ASSESSMENT ON WATER, SANITATION AND HYGIENE IN STATUS AMONG HOME BASED CARE CLIENTS OF PLWHA IN ADDIS ABABA

BY;
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ACRONYMS

AIDS	Acquired Immuno-Deficiency Syndrome
ART	Anti Retroviral Treatment
ARV	Anti Retro Viral
CRS	Catholic Relief Service
CSA	Central Statistics Agency
FHI	Family Health International
HBC	Home Based Care client
HAPCSO	Hiwot HIV/AIDS prevention, care and support organization
HAPCO	HIV/AIDS Prevention and Control Office
HIV	Human Immuno Deficiency Virus
HIP	Health Improvement Project
IRC	International Research Center
JMP	Joint Monitoring Program
MDG	Millennium Development Goal
MOH	Ministry of Health
NGO	Non Governmental Organization
ORAMP	Office for Revision of Addis Ababa Master Plan
OR	Odds Ratio
PLWHA	People Living With HIV/AIDS
PMTCT	Prevention of Mother To Child Transmission
UNAIDS	Joint United Nations program on HIV/AIDS
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WEDC	Water, Engineering and Development Center
WHO	World Health Organization
WSP	Water and Sanitation Program
VCT	Voluntary Counseling and Testing
VIPL	Ventilated Improved Pit latrine

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ABSTRACT

Background: *- Although HIV/AIDS is not water and sanitation related disease, the issues are closely linked. Many of the opportunistic infections like diarrhea that cause high morbidity and mortality in people living with HIV/AIDS are transmitted through contaminated water and unsanitary living conditions. Therefore, a reliable water supply and good sanitation facilities are indispensable to assist in the task of bathing, washing, cleaning & disinfecting the home environment, providing water for taking drug, using latrine to avoid contamination. Access to Water and sanitation services can help home based care clients to live longer in good health, facilitate care for ill patients, improve the quality of life and increase their dignity. However, this is poorly recognized by either organizations working on HIV/AIDS or water and sanitation sector.*

Objective: - *the objective of this study is to assess the situation of water, sanitation and hygiene in home-based care clients in Addis Ababa city.*

Methods: - *A cross-sectional study using simple random sampling technique was conducted in Addis Ababa from March 31 to April 14/2009. A total of 422 home based care clients proportionally allocated to each sub city were interviewed and the response rate was over 99%. Data on socio-demographic characteristics of home based care client, water, sanitation and hygiene practices were collected through face to face interview and observation using checklists. Participation in this study was voluntary and based on clients' ability to give informed consent. Data was analyzed using SPSS 11.0 for windows statistical package.*

Result: - *The result of this study showed that home based care clients had access to improved water sources (96.4%) with reasonable time taken to fetch. The availability of improved sanitation, bathing facilities and hand washing facility near latrine were 62.5%, 6.9% and 4.3% respectively. The per capita water consumption (10l/c/d) and home based water treatment practices (11.4%) of clients were very low. There was also gap between knowledge of hand washing during critical times with detergents (70.5%) and practice*

(60.5%). Similarly, clients had poor practice of water dipping (86.9%), keeping cleanliness of latrines (69.6%), proper efflu

ent (50%) and child feces disposal (67.9%). While they had good practice of proper covering of water vessels (83.8%) and body bathing at least once a week (90.4%). Home-based care clients were less exposed to hygiene education and hygiene promoting teaching materials. The two week period prevalence of diarrhea was 15.5%. However, only 80% related to water and sanitation which characterized by lack of blood in the stool. The results of bivariate analysis showed that there was no statistically significant association between house owner ship, sex of head of households and income in availability of improved water sources, sanitation and hand washing facilities near a latrine. However, the odds of having improved sanitation in households whose monthly income was ≥300 were about four times higher than the odds in households whose monthly income was <300 birr. Educational status of clients was found to be significant predictor of daily per capita water consumption. Education had also relation with availability of improved water sources and improved sanitation but the associations were not statistically significant at P<0.05.

