



ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

SCHOOL OF PUBLIC HEALTH

**HOUSE HOLD WATER TREATMENT PRACTICES AND
ASSOCIATED FACTORS AT ADOLA REDE DISTRICT IN
SOUTHERN ETHIOPIA**

BY: YITAGESU YOSEF TSEGAYE (BSC)

ADDIS ABABA, ETHIOPIA

JULY.2023



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SCHOOL OF PUBLIC HEALTH
GRADUATE PROGRAMS COORDINATING OFFICE**

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**A THESIS SUBMITTED TO GRADUATE STUDIES
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MEDICAL COLLEGE SCHOOL OF PUBLIC HEALTH, IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTERS OF GENERAL PUBLIC HEALTH.**

ADDIS ABABA, ETHIOPIA

JULY, 2023

DECLARATION

I, the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have acknowledged and refereed all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation/ fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the college and can also evoke penal action from the sources which have not been properly cited or acknowledged.

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This thesis has been submitted for examination with my approval as a college advisor

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LIST OF ABBREVIATION AND ACRONYMS

AOR	Adjusted Odds Ratio
CI	Confidence interval
COR:	Crude Odds Ratio
EDHS	Ethiopian Demographic and Health survey
ETB	Ethiopian Birr
HEW	Health Extension Workers
HH.	Household
HHLWT	House hold level water treatment
HWT	House Hold Water Treatment
HWTS	Household Water Treatment and Safe Storage
HHWTP	House Hold Water Treatment practices
JMP	Joint Monitoring Program
LMICs.	Low and Middle-Income Countries
MOH	Ministry of Health
SDGs	Sustainable Development Goals
SODIS	Solar Disinfections
SPSS	Statistical Package for Social Science studies
WASH	Water Sanitation and Hygiene
WHO.	World Health Organization
UN	United Nations

ABSTRACT

Background: Household water treatment practices are crucial for providing safe water to millions of people in need. However, evidence on household water treatment practices and associated factors in Ethiopia, especially Southern Oromia, is limited. This study aims to assess these practices and factors among households in southern Ethiopia, focusing on the Guji zone Adola Rede district.

Methods: A community-based cross-sectional study in Adola Rede district involved 627 households, collected data using a structured questionnaire, and analyzed it using Epi data and SPSS. Statistically significant variables had P-values of ≤ 0.05 .

Results: This study revealed that the level of household water treatment practice was 61.6% with a 95% CI of 57.6%–65.6%, and chemical disinfection was the most common method of household water treatment in the study area. Of the potential factors associated with practicing household water treatment among the study participants, the age of the respondent (AOR = 2.90, 95% CI = 1.53-5.41) Receive health education on House hold water treatment practice (AOR =1.70, 95% CI = 1.10–2.65). Store water separately (AOR =4.61, 95% CI = 2.70–8.00) and fetch water frequently per day (AOR = 3.72, 95% CI = 1.80–800).Possessing radio (AOR = 4.23, 95% CI = 2.70–6.80) and having good knowledge about the importance of water treatment (AOR=6, 95% CI= 3.80-10.43) showed statistically significant associations.

Conclusion: Adola Rede district's water treatment practice is low; Woreda Water Office and Health Office should design effective strategies, raise community awareness, and provide necessary materials for timely implementation.

Key words: Household-level, water treatment practices, southern Ethiopia, Rural Adola rede.

1. INTRODUCTION

1.1. Background

Treating water and safely storing it in the home are commonly referred to as “household water treatment and safe storage” (HWTS) or treating water at the “point of use”(1).

Globally, the common household water treatment technologies are chlorination, filtration, solar disinfection and boiling, and boiling is the most frequently used method. Household water treatment and safe storage is the term used to describe the process of treating and safely storing water in the home(2).

In general, it is a way of lowering disease-causing pathogens and improving the quality of drinking water at the household level. Worldwide, more than 1 billion people lack access to drinking water, which is equal to 17% of the global population, Household water treatment and safe storage are recommended as part of the World Health Organization (WHO) strategy to reduce diarrhea risk, yet only 10% of people living in Low and Middle-Income Countries (LMICs) report using an effective method to treat their household drinking water. Evidence from the Demographic and Health Survey of sub Saharan Africa also showed that only 18% of households treat their drinking water appropriate(1, 3).

In underdeveloped nations, diarrhea is one of the primary causes of death and morbidity. Acute diarrheal disease (ADD) is thought to cause 1.7 billion illnesses and 2.2 million fatalities annually around the world. According to a recent estimate, it accounts for 38% of all fatalities among children under the age of five and is the fourth largest cause of mortality worldwide. Inadequate access to water, sanitation, and hygiene in impoverished nations is mostly to blame for diarrheal illness deaths(4, 5).

The sixth Sustainable Development Goal (SDG) is to guarantee that everyone has access to water and sanitation systems that are managed sustainably. The SDGs Targets 6.1 and 6.2 are specifically designed to help accomplish the objective of providing everyone with fair access to appropriate sanitation and hygienic conditions by 2030 (6).

According to a research based on 67 national surveys, 21.0% of the study homes (598 million people) use boiling as their primary water treatment technique at home, which is utilized by 33.0% of households in these nations. The Eastern Mediterranean (13.6%) and

Africa (18.2%) have lower prevalence's of the practice than the Western Pacific (66.8%) and Southeast Asia (45.4%) do. In 2020, 74% of the world's population will have access to properly regulated drinking water at home, compared to 30% in Sub-Saharan Africa and 13% in Ethiopia.³ According to the EDHS 2016 (Ethiopian Demography and Health Survey), 57% of rural families and 97% of urban households in Ethiopia have access to improved drinking water(6, 7).

The Health Transformation Plan of Ethiopia (2016–2020) is targeted to reach 35% coverage in household use of water treatment methods and safe storage practices by 2020–26. So, to achieve the goal, the government of Ethiopia encourages household water treatment through the rural health extension program by incorporating it into the health extension package(8).

In Ethiopia, there is a severe lack of access to clean drinking water, and even that which is clean at the point of delivery is frequently and seriously contaminated during collection, transit, and storage. Conventional water treatment facilities are also hard to come by, and those that are already in operation are susceptible to frequent outages and technical problems(2).

Since the majority of the population lacks access to clean and sufficient water supply and sanitation facilities, Ethiopia's water supply and sanitation condition is very bad. People who don't have consistent access to clean drinking water can lessen pollution and microbiological risk levels using point-of-use water treatment(1, 9).

Therefore the main aim of this study is to fill this gap by identifying the level of household water treatment practice and associated factors among households in Oromia regional state Guji zone Adola Rede district Ethiopia and The findings from this study can be used by concerned bodies to design a strategy for a wide-scale use of treatment methods for the ultimate health gain of reducing the burden of diarrheal disease in the country.

1.2 .Statement of the problem

Treatment of water that has become contaminated both at the source and through domestic handling with the goal of reducing contamination to levels of low microbial risk is said to be household water treatment safe drinking water is one of the basic necessities for human beings. However, billions of people in the world do not have access to it today(10).

The bulk of the world's 1.8 billion users of fecally polluted water sources are in low- and middle-income nations. The biggest health concern associated with water use is ingesting germs in feces-contaminated water. Only 18% of families in Sub-Saharan Africa treated their drinking water properly, according to data from the Demographic and Health Survey of Sub-Saharan Africa(7, 11).

Even though different studies were conducted in different parts of Ethiopia on household water treatment, a community in the study area is still suffering from water-borne diseases like diarrhea that are related to untreated water and can be easily prevented by a small means of treating water at the household level(6).

Almost 90% of the rural population of Ethiopia does not practice any alternative water treatment methods, which would pose high public health risks unless prompt intervention like alternative HWT methods with safe water storage is undertaken(11).

Whereas waterborne illnesses seriously impair public health, ensuring clean drinking water continues to be a difficult task. Furthermore, there aren't many research on Ethiopian household water treatment knowledge, practices, and related variables(3).

According to JMP and UNICEF-WHO data as well as official statistics in Ethiopia, rural water coverage has grown at encouraging rates since 1990, from 8 to 26% and from 11 to 62%, respectively. Both data show that there is an issue with water coverage in rural Ethiopia, despite the fact that there is a significant difference between the two reports. There hasn't been much research done on this topic, and there isn't any solid data about what influences whether or not rural people treat their domestic water(2, 8).

In fact, data reveals that rural Ethiopians may be more likely than urban Ethiopians to get a waterborne illness. In Sub-Saharan Africa, rural households are responsible for 57% of the unimproved water supply, making rural Ethiopia the country with the lowest access to clean water sources. Only 21.8% of rural families have access to piped drinking water; the remaining 7% and 13.9% rely on protected dug wells and protected springs, respectively(12).

The study was conducted in a rural location where the only supply of drinking water, which is a river, spring, precipitation, or hand dung well, is not piped, necessitating point-of-use treatment. It may be used as a starting point to modify how individuals treat household water. In addition to the gap between information and action, the issue of access to safe water handling methods is also complicated by incorrect knowledge and attitude (1, 13).

Therefore, this study tried to identify how rural people use the available water treatment practices and factors associated with household-level water treatment practices and to bridge the research gap by identifying the level of household water treatment practices and associated factors among households in Adola Rede district in Oromia, Ethiopia.

1.3. Rationale /Justification of the study

Contamination of water often occurs from handling, dirty containers, or the introduction of extraneous matter during collection and transportation. (10).

