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House Hold Water Handling Practice in Southern-East Ethiopia: Magnitude and Associated Factors

Deginet Kebede Belihu[1], Girma Worku Obsie[2, *], Melese Tadessa Aredo[2]

[1]Assela Town Health Office, Assela, Ethiopia

[2]Department of Public Health, College of Health Science, Arsi University, Assela, Ethiopia

Email address:

natigirmaw16@gmail.com (Girma Worku Obsie), deginetkebede2019@gmail.com (Deginet Kebede Belihu), meletade13@gmail.com (Melese Tadessa Aredo)

[*]Corresponding author

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Abstract: *Background*: household water handling practice is very critical for prevention of water borne communicable disease. This study aimed to assess household water handling practice and associated factors in rural kebeles of Tiyo district, Arsi zone South East Ethiopia. *Methods:* community-based cross-sectional study was employed among 403 households by using simple random sampling techniques from September 02-25/2019. Data were collected by interviewer administered structured questionnaire, entered into EPI INFO version 7 and analyzed by SPSS Version 20. Logistic regression models were fitted to identify the association between the dependent and independent variables by computing the odds ratios with 95% confidence intervals at P-value< 0.05. *Results*: a total of 403 households participated with an overall response rate was 98%. More than fifty percent (53.3%) were found to handle their drinking water properly. Level of education [AOR=3.341,95% CI:(1.536,7.267)], monthly income [AOR= 0.291, 95%CI:(0.100,0.848)], know about safe water handling [AOR=1.721, 95%CI: (1.103, 2.681)], frequency of water collected per day [AOR=3.049, 95%CI: (1.476, 6.299)], knowing water treatment [AOR=1.588,95%CI: (1.015,2.485)] and methods with draw water from container [AOR=1.840, 95% CI: (1.111, 3.046)] were found to be factors associated with proper water handling practices. *Conclusion*: unsafe water handling practiced is high irrespective of the efforts being done the ministry of health and stakeholders were found to be significantly associated in the study area. Thus, Education on water handling practice with emphasis on the consequences of negative impacts of poor water handling practice and implement treating of water at house holds' level insured good practice.

Keywords: Water Handling Practice, Households, Safe Drinking Water, Factors, Ethiopia

1. Introduction

Every man, woman as well as child have a fundamental human right to have a safe drinking-water. To maintain personal health and dignity clean water is needed for people. As a result people have accountability for their own water security by proper handling and safely storing water by themselves [1].

According, to World Health Organization's make out everyone have to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses. Improving water supply, sanitation, hygiene and handling of water resources can be prevent almost one tenth of the global disease burden. Civilizing poor people's access to safe drinking-water and adequate sanitation as well as encouraging personal, domestic and community hygiene will improve the quality of life of millions of individuals [2].

Globally, poor quality of drinking water and have no good sanitation have resulted in diseases, causing 42,000 deaths every week and over 90% of them occur to children under the age of five diarrhea causes 4% of all deaths and 5% of health loss to disability worldwide [3]. Besides this the health implications of improper handling water and sanitation at house hold level and inadequate services include an estimated 4 billion cases of diarrhea and 1.9 million deaths

each year, frequently among young children in developing countries [3].

Nationally, 60% of existing disease burden is attributed to poor sanitation, 15% of the total deaths from diarrhea essentially among children below five causing into some 250,000 children deaths each year and the most universal problem related with water contamination is due to either directly or indirectly inappropriate handling of water [4].

Nationally, a constant outbreaks occurrence of acute watery diarrhea due to lack of clean drinking water and good sanitation facilities and lack of community education programs of water handling practices [4].

Following this the degree of water contamination is highly determined by the degree of contact these diseases are the major causes of morbidity and mortality. At household level water passing through unhygienic storage and handling practices resulted in contaminated with pathogens of fecal origin during transport and storage. Three-fourths of the health problems in Ethiopia are cause of communicable diseases result of unsafe in water supply, and poor sanitary waste management, particularly excreta [5].

Examining the factors contributing to improper water handling practice at house hold level are needed to improve proper water handling practice at households level; keep container with clean container, transport and storage thus; fighting waterborne disease at the household level made a strong clean and safe for managing water in the home to prevent diarrhea and related diseases then contributed to the increase in global acceptance of household water storage [6].

