



**AVAILABILITY OF IMPROVED SANITATION FACILITIES AND
ASSOCIATED FACTORS AMONG RURAL COMMUNITIES IN LEMO
WOREDA, HADIYA ZONE, SOUTHERN ETHIOPIA**

BY:

TADELE YOHANNES (BSc)

**A THESIS SUBMITTED TO DEPARTMENT OF EPIDEMIOLOGY
COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES JIMMA
UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR DEGREE OF MASTER OF PUBLIC HEALTH IN EPIDEMIOLOGY**

JUNE 2014

JIMMA, ETHIOPIA

**AVAILABILITY OF IMPROVED SANITATION FACILITIES AND
ASSOCIATED FACTORS AMONG RURAL COMMUNITIES IN LEMO
WOREDA, HADIYA ZONE, SOUTHERN ETHIOPIA**

BY: TADELE YOHANNES (BSc)

ADVISORS:

- 1. ABDULALIK WORKICHO (BSc, MPH)**
- 2. HENOK ASEFA(BSc, MSc)**

**JUNE 2014
JIMMA, ETHIOPIA**

Abstract

Background: Faecal-oral diseases represent the largest health burden associated with a lack of improved sanitation. Diarrhea being the most burdensome of these and accounting for over millions of deaths each year. Access to improved household sanitary facilities have great health benefits ranging from reductions in diarrhea, helmenth infections and trachoma through reduced risk of accidents and enhanced psycho-social well-being.

Objective: This study was aimed at assessing the availability of improved sanitation facilities and factors affecting it among rural communities in Lemo woreda of Hadiya zone in 2014.

Methods: Community based cross-sectional study was conducted from March to April, 2014 in Lemo Woreda, Hadiya Zone. To draw a total sample of size 515 a multistage sampling technique was used. Head of the households or their spouses were interviewed to collect data using structured, pretested questionnaire. Data were entered using Epi-Data version 3.1 and exported to SPSS version 16 for analysis. Binary logistic regression was used to predict variables which have independent association with outcome variables.

Results: The findings of this study showed that 35.9% (95%CI: 30.9%, 40.9%) of the households included in the study had improved sanitation facilities. The likelihood of improved sanitation facility was 2.3 fold higher in households that had a higher income than those with lower income (AOR: 2.346(1.483, 3.714)). The odds of having improved sanitation facilities was 6.5 folds higher in households headed by government employers/students as compared to households headed by farmers (AOR: 6.521, 95%CI: (2.216,19.188)). Respondents who had sufficient knowledge on improved sanitation facilities were 1.6 times more likely to have improved sanitation facilities as those who had insufficient knowledge on improved sanitation facilities (AOR: 1.606, 95%CI: (1.022,2.253)). Respondents who had positive attitude towards improved sanitation facilities were 2 times more likely to had improved sanitation facilities as those who had negative attitude towards improved sanitation facilities (AOR: 1.989, 95%CI: (1.250,3.165)).

Conclusion: The findings of this study showed that 35.9% (95%CI: 30.9%, 40.9%) of the households included in the study had improved sanitation facilities. Income of the household, occupation of the respondents, knowledge and attitude of the respondents towards improved sanitation were the major factors affecting availability of improved sanitation facilities. Therefore, it is recommended that continuous education on improved sanitation facilities should be provided to rural communities and special attention be given to farmers.

Key words: sanitation facilities, availability, improved, factors, Lemo woreda

Acknowledgement

I would like to forward my great thanks to Jimma University, Collage of Public Health and Medical Sciences, Department of Epidemiology and Biostatistics for providing me the necessary knowledge and giving me this golden opportunity to conduct this study.

My heartfelt thank goes to Hadiya zone health department, Lemo woreda health office and kebele administrations for writing permission letters and cooperation during the study period.

I would like to express my gratitude to my advisors Mr. Abdulalik Workicho and Mr. Henok Asefa for their unreserved and constructive comments and advice for conducting this study.

Finally, my sincere gratitude goes to all data collectors, supervisors and study participants whose contribution was vital to go through the data collection work.

Table of contents

Contents	pages
Abstract	i
Acknowledgement	ii
Table of contents.....	iii
List of tables.....	v
List of Figures.....	vi
Acronyms and abbreviations.....	vii
1. Introduction	1
1.1. Background	1
1.2. Statement of the problem	3
2. Literature review.....	5
Conceptual framework.....	10
Significance of the study.....	11
3. Objectives	12
3.1. General objective.....	12
3.2. Specific objectives.....	12
4. Methods and materials	13
4.1 Study area and Period.....	13
4.1.1 Study Area.....	13
4.1.2 Study period:.....	13
4.2 Study design:.....	13
4.3 Population.....	13
4.3.1 Source population	13
4.3.2 Study population:	13
4.4 Inclusion and exclusion criteria.....	13
4.4.1 Inclusion criteria.....	13
4.4.2 Exclusion criteria.....	13
4.5 Sample size Determination and Sampling technique.....	14
4.5.1 Sample size Determination	14

4.5.2	<i>Sampling techniques</i>	14
4.6	Study Variables	15
4.6.1	<i>Dependent variable</i>	15
4.6.2	Independent variables	15
4.7	Data collection Techniques and Tool.....	16
4.7.1	<i>Data collection Tools</i>	16
4.7.2	<i>Data collection Techniques</i>	16
4.8	Operational definitions	17
4.9	Data processing and analysis.....	17
4.10	Data Quality control	18
4.11	Ethical consideration	18
4.12	Dissemination Plan.....	18
5	Results	19
6.	Discussion.....	27
	Limitation of the study.....	29
7.	Conclusion and Recommendations	30
7.1.	Conclusion.....	30
7.2.	Recommendations	31
	References.....	32
	Annex 1 English version of consent form &Questionnaire	36
	Annex 2 Hadiyissa version of consent form &Questionnaire	43

List of tables

Table 1 Socio-demographic characteristics of the respondents, Lemo woreda rural communities, April 2014	19
Table 2 Behavioural factors, Lemo Woreda rural communities, April 2014	21
Table 3 Environmental factors, Lemo Woreda rural communities, April 2014	22
Table 4 Factors associated with the availability of improved sanitation facilities in the bivariate analysis, Lemo Woreda rural communities, April 2014	23
Table 5 Factors associated with the availability of improved sanitation facilities in multivariate analysis, Lemo Woreda rural communities, April 2014	26

List of Figures

Figure 1 Conceptual frame work for factors affecting availability of improved sanitation facilities	10
Figure 2 schematic presentation of sampling procedure.....	15
Figure 3 kinds of sanitation facilities used by households, Lemo woreda rural communities, April 2014.....	20

Acronyms and abbreviations

CLTS	Community Lead Total Sanitation
EDHS	Ethiopian Demographic and Health Survey
JMP	Joint Monitoring Programme
MDG	Millennium Development Goal
ODF	Open Defecation Free
PHAST	Participatory Hygiene and Sanitation Transformation
SPSS	Statistical Package for Social Science
UNICEF	United Nations Children Fund
USAID	United States of America International Development
VIPL	Ventilated Improved Pit Latrine
WASH	Water, Sanitation and Hygiene
WC	Water Closet
WHO	World Health Organization

1. Introduction

1.1. Background

Sanitation is a critical part of breaking the fecal-oral transmission route for many diarrheal and other illnesses. A lack of sanitation will eventually contaminate water, food or hands and transmit enteric pathogens (1).

The provision and consistent use of sanitation isolates contaminated faeces from the environment breaking down the faecal-oral transmission of disease. The evidence for the protective effect of sanitation against diarrhea is greatest, with latrines potentially reducing the diarrhea disease by an average of 36% (2).

Sanitation facilities have been classified in a different way by the World health organization (WHO)/ United Nations Children Fund (UNICEF) Joint Monitoring Programme (JMP) as ‘improved’ or ‘unimproved’. Improved sanitation services or methods include: Water Closet (WC) or flush toilet to piped sewer system or septic tank, Pour-flush latrine, Pit latrine with slab, Ventilated Improved Pit (VIP) latrine, Ecological sanitation (3). Access to improved sanitation facilities refers to the percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection (4).

The health benefits of improved household sanitation are broad in scope, ranging from reductions in diarrhea, helminth infections and trachoma through reduced risk of accidents and/or sexual harassment, to enhanced psycho-social well-being afforded via such factors as improved dignity and social standing (2).

The health impact of inadequate sanitation leads to a number of financial and economic costs including direct medical costs associated with treating sanitation-related illnesses and lost income through reduced or lost productivity and the government costs of providing health services (5).

Lack of provisions to proper sanitation facilities can hinder the development of a country. This may be a challenge to achieve Millennium Development Goal (MDG). Provision of adequate

sanitation facilities is not only a socioeconomic and developmental issue, but also an issue of self respect, human dignity and public health. (6)

Publication of WHO/UNICEF indicated Africa is lagging much to attain MDG goals in sanitation that aims to achieve improving coverage of 38% (in 2006) to a level of 66% (in 2015) (7).

Ethiopia is among the poorest countries in the world, ranking 170 out of 177 in the United Nations human development index and is the second most populous country in Africa. Yet, Ethiopia's rural populations are among the least served with rural water supply and sanitation access (8).

Over recent years Ethiopia has been progressively pushing forward on improving sanitation. Recent progress has been promising, on the back of a strong policy of increased promotion of hygiene and sanitation behavior change. Although there is significant progress, many of the reforms remain incomplete, and a number of ongoing challenges must be surmounted to establish the institutional capacity to achieve and sustain MDG coverage levels (9).

UNICEF uses the term Community Approaches to Total Sanitation (CATS) to encompass a range of different community-based sanitation programmes. The aim of these approaches is total sanitation which means the complete separation of wastes from humans i.e. no open defecation and 100% of excreta to be hygienically contained. An important goal for villages and other communities is to achieve open defecation free (ODF) status (3).