No study has been conducted in the Woreda that indicates the extent of the problem. The result of the study can be used as a source of information for governmental organizations and NGOs to plan for improved water sources for households and for health extension workers to provide additional health education regarding handling and treatment practices for households.

In addition, it is hoped that this study will help the government and other interested parties understand the current trends in household water treatment practices and identify the required effective intervention in household water treatment practices by mobilizing the community in the study district.

Furthermore, the water and health offices of the study district will benefit from the outputs of this study by clearly understanding the magnitude of the problems related to drinking water treatment in the community and how they can be addressed through effective planning and implementation strategies.

Lastly, as the data on the practice and associated factors of household water treatment in the study area are either not available or otherwise very limited, the data to be generated from this study can serve as a baseline for further research.

2. LITERATURE REVIEW

2.1. House Hold Water Treatment Practice

Household water treatment (HWT) can improve the quality of drinking water at the point of use and reduce the risk of diarrhea among the millions of people that rely on unimproved drinking water sources and among those that rely on improved water sources. It can reduce the risk of diarrheal disease by as much as 61% when effective HWT methods are used correctly and consistently by populations at risk of waterborne disease(11).

Treatment of water that has become contaminated both at the source and through domestic handling with the goal of reducing contamination to levels of low microbial risk is said to be household water treatment. There is different point-of-use water treatment options being practiced, of which boiling, adding bleach, filtration, and solar disinfection are listed as appropriate point-of-use water treatment methods. However, the use of point-of-use water treatment methods is still low(1, 4).

The bulk of the world's 1.8 billion users of fecally polluted water sources are in low- and middle-income nations. The World Health Organization (WHO) recommends household water treatment and safe storage as part of a plan to lower the risk of diarrhea, however only 10% of residents of low- and middle-income countries (LMICs) report using an efficient technique to treat their household drinking water. Nearly 58% of people in sub-Saharan Africa lack access to clean drinking water(3, 14).

Ethiopia planned to raise the population's safe water supply coverage to 83% by 2020 from 58% coverage in 2015, despite the prohibitive costs of capital and maintenance of conventional large-scale water treatment. extremely limited access to safe drinking water, the rate of water purification in the home is still very low, with only 5% to 10% of Ethiopia's population using it(6, 14).

A study conducted in Alemeya district, Oromia region, on Household water treatment practice and associated factors showed that about 30.3% of households practiced water

treatment at the household level. Factors associated with household-level water treatment practices include educational status (being in secondary school) and training in water treatment(15).

A study conducted in Bahdar town on Household water treatment practice and associated factors showed that, of the total respondents, 76.3% reported that they treated their drinking water at home. But only 11% of respondents treated water at home within 24 hours. The main reasons for not treating water at home were psycho-social problems (53.7%), the unavailability of treatment methods (31.5%), and a lack of knowledge about how to use treatment methods (14.8%) (16).

A study conducted in Southern Ethiopia on Household water treatment practice and associated factors showed that Household-level water treatment is practiced by using chlorination (Wu ha-Agar), boiling (24%), and filtration (4.8%) using cloth, sand, and grave(6).

2.1. Factor associated with house hold treatment practice

2.1.1. Socio-demographic characteristics

In 2020, coverage of safely managed drinking water at home will be 74% globally, 30% in Sub-Saharan Africa, and 13% In Ethiopia in 2020.3 The EDHS 2016 (Ethiopian Demography and Health Survey) indicates that improved drinking water is available to 97% of urban households and 57% of rural households in Ethiopia(6).

A study conducted in Gibe District, Southern Ethiopia, on Household water treatment practice and associated factors showed that the use of appropriate treatment methods is high in households headed by educated household heads, high wealth quintiles, urban dwellings, people who own a radio, and people who own a television(7).

A study conducted in Southern Ethiopia on Household water treatment practice and associated factors showed that the age of the respondents ranged from 20 to 65 years (mean age, 35.65 years). All respondents were female, with an average family size of six, and 40% of the respondents' monthly average income was 1001 to 3000 ETB(6).

A study conducted in Gibe District, Southern Ethiopia, on Household water treatment practice and associated factors showed that practicing household water treatment was twice as common among respondents who have formal education as among those who are not able to read and write. Besides, those who collect water three or more times a day were 2.65 times more likely to practice household water treatment than those who collect once a day(7).

2.1.2 .Factors associated with Information access

The report shows that the use of appropriate household water treatment methods is high in households that own a radio or television. Misinformation and a lack of experience with the best practices of alternative water treatment technologies are among the leading challenges(4, 16).

2.1.3. Factors associated with Knowledge and attitude

A study conducted in Northwest Ethiopia on Household water treatment practices and associated factors showed that The problem of access to safe water handling practices is hampered not only by the gap between knowledge and action but also by the wrong knowledge and attitude. Particularly in rural areas of many developing countries, the knowledge level about the direct link between unsafe water consumption and diarrheal diseases is very low and Water quality problems in rural Ethiopia exist due to poor knowledge and malpractice in water handling at the source and point of use(13).

A study conducted in Northwest Ethiopia on Household water treatment practice and associated factors showed that mothers and caregivers who had good knowledge were more than two and a half times more likely to use HWT methods compared with mothers and caregivers who had poor knowledge. This difference may be due to the literacy level of mothers and caregivers on HWT. More than half of respondents (54.8%) had a favorable attitude toward HWT, whereas the remaining respondents (45.2%) had an unfavorable attitude toward HWT(13).

A study conducted in Rural Kebeles of Degadamot Woreda, Northwest Ethiopia, on Household water treatment practice and associated factors showed that Practice on HWT

was greater than 600 ETB in the monthly income of households, which was 2.71 times more than their counterparts(3).

A study conducted in southern Ethiopia on Household water treatment practice and associated factors showed that those with good knowledge about household-level water treatment practice are 6.98 times more likely to practice than those with poor knowledge(6).

A study conducted in Gibe, Ethiopia, on Household water treatment practice and associated factors showed that the knowledge of respondents on household water treatment practice was scored as <50% poor knowledge, 50% to 69% fair knowledge, and 70 good knowledge according to the above scoring (77.5%), 76 (12.1%), and 10.4% of respondents had poor, fair, and good knowledge on household water treatment practice, respectively(7).

2.1.4. Factors associated with Accessibility and Availability

Access to a safe water supply in Ethiopia is the lowest in the world. According to the Joint Monitoring Program (JMP) of the WHO and UNICEF, Ethiopia has the lowest rates of safe water coverage in the world, with 31% of the rural population and 96% of the urban population using improved drinking water sources. However, official government reports in 2010 show access to a safe water supply of about 65.8% (91.5% for urban and 65.8% for rural)(4).

A study conducted in Beshangul Gumuz, north Ethiopia, on Household water treatment practice and associated factors showed that the majority of households (78.6%) had access to improved (treated hand pump) water sources, and 21.4% were using unimproved (spring, shallow well, etc.) water resources that were not treated and fully protected. Also, there are differences among Kenyans on the accessibility of improved drinking water. The majority of HH heads (81%) get moving in less than 30 minutes to collect drinking water(10).

2.1.5. Factors associated with Domestic factors

About 19.6% used chlorine and 20.7% used settle and stand as domestic water treatment options. The majority of them used boiling; this might be due to the fact that the method is

easy to practice, most households have the required materials to do so, and there is water boiling practice for other purposes, like coffee, by washing heavily soiled utensils. This was in line with the suggestion given by CDC(1).

A study conducted in Benshangul Gumuz, north Ethiopia, on Household water treatment practice and associated factors showed that most (95.2%) of the residents use jerry cans, while the remaining 3.9% and 0.9% use plastic buckets and traditional clay pots (Insra), respectively. 62.6% of the collectors wash their hands before collecting water. The washing and rinsing practice of containers before collection was observed among 91.6% of respondents. The currently employed rinsing materials used by the collectors were soap or detergent, sand, and other materials like grass and leaves in 29.1%, 46.1%, 24.1%, and 0.7%, respectively(10).

2. 3. Conceptual Framework

This conceptual framework shows the relationship between the independent variable and the household water treatment practices of the study community. The framework was developed after reviewing different literature. The causal pathway, as shown in Fig. 1, indicates a relationship between Household level of water treatment practice and socio-demographic factors, information access, Knowledge and attitude, accessibility, and availability for Safe drinking water and domestic water storage in the study population.

Conceptual frame work for house hold water treatment.

