Caregivers with high school and higher education levels (Diploma, Degree) were 6.537 and 9.00 times more likely to have good practice compared with those

Fig. 3. KAP of Oral Rehydration Salt (ORS) and Zinc use for diarrheal disease management among caregivers of under-five children in Gondar town, Amhara regional state, North West Ethiopia, 2021.

Table 4

Association of the socio-demographic variables with knowledge of ORS and zinc usage in under-five children in Gondar town, Amhara regional state, North West Ethiopia, 2021.

Variables	ORS and Zn use	Knowledge		Total	COR (95%CI)	P-value	AOR	P-value
		Poor	Good					
Educational level	No formal education	8	2	10	1	1	1	1
	Primary school	30	28	58	3.250(0.634,16.648)	0.157	2.547(0.416,15.585)	0.312
	High school	41	67	108	7.676(1.55,38.004)	0.013	4.234(0.699,25.651)	0.116
	Higher education	40	90	130	13.3(2.686,66.193)	0.002	6.293(1.006,39.357)	0.049
Residence	Rural	16	14	30	1	1	1	1
	Urban	103	173	276	1.722(0.806,3.680)	0.161	1.450(0.613,3.430)	0.397
Occupational status	Employed	43	117	160	2.949(1.759,4.943)	0.001	2.313(1.180,4.533)	0.015
	Searching for job	17	12	29	0.828(.367,1.868)	0.649	0.654(.240,1.783)	0.406
Monthly income	House wife	59	58	117	1	1	1	1
	<1000birr	2	4	6	1	1	1	1
	1000-3000birr	34	26	60	3.571(0.393,32.476)	0.258	4.092(0.387,43.216)	0.241
	3000-5000birr	24	46	70	14.444(1.580,132.0)	0.018	10.086(0.940,108.212)	0.056
Family size	>5000birr	59	111	170	12.347(1.406,108.4)	0.023	6.632(.636,69.202)	0.114
	< or equal to 3	14	18	32	1	1	1	1
	4 to 5	85	127	212	1.428(0.823,2.476)	0.205	1.039(0.535,2.018)	0.910
	>5	20	42	62	1.110(0.522,2.362)	0.787	0.770(0.304,1.949)	0.581
Marital status	Single	2	6	8	4.500(0.408,49.654)	0.219	9.475(0.456,196.942)	0.146
	Married	108	178	286	2.923(.480,17.709)	0.244	1.918(0.198,18.567)	0.574
	Divorced	5	2	7	0.600(0.053,6.712)	0.680	0.336(0.018,6.292)	0.465
	Widowed	4	1	5	1	1	1	1
Age	15-24	14	18	32	1	1	1	1
	25-35	85	127	212	0.612(0.254,1.473)	0.274	0.377(0.125,1.135)	0.083
	>35	20	42	62	0.907(.496,1.657)	0.750	0.600(.275,1.309)	0.199
Sex	Male	21	29	50	1	1	1	1
	Female	86	170	256	1.431(.771,2.657)	0.256	2.804(1.254,6.270)	0.012

Abbreviations: AOR: Adjusted odds ratio, COR: Crude odds ratio, CI: Confidence interval, ORS: Oral Rehydration Salt, and Zn: Zinc.

that have no formal education, respectively (COR = 6.537 (1.323,32.294)), (COR = 9.000(1.829,44.29)). Similarly, employed caregivers, those with a family size of >5, and female caregivers were 2.768, 2.444, and 1.288 times more likely to have a good practice than their counterparts, respectively (Table 6).

In the multivariable analysis, however, only occupational status of the caregiver and their sex were the only factors associated with their practice at $P \leq 0.05$. Employed caregivers were 2.9 times more to have good practice than their unemployed counterparts (AOR = 2.927 (1.533,5.587)). Similarly, female caregivers were found 2.8 times more practical about ORS and zinc utilization for management of diarrhea compared to males (AOR = 2.875(1.319,6.263)) (Table 6).

4. Discussion

Diarrhea is a leading cause of morbidity and mortality in under-five children, particularly in developing nations. It is critical to treat diarrhea well before dehydration sets in. Millions of children's lives may be saved if caregivers were taught how to give their children ORS, Zinc, and proper home care.¹² The cornerstone of fluid replacement is oral rehydration therapy. Proper awareness and administration of oral rehydration solution is one of the components of the WHO diarrhea control program.^{15,16}

In the present study, 295(96.4%) of the caregivers have had ever experienced ORS use. This finding is higher than a survey conducted in Wolaita sodo, in which 186(74.4%) of the caregivers experienced ORS use.¹¹ This could be attributed to the difference in the prevalence rate of

Table 5

Association of the socio-demographic variables with attitude of ORS and zinc usage in under-five children in Gondar town, Amhara regional state, North West Ethiopia, 2021.