Conclusion and recommendations- *From the study it can be concluded that the water, sanitation and hygiene needs of home based care clients was not full filled. Therefore their need should be addressed by including safe water, sanitation and hygiene as essential components of basic preventive care packages of home based care clients at policy, service provision and community levels.*

Key words*: HIV/AIDS, Home-based care, water, sanitation, Hygiene*

I. INTRODUCTION

According to 2007 report of Joint United Nations Program on HIV/AIDS (UNAIDS), the global HIV/AIDS epidemic was stabilizing but at an unacceptable high level. Globally, there were an estimated 33 million people living with HIV in 2007. The annual number of new HIV infections declined from 3 million in 2001 to 2.7 million in 2007 (1). Ethiopia is one of the hardest hit countries by the pandemic with prevalence of 2.1% (2). Reports also indicated that Addis Ababa has 156577 people living with the disease, 21585 new infection, 7993 deaths and prevalence of 7.5% (3). There are also 6700 people getting home-based care in Addis Ababa (4). The disease has negative impact on overall social and economic development at all levels hence its prevention; care, treatment and support, and impact mitigation had to be integrated with all developmental plans including the water and sanitation sectors.

Access to safe water is considered as a basic human need and basic human right to all people. Yet this basic right remains unrealized for large majority of people in developing countries (5). This is also true in Ethiopia with access to safe water is nationally estimated to be 76% in urban areas and as low as 20% in rural areas. Access to sanitation is nationally estimated at 50% and 4% in urban and rural areas respectively (6). In the 2005 Demographic and Health survey 92% reported that they did not treat water at home (6). The negative impact of low access to necessary quantities of water, reasonable water quality, to basic sanitation and hygiene is even more magnified on HIV-infected (immuno-compromized) individuals. The added burden affects not only the HIV infected individuals, but the entire family by increasing risk of diarrheal diseases and lost productivity (7).

There are five areas in which water and sanitation issues have an impact on people living with HIV/AIDS (PLWHA); opportunistic & other infection, home-based care, infant feeding, labour saving and food security (8).

Lack of availability and accessibility of safe water with lowered and compromised immunity makes PLWHA highly susceptible to opportunistic infections related to poor water supply, sanitation and hygiene like diarrhea which causes significant morbidity and mortality in 90% of PLWHA and reduces absorption of ART (9). Shortage of safe water and sanitation can also exacerbate poor personal, domestic and food hygiene which

increases the chance of contracting the disease by people living with HIV/AIDS and their care givers (8).

The majority of AIDS patients are being cared for within their families often by trained volunteers. For home-based care to be effective a reliable and sufficient water supply and good sanitation are indispensable for bathing, washing, cleaning and disinfecting of the home environment and latrines, taking drugs, and increase of comfort & dignity of patients(9). Safe water, sound sanitation practices and hygiene education are needed to prevent the babies of HIV positive mothers from falling ill with diarrhea (8).

Improved access to water supply provides important labour- saving benefits, more time and energy for coping with the disease, obtaining education or to work outside the home particularly to women and girls in households affected by HIV/AIDS(9).

Within households, water is needed for income- generating activities such as urban horticulture, local beer brewing and food production to increase food security and maintain nutritional status. Nutrition can also be improved by making food softer and easier to eat for people who are suffering from mouth ulcers or thrush and cannot eat solid foods (8).

Thus particular attention has to be given to specific needs of HIV positive people and their care givers who have a substantially greater need for water and sanitation services: more water; safe water; access to water, sanitation and proper hygiene as a means to mitigate the epidemic. To date, there was little study examining the situation of water, sanitation and hygiene in PLWHA and home-based care clients in our country.

Therefore, this study helps to examine the current situation of water, sanitation and hygiene in home based care clients and provides the foundation for future effort to integrate water and sanitation activities with home based care programs.

SIGNIFICANCE OF THE STUDY

Access to water and sanitation in Ethiopia is among the lowest in the world and needs greater effort and resource to access these basic rights for the society. On the other hand the country is one of the hardest hit by HIV/AIDS pandemic. Although HIV/AIDS is not directly transmitted by lack of water and sanitation, there are many secondary infections related to it that can be prevented through access to water, sanitation and better hygiene. Water also helps to reduce the work load for care givers and preserve dignity. Due to lack of resources, problems should be prioritized and some cost effective home-based treatment mechanisms should be integrated. Since there were few studies done in our country related to the situation of water, sanitation and hygiene practices in home-based care clients, this study would serve as the baseline to identify the problem and most critical measures to be taken by policy makers, program planners, managers, donors, field workers and beneficiaries to counter act the cruel impact on day to day health, work, income and dignity of home-based care clients.

II. LITERATURE REVIEW

The World Health Organization (WHO) recommended thirteen areas of intervention seen as low cost and of particular importance for people living with HIV/AIDS. Water, sanitation and hygiene are among the recommended interventions in resource limited settings (10).