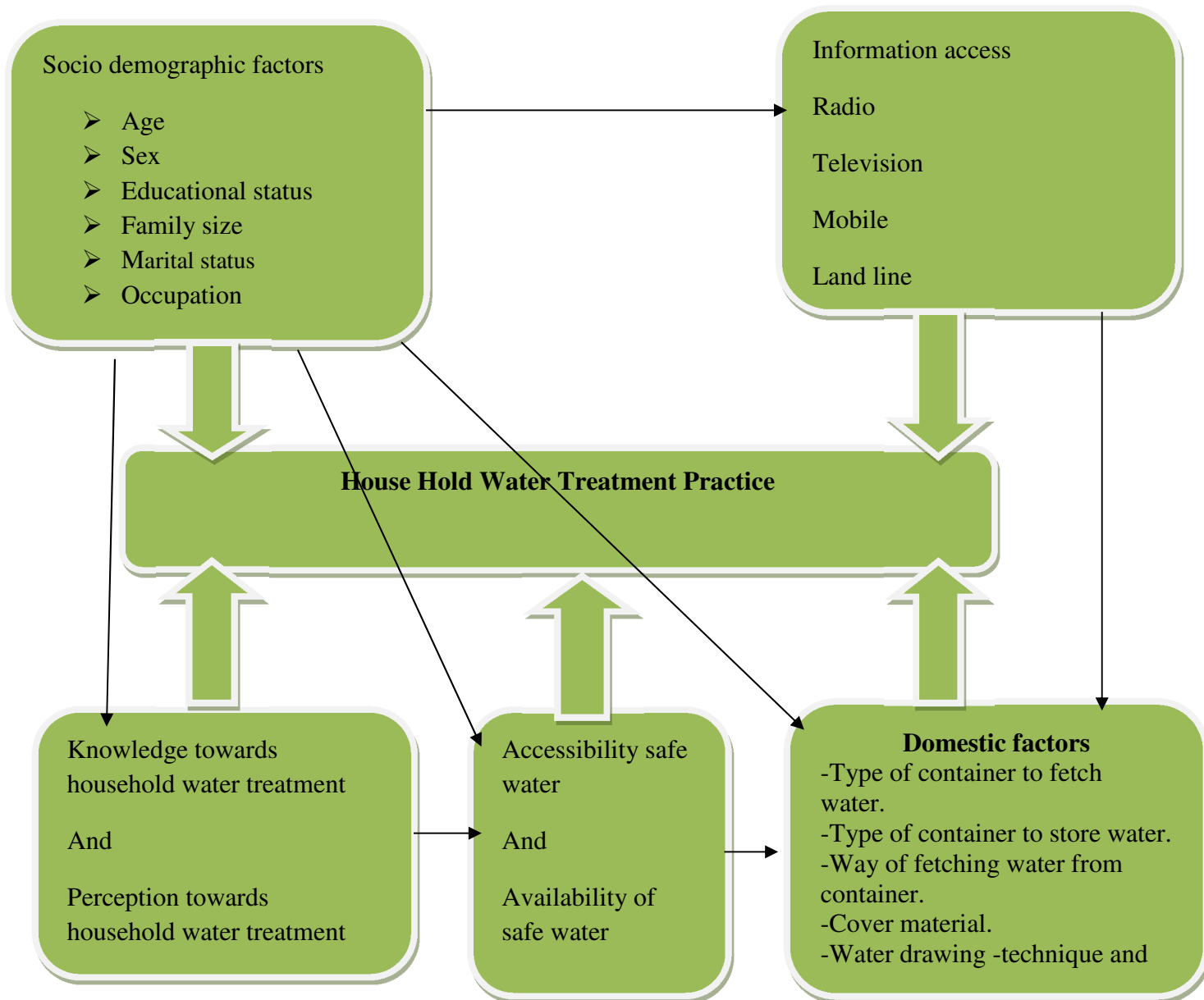


Figure 1. Conceptual formwork for study of household level of water treatment practices, and associated factors in Adola Rede district, Oromia, Ethiopia, 2023(1, 3, 11, 16). (Developed by researcher by reviewing different literature).

3. OBJECTIVE

3.1. General objective

- To assess the prevalence of household water treatment practices and associated Factors in Adola Rede district in Oromia Regional State, Ethiopia.

3.2. Specific objective

- To assess the prevalence of household water treatment practices in Adola Rede district in Southern Ethiopia.
- To identify factors associated with household water treatment practice in Adola Rede district, southern Ethiopia

4. METHODS AND MATERIALS

4.1. Study area and period

The study was conducted in Adola Rede district in Guji zone, Oromia Regional State. Adola town is the capital city of Adola Rede district and is located 420 kilometers away from the Capital City of Ethiopia, Addis Ababa. The district is flat, hot, and humid, with an altitude range of between 1,100 and 1,700 meters above sea level.

According to the information obtained from the district administration office, the current (2022GC) projected total population of the district is 49,859 (Adola Rede and Weyu Vital Registration) the district has 27 Kebeles (the lowest administrative unit in Ethiopian context) and 33,564 households. The majority of the population in the area belongs to the Oromo ethnic group (Adola Rede Agriculture Office).

According to the information obtained from the district health office report, the district has one government-owned general hospital, 13 health centers, ten medium private clinics, eight primary clinics, and 27 health posts. Furthermore, the common sources of households' water supply in the district are unimproved water sources such as a river, a well, and spring water. The coverage of the improved water source is 57.1% (Adola Red Energy and Water Office). The health office report also indicated that diarrheal disease and intestinal parasites are the ten top-listed diseases in the district.

The study was conducted during the period of February 13–March 6, 2023.

4.2. Study design

A community-based cross-sectional study design was employed to determine the prevalence of household-level water treatment practice and associated factors among households in Adola Rede district, Gu Ji zone, Oromia region, southern Ethiopia.

4.3. Source Population

All the Households in the Adola Rede district were the source population of the study.

4.4. Study Population

All randomly selected households from the selected kebeles of Adola Rede district were considered the study population..

4.5. Study subjects Study

Participants were mothers who live in selected rural kebeles of Adola Rede district.

4.6. Eligibility criteria

4.6.1. Inclusion criteria

Respondents whose age is 18 years and above (Preferable mothers) and who have been living for at least 6 months in the district were included in the study.

4.6.2. Exclusion criteria

Respondents who were seriously ill and could not communicate to give information were excluded from the study.

4.7. Sample size determination

The sample size was determined using the formula for a single population proportion with the assumption that 44.8% (P) of households have water treatment practices from a study conducted previously in southern Ethiopia(6). In addition, the following assumptions were made: 95% confidence level ($Z = 1.96$), 5% margin of error, a design effect of 1.5, and an anticipated non-response rate of 10%.

$$n = \frac{Z_{\alpha}^2 \times p(1-p)}{d^2}$$

Where n=sample size, $Z=1.96$, d= margin of error of 5%, $p=0.448$ and $q=0.552$, $D=1.5$

Based on the above assumptions, using the single proportion formula, the calculated sample size is **627**.

4.7.1. Sample size determination for the 2nd Objective

The sample Size was also calculated for factors associated with household water treatment practices that were significantly associated with outcome variables from previous studies and with a two-sided confidence level of 95% and a power of 80% using the Epi Info 7 Stat Calc computer software program (Table 1).

Table 1. Sample size determination for factors associated with house hold water treatment practices in Adola rede district, Guji zone, Oromia, Ethiopia, 2023.

	CI	Power	Ratio(un expose to exposed)	% outcome In un exposed	Odds ratio	% Out come in exposed	Sample size + 10%	Reference
knowledge	95%	80%	1:1	45.4	2.62	68.5	106	Northwest Ethiopia(3).
Educational level	95%	80%	1:1	45.2	1.9	61	367	Gibe District Southern Ethiopia(7).
Income	95%	80%	1:1	60	2.35	77.9	231	Southern Ethiopia(6).

Ultimately, the largest sample size is 627 was taken as the final sample size for this study

4.8. Sampling procedure

A multistage sampling procedure was used. The first nine kebeles were selected using a random sampling technique from those 27 kebeles in Adola Rede district. Secondly, based on the proportional allocation, households were distributed for each of the nine kebeles. Thirdly, the households of the study participants were selected using systematic sampling techniques after calculating the sampling interval of the 9 randomly selected households

divided by the number of study sample size households, which is $7115/627 = 11$. Therefore, the data were collected from every 11th household. Finally, from each selected household, preferable mothers whose age is above 18 years were interviewed for the study.

4.9. Study variables

4.9.1. Dependent variables

- House hold water treatment Practice

4.9.2. Independent variables

- Socio-demographic characteristics: - Age, Educational status, Family size, Marital status, Occupation, Religion, House hold income(11).
- knowledge and perception towards household water treatment,
- Source of information with regard to HHWT
- Availability and accessibility of water sources
- Water source and handling status: -source of drinking water, type of container to fetch water, distance to fetch water, type of container to store water, way of fetching water from container(11).

4.10. Operational definitions

Household water treatment practice: - Households who used at least one alternative method (boiling, adding bleach/chlorine, letting the water pass through a clean cloth (filtering), solar disinfection) of HWT with in the last 24hrs were considered as good practices which will be scored as 1, while poor practices were considered as households who were not used any alternative method of HWT and scored as 0(11)

Knowledge of respondents for the knowledge assessment, each correct response was given a score of 1, while a wrong response was scored as 0. Respondents who scored knowledge questions above the mean were considered to have "good knowledge," and those who scored below the mean were considered to have "poor knowledge." (6) From the 7 questions included in the questionnaire

Improved water sources: include piped water and public tap water(6).

Water source and handling status: -source of drinking water, type of container to fetch water, distance to fetch water, type of container to store water, way of fetching water from container(11).

4.11. Data collection instrument, method and procedure

4.11.1. Data collection instrument development

The data collection tools, or a questionnaire, were developed based on a review of relevant literature as well as considering the need to adequately address both specific objectives of the study. The conceptual framework was also used to arrive at the right answers for the research questions. Furthermore, valuable suggestions and comments were taken from advisors and other individuals to improve the instrument during the development of the questionnaire. The questionnaire is composed of socio demographic characteristics, household water treatment practice, household perception and knowledge of household water treatment practice, and accessibility to information on how to treat water at the household level.