However, total sanitation can only be achieved if the communities are using improved sanitation facilities to the complete separation of wastes from humans. But recently the low coverage of the improved sanitation facilities in Ethiopia particularly in rural part of the country hinders the achievements and feco-orally transmitted diseases are the leading causes of morbidity in the health facilities.

Lemo woreda is located in Hadiya zone Southern Ethiopia. The woreda is declared as open defecation free woreda but the coverage of improved sanitation facilities is not known and no study was conducted in the area to assess this coverage.

Therefore, this study assessed the availability of improved sanitation facilities in the study area and identified the factors which lead to low coverage of the facilities. The result of this study will be used as a guide for government and other concerned bodies to take measure and solve the problem.

1.2. Statement of the problem

The largest overall difference between WHO regions was infectious diseases. The total number of healthy life years lost per capita as a result of environmental burden per capita was 15-times higher in developing countries than in developed countries. The environmental burden per capita of diarrheal diseases and lower respiratory infections was 120- to 150-times greater in certain WHO developing country sub-regions as compared to developed country sub-regions (10).

The right to safe water and adequate sanitation remains a promise unfulfilled for the world's poorest citizens. The lack of access to safe drinking water and to basic sanitation impedes economic development, thwarts progress towards gender equality and puts the health in danger (11).

The United Nations estimates that there are 2.5 billion people who still do not use an improved sanitation facility and a little over 1 billion practicing open defecation. Sub-Saharan Africa and Southern Asia still struggle with low sanitation coverage. In sub-Saharan Africa, 44% of the population uses either shared or unimproved facilities, and an estimated 26% practices open defecation while in Southern Asia, the proportion of the population using shared or unimproved facilities has declined to 18% but open defecation remains the highest of any region (39%) (12).

Open defecation in rural areas affects almost a third of humankind, mainly in Asia and Sub-Saharan Africa. It causes sickness, inability to work and high healthcare expenditures that undermine livelihoods. It impacts on educational performance of children through illness, and causes women suffering, embarrassment and inconvenience. The Millennium Development Goals (MDG) target to halve the proportion of the population without access to safe sanitation is currently off track in many countries in Asia, Africa and Latin America. The benefits of improved sanitation are many, impacting on livelihoods, health, education, child health, and women's and girl's wellbeing, safety and convenience (13).

Although the urban sanitation challenge is huge, rural sanitation appears to be nobody's concern. With 2 billion unserved in 2004 (two in every three rural citizens are unserved) and a projected 1.7 billion unserved in 2015, rural sanitation requires a massive concentration of effort to reduce substantially the urban/rural disparity in coverage (14).

In Ethiopia, 74% of rural people use open defecation and a further 16% only have access to unimproved facilities therefore a total of 90% of people in rural areas of Ethiopia do not have access to improved sanitation facilities (15).

Wherever humans gather, their waste also accumulates. Progress in sanitation and improved hygiene has greatly improved health, but many people still have no adequate means of disposing of their waste. This is a growing nuisance for heavily populated areas, carrying the risk of infectious disease, particularly to vulnerable groups such as the very young, the elderly and people suffering from diseases that lower their resistance. Poorly controlled waste also means daily exposure to an unpleasant environment. The buildup of faecal contamination in rivers and other waters is not just a human risk: other species are affected, threatening the ecological balance of the environment (5).

The progress towards meeting the MDG sanitation target is much too slow, with an enormous gap existing between the intended coverage and today's reality especially in Sub-Saharan Africa and parts of Asia. The reasons for this are numerous. A major issue is the fact that sanitation rarely benefits from the political attention given to other topics despite its key importance on many other sectors and on all other MDGs. Political will has been sorely lacking when it comes to placing sanitation high on the international development agenda. This has pushed sanitation into the shadows of water supply projects for example, and limited innovation in the sector (16).

Ethiopia is known to have one of the lowest rural sanitation coverage levels in the world. Such low coverage presented a major challenge to the Government and donors on how to scale up implementation at community level so as to ensure the MDG target could be reached and the health status of the population improved (14).

NGOs, multinational organizations and government health programmes in many countries in developing regions of the world (including Ethiopia) are adopting different approaches such as participatory hygiene and sanitation transformation (PHAST) and CLTS which has become the most successful community approach to total sanitation (15).

However, the coverage of improved sanitation facilities is low in Ethiopia particularly in rural communities. Therefore, this study assessed the availability of improved sanitation facilities in the study area and identified the factors which lead to low coverage of the facilities among rural communities in Lemo woreda of Hadiya zone.

2. Literature review

Availability of improved sanitary facilities

Study conducted to assess long term sustainability of improved sanitation facilities in rural Bangladesh showed that, based on definitions used by WHO and UNICEF Joint Monitoring Program, 52% met the criteria for an improved latrine, which excludes sharing (17). Another study conducted on Factors affecting the utilization of improved ventilated latrines among communities in Mtwara Rural District of Tanzania showed that 50.5% had an improved latrine (18).

A study used data from the fourth wave of the Indonesia Family Life Survey to assess access to improved sanitation facilities in Indonesia examined that, Based on WHO/UNICEF JMP criteria, 65.61% of the households sample had access to improved sanitation facilities (19).

According to EDHS 2011, 8 percent of households in Ethiopia use improved toilet facilities that are not shared with other households, 14 percent in urban areas and 7 percent in rural areas (20).

WHO/UNICEF Joint Monitoring program report of 2013 on progress on sanitation and drinking water showed that 19% of the rural population of Ethiopia use improved sanitation facilities (21).

Factors affecting availability of improved sanitation facilities

Socio-demographic factors

Study conducted on Scaling up Rural Sanitation and Long Term Sustainability of Improved Sanitation in Rural Bangladesh examined that Female-headed households were more likely to have an improved latrine compared to households headed by males. But Study conducted on Factors affecting the utilization of improved ventilated latrines among communities in Mtwara Rural District of Tanzania showed among female-headed households the use of the latrine by all household members was comparatively low at 35.5% compared to the performance of 54.2% of male-headed households (17, 18).

Study that used data from the fourth wave of the Indonesia Family Life Survey to assess access improved sanitation facilities in Indonesia revealed that a household that is headed by a person who has graduated from secondary school or higher is three times more likely to have improved sanitation facility compared to that headed by a person who has graduated from primary school or lower (19). Another Study done to assess community use of pit-latrines in Mubende district of Uganda also revealed that 77.9% of the household heads who had ever been to school were more

likely to have latrines in their homes as compared to 22.1% those who had never been to school (22).

Study conducted on Factors affecting the utilization of improved ventilated latrines among communities in Mtwara Rural District of Tanzania showed that households with a monthly income of less than 50,000 Tanzanian Shillings had a lower proportion (54.5%) of all household members who used a latrine than those with a higher income (63.0%). This study also revealed only 47.8% of household members used the latrine at their disposal as compared to 74.4 % households whose heads were in gainful employment. Another study done in rural Bangladesh suggested that poverty is a factor that affects sustained use of latrines and indicated 89.5% of households own or shares an improved latrine but those 10.5%, who have low income, were continued to defecate in the open or did not use an improved or shared latrine.(17, 18).

Another study done on latrine coverage and associated factors among rural communities in the District of Bahir Dar Zuria, Ethiopia also showed that the availability of latrines was twice higher in households with an income of 5000 or more Ethiopian Birr per year than those who had an income less than 5000 Birr per year (23).

Study done to assess effect of Socio-economic Factors on Access to Improved Water Sources and Basic Sanitation in Kenya showed association between marital status of household heads and type of toilet facility used. In this Most of the married respondents used improved sanitation facilities (71% used VIP latrine). This study also revealed 14% of the separated respondents used flush/pour flush latrine and none of the single and widowed respondents used improved facilities. But, there was no significant association between level of education, occupation and gender of household head and the kind of toilet facility used by the household. The study also noted that there was no significant association between household size and type of sanitation facility used by households but a study conducted on availability of domestic water and sanitation in households using survey data in South Africa founded that the difference between household size and toilet facilities was statistically significant for improved and unimproved toilet facilities (24, 25).

Behavioral Factors

Knowledge is a prerequisite for responsible environmental behavior and without knowledge of any project; people cannot accept the management strategy of that particular project (26).

Study done on Perception and Practice of Hygiene and impact on health in India showed positive correlation between the sanitation coverage and level of awareness (27).

A study conducted to determine the perceived structural, economic, educational, social and technological sanitation challenges in the rural communities of the Eastern Cape in 2006 showed lack of advocacy/awareness creation, training/capacity building, access to information, and information exchanges of local people were identified a challenges to rural sanitation (28).

A study done to assess the level of sanitation and hygiene information and identifying factors that determine its access and utilization by rural households in Alaba District, Southern Ethiopia revealed knowledge on sanitation and hygiene components has significant and positive relationship with owning safe excreta disposal facilities which accounts for 57.4%. This study also explained that that educational status of the respondent, contact with health extension worker and knowledge level significantly affect the utilization decision of sanitation and hygiene information accessed by rural households (29).

Water aid report in the results of studies on open defecation in rural communities and the cultural values that reinforce its practice in four West African countries — Burkina Faso, Ghana, Mali, and Nigeria revealed that a number of behavioral factors such as knowledge and attitude related to both their reasons for retaining the practice of open defecation and their resistance to changing their sanitation practices affects availability of sanitation facilities (30).

Study done to assess community use of pit-latrines in Mubende district of Uganda identified that attitude towards use of pit latrine is associated with latrine use in the homes (22).

Study conducted to assess factors that could motivate people to adopt safe hygienic practices in the Eastern Cape Province revealed that attitude of the people towards sanitation has motivating or de-motivating effect on having sanitation facilities (31).

Environmental factors

Study used data from the fourth wave of the Indonesia Family Life Survey to assess access to improved sanitation facilities in Indonesia examined that the likelihood of owning improved sanitation facility in a household with access to improved drinking-water source is almost twofold that of a household that do not (19).