WATER SUPPLY

According to joint United Nations International Children's Emergency Fund (UNICEF)/WHO monitoring committee, improved drinking water sources include household connection, public standpipe, borehole, protected well, protected spring and rain water collection and within 1km or a 30 minute round trip distance(11). Studies have shown that those traveling great distance to collect water will reduce intake of water and use less safe water sources (12). However, this is not the case in people living with HIV/AIDS in developing countries. For instance, a 2002 survey of South African HIV-affected households found less than half had household connection water sources (13). Similarly, water and sanitation assessment among home-based care clients in Zambia found that only 54% of clients fetch water from improved sources. This study also showed that 28% of respondents walk at least 40 minutes and an average walking distance of 400metrs to fetch water (14). Similar study in Malawi indicated that only 53% of the clients have access to improved water sources. In this study, client walk on average 25.33 minutes and 55% reported that their water source was located outside their plots (15). Another study conducted in Botswana on access to safe water for HIV/AIDS patients showed that people use several sources of water and the unreliability leads to use of poor quality water and poor hygiene (16). A community household's survey in Addis Ababa also showed that there is great discrepancy in accessibility of safe water by wealth, sex of house hold head and functional areas. The distance of fetching water falls between 100 and 500 meters (17).

Availability of 20 liters per capita per day is considered to be basic access in the general population (18). Studies showed that an additional 20-80 liters of water per day is

required to support bedridden PLWHA (16). People on anti-retroviral treatment (ART) require additional 1.5 liters per day of water for drinking (7). A great irony exists in giving advanced costly life saving ART to patients. It is important to maximize the effect of these medicines by using safe water for ingesting them, since a side effect of many Anti Retro Viral (ARV) drugs is diarrhea (7). This should include an estimate of water quantity needs as well as information on what to clean and how. Studies showed that establishment of safe water supply increased water use for bathing, washing cloth and utensils from 30% to more than 50% of total water consumption. This study also showed that water consumption was increased from 40 litters to 100 litters (9). However, not all researches showed increase in use of water due to accessibility of safe water. For example, a community household's survey in Addis Ababa showed that 80% of households fetched less than 20 liters of water in a day (17).

Simple, low cost strategies for treating and safely storing water at the household level can greatly improve the microbial quality of water and results in reduction of dirarheal disease morbidity comparable to those achieved by proper hand washing and safe faces handling and disposal (19). For instance, in a randomized controlled trial conducted in rural Uganda among people living with HIV, safe water systems reduced the risk of diarrhea by 25% and reduced the number of days ill with diarrhea by 33% and in combination with co-trimoxazole it reduced diarrhea episodes by 67%(20). This study also showed that safe treatment and storage of water at the point of use has been shown to reduce the risk of diarrhea disease by 30 to 40 percent (20). The Uganda study mentioned above showed that the use of simple, home-based safe water system consisting of a chlorine solution to disinfect water and storage in a container with a narrow mouth, lid and a spigot reduce the frequency by 30% and severity of diarrhea in people living with HIV/AIDS (20).

Several technologies are available for treating water in the home, including chlorination, storage in a narrow-mouth container; spigot designed to prevent recontamination, various types of filter, proper boiling, solar disinfection, combined chemical coagulation, flocculation and disinfection (19). Safe water in combination with a locally available antibiotic prophylaxis (cotrimoxazole) reduced diarrhea episodes by 67% (20).

Household-based water treatment and storage methods are recommended for people living with HIV and their households in resource-limited settings (10). In this regard findings showed that people living with HIV/AIDS practice some form of home treatment to make water safe. For example, a cross sectional survey among home based clients in Zambia indicated that 33% used chlorine and 67% practiced boiling to treat their water (14). A similar study done in Malawi also reported that 16.7% of respondents reported they had treated their drinking water within the previous 24 hours using chlorine and boiling (15). In Ethiopia the practice of treating water in home in the general population was 8% (5.3% in urban and 8.6% in rural) and the primary method used was boiling (6).

Solar disinfection is one of the simplest and effective methods of home treatment to reduce diarrhea. In randomized trials in Kenya, solar treatment of drinking water reduced the risk of diarrhea by 16-26% and of cholera by 86% in the general population (21).

Flocculants disinfection is another technology for treating water at home that incorporates techniques used in municipal water purification. This type of water treatment system had reduced the risk of diarrhea by 20-40% in Guatemala and Kenya (22, 23).