4.11.2. Data collection method

Data was collected using a semi-structured and interviewer-administered questionnaire.

4.11.3. Data collection procedure

After extensive revision, the final English version of the questionnaire was translated into the local language of the study area, which is Afan Oromo. A pre-test plan was conducted before the original data collection day. Then check the consistency of the questionnaire; it was re-translated back to English by another individual who is fluent in both languages.

Five data collectors who are health professionals with at least a diploma level of education or level IV certificates, able to speak the local Language (afan Oromo), and familiar with local customs were selected, and three supervisors with a BSc degree in health professions were recruited and trained on the objectives and contents of the questionnaires as well as how to collect valid data with ethically sound procedures.

4.12. Data quality assurance

Data quality was ensured during instrument development, collection, coding, entry, and analysis. Training was given for both the supervisors and the data collectors. The session of training included the objective of the study, relevance of the study, confidentiality of information, respondent's rights, informed consent, pre-testing, interview techniques, and how to approach the respondents.

The pretest of the instrument was carried out in 35 households (5% of the total sample) by one supervisor and three data collectors in Shakiso district, which is 19km from the study area. The results of the pretest were discussed with the data collectors, and important corrections and changes were made to the questionnaires accordingly.

During the actual data collection, the Principal Investigator (PI) and the supervisors checked the whole process of data collection. Anything that was unclear or ambiguous was corrected immediately. The computed questionnaires were reviewed and checked for completeness and relevance by the supervisors and principal investigator, and the necessary feedback was offered to the data collectors in the morning before the actual procedure. Finally, the data was thoroughly cleaned before analysis and double entry of data were applied.

4.13. Data processing and analysis

Data were first checked manually for completeness and then coded and entered into Epi-data 3 statistical packages. The entered data was exported to SPSS version 26 for further analysis. The data was then cleaned by visualizing, calculating frequencies, and sorting. Any errors identified at this stage were corrected after revision of the original data using the code numbers and statistical commands.

The data was presented using percentages and distributions of the respondents by socio-demographic characteristics and other relevant variables in the study. A bivariate logistic regression analysis was employed to identify factors associated with the household water treatment practices of the study participants. All explanatory variables associated with the outcome variable in bivariate analysis with P-values of 0.25 were entered into

multivariable logistic regression analysis. Backward-stepwise logistic regression models of multivariable analysis were employed in order to control confounders, and the problem of multi-collinearity was checked with VIF (< 10) and the standard error < 2 . Hosmer-Lemeshow goodness-of-fit statistics were checked to assess whether the necessary assumptions for the application of multiple logistic regression models were fulfilled, with a $P > 0.05$ (6)

Variables that show significant association with the outcome variable were selected as a full model of outcome-variable predictors if all of the assumptions were fulfilled. Finally, the crude odds ratio (COR) and adjusted odds ratio (AOR), together with their corresponding 95% confidence intervals (CIs) and P-value, were computed and presented in tables. Statistical significance was declared at $P \leq 0.05$ (6).

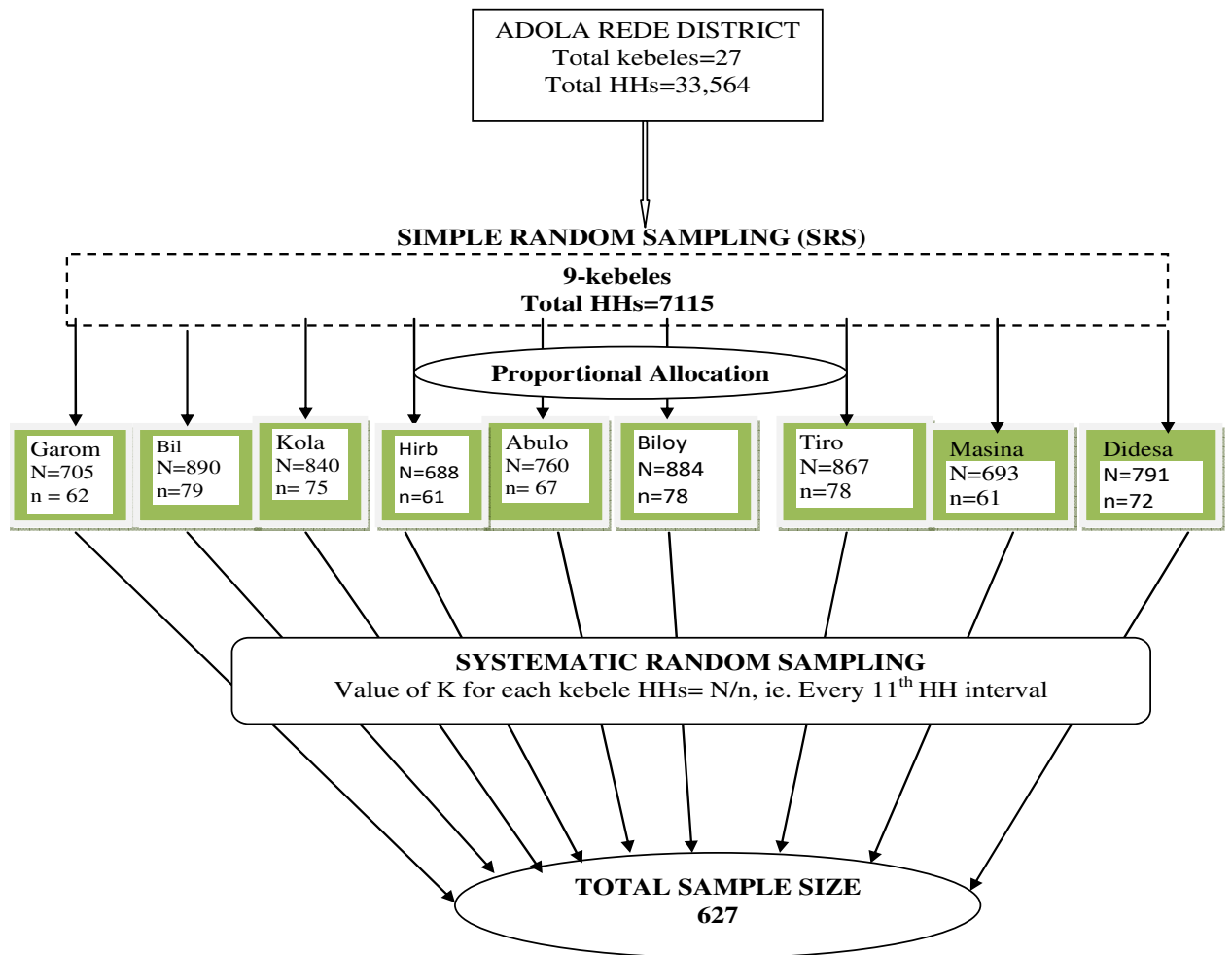


Fig-2 Diagrammatical presentation of sampling procedure

4.13. Ethical considerations and informed consent

The proposal was reviewed by the ethical review committee of St. Paul's Hospital, Millennium Medical College, and school public health. The surveys were conducted after approval from the review committee. An official letter was obtained from St. Paul's Hospital, Millennium Medical College, and the School of Public Health for the Adola Rede district administration. Moreover, informed verbal consent was obtained from each of the respondents after a thorough explanation of the purpose and procedures of the study. The participants were also informed that they have the full right to discontinue or refuse to participate in the study. All responses were kept confidential and anonymous.

4.14. Dissemination plan

The primary objectives of this study are to fulfill the requirement for the Master's Degree in Public Health from St. Paul's Hospital Millennium Medical College, School of Public Health. However, the short reports were also communicated to the Adola Rede district administration, the Adola Rede district Health Office, and the Guji zone health administration. Moreover, Presentations at professional, local, and national meetings were conducted accordingly. Furthermore, publication of the main findings in peer-reviewed national or international journals was attempted.

5. RESULT

5.1. Socio-demographic characteristics of the study participants

Of the total 627 study participant households, 620, with a response rate of 98.8%, completed the questionnaire. The largest number of study participants, 241 (38.9%), were aged between 30 and 39 years, with a mean age of 38.82 ± 12 years. The majority of respondents were female mothers, 265 (42.7%) were protestant religion followers, 517 (83.4%) were formally educated, 280 (45%) had an average family size of 4–7, more than half of respondents had an income below 6,000 ETB, and 376 (60.6%) were farmers.

Table -2 Socio-demographic characteristics of the study participants Adola rede district2023

Characteristics	Category	frequency	Percent
Age	18-29 Years	140	22.6
	30-39Years	241	38.9
	40-49 Years	121	19.5
	≥ 50 Years	118	19
Ethnicity	Oromo	533	86
	Amhara	59	9.5
	Other	28	4.5
Sex	Male	65	10.5
	Female	555	89.5
Marital status	Married	405	65.3
	Single	120	19.4
	Divorce	85	13.7
	Widowed	10	1.6
Religion	Orthodox	171	27.6
	Muslim	159	25.6
	Protestant	265	42.7

	Other	25	4
Educational status	Formally educated	517	83.4
	Not formally educated	103	16.6
Occupation	Famers	376	60.6
	House wife	88	14.2
	Merchant	82	13.2
	Gov. employee	74	12
Monthly income of the family	Below 6000	361	58.2
	Between 6000-9000	191	30.8
	Above 9000	68	11
Family size the household	.≤3	278	44.8
	4-7	280	45.2
	>7	62	10
Number of children less than five years in households	None	281	45.3
	1	205	33.1
	2 or more	134	21.6

5.2. Respondents' household-level water treatment practices

Household-level water treatment is practiced by 382(61.6%) with 95% CI (57.6%-65.6%). Majority of them 169(44.2%) were using Chemical disinfection, 108(28.3%) cloth filter, 59(15.4%) boiling and 46 (12%) ceramic filter.