2. Research Method

2.1. Study Design and Setting

Community based cross-sectional study design was employed September 02-25/2019 in the rural community of Tiyo District in Arsi Zone Oromia regional state south east Ethiopia. Tiyo District is located about 212km south east of Addis Ababa and it is with a latitude and longitude of 7°57′N 39°7′E, with an elevation of 2,430 meters. According to the 2019 G. C population growth projected it has a total population of 120,585 and half of 60,654 (50.3%) male the rest are female. The district has a total of 25,122 households and administratively divided into 21 kebeles. All household that was at random selected from selected kebele was integrated in the study was source of study population.

2.2. Sampling Size and Sampling Procedure

The sample size of the study was designed by using a single population proportion formula by considering 95% confidence interval and standard error was 5%. There previous similar study done in the other region, its proportion of respondents who have good water handling practices was 55% [7]. Based on this model of sample size determination the following assumption was drawn:

1) Proportion population was 55%.
2) Margin of error (E) 5%
3) A confidence level of 95%
4) For non-response rate 10% was considered.

$$n = \frac{Z\alpha^2 P\,(1-P)}{d\alpha^2} = \left[(1.96)(1.96)\,(0.55\%)\,\frac{(1-0.55\%)]*10\%}{(0.05)^2}\right] = 374 + 37 = 411$$

Finally, the total maximum sample size was 411 households were participated in the study from selected kebeles by using simple random sampling technique particularly lottery method was applied to give equal chance among the respondents.

2.3. Study Participants and Data Collection

Overall 411 study respondents were participated in this study. The respondents were who residents live for 6 months and above in the kebeles were eligible for study subjects. Training was given for both data collectors and supervisors. Primary data was collected by an enumerator administered questions which was consist of, behavioral factors: knowledge and attitude about household water handling practice, socio-demographic factors: educational status, family size, Income environmental factors: availability, accessibility, types and distance of water source and finally health related system factors: implementation guideline on water handling practice, at household level.

2.4. Data Quality and Statistical Analysis

The tools for the assessment was initial, prepared in the English language, then translated into Afan Oromo and turn back into English to check for consistency. Besides this to uphold its consistency, the questionnaire was tested on local people lived outside of the selected kebelles. The validity or reliability tests were computed and the value Construct Validity Testing Kaiser Meyer Olkin (KMO) value ≥ 0.5 and p-value of Bartlett Test of Sphericity (BTS)/(Sig) ≤ 0.05& reliability testing Cronbach Alpha value above 0.65. The collected data was entered into Epi Info version 7 for data exploration, then for analysis exported to statistical package for social sciences (SPSS) version 20. Descriptive analysis was done for each variable in the study by running number, percentage. Computed to be tested the associations between dependent and independent variables. In bivariate logistic regression P-value less than 0.25 was considered as candidate to multivariable logistic regression analysis and was employed to identify factors associated with outcome variable at the P-value < 0.05 with 95%CI. Odds ratio was considered to determine the strength of associations between outcome and independent variables.

3. Result and Discussion

3.1. Households Profile

In this study a total of 403 households involved with an overall response rate were 98%. The mean age was 37.54± SD 8.33. More than six in ten respondents 256 (63.5%)

belongs to the age groups of 31-45 years. Majority of respondents 336 (83.4%) were females. In this study, one-fourth of them104 (25.8%) were unable to read and write. About three in seven of respondents 166 (41.2%) were house wives in case of occupation status. The average monthly income of households more than a third 148 (36.7%) were less than 500 Ethiopian birr (ETB) and more than eighty percent's 337 (83.6%) of households had four and less in family at all.

3.2. Household Water Source and Collection & Storage Practice

In this study more than one-third of respondents 140 (34.7%) were collected water from public tap, whereas 50 (12.4%) of households responded that the main source of water for their families was from unprotected spring. More than five-eighth of respondents were travelled less than fifteen minutes to fetch water. In contrast maximum time, was half hour 48 (11.9%) of households required to fetch water. This study showed that the majority of households frequently used Jerry cans for water collection was, accounted 380 (94.3%) while only 8 (2%) households were collected water by plastic bucket. Of the total respondents nearly three-fourth 291 (72.2%) of the respondents had clean containers for collection. In addition, the most of the respondents 335 (83.1%) were covering the collection containers during transportation. In the same case about 254 (63%) of participants were collected water twice a day, whilst 70 (17.4%) of the study participants were collected water more than three times a day.