A study done on latrine coverage and associated factors among rural communities in the District of Bahir Dar Zuria, Ethiopia showed that the latrine coverage was about two times higher in households that were less than 30 minutes walk from a health institution than households that were over 30 minutes walk. The latrine coverage was lower in households located in distant than in households closer to the city (23).

Study done on Sustaining Sanitation and Hygiene in Kenya showed that flood prone districts are registered as a decrease in pit latrine coverage and an increase in the use of the bush (32).

Assistance related factors

A guide to simple sanitary measures for the control of endemic diseases by Rejaepalan in 1999 showed that the external assistance variables influence participation of a community in waste management, for example, community members become motivated to participate in sanitation programmes if they are being aided with external resources in form of labor, funds and materials (33).

Study done to Examining the Influence of Economic and Political Factors upon Access to Improved Water and Sanitation in Select African Nations, 2005-2008 showed that low sanitation coverage level may be a result of the lack of funding sanitation projects receives worldwide (34). Study conducted on Characteristics of Subsidized Latrines in Rural Cambodia showed that in the subsidized households 93% of latrines fall in the category of improved latrines but in the non-subsidized only 77% of the latrines are improved types (35).

Contrary, study done on Sustaining Sanitation and Hygiene in Kenya showed that most households that own latrines were not provided with any external assistance. Households already spend comparatively large sums of money on sanitation facilities (32).

Study conducted on Scaling up Rural Sanitation and Long Term Sustainability of Improved Sanitation in Rural Bangladesh examined Households that reported having been exposed to a follow up program were more likely to have an improved or shared latrine compared to those that did not receive a follow-up program. Similarly, households that were visited by someone who advised them on latrine use were slightly more likely to have an improved or shared latrine compared to those who did not report receiving a visit (17, 19)

A community based descriptive cross-sectional study on Assessment of the impact of latrine utilization on diarrheal diseases in the rural community of Hulet Ejju Enessie Woreda in Amhara

region explained 76.1% of the respondents who had latrines explained that they were advised by extension health workers to construct latrines.5.2% respondents complained that they were imposed by other bodies like local administrators. (36).

Increasing coverage of improved sanitation would bring many benefits. Not only that the urban-rural disparity would be diminished, would the ill-health deprivation associated with sanitation also be reduced (19). However, there was a need to conduct a study to firmly identify the current coverage of improved sanitation facilities and factors that lead to low coverage in rural community to take remedial actions by concerned bodies.

Therefore, the aim of the present study was to assess the availability of improved sanitation facilities and factors affecting it in rural community of Lemo Woreda in Hadiya Zone.

Conceptual framework

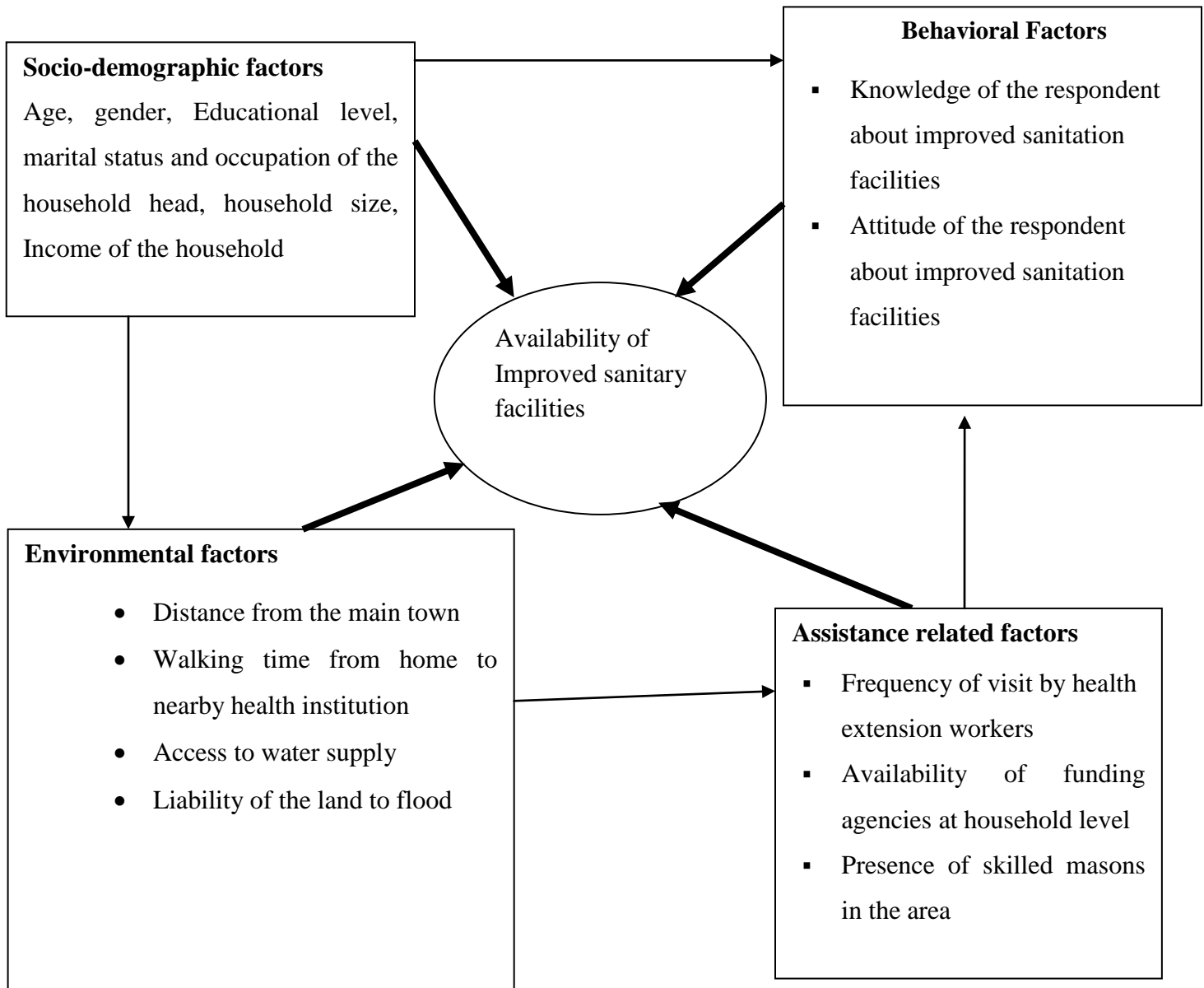


Figure 1: Conceptual frame work for factors affecting availability of improved sanitation facilities

Source: Developed through review of literature by principal investigator

Significance of the study

Safe water and adequate sanitation are basic to the health of every person on the planet, yet many people throughout the world do not have access to these fundamental needs. An important step towards resolving this global crisis is to understand its magnitude and how many people lack access to drinking-water and sanitation facilities.

Ensuring adequate sanitation facilities is another Millennium Development Goal that Ethiopia shares with other countries. To achieve this goal, many developing countries including Ethiopia are implementing community approach to total sanitation aims to achieve 100% open defecation free (ODF) communities through affordable, appropriate, acceptable technology and behavior change mainly focusing on rural communities. This issue needs identifying the current status of the area regarding improved sanitation facilities which separate human contact to excreta and finding out the factors affecting the approaches towards total sanitation. Studies in Ethiopia are rare in improved sanitation facilities and no study has been conducted in the study area before. Efforts to increase improved sanitation coverage have been limited due to lack of attention to the problem, as well as inadequate sanitation technologies and an incomplete understanding of the factors that influence sanitation choices in rural areas.

This might make achieving the Millennium Development Goal 7, Target 7c difficult which calls on countries to Halve, by 2015, the proportion of people without sustainable access to safe drinking-water and basic sanitation.

Therefore, this study assessed the availability and identified factors which lead to low coverage of improved sanitation facilities. This enables concerned governmental and non governmental agencies and other concerned bodies who are working in Water, Sanitation and Hygiene (WASH) program to design and implement possible interventions to alleviate human contact with excreta. The findings of the study will also be used as a baseline data for those who are in need of it for further study.

3. Objectives

3.1. General objective

- ✓ To assess availability of improved sanitation facilities and factors affecting it among rural communities in Lemo woreda of Hadiya zone from April to May, 2014.

3.2. Specific objectives

- ✓ To determine improved sanitation facilities coverage in Lemo woreda
- ✓ To identify factors affecting the availability of improved sanitation facilities in Lemo woreda

4. Methods and materials

4.1 Study area and Period

4.1.1 Study Area

The study was conducted in Lemo woreda which is located in Hadiya zone of Southern Nations Nationalities And peoples' regional state, across the high way from Addis Ababa to Hossana 230 km from Addis and 210km ahead to reach Hossana. It is bounded in the North by Misha woreda and Silte zone, in the South Sorro woreda and Kembata-Tembaro Zone, in the East Anelemo woreda and in the West by Sorro and Gombora woreda. The woreda has 33 rural and 2 urban kebeles, total 35 kebeles. The total population of Lemo woreda is around 144,244. Of this, 140,402(97.3%) residents live in rural and 3,842(2.7%) in urban area. Male population is about 70,680(49%) and female population is 73,564(51%). Regarding health service distribution there are 7 health centers and 35 health posts found in the woreda and 65 health extension workers. According to Hadiya Zonal Health department report in 2012/2013 water supply coverage is 49% and latrine coverage is 96%.

4.1.2 Study period: The study was conducted from April – May, 2014.

4.2 Study design: Community based cross sectional study design was used.

4.3 Population

4.3.1 Source population: All households found in Lemo woreda rural Communities

4.3.2 Study population: All households found in the selected kebeles of Lemo woreda rural communities

4.4 Inclusion and exclusion criteria

4.4.1 Inclusion criteria

Homes in which the head of households lived in the kebele for six or more months before the study began.

4.4.2 Exclusion criteria

Homes in which the head of households lived in the kebele for less than six months was excluded.