Storing of water in covered container and using of proper procedure to pour water also ensures the water is not re-contaminated. However, practice of home based clients in Zambia showed that only 55% used vessels having a narrow neck for storage and 12% reported dipping from the container (14). Similar study in Malawi also showed that 26.7% used narrow neck while the majority (83.3%) reported dipping a coup into the storage (15). Another study conducted in India showed that 95% of PLWHA put their hands inside the water container to take out water even when using mugs, jugs or cups (24).

Studies in Zambia and Malawi indicated that expense of water fees in urban areas and distance of water sources in rural areas were mentioned as barriers for accessibility of safe water (14, 15).

SANITATION

Safe feces handling and disposal have been shown to reduce the risk of diarrheal diseases by 30% or more (24). Compared to feces of an adult, children's feces are more likely to be a source of contamination for the household environment. However, many cultures do not regard the feces of small children as dangerous and do not dispose of them in a safe manner (25). Given the prevalence of diarrheal disease in PLWHA, all members of a household should dispose of feces safely. To reduce diarrhoeal disease among people living with HIV/AIDS, their families or households should dispose of feces in a toilet or at a minimum buried in the ground. PLWHA who do not have indoor latrine facilities and are too sick or too weak to use a latrine may need special equipment or supports like bedside potties and squatting poles or stools which support a weak person using a conventional latrine. In field trial in Uganda, the presence of latrine in a compound was associated with fewer episodes and days of diarrhea in PLWHA (20). Although research in Zambia and Malawi showed 96.7% and 75% of the home-based clients had latrine respectively, the cleanliness of the latrines was not good as indicated by the presence of fecal matter in the areas surrounding the latrine (14, 15). In the Zambian study three-quarter of the latrines were pit latrines, which may be difficult to keep them clean (14). A community household survey in Addis Ababa also showed that high number of households used pit latrines (78%). Out of the total pit latrines 15% was not clean, 15% do not have adequate shelter, 26% lack regular maintenance and 23.6% do not provide convenience for use (17).

Research outputs in Zambia and Malawi showed that availability of local building materials and sandy soil were barriers for availability of latrines (14, 15).

HYGIENE

Hygiene improvement is a comprehensive approach to prevent diarrheal disease by promoting improvements in hand washing, treatment and safe storage of water, sanitation, improve access to water and sanitation technologies and products, and fostering an enabling environment (improved policies, community organization, institutional strengthening and public-private partnerships(26). Studies have documented that hand washing at critical times with soap reduce the risk of diarrheal diseases (27). Hands should be washed with soap at critical times such as after defecation and handling of human or animal feces, before preparing and eating of food, after cleaning a baby or changing a diaper, after cleaning up the feces of a person who is chronically ill and before feeding a child. Proper technique includes using soap or ash, rubbing hands at least three times and then drying them with a clean cloth or by air. Although studies have not specifically addressed the efficacy of hand washing in diarrhea prevention in people with HIV, those belonging to this group have a two fold risk of diarrheal diseases than people without HIV (27). Meta-analysis of hand washing studies conducted in developing countries concluded that hand washing can reduce the risk of diarrhea in the general population by 42-44 % (27). Proper hand washing at critical times will help prolong and improve the quality of life of PLWHA and help to ensure the health and safety of family members and care givers. In a randomized experimental trial in Uganda, the presence of soap in the home was associated with 42% fewer days ill with diarrhea which

was one of the cost effective intervention (20). However, some studies showed the practice of hand washing in home based care clients was low. For example, a study in Malawi indicated that only 41.7% of home based care clients had soap and 55% washed their hands with soap during the previous 24 hours (15). This study also showed that there was large gap between existing knowledge and corresponding behavior because only 21.7% used soap after defecating despite 80% reported importance of hand washing after defecation. Similarly a study conducted in Zambia showed that 49% reported having soap in their house and 45% reported washing their hands with soap during the previous 24 hours (14). It also showed only 8% of respondents reported using soap for washing hands after defecating despite 38% knowledge on its importance (14). Other studies showed that the existence of a yard tap nearly doubles the chance of a mother washing hands after cleaning a child's anus and doubles chances of her washing faecally soiled linen immediately (9).