Only 13 (3.2%) of the household having water tank; of these five in seven of the respondents 288 (71.5%) had separated containers storing water for drinking purpose likewise, 329 (81.6%) of the households used closed container during data collection is presented in (table 1).

Table 1. *Households' water source and collecting& storing practice in rural kebeles of Tiyo district, Arsi zone south east Ethiopia, 2019 (n= 403).*

Variables	Number (%)
Main source of water drinking water	
Piped water into dwelling	91 (22.6)
Public tap	140 (34.7)
Protected spring	53 (13.2)
Unprotected spring	50 (12,4)
Surface water (river, lake)	69 (17.1)
Time taken from the house to the water source	
<15 Minutes	257 (63.8)
15-30 Minutes	98 (24.3)
>30 Minutes	48 (11.9)
Water collecting container	
Clay pot	15 (3.7)
Jerri can	380 (94.3)
Plastic bucket	8 (2.0)
Covering water container during transportation	
Yes	335 (83.1)
No	68 (16.9)
Wash your container before collecting water	
Yes	291 (72.2)
No	112 (27.8)
Frequency of water collected per day	
Once	70 (17.4)
Twice	254 (63.0)
More than three time	79 (19.6)
Having a water storage tank	
Yes	13 (3.2)
No	390 (96.8)
keeping drinking water in separated container	
Yes	288 (71.5)
No	115 (28.5)
Type of container use to store drinking water	
Closed container	329 (81.6)
Open container	71 (17.6)
Others**	3 (0.7)

** (piping)

3.3. Knowledge and Attitude of House Hold Towards Water Handling Practice

Less than half of respondents 180 (44.7%) had knowledge about water handling practice. Of these participants the main source of knowledge about safe water handling practice sixty-two percent 112 (62.2%) were accounted self-experiences. The households who had tap water about 177 (43.9%) perceived that tap water was safe to drink by identifying color, taste and smell. Nearly sixty percent of households 236 (58.6%) were responded that drinking water could be contaminated or become unsafe even at the source. More than half of respondents 215 (53.3%) had information about water treatment 107 (26.6%), 64 (15.9%), 33 (8.2%) & 11 (2.7%) were responded that boiling, bleaching/chlorination, water filter and Strain it through a cloth method respectively.

On other hand just five in six of the respondents 338 (83.8%) believed that water source contamination caused due to flooding. In contrast about three-fourth 304 (75.4%) of respondents reflected that drinking water was not cause of illness. Following this slightly more than one-fourth of participates 106 (26.3%) supposed that the reason of got sick or well when drinking the same source of water was individual differences. Furthermore, about 116 (28.8%) of respondents thought that improving storage of water was solution of solving problem related to drinking water.

3.4. Household Water Handling Practice

Nearly three-fourth of the respondents 288 (71.5%) were used separated containers for storing water to drink and other purposes. Likewise, more than three-fourth of respondents 314 (77.9%) covered the storage containers during data collection time, whereas only 113 (28%) kept drinking water storage containers as WHO recommendation 40 cm above the floor. Moreover, less than one third of the respondents 128 (31.8%) were clean the container every day. Similarly, fetching the water from the container was carried out by pouring in and dipping in 255 (63.3%) & 109 (27%) respectively were practicing by respondents prior to study time is presented in table 2.

Table 2. *Households water handling practice in rural kebeles of Tiyo district, Arsi zone south east Ethiopia, 2019 (n=403).*

Variables	Number (%)
Keeping drinking water in separated container	
Yes	288 (71.5)
No	115 (28.5)
Keeping drinking water container above floor level	
Yes	113 (28.0)
No	290 (72.0)
Having covered containers	
Yes	314 (77.9)
No	89 (22.1)
Placing well at time of visit	
Yes	315 (78.2)
No	88 (21.8)
fetching methods water from container	
Pouring	255 (63.3)
Dipping	109 (27.0)
Other utensil	39 (9.7)
Is the utensil used to draw water from the container clean	
Yes	122 (30.3)
No	281 (69.7)
Frequency of container cleaning	
Every day	128 (31.8)
Every Week	248 (61.5)
Rarely	27 (6.7)