4.5 Sample size Determination and Sampling technique

4.5.1 Sample size Determination

Sample size was determined by Epi info version 7 using formula for single population proportion by considering 19% of improved sanitation facilities in rural Ethiopia (21). Confidence level of 95 %, design effect of 2 and 0.05 margin of error were taken in the calculation.

The calculated sample size = 468.

Considering 10% non-response rate, the final sample size is **515** households.

4.5.2 Sampling techniques

Multi-stage sampling technique was used. Primary sampling units, 10 Kebeles were selected from total 33 rural kebeles in the woreda with probability proportional to size sampling (PPS). The sample size, 515 households, was allocated to selected 10 kebeles with population proportion to size allocation. The secondary sampling units, the households in the selected Kebeles were selected by using systematic sampling technique. Intervals (K) for selecting households was determined by dividing the number of households with the sample size allocated for each kebele which is 20. After determining the sampling (K) interval, the first household was selected randomly. The next households were selected systematically by adding the sampling interval to the first selected household and so on.

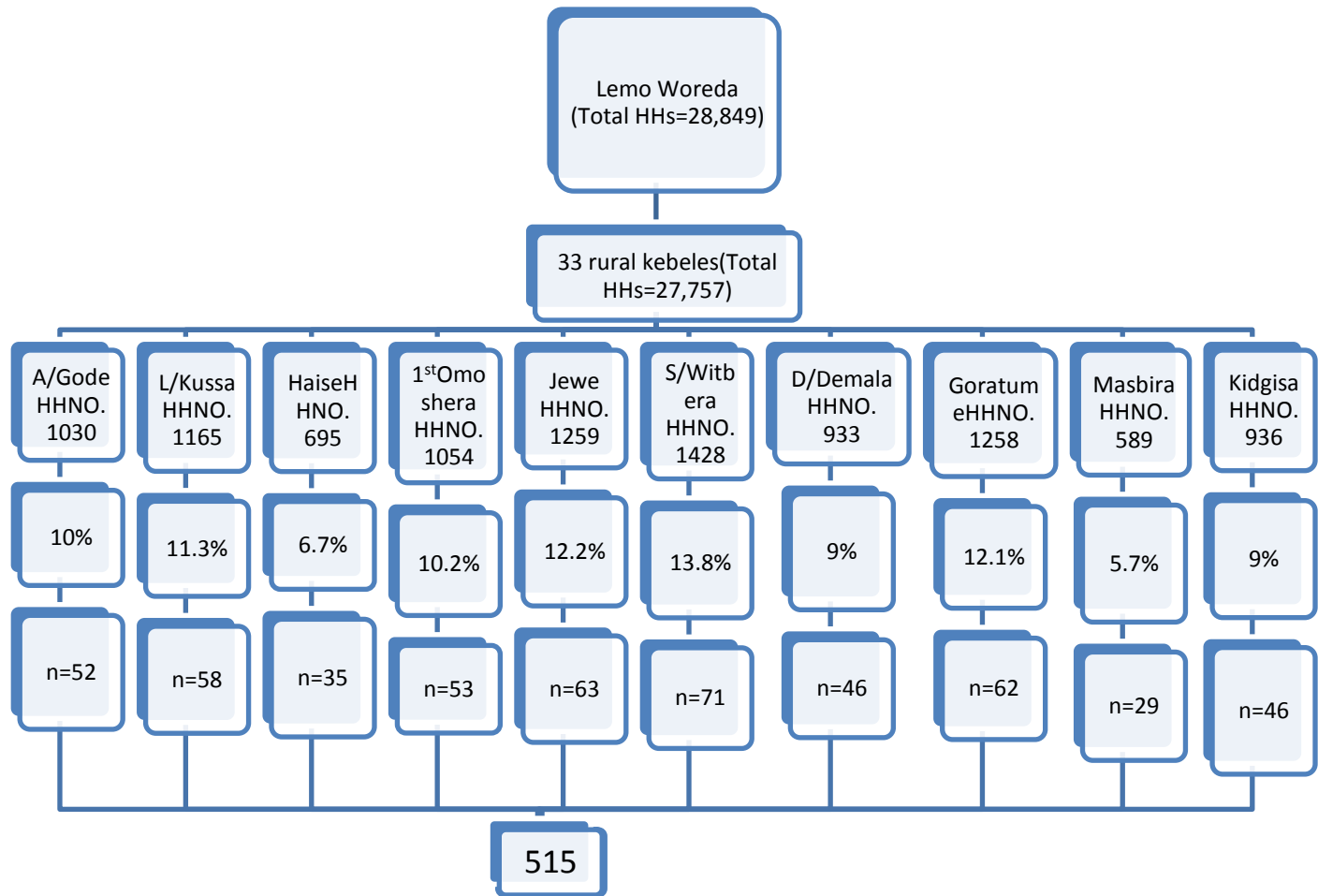


Figure 2 schematic presentation of sampling procedure

4.6 Study Variables

4.6.1 Dependent variable

- Availability of Improved sanitation facilities

4.6.2 Independent variables

➤ Socio-demographic

- Age, gender, Educational level, occupation and marital status of the household head, Household size, Income of the household

➤ Behavioral factors

- Knowledge of the household heads or his/her spouses/husbands about improved sanitation facilities

- Attitude of the household heads or his/her spouses/husbands about improved sanitation facilities
- **Environmental factors**
 - Distance from the main town
 - Walking time from home to nearby health institution
 - Access to water supply
 - Liability of the land to flood
- **Assistance related factors**
 - Availability of funding agencies on household level
 - Frequency of visit by health extension workers
 - Presence of skilled masons in the area

4.7 Data collection Techniques and Tool

4.7.1 Data collection Tools

The questionnaire was adapted from USAID hygiene improvement project questionnaire and from other related literature with slight modification made in line with the objective of this particular study and to fit to the local context. The questionnaires consist of five parts. Part I consist of socio-demographic characteristics. Part II contains questionnaire that would assess improved sanitation facilities coverage. Part III contains about behavioural factors including knowledge and Attitude, part IV contains environmental factors and part V assistance related factors. Attitude was measured using 11 items on five points Likert scale ranged from strongly disagree to strongly agree. Knowledge was measured using 16 items prepared to assess it.

4.7.2 Data collection Techniques

The interview technique was employed for the respondents in the chosen households and observation was conducted to confirm some items. Respondents who volunteered were interviewed face- to- face using structured and pretested questionnaires. The data collectors were environmental health technicians (Diploma) who know and speak the local language. The supervisors were one environmental health officer (degree) and one master degree in infectious diseases and tropical medicine. During the training days explanation was given on the purpose of the study and discussion was also held on the tool designed for data collection, how to implement, potential problems that can arise and how to solve them.

4.8 Operational definitions

Availability of Improved sanitation facility: if the household has flush or pour/flush facility connected to a piped sewer system, Pit latrine with a slab, Ventilated improved pit latrine and Composting toilet excluding any of these facilities that are shared between more than one household or are public facilities.

Improved sanitary facilities coverage: The proportion of households who have access to some kind of improved sanitation facility

Income: for rural study participant calculated in kind; the crop, cattle owned over a year 7months was changed in to monetary forms. The individual respondents income was compared with the median (\geq median or $<$ median).

Knowledge: Respondents were asked knowledge related questions and right answer was given a value of 1 and for those incorrect answers a value of 0 was given. Then, total score was computed by summing up all the items together. The respondents score was dichotomized as sufficient knowledge or insufficient knowledge.

- Sufficient Knowledge \geq overall mean
- Insufficient knowledge $<$ overall mean

Attitude: respondents were asked attitude related questions on five point likert scale ranged from strongly disagree to strongly agree. After computing the mean of all respondents' responses, the mean score of each respondent was dichotomized as have positive attitude or negative attitude

Positive attitude \geq mean

Negative attitude $<$ mean

Access to water supply: The water source is within one kilometer/30-minute round trip.

4.9 Data processing and analysis

Data were entered using Epi-Data version 3.1 and exported to SPSS version 16 for analysis. Descriptive statistics (Frequency, mean, standard deviation, and proportion) were calculated to summarize the findings. Results were presented by tables and graphs. For knowledge and attitude scale, the items were summed up to produce composite measure and mean score was calculated for each score. Binary logistic regression was used to predict variables which have

independent association with outcome variables. Variables which have a significant association at p-value ≤ 0.25 in the bivariate analysis were taken to multivariate analysis to include all potential variables. Odds ratio, and 95% CI was used to check for the existence and strength of association between independent and outcome variables. P-value of less than 0.05 considered as statistical significant in the multivariate analysis.

4.10 Data Quality control

Data collection tool was translated to local language and back translated to English by people who have proficiency in translation to ensure its consistency. Training of data collectors and supervisors was made for 2 days to enable them acquire basic skills necessary for data collection and supervision, respectively. Pre-testing of data collection tool was made in rural kebeles other than the study area on 10% of sampled households and based on the results of pre-testing necessary adjustment to the data collection tool was made. Spot check was done on the field. Filled questionnaires were also checked daily. Data cleaning was done using SPSS version 16.0.

4.11 Ethical consideration

Ethical approval and clearance was obtained from Jimma University medical and public health college Review Board Committee. Permission letter was also obtained from Lemo woreda health office. To collect data from participants, explanation was given on the purpose of the study, the importance of their participation and true response. It was also explained that the study has no connection with individual affairs of respondents. Confidentiality of all data collected was kept. All sample populations were encouraged to participate in the study while at the same time they were told their right not to participate.

4.12 Dissemination Plan

The findings of the study will be submitted to Jimma University, college of Public Health and Medical sciences, Department of Epidemiology and Biostatistics. The dissemination will also goes to concerned bodies including the Lemo woreda health office, kebele councils and other concerned bodies implementing on water and sanitation programs in the area to take valuable measures based on the results. Publication of the results will be carried out accordingly.