Variables	ORS and Zn use	Attitude		Total	COR (95%CI)	p-value	AOR	P-value
		Poor	Good					
Educational level	No formal education	4	6	10	1	1	1	1
	Primary school	14	44	58	2.095(0.516,8.504)	0.301	1.019(0.192,5.414)	0.983
	High school	13	95	108	4.872(1.212,19.591)	0.026	2.093(0.382,11.472)	0.395
	Higher education	18	112	130	4.148(1.065,16.154)	0.040	1.319(0.226,7.679)	0.758
Residence	Rural	4	26	30	1	1	1	1
	Urban	45	231	276	0.790(0.263,2.373)	0.674	0.719(0.221,2.338)	0.583
Occupational status	Employed	18	142	160	2.144(1.108,4.149)	0.024	2.408(1.035,5.607)	0.041
	Searching for job	6	23	29	1.042(0.383,2.835)	0.936	0.983(0.316,3.053)	0.976
	House wife	25	92	117	1	1	1	1
Monthly income	<1000birr	2	4	6	1	1	1	1
	1000-3000birr	13	47	60	1.808(0.297,10.992)	0.520	2.775(0.351,21.946)	0.333
	3000-5000birr	13	57	70	2.192(0.262,13.277)	0.393	2.146(0.276,16.708)	0.466
	>5000birr	21	149	170	3.548(0.612,20.575)	0.158	3.401(0.455,25.443)	0.233
Family size	< or equal to 3	34	43	77	1	1	1	1
	4 to 5	74	110	184	0.877(0.425,1.809)	0.722	0.752(0.328,1.723)	0.500
	>5	11	34	45	1.477(0.484,4.505)	0.493	1.769(0.480,6.518)	0.392
Marital status	Single	0	8	8	242332	0.99	28621	0.99
	Married	44	242	286	8.250(1.340,50.806)	0.23	5.933(0.723,48.677)	0.097
	Divorced	2	5	7	3.750(0.331,42.467)	0.286	3.378(0.222,51.488)	0.381
	Widowed	3	2	5	1	1	1	1
Age	15–24	7	25	32	1	1	1	1
	25–35	28	184	212	1.840(0.728,4.652)	0.198	1.914(0.684,5.358)	0.216
	>35	14	48	62	0.960(0.343,2.684)	0.938	1.044(0.291,3.740)	0.948
Sex	Male	9	41	50	1	1	1	1
	Female	40	216	256	1.185(0.535,2.629)	0.676	1.542(0.580,4.098)	0.385

Abbreviations: AOR: Adjusted odds ratio, COR: Crude odds ratio, CI: Confidence interval, ORS: Oral Rehydration Salt, and Zn: Zinc.

Table 6

Association of the socio-demographic variables with the practice of ORS and zinc usage in under-five children in Gondar town, Amhara regional state, North West Ethiopia, 2021.

Variables	ORS and Zn use	Practice		Total	COR (95%CI)	p-value	AOR	P-value
		Poor	Good					
Educational level	No formal education	8	2	10	1	1	1	1
	Primary school	30	28	58	3.733(0.729,19.109)	0.114	3.084(0.487,19.531)	0.232
	High school	41	67	108	6.537(1.323,32.294)	0.021	4.332(0.692,27.135)	0.117
	Higher education	40	90	130	9.000(1.829,44.29)	0.007	5.183(0.796,33.747)	0.085
Residence	Rural	16	14	30	1	1	1	1
	Urban	103	173	276	1.920(0.900,4.095)	0.092	1.537(0.663,3.56)	0.316)
Occupational status	Employed	43	117	160	2.768(1.673,4.579)	0.001	2.927(1.533,5.587)	0.001
	Job seekers	17	12	29	0.718(0.315,1.635)	0.430	0.611(0.231,1.615)	0.320
	House wife	59	58	117	1	1	1	1
Monthly income	<1000birr	2	4	6	1	1	1	1
	1000-3000birr	34	26	60	0.382(0.065,2.250)	0.288	0.422(0.062,2.860)	0.377
	3000-5000birr	24	46	70	0.958(0.164,5.613)	0.962	0.576(0.084,3.967)	0.575
	>5000birr	59	111	170	0.941(0.164,5.288)	0.945	0.446(0.067,2.961)	0.403
Family size	< or equal to 3	34	43	77	1	1	1	1
	4 to 5	74	110	184	1.175(0.686,2.012)	0.556	0.900(0.479,1.694)	0.745
	>5	11	34	45	2.444(1.082,5.522)	0.032	2.103,0.805,5.496)	0.129
Marital status	Single	2	6	8	12.00(0.796,180.974)	0.073	22.873(0.903,579.448)	0.058
	Married	108	178	286	6.593(0.727,59.755)	0.094	9.461(0.664,134.719)	0.097
	Divorced	5	2	7	1.600(0.104,24.703)	0.736	1.986(0.081,48.657)	0.674
	Widowed	4	1	5	1	1	1	1
Age	15–24	14	18	32	1	1	1	1
	25–35	85	127	212	1.162(0.549,2.461)	0.695	1.105(0.478,2.556)	0.816
	>35	20	42	62	1.633(0.679,3.931)	0.274	1.957(0.664,5.766)	0.223
Sex	Male	22	28	50	1	1	1	1
	Female	97	159	256	1.288(1.698,2.377)	0.041	2.875(1.319,6.263)	0.008