3.5. Magnitude of Handling Practice

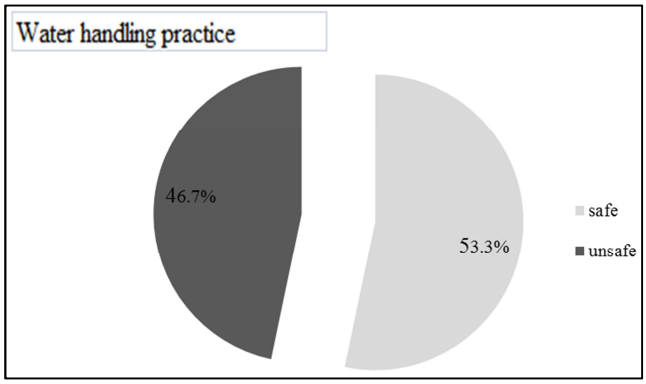

Figure 1. *The proportion of water handling practice among households in rural kebeles of Tiyo district, Arsi zone south east Ethiopia, Sep. 2019.*

Properly household water handling practice is very critical for prevention of water borne communicable disease. Thus, this study attempted to provide insight into the magnitude of handling practice of water using composite practices among households in study area. Of the total of households participated in this study more than half 215 (53.3%) had good practice of water handling at the corresponding 95% confidence interval was (48.45, 58.24), whereas 188 (46.7%) respondents had poor practice of water handling at the corresponding 95% confidence interval was (41.75, 51.54) and respondents' practice classified as safe and unsafe at all. This finding is consistent with the studies conducted in Kolladiba Town, Northern region of Ethiopia, 51% [8] and Dire Dawa 55 % [7]. But, it was lower than the study conducted in Farta district, Northwest Ethiopia, 92.5% [9] &Bona District in Sidama Zone southern, Ethiopia, 73.5%. The observed difference could be because of geographical variation as well as difference in socio-demographic and study period among study groups. The respondents' practice is presented in (Figure 1).

3.6. Factors Influencing Water Handling Practice

The result of multivariate analysis showed that factors associated with water handling practice were computed. The odds of performing unsafe water handling practice among respondents who had average monthly income below 500 and between 500-1000 were 70.9 % and 70.7% more likely practice unsafe water handling compared to 3000 and above Ethiopian birr (ETB) monthly income household's respectively. The possible justification might be those who had monthly income ≥3000 ETB might have good education status, experience and knowledge towards safe water handling practice. The finding agrees with study conducted in Kolladiba Town, Ethiopia and others worlds [9-14]. Monthly income [AOR= 0.291, 95%CI: (0.100, 0.848].

Correspondingly, level of educational also showed statistical significant association with outcome variable. The odds of performing unsafe water handling practice among respondents those who were unable to read and write 3.3 times more likely unsafe water handling practice compared to those who had college diploma and above ([AOR=3.341, 95% CI: (1.536,7.267]). The possible explanation could be level of education of the community have significant relationship with household water handling practice and respondents who have high level of education have good water handling practice. The result is supported by study conducted in Sidama Zone and others sites [15-19].

On the other hand, respondents who were not educated and didn't know about safe water handling were 1.7 more likely practiced unsafe water handling compared to more educated classes ([AOR=1.721, 95%CI: (1.103, 2.681]). Even if in this consequence it needs more investigation to know the other reason, probably might be explained that the respondents whose educated by community health workers door to door, got information on household water handling practice could be exercised safe household water handling practice. Likewise, respondents who were didn't know about water treatment were about 1.6 times more likely practiced unsafe water handling compared to households who had information about water treatment. Because of that the studies stated as the respondents who use at level of household treating water at point of use, they can be reduced the risk of diarrheal disease by 30% to 40%. This is in line with survey and research conducted nationally in Ethiopia [20-24].

The likelihood of performing unsafe water handling practice respondents who collected water more than three times per day were practicing above 3 times more likely to have unsafe water handling practice than those who collect water once per day ([AOR=3.049, 95%CI: (1.476, 6.299]). This is because of the lack of water reliability results a water scarcity that had overwhelming effect on the domestic water consumption. In Ethiopia 15L of safe water per person per day within a 1.5 km rural dwelling radius from the point of source. This is supported with several researches were

investigated nationally [25-28].