5 Results

Socio-demographic characteristics

A total of 473 households were included in the study with a response rate of 92% out of 515 sampled households. The respondents were either the head of the households or their spouses. Based on the finding minimum, mean and maximum ages in years of the respondents were 18, 40.7 and 90 respectively with SD of 12.4. The average family size was 7 with in household. The minimum family size was 2 and the maximum was 15 with SD of 2.5. The median family income per month of the respondents was 533 Ethiopian birr. The minimum and the maximum family income per month was 50 and 3800 ETB respectively.

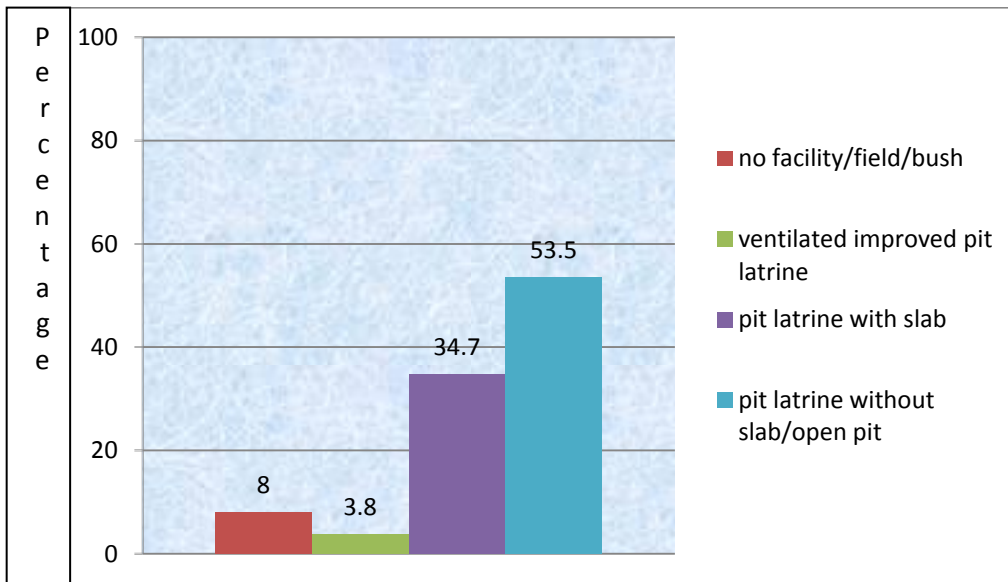
Table 1 Socio-demographic characteristics of the respondents, Lemo Woreda rural communities, April, 2014 (N=473)

Variables	Total (N and %), N =473
Head of household	
Husband	298(63%)
Wife	149(31.5%)
Others	26(5.5%)
Sex of household head	
Male	315(66.6%)
Female	158 (33.4%)
Marital Status	
Married	363(76.7%)
Single	31 (6.6%)
Divorced	15 (3.2%)
Widowed	64 (13.5%)
Occupation	
Farmers	310 (65.5%)
Daily laborers/merchants	112 (23.7%)
Others*	51 (10.8%)
Educational Status	
No formal education	141 (29.8%)
primary(1-8)	163 (34.5%)
Secondary (9-12)	126 (26.6%)
More than secondary education	43 (9.1%)
Average monthly income	
<533	237(50.1%)
≥533	236(49.9%)

*Others: government employers/students

Availability of improved sanitation facilities

Of the households, 170(35.9%) with 95% CI :(30.9, 40.9) had improved sanitation facilities. All the available sanitation facilities were 253(53.5%) pit latrine without slab/open pit, 164(34.7%) pit latrine with slab, 18(3.8%) ventilated pit latrine and 38(8%) did not have any facility and used bush/field (figure 3). From those households who had latrine, 21(4.4%) shared the existing facilities with average of 2 households.



Kinds of sanitation facilities

Figure 3 kinds of sanitation facilities used by households, Lemo woreda rural communities, April 2014

Behavioral factors

From the participants included in this study, 82.2% of the respondents heard about improved sanitation facilities from different sources. With respect to knowledge on improved sanitation facilities, 60.5% of the respondents had sufficient knowledge on improved sanitation facilities. From the respondents, 350(90%) knew the presence of different options of improved sanitation facilities but 39(10%) did not know different options of improved sanitation facilities. From the respondents, 359(92.3%) knew diseases that can be transmitted due to lack of improved sanitation facilities. As the source of information, 245(63.0%) heard mainly from health professionals the rest from mass media 120(30.8%) and neighborhoods 24(6.2%).

Out of 473 respondents, 250(52.9%) had positive attitude and 223(47.1%) had negative attitude towards improved sanitation facilities.

Table 2 Behavioural factors, Lemo Woreda rural communities, April 2014

Variables	Total (N and %), N =473
Source of information(n=389)	
Health professionals	245(63.0%)
Mass media	120 (30.8%)
Neighborhoods	24(6.2%)
Types of improved sanitation facilities respondents knew*	
Flush or pour/flush connected to sewer system	50(14.3%)
Pit latrine with slab	299(85.4%)
Compositing latrine	46(13.1%)
Ventilated improved pit latrine	151(43.1%)
Others/biogas	1(0.3%)
Advantages of improved sanitation facilities*	
Prevent disease transmission	375(96.4%)
Prevents environmental pollution	227 (58.4%)
Has economic benefits	220(56.6%)
Has aesthetic values	265 (68.1%)
Diseases mentioned*	
Diarrhea	178(49.6%)
Typhoid fever	257(71.6%)
Cholera	221 (61.6%)
Trachoma	187 (52.1%)

* More than one possible answer was used

Environmental factors

Out of the households, 208(44%) had access to water supply but more than half of the households 265(56%) did not have access to water supply, that means, they spent more than 30minutes or travelled greater than 1km round trip to get water. Regarding the distance of the houses from the main town (Hossana town), nearly half of the houses 266(56.2%) were located near to the main town and 207(43.8%) of the houses were located far from the main town (table3).

Table 3 Environmental factors, Lemo Woreda rural communities, April 2014

Variables	Total (N and %), N =473
Walking time to the nearby health facilities	
≤30 minutes	208(44%)
>30 minutes	265(56%)
Regular flood problem	
Never	380(80.3%)
sometimes	93(19.7%)
Distance of house from main town	
Near average	266(56.2%)
Far	207(43.8%)

Assistance related factors

Concerning health extension workers supervision per month, more than half 293(61.9%) of the total households included in this study were visited 1-2 times per month and 40(8.5%) visited ≥ 3 times but 140(29.6%) of the households were never visited by health professional per month. Out of the 473 respondents, 200(42.3%) of them complained that they didn't get skilled masons when they want to construct/maintain the sanitary facilities. Out of the total households included in this study, 200(42.3%) availability of funding agencies for sanitation. Out of these, 157(78.5%) were funded by government and 43(21.5%) by non-governmental organizations.

Factors associated with availability of improved sanitation facilities

Selected variables that were significantly associated at the bivariate analysis were further examined in the logistic regression to see their relative effects on the availability of improved sanitation facilities.

Result of bivariate analysis showed that educational status($p < 0.001$), occupation($p < 0.001$), average monthly income($p < 0.001$), knowledge($P < 0.005$), attitude of the respondents towards improved sanitation facilities($p < 0.05$), health professionals supervision per month($p < 0.05$), availability of skilled masons($p = 0.001$), presence of funding for sanitation($p < 0.05$) were identified as candidates for multivariate analysis at p -value < 0.05 , while access to water supply was identified as candidate for multivariate analysis at p -value ≤ 0.25 in bivariate analysis (Table 4).

Table 4 Factors associated with the availability of improved sanitation facilities in the bivariate analysis, Lemo Woreda rural communities, April 2014

Variable	Availability of improved sanitation facilities N (%)		Crude Odds ratio at 95%CI
	No	Yes	
Educational status			
No formal education	104(73.8%)	37(26.2%)	1
Primary	109(66.4%)	54(33.1%)	1.393(0.847,2.289)
Secondary	77(61.1%)	49(38.8%)	1.789(1.065,3.005)**
More than secondary	13(30.2%)	30(69.8%)	6.486(3.060,13.748)*
Occupation			
Farmers	222(71.6%)	88(28.4%)	1
Daily laborers/merchants	68(60.7%)	44(39.3%)	1.632(1.038,2.566)**
Others	13(25.5%)	38(74.5%)	7.374(3.749,14.504)*
Average monthly income			
≥ 533	124(52.5%)	112(47.5%)	2.788(1.885,4.122)*
< 533	179(75.5%)	58(24.5%)	1

Knowledge on improved sanitation facilities			
Sufficient knowledge	168(58.7%)	118(41.3%)	1.823(1.226,2.713)**
Insufficient knowledge	135(72.2%)	52(27.8%)	1
Attitude towards improved sanitation facilities			
Positive attitude	147(58.8%)	103(41.2%)	1.631(1.114,2.389)**
Negative attitude	158(70%)	67(30%)	1
Access to water supply			
No	178(67.2%)	87(32.8%)	1
Yes	125(60.1%)	83(39.9%)	1.359(0.931,1.982)
Availability of skilled masons			
No	145(72.5%)	55(27.5%)	1
Yes	158(57.9%)	115(42.1%)	1.919(1.296,2.841)*
Health extension workers supervision per month			
1-2 times	189(64.5%)	104(35.5%)	1.201(0.781,1.845)
≥3 times	18(45%)	22(55%)	2.667(1.301,5.467)**
Never visited	96(68.6%)	44(31.4%)	1
The presence of funding for sanitation			
No	187(68.5%)	86(31.5%)	1
Yes	116(56%)	84(42%)	1573(1.077,2.301)

Significant at $p < 0.001$ *; $p < 0.05$ **

In multivariate logistic regression analysis average monthly income of the household, occupation of respondents, knowledge on improved sanitation facilities and attitude towards improved sanitation facilities were significantly associated with availability of improved sanitation facilities (Table 5).

Households who had average monthly income of ≥ 533 Ethiopian birr per month were 2.3 times more likely to had improved sanitation facilities as households who had average monthly income of < 533 Ethiopian birr per month (AOR: 2.346, 95%CI: (1.483,3.714)).