Abbreviations: AOR: Adjusted odds ratio, COR: Crude odds ratio, CI: Confidence interval, ORS: Oral Rehydration Salt, and Zn: Zinc.

diarrheal disease in children between the two study areas.

In the present study, it was found that about 65% of the caregivers had good knowledge about ORS and zinc utilization for treating diarrhea. This result was greater than a study done in Botswana in which only 32% of the caregivers were reported to have good knowledge.¹⁷ A study done in Nigeria also showed that about 69.3% of mothers knew about ORS use and only 18.5% of caregivers had heard of Zinc use in

diarrhea.⁹

In this study, female caregivers were found 2.804 times more knowledgeable about ORS and zinc utilization than male counterparts. This could be due to the frequent involvement of females (usually mothers) in the care of their children when they were sick and this could increase the chance that they will be more exposed to health education and medical information as compared to male counterparts (fathers). In

addition, caregivers who have had higher education and those employed were 6.293 and 2.313 times more knowledgeable than their counterparts, respectively.

This study also revealed that 84% of the participants had a good attitude towards ORS and zinc usage which is higher than a study done in wolaita sodo town, 76.8%.¹¹ Caregivers' employment status was also a significant factor associated with their attitude towards ORS and Zinc utilization in which employed caregivers were found to be 2.408 times more likely to have good attitude about ORS and zinc utilization than unemployed respondents. This could be due to the fact that employed caregivers would have better knowledge and access to medical information during their study times and/or at their workplaces which will have a direct influence to their overall health-related knowledge, attitude and practice.

Employed caregivers were also found 2.9 times more likely to have good ORS and Zinc usage practice than their unemployed counterparts. Similarly, female caregivers were found 2.8 times more practical about ORS and zinc utilization for management of diarrhea compared to males. This could be because of the fact that female caregivers (mostly mothers) are naturally very caring to their children's health and will most likely follow medical instructions in the care for their children.

In this study, about 94.1% of the caregivers followed the correct procedures in the preparation of ORS solution. This finding was greater than other studies done in Direedawa (85.4%), and India (76.7%).^{13,14} This could be justified by differences in educational status/awareness level of participants in these studies, and or frequent education by health workers in the present area due to the high prevalence of under-five diarrheal disease which will, in turn, increase caregivers' awareness of the care strategies.

In the present study, the majority 86.9% of the caregivers gain information about ORS and zinc utilization from health workers. A similar study conducted in Assela town, Ethiopia showed that (62.3%) of the caregivers received their information about ORS and zinc utilization from the health workers.¹⁶ This could be due to frequent health facility visits and subsequent meetings with health professionals and/or the involvement of health extension workers that regularly provide home-based health education in these areas.

4.1. Limitation of the study

As the study is cross-sectional and depends on self-reported assessment, under-reporting is more likely to occur. It is possible that some caregivers may not remember the details about the usage and practice of ORS and Zinc (recall bias) which may affect the reliability and validity of the data.

5. Conclusion

There was good knowledge, attitude, and practice about Oral Rehydration Salt and zinc usage among child caregivers. Occupational status of caregivers was significantly associated with all three variables; knowledge, attitude, and practice. Regular educational strategies aimed at improving child caregivers' awareness of diarrhea disease management and utilization of ORS and Zinc tablets are advised.