Table 3. *Bivariate and multivariable logistic regression analysis of factors associated with water handling practice among respondents in rural kebeles of Tiyo, Arsi zone south east Ethiopia, Sep. 2019 (N= 403).*

Variables	Practicing		COR (95%CI)	AOR (95%CI)	P-value
	Safe	Unsafe			
Level of Education					
Illiteracy	42	62	2.812 (1.457,5.427)*	3.341 (1.536,7.267)*	0.002
Read and write	26	18	1.319 (0.592,2.935)	1.426 (.569,3.573)	0.449
Elementary	68	60	1681 (0.893,3.162)	1.680 (0.812,3.479)	0.162
High school	39	27	1.319 (0.641,2.712)	1.130 (0.513,2.487)	0.762
College and above	40	21	1	1	
Monthly income					
<500	73	75	0.685 (0.265,1.773)	0.291 (0.100,0.848)**	0.024
500-1000	31	26	0.559 (0.199,1.575)	0.293 (0.094,0.916)**	0.035
1000-2000	67	55	0.547 (0.209,1.434)	0.351 (0.123,1.002)	0.050
2000-3000	36	20	0.370 (0.130,1.057)	0.257 (0.084,1.001)	0.117
>3000	8	12	1	1	
Educated about safe water handling					
Yes	115	65	1	1	
No	100	123	2.176 (1.455,3.255)*	1.721 (1.103,2.681)**	0.017
Family size					
≤4	180	157	1.015 (1.599,1.723)*	0.782 (0.437,1.401)	0.409
≥5	35	31	1	1	
Frequency of water collected per day					
Once	51	28	1	1	
Twice	134	120	1.631 (0.967,2.751)	1.479 (0.839,2.607)	0.176
More than three time	30	40	2.429 (1.254,4.702)*	3.049 (1.476,6.299)**	0.003
Knowing water treatment				1	
Yes	128	87	1		
No	87	101	1.708 (1.150,2.536)*	1.588 (1.015,2.485)**	0.043
Children below age of 5 years					
Yes	73	71	1.180 (1.785,1.775)*	1.405 (0.839,2.221)	0.145
No	142	117	1	1	
Methods with draw water from container					
Pouring	145	110	1	1	
Dipping	43	66	2.023 (1.281,3.196)*	1.840 (1.111,3.046)***	0.018
Other utensil	27	12	0.586 (0.284,1.208)	0.605 (0.272,1.343)	0.217

Note: * =P<0.05, ** P<0.01& ***P<0.001

Yet again, respondent's members who draw water from their container by dipping method were 1.8 more likely practicing unsafe water handling as computed to those households draw by pouring methods. On the other hand using of a clean and special utensil for pouring water made that safe method to draw water from containers. Water fetch by pouring properly proved a significant reduction of the concentrations of fecal coli whereas, dipping practice increased the risk of contamination by unclean cups and through hand contact. The result is supported with studies those investigated different period nationally and globally [29-32]. Methods with draw water from container [AOR=1.840, 95% CI: (1.111, 3.046)] and knowing water treatment [AOR=1.588, 95%CI: (1.015, 2.485] were found out factors associated with outcome variable at P- value less than 0.05 is presented above in table 3.

4. Conclusion

In conclusion of this study strongly indicated that the practice of water handling of the rural community was relatively poor, compared to previous studies at all. Level of education, monthly income, know about safe water handling, frequency of water collected per day, knowing water treatment and methods with draw water from container were factors associated with increase the odds of water handling practice among households. Therefore, education on water handling practice with emphasis on the consequences of negative impacts of poor water handling practice and implement and encourage to treat water for all households through health education and community mobilization in order to maximize the benefits of water treating and management at household level are recommended.

Abbreviations

EDHS: Ethiopia Demographic Health Survey, HHWTSS: Household Water Treatment and Safe Storage, HWSS: Household Water Safe Storage, WASH: Water, Sanitation and Hygiene and WHO: World Health Organization.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

DK Addressed significantly in initiation and design of the study, data analysis and interpretation, drafting and critically revising the manuscript for important intellectual content. GW&MT contributed design of the study, data collection, analysis and interpretation as well as drafting and revising the manuscript. All authors have read and approved the final manuscript for possible publication.

Data Availability

The datasets generated or analyzed during the current study are not publicly available due privacy issue and restricted institutionally to be disclosed but are available from the corresponding author on reasonable request.

Consent for Publication

Consent to publish is not applicable for this manuscript because there are no individual data details like images or videos.

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