The odds of having improved sanitation facilities was 6.5 folds higher in households headed by government employers/students as compared to households headed by farmers (AOR: 6.521, 95%CI: (2.216,19.188)).

Respondents who had sufficient knowledge on improved sanitation facilities were 1.6 times more likely to had improved sanitation facilities as those who had insufficient knowledge on improved sanitation facilities (AOR: 1.606, 95%CI: (1.022,2.253)).

Respondents who had positive attitude towards improved sanitation facilities were about 2 times more likely to had improved sanitation facilities as those who had negative attitude towards improved sanitation facilities (AOR: 1.989, 95%CI: (1.250,3.165)).

Table 5 Factors associated with the availability of improved sanitation facilities in multivariate analysis, Lemo Woreda rural communities, April 2014

Variable	Availability of improved sanitation facilities N (%)		Odds ratio at 95%CI	
	No	Yes	Crude	Adjusted
Occupation				
Farmers	222(71.6%)	88(28.4%)	1	1
Daily laborers/merchants	68(60.7%)	44(39.3%)	1.632(1.038,2.566)**	1.579(0.921,2.707)
Others	13(25.5%)	38(74.5%)	7.374(3.749,14.504)*	6.531(2.216,19.188)*
Average monthly income				
≥533	124(52.5%)	112(47.5%)	2.788(1.885,4.122)*	2.346(1.483,3.714)*
<533	179(75.5%)	58(24.5%)	1	1
Knowledge on improved sanitation facilities				
Sufficient knowledge	168(58.7%)	118(41.3%)	1.823(1.226,2.713)**	1.606(1.022,2.523)**
Insufficient knowledge	135(72.2%)	52(27.8%)	1	1
Attitude towards improved sanitation facilities				
Positive attitude	147(58.8%)	103(41.2%)	1.631(1.114,2.389)**	1.989(1.250,3.165)**
Negative attitude	158(70%)	67(30%)	1	1

Significant at $p \leq 0.001$ *; $p < 0.05$ **

6. Discussion

The findings of this study revealed that, based on WHO/UNICEF JMP criteria, the availability of improved sanitation facilities was about 35.9% (95%CI: 30.9%, 40.9%) which is lower than the report in rural Bangladesh (52%) (17) and Mtwara Rural District of Tanzania (50.5%) (18). However, it was higher than the report by WHO/UNICEF Joint Monitoring program on rural population of sub-Saharan which stated in 2010 only 24% of the rural population in sub-Saharan Africa used an improved sanitation facility and Ethiopia in 2013 which was 19% of the rural population used improved sanitation facilities (4, 21). It was also higher than the Ethiopian health and Demographic survey report of 2011 which is 7% (20). This may be due to the application of total sanitation principles by the Ethiopian government at different districts of the country.

The likelihood of improved sanitation facility was 2 times higher in households that had a higher income than those with lower income. This finding is in line with the results of a study conducted in rural communities in the District of Bahir Dar Zuria, Ethiopia, which was 1.5 fold higher in households who had higher income than those who had lower income (23). The result is also near to the findings of studies conducted in Mtwara Rural District of Tanzania and rural Bangladesh (17, 18).

The odds of having improved sanitation facilities was 6.5 folds higher in households headed by government employers/students as compared to households headed by farmers. But, study conducted in Kenya showed that there was no significant association between occupation of the household head and the kind of sanitation facilities used by the households.

The odds of having improved sanitation facilities was 1.8 times higher in respondents who had sufficient knowledge on improved sanitation facilities as compared to households who had insufficient knowledge. This finding is in line with the results of a study done in rural households of Alaba District, Southern Ethiopia which revealed knowledge on sanitation and hygiene components has significant and positive relationship with owning safe excreta disposal facilities which accounts for 57.4% (29).

The attitude of the respondents was also associated with the availability improved sanitation facilities. Respondents who had positive attitude towards improved sanitation facilities were 1.6 times more likely to had improved sanitation facilities as those who had negative attitude towards improved sanitation facilities. The finding is similar with Water aid report of 2009 in four West African countries — Burkina Faso, Ghana, Mali, and Nigeria and result of study done

in Mubende district of Uganda (22, 30). Attitude of the people towards sanitation is also known to have motivating or de-motivating effect on having sanitation facilities (31).

The multivariate analysis of this study revealed that educational status of the respondents did not have any independent statistically significant association with availability of improved sanitation facilities. However, study done in Indonesia revealed that a household that is headed by a person who has graduated from secondary school or higher is three times more likely to have improved sanitation facility compared to that headed by a person who has graduated from primary school or lower (19). The study conducted in Indonesia used secondary data where as this study was community based and used primary data which might bring the discrepancy.

In the findings of this study the availability of skilled masons and the presence of funding for sanitation had no significant association with the availability of improved sanitation facilities. The finding was similar with the study done in Kenya which showed most households that own sanitary facilities were not provided with any external assistance (32). Contrary to this finding, concerning the presence of funding for sanitation, study conducted in Rural Cambodia showed that in the subsidized households 93% of latrines fall in the category of improved latrines but in the non-subsidized only 77% of the latrines are improved types (35). Another study done in Select African Nations, 2005-2008 also showed that low sanitation coverage level may be a result of the lack of funding sanitation projects receives worldwide (34). This difference might be due to Households already spent comparatively large sums of money on sanitation facilities.

This study also showed health extension workers supervision did not have significant association with the availability of improved sanitation facilities. Contrary, the results of a study conducted in rural Bangladesh showed that Households that reported having been exposed to a follow up program were more likely to have an improved or shared latrine compared to those that did not receive a follow-up program. Similarly, a study conducted in Indonesia revealed that households that were visited by someone who advised them on latrine use were slightly more likely to have an improved or shared latrine compared to those who did not report receiving a visit (17, 19).

Limitation of the study

As being cross-sectional in the design, this study shares the drawbacks of similar cross-sectional studies. As it is cross-sectional, it fails to show seasonal variability in availability of improved sanitation facilities. Shortage of literature addressing the research questions was also a limiting factor to discuss the findings.

7. Conclusion and Recommendations

7.1. Conclusion

The findings of this study showed that 35.9% (95%CI: 30.9%, 40.9%) of the households included in the study had improved sanitation facilities. Income of the household, occupation of the respondents, knowledge on improved sanitation facilities and attitude of the respondents towards improved sanitation were the major factors affecting availability of improved sanitation facilities. However, educational status, availability of skilled masons, the presence of funding for sanitation and health extension workers' supervision was not significantly associated with the availability of improved sanitation facilities.

From this study, it was concluded that Even though there is encouraging improvement, the availability of improved sanitation facilities are still believed to be low in rural Ethiopia in spite of the introduction of various interventions programs.

7.2. Recommendations

- Policy makers and health planners need to recognize the factors affecting availability of improved sanitation facilities and more efforts should be given to educate the rural communities to bring change in knowledge and attitude towards sanitation facilities.
- As low income is one of the factors affecting availability of improved sanitation facilities, integrated efforts of different sectors is needed to alleviate the problem in the long run.
- Non-governmental organizations who are working on water and sanitation programs should highly focus on provision of improved sanitation facilities to rural farmers simultaneously with water supply.
- Continuous refreshment trainings on improving the sanitary facilities of the rural community, mainly the farmers, should be provided to rural health extension workers and other health professionals working with the communities.
- Zonal Health Administration in collaboration with the woreda should strengthen community approach to total sanitation aims to achieve 100% open defecation free (ODF) communities through affordable, appropriate, acceptable technology and behavior change to the rural communities.
- Finally, further research is required in order to understand other possible contributors which were not addressed in this research.

References

1. Mary Charlotte Spencer. Sanitation Practices and Preferences in Peri-Urban Accra, Ghana. Hubert Department of Global Health. 2012
2. Beth Scott. Health Impacts of Improved Household Sanitation, November 2006. <http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/Household%20Sanitation.htm>. Accessed 9 December 9, 2013
3. Federal Democratic Republic of Ethiopia Ministry of Health, Hygiene and Environmental Health, Part 2, Blended Learning Module for the Health Extension Programme. www.moh.gov.et, accessed 8 December, 2013
4. WHO/UNICEF. Joint Monitoring Program for Water Supply and Sanitation report. World health organization, Geneva, 2010.
5. WHO in cooperation with UNICEF and WSSCC. Things You Need to Know About Sanitation. <http://www.unwater.org/wwd08/docs/10Things.pdf> accessed 9 December 2013
6. Legesse W, Haile Mariam D, Kloos H. Water supply and sanitation. In; Berhane Y, Haile Mariam D, Kloos H (editors). Epidemiology and Ecology of health and disease in Ethiopia. Shama Books. 2006 edition; 129-146
7. World Health Organization, UNICEF. A Snapshot of Sanitation in Africa a special tabulation for Africa San. Based on preliminary data from the WHO/UNICEF. Joint Monitoring Program for Water Supply and Sanitation. Africa San: Second African Conference on Sanitation and Hygiene Durban, South Africa; February 18-20, 2008. http://www.who.int/water_sanitation_health/monitoring/africasan.pdf2008. Date accessed 10 December 2013.
8. African Development Fund (ADF). Rural water supply and sanitation program in Ethiopia. ADF. 2005. Appraisal Report, 1:10-15
9. AMCOW, Water supply and sanitation in Ethiopia turning finance in to services for 2015 and beyond. AMCOW. 2009/2010
10. A. Prüss-Üstün and C. Corvalán, preventing disease through healthy environments towards an estimate of the environmental burden of disease. WHO, Geneva. 2006
11. Susanne Hesselbarth. Socio-economic Impacts of Water Supply and Sanitation Projects. KFW. October. 2005.