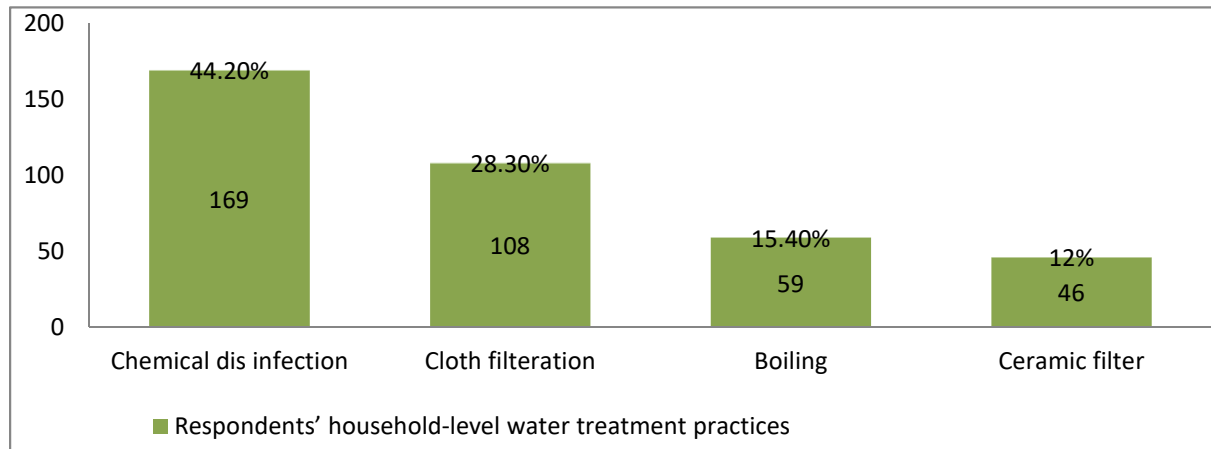


Figure: 3. Methods of household level water treatment practice in Adola-Rede district, Oromia, Ethiopia 2023.

5.3. Magnitude of Household water treatment practices

Majority of the household participants 293 (76.4%) stated that the main reason house hold level water treatment is good for health, 308 (70.2%) of participants were enjoyed with the taste and smell. Reason for not practicing water treatment at **HHL** 64 (26.9%) participants believe untreated water has no effect; 59 (24.8%) of them believe Water is pure in nature and 87 (36.7%) due to a lack of resources.

Table -3 Magnitude of Household water treatment practices at Adola rede district 2023

Characteristics	Category	Frequency	Percent
Household water treatment practice	Practice	382	61.6
	Not practice	238	38.4
Reason for household water treatment (n=382)	Good for health	293	76.7
	Because hygienic purpose	65	17
	Others	24	6.3
Enjoyed the taste and smell of treated water(n=382)	Yes	268	70.2
	No	114	29.8
Reason for not practicing water treatment at HH level(n=238)	Lack of resource	87	36.8
	Water is pure in nature	59	24.8
	Believe un treated water has no effect	64	26.9
	Material cost	3	1.3
	Lack of awareness	11	4.6
	Other	14	5.9

5.4. Household perception (attitude) and knowledge of water treatment at the household level

Among all participants in the households, more than half (366)) perceived that treating drinking water is very important, 322 (51.9%) stated that the quality of drinking water is not clean, 241 (38.1%) believed that water is safe to drink from sources, 333 (53.7%) believed that water from the source was contaminated, 406 (65.5%) have a plan to treat drinking water, and 409 (66%) reported that they know the cause of diarrheal disease due to contaminated water (Table 4).

Table 4. Knowledge and Perception of the respondent about the HH water treatment practice in Adola-Rede district, Oromia, Ethiopia, 2023

Characteristics	Options	frequency	Percent
How is the quality of water you drink?	Clean	168	27.1
	Not clean.	322	51.9
	I don't know	130	21
How important is it to treat water	Very important	366	59
	Not important	135	21.8
	Do not know	119	19.2
How safe to drink water from the source	safe	241	38.9
	Not safe	344	55.5
	I don't know	35	5.6
Do you believe water from source is contaminated	Yes	333	53.7
	No	287	46.3
Do have a plan to treat your drinking water	Yes	406	65.5
	No	214	34.5
The causes of diarrheal diseases	Drinking contaminated water	409	66
	Drinking water from source	116	18.7
	I don't know	95	15.3

5.5. Respondents' knowledge of household-level water treatment

Among the total study participants, Majorities of them 383(62%) of the households has a good knowledge while the other 237(38%) of the households has poor knowledge on household level water treatment (Figure: 4).

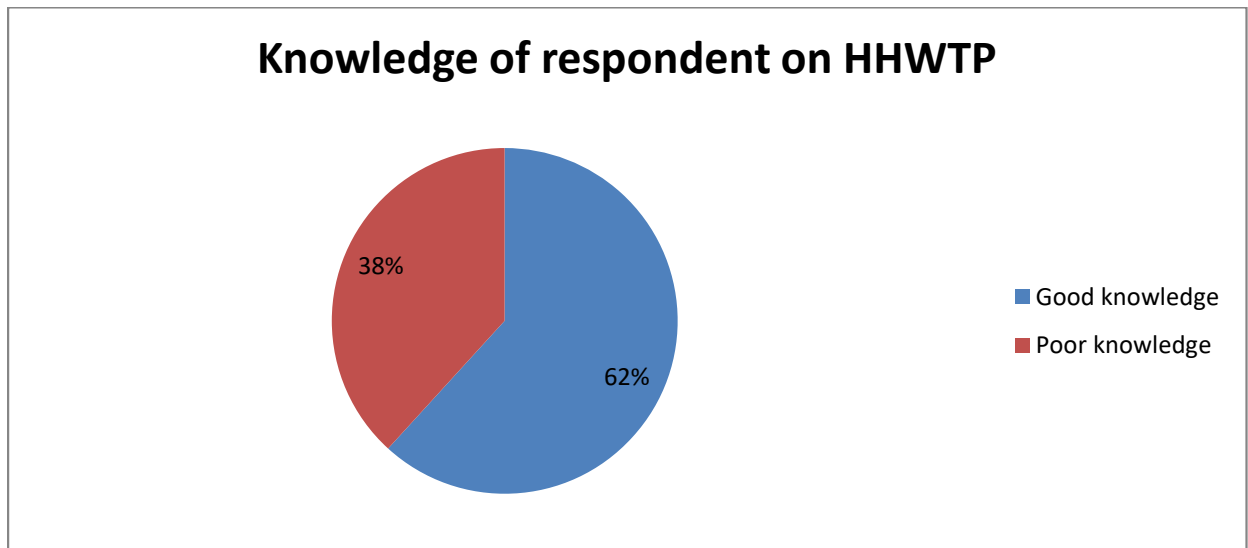


Figure-4 Knowledge of the respondent about the **HHL** water treatment practice in Adola-Rede district, Oromia, Ethiopia, 2023

5.6. Access to information and environmental characteristics of water treatment practice at the household level

The study finding revealed that Among all participants of the households ,Majority of them 376(60.6%) possessed radio,414(66.8%) were receive health education to treat water at the household level, Main source of drink water 235(37.9%) were getting water from protected well,168(27.1%) from un protected well, 513 (82.7%) store their drinking water separately, 211 (55.2%) of them store their drinking water in jerry can, More than half 239 (62.5%) of them used detergent or soap for cleansing their water storage container; 361(58.2%), fetched water one time per day, and more than half of them 419 (67.6%) get information about **HHLWT** from health professional (**Table 5**).

5. Access to information, & environmental characteristics on water treatment practice of respondents in the Adola Rede district, Oromia, Ethiopia, 2023

Characteristics	Responses	frequency	Percent
Does your household have Electricity (n=620)	Yes	405	65.3
	No	215	34.7
Does your household have Radio(n=620)	Yes	380	61.3
	No	240	38.7
Does your household have Television(n=620)	Yes	376	60.6
	No	244	39.4
Does your household have Landline(n=620)	Yes	539	86.9
	No	81	13.1
Receive health education on HHWTP from C. body (n=620)	Yes	414	66.8
	No	206	33.2
Main source of drinking water (n=620)	Protected well	235	37.9
	Un protected well	168	27.1
	River	66	10.6
	Tap	151	24.4
Do you store water for drinking separately(n=620)	Yes	513	82.7
	No	107	17.3

Which container do you use to store water for drinking (n=382)	Bucket	108	28.3
	Bucket without lid	28	7.3
	Small pans	35	9.2
	Jerri can	211	55.2
Do you clean container you use to store water(n=382)	Yes	286	74.9
	No	96	25.1
How often do you clean the container(n=382)	Daily	185	48.2
	Weekly twice	108	28.1
	Once a week	70	18.3
	No plan	13	3.4
	Other type	8	2.1
Frequency to fetch water	One time per day	361	58.2
	Three times per day	202	32.6
	Greater than 3 times	57	9.2
How do you clean the container(n=382)	Only by water	105	27.5
	With water and detergent	239	62.5
	Mopping with leaves	38	9.9
Do you use drinking water for other purposes(n=620)	Yes	362	58.4
	No	258	41.6
Material to draw water at home(n=620)	Jock	562	90.6
	Using tube	58	9.4
Source of information on HHLWT	Media	123	19.8
	Health professional	419	67.6
	NGO	46	7.4
	Other	32	5.2

5.7. Factors associated with household water treatment practice

In bivariate logistic regression analysis the following factors; Age of respondent, educational status, knowledge of respondent, responsible body, frequency to fetch water per day, have radio, store water separately, Receive health education on HHWTP from Concerned body and Source of information were associated with household water treatment practice($P\text{-value} \leq 0.25$)(Table 6).