Ethical consideration

Ethical clearance of the study was obtained from the ethical review board of the school of Pharmacy, the University of Gondar with an approval number of SOP/272/2013. Verbal consent was obtained from each participant. Participation in the study was on a voluntary basis, and participants were informed of their right not to participate in the study if they do not want to participate and the right to withdraw from the study

at any point of the interview. Moreover, the confidentiality of the information was assured by using an anonymous questionnaire and keeping the data in a secured place.

Availability of data and materials

Most of the data is included in the manuscript. Additional can be found from the corresponding author based on reasonable request.

Funding

No funding to report.

Declaration of competing interest

The authors declares that they have no competing interests.

Acknowledgment

We would like to acknowledge University of Gondar for material supports.

References

- Satcher D. Food safety: a growing global health problem. *JAMA*. 2000;283(14):1817-1817.
- Kotloff KL. The burden and etiology of diarrheal illness in developing countries. *Pediatr Clin*. 2017;64(4):799-814.
- Olopha OO, Egbewale B. Awareness and knowledge of diarrhoeal home management among mothers of under-five in Ibadan, Nigeria. *Univers J Publ Health*. 2017;5(1):40-45.
- Ogunrinde OGRT, Owolabi OA, Anigo KM. Knowledge, attitude and practice of home management of childhood diarrhoea among caregivers of under-5 children with diarrhoeal disease in Northwestern Nigeria. *J Trop Pediatr*. 2012;58(2):143-146. *Journal of tropical pediatrics*. 2012 Apr 1.
- CSA I. *Ethiopia Demographic and Health Survey*. Central Statistics Agency and ICF International: USA, Addis Ababa, Ethiopia and Calverton. 2012. Maryland. 2011.
- Lemma F, Matji J. Child nutrition in Ethiopia: a review article. *Ethiop J Pediatr Child Health*. 2014;10(10):1-15.
- Blum LS, Oria PA, Olson CK, Breiman RF, Ram PK. Examining the use of oral rehydration salts and other oral rehydration therapy for childhood diarrhea in Kenya. *Am J Trop Med Hyg*. 2011;85(6):1126.
- Mengistie B, Berhane Y, Worku A. Predictors of Oral Rehydration Therapy use among under-five children with diarrhea in Eastern Ethiopia: a community based case control study. *BMC Publ Health*. 2012;12(1):1-7.
- Ugwu J, Ezeagu I, Ibegbu M. Awareness and practice of zinc therapy in diarrheal management among under-five caregivers in Enugu State, Nigeria. *Int J Med Health Dev*. 2019;24(2):63-69.
- Kumar S, Subita L. Diarrhoeal diseases in developing countries: a situational analysis. *Kathmandu Univ Med J*. 2012;10(2):83-88.
- Yasin Ddeky, Halala Y. Assessment of knowledge, attitude& practice of child care givers towards oral rehydration salt for diarrhea treatment in under 5 children in wolaita sodo town, SNNPR/2016. *Assessment*. 2017;7(4).
- Abera A, Assefa E. School of Nursing and Midwifery, Jimma University, Jimma, south west Ethiopia.
- Workie Hm, Sharifabdilahi As, Addis Em. Mothers' knowledge, attitude and practice towards the prevention and home-based management of diarrheal disease among under-five children in Direedawa, Eastern Ethiopia, 2016: a cross-sectional study. *BMC Pediatr*. 2018;18(1):1-9.
- Lamberti Lm, Fischer Walker Cl, Taneja S, Mazumder S, Black Re. The association between provider practice and knowledge of ORS and zinc supplementation for the treatment of childhood diarrhea in Bihar, Gujarat and Uttar Pradesh, India: a multi-site cross-sectional study. *PLoS One*. 2015;10(6):e0130845.
- Liben ML, Abebe Y, Birara S, et al. KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDSORAL REHYDRATION SALTIN AYSAITA TOWN, AFAR REGIONAL STATE, NORTHEASTERN ETHIOPIA.
- Adanech E. *Assessment of Knowledge, Practice and Utilaization of Oral Rehayderation Therapy for Acute Watery Diarrhoeal Disease Case Management Among Mothers (Caregivers') of Under-five Children in Assela Town, Ethiopia*. Addis Ababa University; 2015.
- Mosweu GJ. *Knowledge, Attitude and Practices of Caregivers (KAP) on Management of Childhood Diarrhoeas Among Children Aged between 0-5 Years Attending Child Welfare Clinic (CWC) in Mogoditshane Village*. 2018. Botswana.