12. United Nations Department of Economic and social Affairs (UNDESA), International Decades for action “water for Life 2005-2015”, <http://www.un.org/waterforlifedecade/index.shtml>, accessed 28 November, 2013
13. Bongartz, P. and Chambers, R. Beyond subsidies: triggering a revolution in rural sanitation. (IDS policy briefing; no. 10). Brighton, UK, Institute of Development Studies at the University of Sussex. July 2009
14. World Health Organization and UNICEF Meeting the MDG drinking water and sanitation target: the urban and rural challenge of the decade. WHO/UNICEF. 2006
15. World Health Organization and United Nations Children’s Fund Joint Monitoring Programme for Water Supply and Sanitation (JMP). Progress on Drinking Water and Sanitation: Special Focus on Sanitation. UNICEF, New York and WHO, Geneva, 2008.
16. WIKIPEDIA, Sustainable sanitation, http://en.wikipedia.org/wiki/Sustainable_sanitation, accessed 01 november.2013
17. Water and sanitation program (WSP). Scaling Up Rural Sanitation, Long Term Sustainability of Improved Sanitation in Rural Bangladesh. World Bank. October 2011
18. Koronel Kema, Innocent Semali, Serafina Mkuwa, Ignatio Kagonji, Florence Temu, Festus Ilako, Martin Mkuye. Factors affecting the utilization of improved ventilated latrines among communities in Mtwara Rural District, Tanzania. Pan Afr Med J. 2012;13(Supp 1):4
19. Puguh Prasetyoputra and Sri Irianti. Access to Improved Sanitation Facilities in Indonesia: An Econometric Analysis of Geographical and Socioeconomic Disparities. Journal of Applied Sciences in Environmental Sanitation, 8 (3): 215-224.
20. Central statistical Authority and ORC Macro. Ethiopian Demographic and Health Survey. Addis Ababa.2011
21. WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation. Progress on Drinking Water and Sanitation: Special Focus on Sanitation. UNICEF, New York and WHO, Geneva. 2013
22. Mukwaya Robert and Beatrice Akiiki Kusiima, Community use of pit-latrines in Mubende district, Assisted by Child Health and Development Centre Ministry of Health, Health Planning Department, Uganda National Health Research Organization and UNICEF. December 1998

23. Awoke and Muche: A cross sectional study: latrine coverage and associated factors among rural communities in the District of Bahir Dar Zuria, Ethiopia. *BMC Public Health* 2013 13:99.
24. E.C. Koskei, R.C. Koskei, M.C. Koske and H.K. Koech, Effect of Socio-economic Factors on Access to Improved Water Sources and Basic Sanitation in Bomet Municipality, Kenya, *Research Journal of Environmental and Earth Sciences*. 2013. 5(12): 714-719
25. Esther W. Dungumaro. Availability of domestic water and sanitation in households: a gender perspective using survey data in South Africa. Institute of Development Studies, University of Dar es-Salaam, Tanzania.2009
26. Zelezny, L. C. Educational interventions that improve environmental behavior: A meta analysis. *Journal of Environmental*. 1999. Education 31, 5–14.
27. Kumar Jyoti Nath, Barenyo Chowdhury, Anish Sengupta, Study on Perception and Practice of Hygiene and impact on health in India. Dhaka, Bangladesh. 2010
28. Nancy Phaswana-Mafuya, an investigation into the perceived sanitation challenges in the eastern cape rural communities, *health sa gesondheid* Vol.11 No.1 – 2006
29. Nigatu Regassa, D. Sundaraa Rajan and Kalkidan Ketsela, Access to, and Utilization of Information on Sanitation and Hygiene by Rural Households in Alaba Special District, Southern Ethiopia, *J Hum Ecol*, (2011), 33(2): 101-112
30. Water Aid. Report Towards total sanitation Socio-cultural barriers and triggers to total sanitation in West Africa. Water Aid. October 2009
31. Nancy Phaswana-Mafuya¹ and Nimish Shukla, Factors that could motivate people to adopt safe hygienic practices in the Eastern Cape Province, South Africa. *African Health Sciences* 2005; 5(1): 21-28
32. Boro Gathuo, Sanitation and Hygiene in Kenya: Lessons on What Drives Demand for Improved Sanitation, Water and sanitation program (WSP), June 2004
33. Rejaepalan, S. A guide to simple sanitary measures for the control of endemic diseases. Oxford: University press. 1999
34. Jenkins, Dlorah C., "Examining the Influence of Economic and Political Factors upon Access to Improved Water and Sanitation in Select African Nations, 2005-2008". *Public Health Theses*. 2010.page 84

35. Heino Güllemann. Characteristics of Subsidized Latrines in Rural Cambodia, A deep look into the database of the MRD KAP Survey, SNV Working Paper, G2. 2010
36. Andualem Anteneh and Abera Kumie, Assessment of the impact of latrine utilization on diarrhoeal diseases in the rural community of Hulet Ejju Enessie Woreda, East Gojjam Zone, Amhara Region, Ethiop. J. Health Dev. 2010;24(2), 114

Annex 1 English version of consent form & Questionnaire

Jimma University College of Public Health and Medical Sciences Department of Epidemiology

Questionnaires for assessment of availability of improved sanitation facilities and associated factors among rural communities in Lemo woreda, Hadiya zone, Southern Ethiopia, 2014

Verbal consent

Greeting

Hello, my name is-----I am from----- . I am part of a team of people who are carrying out a survey on availability of improved sanitation facilities and associated factors among rural communities. I would like to ask you some question regarding the topic. The result of this study will help as an input to increase availability of improved sanitation facilities in Lemo woreda.

The questions about improved sanitation facilities that I would like to ask you will take about 40 minutes of your time. What you tell me will be kept strictly confidential. This information will be kept securely and no one outside of this research team will find out the answers that you give me. During the course of interview, you are free to stop the interview at any point, or not to answer any of the questions that we ask. However, we hope that you will participate in this study since your views are important. May I begin the interview now?

1. Yes 2. No

Informed consent certified by

Interviewer name _____ Signature _____

Date of interview _____ Time started _____ Time completed _____

Result of interview: 1. Completed 2. Respondent not available

3. Refused 4. Partially completed

Name of the supervisor-----sign-----Date-----

Name of woreda _____ Name of kebele _____ House No _____

Responsibility of respondent in the household _____

Part I Respondents Socio-demographic characteristics

Question	Option	Skip Ques
101. Respondent's ID number	-----	
102. Household head	Husband-----0 spouse-----1 Others(specify)-----2	
103. sex of the household head	Male-----0 Female-----1	
104. Age in completed years	-----	
105. Marital Status of the household head	Married-----0 Single-----1 Divorced----2 separated ---3 Widowed----4	
106. Educational status of the household head	No education-----0 Primary -----1 Secondary -----2 More than secondary---3	
107. Occupation of the household head	Farmer-----0 Daily laborers -----1 Merchant -----2 Governmental employer---3 Student-----4 Others (specify)-----5	
108. What is your total family size?	-----	
109. What is the average Monthly income of the house hold?	----- (birr)	

II. Questions for Availability of improved sanitary facilities

Question	Option	Skip to Ques
201. What kind of sanitation facility do members of your household usually use? (Observe to confirm).	No facility/bush/field -----0 Ventilated improved pit latrine----1 Pit latrine with slab-----2 Pit latrine with no slab/open pit----3 Composting toilet -----4	If answer is "No facility," skip to ques 204

	Bucket toilet -----5 Other (specify)-----6	
202. Do you share this facility with other households?	No-----0 Yes-----1	If 'no' skip to ques 204
203. How many households do you share this facility with?	-----	
204. Do you intend to install/change a sanitation facility in the future if it is filled/not satisfied with current facility?	No-----0 Yes-----1	

III. Behavioral factors

3.1 Knowledge Questions

311. Have you heard about improved sanitation facilities?	No-----0 Yes-----1	If 'no' skip to ques 321
312. Where or from who did you heard about improved sanitation facilities?	Health professionals-----0 Mass media -----2 Neighborhoods-----3 Others(specify)-----4	
313 Do you know the presence of different options of improved sanitary facilities for excreta disposal?	No-----0 Yes -----1	If no skip to ques 315
314. If yes, which of the following option do you know about?	Flush or pour/flush facilities connected to a piped sewer system-----0 Pit latrines with a slab-----1 Composting toilets-----2 Ventilated improved pit latrines-----3 Others(specify)-----4	
315. Which advantage of improved	To prevent disease transmission----0	

sanitary facilities do you know?	To prevent environmental pollution ---1 Has economic benefit-----2 Has aesthetic value-----3 Others(specify -----4	
316. Do you know diseases that can be transmitted due to lack of improved sanitary facilities?	No-----0 Yes -----1	If no skip to ques 321
317. If yes, can you mention the diseases?	Diarrhoea-----0 Typhoid fever-----1 Cholera-----2 Trachoma-----3 Do not know the names-----4 Other (specify)-----5	

3. 2. Attitude questions

321	It is important to know more about improved sanitary facility	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
322	Improved sanitary facilities should be used for proper excreta disposal	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
323	I don't have any problem with using improved sanitary facilities	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	

324	I hate open defecation than using sanitary facilities	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
325	No problem if women share sanitary facility with their husband or father in low	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
326	It is important for children to use sanitary facility because children feaces is a potential health hazard	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
327	I encourage use of sanitary facility at night time and no evil in the sanitary facility at any time	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
328	Using” cat system” for disposal of feaces will not improve the soil condition	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
329	All members of the household should use improved sanitary facility for excreta disposal	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
330	Improving the sanitary facility is for the household is	Strongly disagree-----1	

	my responsibility	Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	
331	I can prevent diseases that are related to unimproved sanitary facilities	Strongly disagree-----1 Disagree-----2 Neutral...-----3 Agree-----4 Strongly agree-----5	

IV. Questions for Environmental factors

401. Distance of Water Source from Dwelling?	Water on premises -----0 ≤ 1 km/ 30 minutes round trip----1 > 1km/30 minutes round trip-----2	
402. Daily water consumption/capital/day?	<20 liters-----0 ≥ 20 liters-----1	
403. What is the distance from your home to the main town?	-----m/km	
404. what is the walking time from the home to nearby health facility	≤30minutes-----0 >30 minutes----1	
405. Is your residential land flooded regularly?	Never..... 0 Every year.....1 Some times-----2	

V. Questions for Assistance related factors

501. How many times do the health professionals supervise you per month?	1-2 times per moth-----0 ≥= 3 times per month-----1 Never visited-----2	
502. Do you get skill mason if you want to construct sanitary facility?	No-----0 yes-----1	

503. Is there funding for sanitation?	No-----0 yes-----1	If yes, skip to ques 504
504. If yes, from whom	Government-----0 NGOs-----1 Others(specify)_____2	

Date of interview-----

Name of the interviewer----- Signature-----

Annex 2 Hadiyissa version of consent form & Questionnaire

Jimmi Unveresti minadabina fayahoma egachi epidimologi lossan minane la'am degree massi kitabi naqasha gudesemina wexakam naqash wixachina itti sagara uwoo mana sidimina gudesako gudesha

Dollab shuum minne yoo'issa xassakam xammichuwwa odimmi kakkeno matti issimmine ixuw gaqqi bike isamok mashshika'uw lemmi worradane,hadiyyi zoonanne,worron ettope'e 2014.