However, after applying multi-variable logistic regression six variables were found to be independent predictors of household level water treatment practice. Accordingly; age of respondents, possess radio, Frequency to fetch water per day, storage water separately, Receive health education to treat water from concerned body, and Knowledge of respondents were associated with household level water treatment practice ($P\text{-value} \leq 0.05$)(Table 6).

In multivariable logistic regression, the odds of practicing household water treatment of those respondents age 18-29 years were 3 times higher than their counterpart (above 50 years) (AOR= 2.90,95% CI=1.53-5.41).Participants who had radio were 4 more likely practice house hold water treatment than reference category (AOR=4.23,95% CI= 2.70-6.80).House hold water treatment were 3.7 times higher among who fetch water one times per day than those fetch more than three times per day(AOR=3.72, 95% CI=1.80-800).

Respondents who Store drink water separately were 4.6 times more likely to practice house hold water treatment than reference category (AOR =4.61,95% CI=2.70-8.00).Participants who receive health education on water treatment were 1.7 times more likely to practice household water treatment than participants who did not Receive health education (AOR =1.70, 95% CI =1.10-2.65).Participants who had knowledge on house hold treatment 6 times more likely to practice HHWT than those who had not (AOR = 6, 95% CI = 3.80-10.43).(Table 6)

Table 1. Bivariate and multi variable logistic regression of factors associated with household water treatment practice in Adola-Rede district, Oromia, Southern Ethiopia, 2023

Variable	Category	Water treatment practice		COR(95%CI)	AOR(95%CI)
		Yes	No		
Age	18-29	90	50	2.92[1.76-4.850]	2.90[1.53-5.41]
	30-39	172	69	4.05[2.54-6.44]	2.31[1.23-4.13]
	40-50	75	46	2.65[1.60-4.500]	1.82[0.90-3.52]
	>50	45	73	1	1
Have radio	Yes	269	111	2.72[1.946-3.81]	4.23[2.70-6.80]
	No	113	127	1	1
Frequency to fetch water per day	One times per day	244	117	2.90[1.62-5.10]	3.724 [1.80-800]
	Three times per day	114	88	1.80[1.00-3.30]	2.54[1.16 -5.53]
	More than three time	24	33	1	1`
Store drink water separately	Yes	348	165	4.53[3.00-7.01]	4.61[2.70-8.00]
	No	34	73	1	1
Receive health education about water treatment from C.B	Yes	301	113	4.11[3.00-6.00]	1.70[1.10-2.65]
	No	81	125	1	1
Knowledge of respondent	Good knowledge	92	291	5.01[3.57-7.21]	6.23[3.80-10.43]
	Poor knowledge	146	91	1	1

6. DISCUSSION

Water is the most important determinant of public health, and an adequate supply of clean water for drinking is one of the most basic human needs and one that must be met.

It is obvious that access to safe water is important for reducing disease transmission. Even if the source is safe, water becomes fecally contaminated during collection, transportation, storage, and drawing in the home, so access to safe water alone does not significantly reduce diarrheal diseases.

Treating water prior to drinking can be taken as a primary prevention method for diarrhea and has been found to be effective in reducing water-borne disease.

In Ethiopia, despite preceding studies that show the effectiveness of point-of-use water treatment in reducing diarrhea, it is still among the most common health problems.

Reducing the problem using household water treatment can be ensured when the treatment methods are adopted and effectively and consistently used.

The current study focused on the household's reported use of appropriate household water treatment methods and the factors associated with their use for future intervention.

Also Household point-of-use water treatment was associated with ownership of radio, which might be because these media convey information about the health benefits of treating water and the health risks of untreated water. In this regard, a study's findings show that conveying relevant information about household water quality improves the adoption of protective behaviors and technologies.

The findings of this study showed that the magnitude of practice on **HHWT** was 61.6 percent with a CI of 57.6%–65.6%. The prevalence of practice on **HHWT** in this study was higher than in studies conducted in Ameya District, Oromia, Ethiopia (30.3%)(15), Dagdamot Woreda, North West Ethiopia (14.1%)(3), southern Ethiopia (29.9%)(6), southern Ethiopia gibe district (34.3%)(7), Sodo Zuria, Southern Ethiopia (44.1%)(2), Burie Zuria, Northwest Ethiopia (44.8%)(1), household water treatment practice in rural communities of northwest Ethiopia(17) and west Guji zone, southern Ethiopia (35.8%)(8).

This difference might be due to a difference in the time period and sample size and a variation in the level of community awareness of household-level water treatment. It might also be due to a difference in clean water coverage that may vary as well as the accessibility of information about **HHLWT**.

The finding of this study shows that among respondents who practice household-level water treatment methods, the majority (44.2%) of them use chemical disinfectants. This finding was in line with the study done in west Guji zone, southern Ethiopia (44.9%)(8) and In contrast, the finding is higher than Assosa Woreda, Benishangul Gumuz, North West Ethiopia (2.9%)(10) Amaya district, Oromia Ethiopia (13.6%)(15), Burla, Sambalpur, Odisha India (27%)(24), and Lamingo, Plateau state Nigeria(12%) (18) Respectively. The disparity could be due to the availability of Chemical disinfection in the local market and distribution from the study zonal health office for water treatment purposes, as well as the ease of use of the chemical method.

The next method, cloth filtration, accounts for 28.3% This finding was higher than study conducted Gibe district, southern Ethiopia (23.3%) (7), Assosa Woreda, Benishangul Gumuz, north-west Ethiopia (3.4%)(10), west Guji zone, southern Ethiopia (19.5%) (8) Amaya district, Oromia, Ethiopia (23.2%) (15) and lower than Study conducted Semi-Urban Areas of Dakar in Senegal (32.8%)(19).

The possible explanations for this difference might be related to households' perception differences across different contexts.

Concerning factors affecting household-level water treatment, In this study, the Age of respondents Households whose age was 18–29 were three times more likely to practice household-level water treatment than their counterparts (above 50 years). The finding was supported by a study done in Sodo district, southern Ethiopia(2), Endamehoni district, northern Ethiopia(20) and study done Rural Puertorico(21).

The possible explanation for this finding might be that this age group of participants may have understood through exposure the need for household water treatment to reduce diarrheal disease, and their educational level may also encourage practice and make them more likely to get information.

This study revealed that participants who had radio were four times more likely to practice household water treatment compared to those who had not. This finding was Higher than studies done in Ameya district, Oromia(15),spatial variation point-of-use treatment based on the EDHS 2016(22) and Demographic health survey conducted in sub-Saharan countries (23).

The possible explanation for this finding might be due to the fact that those who get information about different types of water treatment methods from the media might be better able to understand the health risks of drinking contaminated water.

This study also showed an association between collecting water once a day and household water treatment practices. Respondents who fetch their water one time a day were 3.7 times more likely to practice household water treatment than those who fetch water more than three times a day. This finding was supported by Southern Ethiopia(7),Burie Zuria Northwest Ethiopia(1) and a systematic review and meta-analysis on **HHWTP** in Ethiopia(9) and In line with Sodo Burie Zuria Southern Ethiopia(2) and in contrast to Gibe District southern Ethiopia (7).

The possible reasons for this may be that those who fetch water once per day may have a higher tendency to store their water, which in turn empowers them to treat their water by storing it.

Among respondents' who had stored drinking water separately, Practice **HHWT** 4.6 was more likely than not. This result was supported by a study done by Bahir Dar, Northwest Ethiopia.(16).

The possible reasons for this may be that those who store drink water separately more frequently may have a higher tendency to store their water, which in turn empowers them to treat their water by storing.

Participants who had received health education (advice) on water treatment were 1.7 times more likely to practice household water treatment than those who had not. This result was in line with study done, West Guji Zone southern Ethiopia(8), a systematic review and meta-analysis in Ethiopia on **HHWTP**(9) and lower than study conducted Amaya Oromia Ethiopia(15). This is due to better information and health education regarding **HHWT** practice.

Respondents who had knowledge of household treatment were six times more likely to practice **HHWP** than those who had not. This result is supported by research done in the southern part of Ethiopia(6), Gibe district, southern Ethiopia(7), West Guji Zone, southern Ethiopia(8),Dagdamot, north-West Ethiopia(3), Qualitative Study in Northwest Ethiopia(14), Northwest Ethiopia (13),Southern Ethiopia(6) and Rural Puerto Rico(21). This might be due to those with good knowledge of household water treatment methods and the consequences of water contamination being more likely to implement **HWTP**.

6. Limitations of the study

Since the information for this study was collected mainly through interviews and self-reports, there is a possibility that some of the responses might suffer from social desirability bias, and to avoid this, we added an observation method as a method of data collection besides the interview. Moreover, since the study employed a cross-sectional study design, it may be difficult to establish a temporal relationship between the outcome and response variables. .

7. Conclusion

This study was conducted to determine the level of household water treatment practice and the factors associated with it. The result showed that household water treatment practice was low in the study area. Knowledge of the respondent, having radio, and receiving health education on HHWT were found to be the factors significantly associated with household water treatment practice. Therefore, efforts should be made through health education by the woreda health office and community health workers to increase the level of household water treatment practice.

8. RECOMMENDATIONS

Based on the findings, health facilities and governmental and non-governmental organizations should strengthen health education on household-level treatment practices to increase community awareness and the availability of necessary supplies, especially for less educated households, which can improve community **HWT** practices.

The woreda water office should collaborate with the woreda health office and Non-governmental organizations to deliver better **HWTP** methods and demonstrate them to kebeles and sub-kebeles. Health extension workers working in the woreda are recommended to deliver pertinent information on how to use **HHWTP**-protected types of water sources for drinking, to have separate containers for storage, and to fetch and handle utensils above the ground where contamination is not a concern. After some time, it is better to monitor their practice on water treatment

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APPENDICES

A: Information sheet

Date: -----

How are you? My name is _____ I provide the information about the researcher Yitagesu Yosef who is Masters student at st,Paul millennium medical college. You are invited to participate in this study that involves research in House hold water treatment and associated factor in Adola rede district southern Ethiopia.

The aim and purpose of this research is to assess House hold water treatment and associated factor in Adola rede district southern Ethiopia. The study is expected to enroll 627 participants. We will conduct this study in Adola rede district. It will involve the following procedures. I am going to ask you the structured questionnaire and you will be answer. All answer that you will answer is accepted as correct .If you are willing enough to participate in the study you will spend only 30 minutes.

The study may have discomforting information that makes you minimum discomfort to disclose your experience but it is opportunity for you because information you provide may save the life of many children. This study has been ethically reviewed and approved by the saint pouls millennium medical College research Ethics Committee (approval number-----).
-----).

In the event of any problems or concerns/questions you may contact the researcher Yitagesu Yosef, GMPH students. I kindly let you know that all of the answers you provide me will be kept secret. The record of your name or address will not be kept by the researcher. Any information from the participants like raw data will be stored securely and kept confidential. The publications that will arise from this study will exclude any information that will make it possible to identify the participants' name or identity.

B: Ascent form

I will select participant that can read/listen and understood the information written on the study information sheet and understood the purpose, benefit and what is required from them if they take part in the study. They should understood that all the information regarding them like name and all answers given by them must not be available on the questionnaire and not transferred to a third party. Participants also understood that they can decide whether or not to take part in the study or even withdraw from the study at any time..

Signature of the participant-----Date-----

Facilitator Name-----sign-----Date-----

In case you need to contact, Contact Address of the Investigator,

Name: Yitagesu Yosef

Phone: 09 16450613

Email address: yitagesuyosefzemyinur@gmail.com

C. English version Questionnaires

ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE SCHOOL OF PUBLIC HEALTH

Questionnaire For The Assessment of Household Water Treatment Practice and Associated Factors at Adola Rede District.

Informed Verbal Consent

Good morning/afternoon

Dear Madam!

To ensure the health of community, understanding of the existing health problems and related practices of these populations is essential. Owing this, the aim of this study is to assess the Household Water Treatment Practice and Associated Factors in Adola Rede District. You are chosen to participate in this study .The choice of the HH and an individual was done randomly from Adola Rede District.

These study questions will involve various personal, social and HH level of water treatment practices. So, it is your full right to refuse or to participate in this study. Moreover, I assure you that your responses are completely confidential & non-of your responses will be reported to anybody. Therefore, there is no need to mention your names on these survey papers. However, in order to attain its goal, we kindly request your kind and good will to participate in the survey. So, please take a few minutes to answer the questions.

Would you like to participate? Yes (____) No (____).Mark "X" in the appropriate space

Identification Number -----

Date of Interview-----

Time at the Beginning of the Interview-----

I. SOCIO- DEMOGRAPHIC CHARACTERSIC OF RESPONDENTS				
No	Questionnaire	Coding and Categories	Skip to	Coding
001	How old are you?	1.18-29 Years____ 2.30-39 Years____ 3.40-49 Years____ 4.>50 Years_____	/----/	
002	Sex of Respondent?	1.Male____ 2.Female____	/----/	
003	Ethnicity	1.Oromo 2.Amhara 3.Other	/-----/	
004	Marital status?	1.Married ____ 2.Unmarried ____ 3.Divorced____ 4.Other_____	/----/	
005	What is your Religion?	1.Orthodox_____ 2.Muslim_____ 3.Proptestant_____ 4.Other_____	/----/	
006	Educational level?	1. Primary 2. Secondary 3.Collage and above 4.Not able to read write 5. Able to read and write	/----/	

007	What is your Occupation?	1.Farmer____ 2.House wife____ 3. Merchant____ 4.Gov. employ____ 5. Other_____	/----/	
008	Monthly income of the family	_____		
009	What is the number of Family size?	1.<=3_____ 2.4-7_____ 3.>7_____	/----/	
010	Number of under five children	1. None _____ 2. 1_____		
		3. >2_____		

PART II. ACCESS TO INFORMATION ,WATER SOURCE, AND DOMESTIC WATER STORAGE AND HANDILING

No	Questionnaire	Coding and Categories	Skip to	
011	Does your household have Electricity?	1.Yes____ 2.No____	/----/	
012	Do you have Radio?	1.Yes____ 2.No____	/----/	
013	Do you have television?	1.Yes____ 2.No____	/----/	
014	Do have Landline?	1.Yes____ 2.No____	/----/	
015	Do you advised or training to treat water at household?	1.Yes____ 2.No____	If no,	

016	If yes for Q.015, from where did you get such advices?	1. Mass media 2. Health professionals 3. NGO _____ 4. others, _____		
017	What is the type of Water source you used for drinking?	1. protected ____ 2. UnProtected ____ 3. Surface water ____ 4. Pipe ____	/----/	
018	How long it takes to get a water source?	1. >30 minutes ____ 2. <= 30 minutes ____	/----/	
019	How many times of fetching water per day?	1. one times ____ 2. two times ____ 3. Three and above times ____		
020	Who is providing water at source?	1. Water authority ____ 2. From open communal well ____ 3. CBO/NGO ____ 4. Private operator ____ 5. Others ____	/----/	
021	Do you store water for drinking separately	1. Yes ____ 2. No ____		
022	If yes for Q.016, Which container do you use to store water for drinking?	1. Bucket ____ 2. Bucket without lid ____ 3. Small pans ____ 4. Jerrican ____ 5. Others ____	/----/	
023	Do you clean container you use to store water?	1. Yes ____ 2. No ____	If no, 21	
024	If yes for Q.021, How often do you clean the container?	1. Daily ____ 2. Every 2 weeks ____	/----/	

		3.Once a week ____ 4.No program ____ 5. Others_____		
025	How do you clean the container?	1.With water only__ 2.With water and detergent ____ 3.Mopping with leaves____ 4.Others_____	/----/	
026	Do you use drinking water for other purposes?	1.Yes_____ 2.No_____	/----/	
027	How you draw water from your container?	1.Using small pan ____ 2. Pour from container directly _____ 3.Use small cup ____ 4.Others_____	/----/	
028	Do you store water for more than 3 day?	1. Yes____ 2. No _____		
029	Do you Covering water storage vessel	1. Yes____ 2. No _____		
Part III. House hold water treatment practices				
030	Have you made household water treatment before drinking water in the last two weeks?	1. Yes ____ 2. No_____	/if no ,	
031	If yes for Q.034, what type of HH water treatment method was used in last 24 HRS?	1.Ceramic filter____ 2.Boiling_____ 3.Filter with cloth____ 4.Use chlorine ____ 5.Let it stand and settle____ 6. Solar _____	/----/	

		7.others _____		
032	What is/ are the reason to use the above method?	1. Good for health____ 2.Hygeinic purpose____ 3.Other____	/----/	
033	Have you enjoyed the taste and smell of treated water?	1.Yes____ 2.No____	/----/	
034	What is the reason for not practicing water treatment at HH level?	1.Unavailability of treatment materials/products ____ 2.Believe drinking water source is clean ____ 3.Believe drinking untreated water has no effect ____ 4.Cost is expensive ____ 5.I don't know ____ 6.Others_____	/----/	

PART IV. PERCEPTION OF THE RESPONDENTS REGARDS TO HHWT PRACTICES AND ASSOCIATED FACTORS

035	How is the quality of water you drink?	1. Clean____ 2. Not clean____ 3.I don't know____	/--- -/	
036	How important is it to treat water?	1.Very important____ 2.Not important ____ 3. Do not know_____	/--- -/	
037	How safe to drink water from the source?	1.Not safe ____ 2.Safe_____ 3.I don't know____	/--- -/	

038	Do you believe water from source is contaminated?	1.Yes____ 2.No_____	/--- -/	
039	Do have a plan to treat your drinking water?	1.Yes____ 2.No_____	/--- -/	
040	What are the causes of diarrheal diseases?	1.Drinking untreated water ____ 2.Drinking water from source____ 3. I don't know_____	/--- -/	

B. Afaan Oromo version Questionnaires

APPENDICES/ANNEXES

Appendix I:

Gaafii afaan oromoo

ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE SCHOOL OF PUBLIC HEALTH.