Saggarine ettancha

Xummatissima

Hallo,issum_____anni warummok_____.Anni dollab shummi minnie awwaximmane odimmi awwaximina te'im awwaximma hoggimma mashshika'i ehoo luwwana sarvee'e te'im qosso'o baxxo kenni matto. Ka bikkina ka horror woshshane xammichuwwa xamommo. Ka sarivee'ik mishshi dillalabissine shummi minne awwaximma lemme'I worradina uwwok awwadi hee'okko.

/ka kurramukki horror woshshanw yoo xammichuwwi 40 daqqiqa massokko. Atti kuttoti maxxaaqqi woshshuwu ayyannam kurrammoyyo. Xammich lamibee'en att hassit ammanenne ullisenna te'im dabachcha uwwima hoggena xantotto.Ihukkarem ki xammicha dabarrim ka qosso'inna lobakatta awwadoko.Kabba xammima ashsherena xannomonihe?

1. xantotto 2. xantoyyo

Xammibine ittanchchi ijajukkok

xammanichi suum_____ furrimma'_____

xammako'I balli _____ ashsheru saa'at _____ beedu saa'at _____

xamichchi mishshi: 1. wommako 2. dabbaranch siddamukkoyyo

3. dabbaranch sabbako 4. kollo wommako

suppeervissar suum-----furrimma'i-----balli-----

Worraxi suuma _____ qabale'i suuma _____ minni xiggo _____
 aqasha uwu'i manichi minina maricho _____

Baxanch I- Xamichuwa dabaranichi hechi qaniqi halatuwa

Xamichcha	Dollo'uwwa	Chalakam xamichchuwa
101. Dabachcha uwwok mancho annan isso xiggo	-----	
102. Minn horror gasanch	Arro'o-----0 mi'in ammate arro'o-----1 Muulek yollassi chakise-----2	
103. Mi'in horror gassanch albachchi	Gonchcho-----0 Mentichchote-----1	
104. Umer mee'o (hundem hincho)?	-----	
105. Mi'in horror gassanch mine issimii ogoorri?	minn issakohanne-----0 minne issu be'anne-----1 tiraakkohane -----2 annani ehhakkohane-----3 minni anchchi te'im amicho letoo'o/hakkohane-----4	
106. Mi'in horror gassanch lossanni gabali?	lossa'inni mine agubee'ane-----0 luxxi qoxxo'o-----1 lammi qoxxo'o-----2 Lammi qoxxo'i hannane-----3	
107. Mi'in horror gassanch baxxii marruchcho?	Abbulanchcho-----0 malayyi baxxo baxxancho----1 daddarancho-----2 adilli baxancho-----3 lossancho -----4 Mulleki yoolas chakkisse-----5	
108. Ki abaaroos xig mee'o?	-----	
109 Mati aganane ago'i amaxi	----- (birri)	

II. Heggeq mucuuro'im dabassanch affu beyyo moo'isso xamichchuwa.

Xammicha	Dollo'o	
201. Ki abarrisinemmi hinkidonne'i shuummi mine awwaxittakamooki? (Moe).	korra'i birrane awwaximma-----0 jorri foshshi bee'i shummi mi-----1 shummi minn summi gaxxi ihha iffisamakko ---2 shummi minn summi gaxxi ihha iffisamuk bee'ane---3 shummi mine chirro ulla harshshisanchone dabbaro--4	kaxamichina dabach kora'I bira ihulas xamich 204 higehe

	poppo'o awwaximma -----5 mulle yoo lassi chakisse _____6	
202. Kinnuw shuummi ine mulli abarrosine maqqire awwaxitakamonihe?	Awaaxinommo-----0 Awwaxinommo-----1	
203. Maqire awaxitakaman ihulas mee'I mi'n abarrosine?	-----	
204. Kaba yoo shu'im minn wo'mulas te'im makubeelas muleka baxximina sawitakamo?	Sawinommo-----0 eeya sawinommo-----1	

III. Halatuwa xamichuwa

3.1 Lach qoosim xa'imichuwa

311. Dollab shuum mine bikkina?	Lanqoomo-----0 Lanqoommo-----1	laqakam beelas xa'imich 321 higehe
312. Ka xambbo hannis maceesito?	fayao'o m lach baxaanins-----0 maas mida'iinse-----1 hegeeq maninse-----2 mulek yoolas caakise-----3	
313. Annan annan dool lab shu'im mi'in doo'ilouwi yoo'isa laqakammo?	Lanqoomo-----0 Lanqoommo-----1	laqakam beelas xa'imich 315 higehe
314. Hanaa'in xa'imichina dabachi laqakaman ihulas, woron yoo do'iluwiins hinka laqakammo?	Habdollich woin baxxokko-----0 shummi minn summi gaxxi ihha iffisamakko -- -----1 shummi mine chirro ulla harshshisanchone dabbaro-----2 jorri foshshi bee'i shummi minne -----3 mulle yoo lassi chakisse -----4	
315. Dool lab shu'im minn uwoo awaaduwiins hinaka keeno laqakammo?	jab higoobee'isa ege'ilimina-----0 hegeeq kolbancha hoo'ilamimina-----1 ekonome'I awaad yoo bikina-----2 mooakamaa mishiso bikina-----3	

	mulek yoolas caakise-----4	
316. Shu'im min beechine higoo te'im dabalammo jabuwwa laqakammo?	Lanqoomoyyo-----0 Lanqoommo-----1	laqakam beelas 321 xa'imichane higehe
317. Laqakaman ihulas hink jabuwa laqakammo?	aado'il jabo-----0 taayfooyida-----1 kolee'il jabo-----2 tiraakoomma-----3 suma la'oombee jabo----4 mulek yoolas caakise_____-----5	

3. 2. Luwina uwakam beyyo moo'isoo xa'imichuwa

321	Dool lab shu'm mi'n bikina la'imane awaad yookko.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
322	Dool lab shu'm mine ogoraamisa awaxim hasisookko.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
323	Dool lab shu'im mine awaaximane maham qed bee'e.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
324	Kora beyoone awaaxima dool labiinse loboka shigigoommo.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
325	Meenit maat shuum minne mii'n anno'inne tee'im li'issuk anni'inne	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2	

	awwaxamukar haaw be'e.	Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
326	Cilluw shum minne awaxima dannamo mashshika'omime ciiluw shuum laasagina fayya'om xanq ihoo bikina.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
327	Shuum mine himmo awwaxima bakisha issommo, joor luwwi hink ammannem hee'o bee'e bikkina.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
328	Shuma aduunissa awwaxim ullane ebbo annanat bee'e	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
329	Minn abbarosi hundin doli lab shuum minne awwaxim hassisoko.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
330	Minn abbarosina shuum minn axxish ehi beecha/qooda.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	
331	Shuum minn muccuroma egerrima hongine warron jabuwwa egelimma xanommo.	Horiyem iitamoomoyyo-----1 Iitamoomoyyo-----2 Lamonem bee'e-----3 Iitamommo-----4 Lobakata iitamoommo-----5	

VI. Hegaqi halata bikina gudakoo xamichuwa		
401. Gaat minnis woo'i inkirram beeyi qellom?	Minine maqirame-----0 ≤ 1 km/ 30 daqiqa Afakka daba'llimma --1 > 1km/30 daqiqa Afakka daba'llimma ----2	
402. maat ballane aggakam woo'i ammax?	<20 Litra-----0 ≥ 20 Litra-----1	
403. Lob beero'i minnis yook qellom?	-----m	
404 minnis hinceen akkim min mee'i daqiqqa takisso?	≤30daqiqa-----0 >30 daqiqa----1	
405. yonit heech beeyo dirris hinkan ammanenne warrokok?	hoore'em warroyo-----0 hich-hinchone-----1 higga-higgatete-----2	
V. Haramo luwi xamichuwa		
501. fayao'o'm lach baxaan agana meekore doammo?	agana 1-2 kore-----0 koree 3 hanaanii-----1 horeem do'ilamoyyo-----2	
502. shuummi minne baxishsha hassiti amanne baxxim lachchi yoo'i manna siddo?	siddomoyyo -----0 siddommo-----1	
503. Shuum minni baxishshina harramni yoo'one?	bee'e-----0 yookko-----1	
504. yoollasi , ayyete?	Addilli-----0 addilli anne ehube'e'i baxxi minuwwi----1 mullek yoo'I lassi chakisse-----2	

Galaxommo!

Saggali xamichchi issamu balli-----

Xammanch----- furrimma'i -----

Declaration

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been fully acknowledged.

Name: Tadele Yohannes

Signature: _____

Name of the institution: Jimma University

Date of submission: _____

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

Name and Signature of the first advisor

Abdulalik Workicho (MPH)

Name and Signature of the second advisor

Henok Asefa (Msc)