Gaafi sakaataa'iinssa bishaan mana keessa yaaluu fi sabaabbaa kan wojjiin wal qabatu nannoo Adoola reddee.

Gaafiis afaan oromoon.

Akkam bultaan/akkam oltaan

Kabaajjamoo!

Rakko fayya hawassaa kesssa jiruu hubachuuf fi muxxanno umattaa bekuun barabachissaa. Kayyoo kana qabaachu dhaan bishaan mana kesssa yaluu fi kan wojjin wal qabatu nannoo adoola.Reddee qo'achuu.akka carraa ta'ee qo'anoo kana kessa wa'ee bishaan mana kessaa yaluu filaamtaniirtaan.

Gafiin qo'aanno kana kan qabatuu wa'ee dhunfaa fi hawassaa kessa bishaan yaluun muxxanoon mal akka fakkatuu fi debiin kessan iccitii dhaan wan qabamuf fi yoo fetaan debii hindebissu yoo jetaan garraa qamaa kamiyyuu hindhiyesinuu.

Sabbaba kanaan carraa gaarii jennee maqaa kessan fi gafii kan daqiqaa murassaf akka hirmaatan kabbajaan gafaana.

Hirmaachuu hin barbaadanii? Eyyee(____) Mitti(____).Malattoo"X" Bakka duwwatii guti
Malattoo enyummaa-----
Guyya gafii gaffameee-----
Sa;atii gafii jalqaba kan gafataamee-----

II. Gafii hawasssa fi Ta’uumssa lafa.				
No	Questionnaire	Sadarkaaa/filanoo	Darbii	
001	Umrii koo meqa?	1.waggaa18-29 _____ 2.waggaa30-39 _____ 3.waggaa40-49 _____ 4.waggaa>50 _____	/-----/	
002	Korniyaa ?	1.Dhira _____ 2.Dubarti _____	/-----/	
003	Sabaa koo?	1.Oromoo 2.Amhara 3.Kan biroo	/-----/	
004	Abaa mana qabdu?	1.Kan heruumtee _____ 2.Kan hin heruumtee _____ 3.Kan hiktee _____ 4.Kan birroo _____	/-----/	
005	Amantii koo?	1.Ortoodossii _____ 2.Muuslimmaa _____ 3.Protestantii _____ 4.kan birraa _____	/-----/	
006	Sadarkaa barumssaa?	1.sadarkaa tokkoffaa _____ 2.sadarkaa lamaffaa _____ 3.Kollejii fi ol _____ 4. Dubisuu fi barressu hind an.. 5. Dubisuu fi barressu kan dand..	/-----/	

007	Hojiin koo malii?	1.Qotee bulaa _____ 2.Hadhaa mana _____ 3. Daldaala _____ 4.Hojjii motummaa _____ 5. Kanbirra _____	/-----/	
008	Malaqaa ji'aa kessaa?	_____		
009	Bayinaa matii?	1.<=3 _____ 2.4-7 _____ 3.>7 _____	/-----/	
010	Bayinaa da'iimaa wagga shan gad?	1. None _____ 2. 1 _____		
		3. $\geq$ _____		

PART II. ACCESS TO INFORMATION ,WATER SOURCE, AND DOMESTIC WATER STORAGE AND HANDILING

No	Questionnaire	Koodii fi sadarkaa	Darbii	
011	Tajajilla elektrikii?	1.Eyyee _____ 2.Mitti _____	/----- -----/	
012	Radiyoo qabdu?	1.Eyyee _____ 2.Mitti _____	/----- -----/	
013	Televizinii qabdu?	1.Eyyee _____ 2.Mitti _____	/----- -----/	
014	Dandii qabdu?	1.Eyyee _____ 2.Mitti _____	/----- -----/	

015	Gorsaa wa'ee bishaan mana kessaa yaluu argaatani bektaan?	1.Eyyee _____ 2.Mitti _____	Mitti yo ta'ee,	
016	Gaafii 015 eyyee yoo jetaan enyuu irrati argataan?	1.Dhamsaamidiyaa irratii 2. Ogeyyifayyairratii _____ 3.NGO _____ 4.kaanbiro irratii, _____		
017	Bishhan dhugatii essa irrati argaatan?	1.Bishaan Bolaa dallaa qabu 2.Bishaan Bolaa dalla kan hinqabne 3. Bishhaan galaanaa. ____ 4. Bu'aambuaa _____	/----- -----/	
018	Yeroo bishan dhugatii warabuuf?	1.>30daqiiqaa ____ 2.<= 30 daqiqaa _____	/----- -----/	
019	Guyya kessa yeroo meqa bishaan warabdaan?	1.Yeroo tokko ____ 2.Yeroo saad ____ 3. Yeroosaadiifi ol _____		
020	Bishaan dhugatii enyuu irrati argataan?	1.Wajirrabishaanirra? ____ 2.Hawassa kessatii ____ 3.CBO/NGO ____ 4.Nama] bola bishaan kandhunfaa qabu irratii ____ 5.Others _____	/----- -----/	
021	Bishaan dhugdaan qopaan masitaan?	1.Eyyee ____ 2.Mitti ____		
022	Gafii 021 eyyee yoo jetaan malin maasitaan?	1.Bucket ____ 2.Bucket without lid ____ 3.Small pans ____ 4.Jerrican ____ 5.Others _____	/----- -----/	

023	Meshaa hin ququlolessitaani bishaan masuuf?	1.Eyyee ____ 2.Mitti____	Mitti yo ta'ee, 21	
024	Gafii.023, Eyyee yoo jetaan yom yoom?	1.Guyyyaguyaaan? ____ 2.Torbbee lama kesss ____ 3.Torbbe tokkokessa ____ 4.Karoorra hinqabu ____ 5.kan birroo____	/----- -----/	
025	Maiin ququulesitaan?	1.Bishaan qofaan__ 2.Samuunaa fi bishaanin ____ 3.Balaa dhaan____ 4.Baan boirraan____	/----- -----/	
026	Bishaan dhugaatii waan birraf fayyadamtanii?	1.Eyyee ____ 2.Mitti____	/----- -----/	
027	Bishaan dhugatii maalin warabdaan?	1.Jookii daan ____ 2. Tubboodhaan ____ 3.Meshaa xiqqodhaan ____ 4.waan brraan____	/----- -----/	
028	Bishaan guyya sad ol masiitaan?	1.Eyyee ____ 2.Mitti____	/----- -----/	
029	Bishaan yoo masitaan qube fayadaamtanii?	1.Eyyee ____ 2.Mitti____	/----- -----/	
Part III. House hold water treatment practices				
030	Bishhan mana kessaa saati 24 keessa Hin yalamtaanii?	1.Eyyee ____ 2.Mitti____	/----- -----/	

031	Gafii 030 eyyee yoo jetaan maliin ?	1.caalalii seeraamikiin ____ 2.Daanfisuu____ 3.Waayaan caalaluu____ 4.kilooriini fayyaduu ____ 5.Let it stand and settle____ 6. aduun ____7. kan biroo _____			
032	Sabbaabaa maliif kaa ol tuqaame fayyadmtaan?	1. Fayyaf gaarii wan ta'eef____ 2. Qulqulinnaf____ 3. Kan biroo____	/----- -----/		
033	Bishaan yalamee hi mi'aa?	1.Eyyee ____ 2.Mitti____	/----- -----/		
034	Bishaan mana keessa maliif yaaltaan?	1.mehaa waanbishaanyaalnuuhinargaanuuu____ 2.Bishaanumammadhaanqulquluuwaanta'eef _____ 3.Bishaankanmadaairratiwarabmequlquuluujenn eamanaa ____ 4.mqarshiin widiiwaanta;eef ____ 5.Hin bennuu ____ 6.waan birraa_____	/----- -----/		
PART IV. PERCEPTION OF THE RESPONDENTS REGARDS TO HHWT PRACTICES AND ASSOCIATED FACTORS					

035	Qulqulinni bishaan mana kessa maal fakkataa?	1.Qulqulluu mitti____ 2.Bayyee quqquluu____ 3.Hin bennu____ 4.waan birra____	/-----/	
036	Fayyidaa bishaan mana kessa yaaluu hubbannon kessan mal fakkataa?	1.Bayyeegaarii____ 2.Fayiidaa hinqabu ____ 3. Hinbnenuu____	/-----/	
037	Qulqulinni bishaan madaa irratii mal fakkataa?	1.Qulqulluu miti ____ 2.Qulqulluu____ 3.Hin bennu____	/-----/	
038	Bishaan madaa irratii falamerrra jetanii hin yaadanii?	1.Eyyee ____ 2.Mitti____	/-----/	
039	Bishaan qulqullessuf karrorraa qabdanii?	1.Eyyee ____ 2.Mitti____	/-----/	
040	Sababbaaa maliif bishaan mana kessa qulqullessitaan?	1.Fayyyaf gariiwan ta'ee fi qarshiisalphaanwaanargaanuuf____ 2.Fayyyaf gariiwan ta'ee fi qulqulinaadhunfaagariwaanta'eef ____ 3.Waan birraa____	/-----/	