Some interventions increase the awareness of people living with HIV/AIDS on the need of safe water, appropriate sanitation and safe hygiene practice better than the general population. This was demonstrated in a study done in Gujarat, India. In this study 69% were aware of the benefits of safe water, sanitation and hygiene; 71% aware that boiling can make water safe for drinking; and 20% were aware of that safe water is good for health compared to 19%, 55% & 12% respectively with the general population. In the same study, despite various barriers, PLWHA did adapt safer water and hygiene practices than the general population; 68% purified water through some method, 83% boiled water, 61% washed hands with soap after defecation. In spite of recognizing needs for safe water and appropriate sanitation and hygiene practices, barriers such as limitation in time, economic constraints, lack of individual household toilets, lack of fuel for boiling water and water scarcity were reported as a problem in transforming knowledge into practice (28).

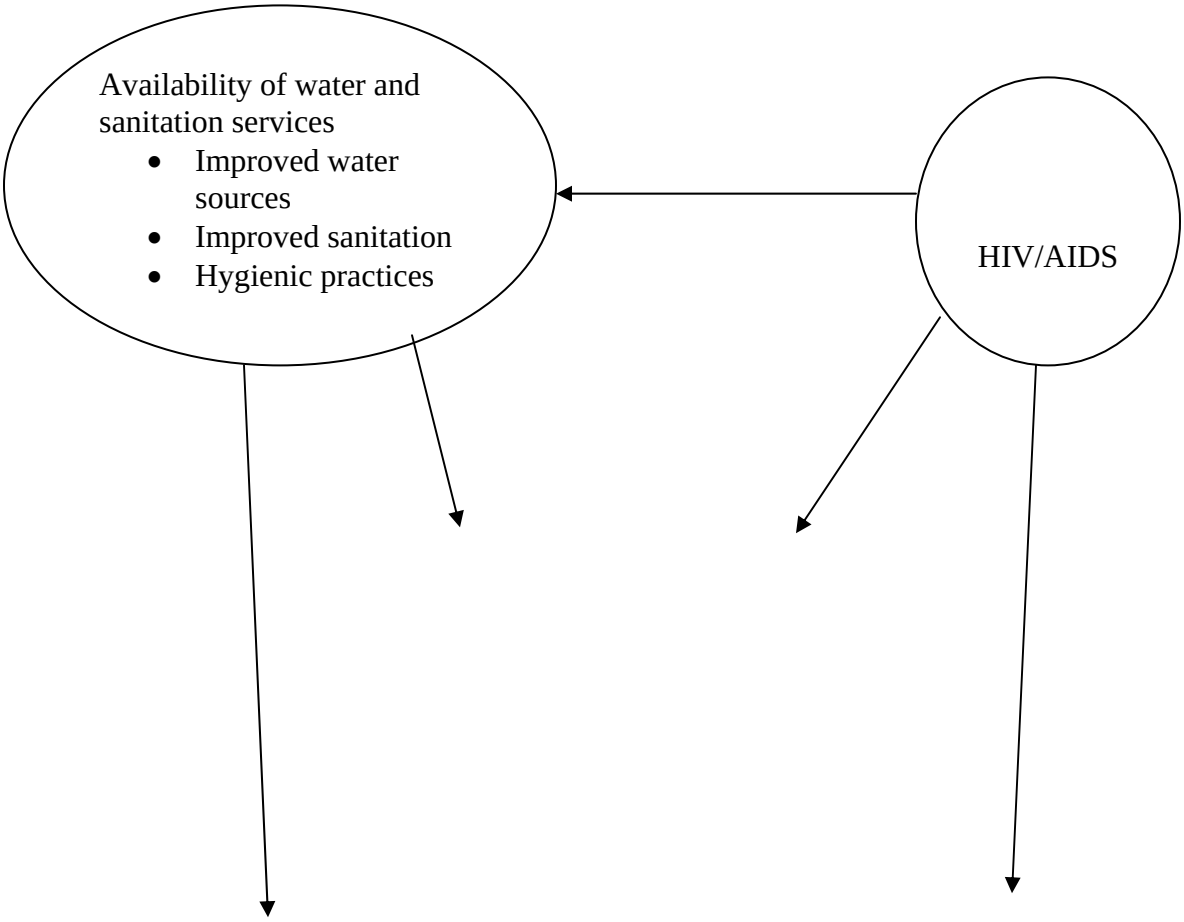
Education alone does not motivate people to wash their hands regularly. Regular follow-up and providing soap particularly those who lack income is required to promote and reinforce this behavior. This can be done through both home-based and clinic-based HIV-care programmes. Soap is a critical component of effective hand washing and consideration should be given to provide soap to clients of HIV care program, particularly those who lack income. Follow up evaluations are important to assess the degree to which hygienic behaviors are adopted and continued and to improve programmes (10).

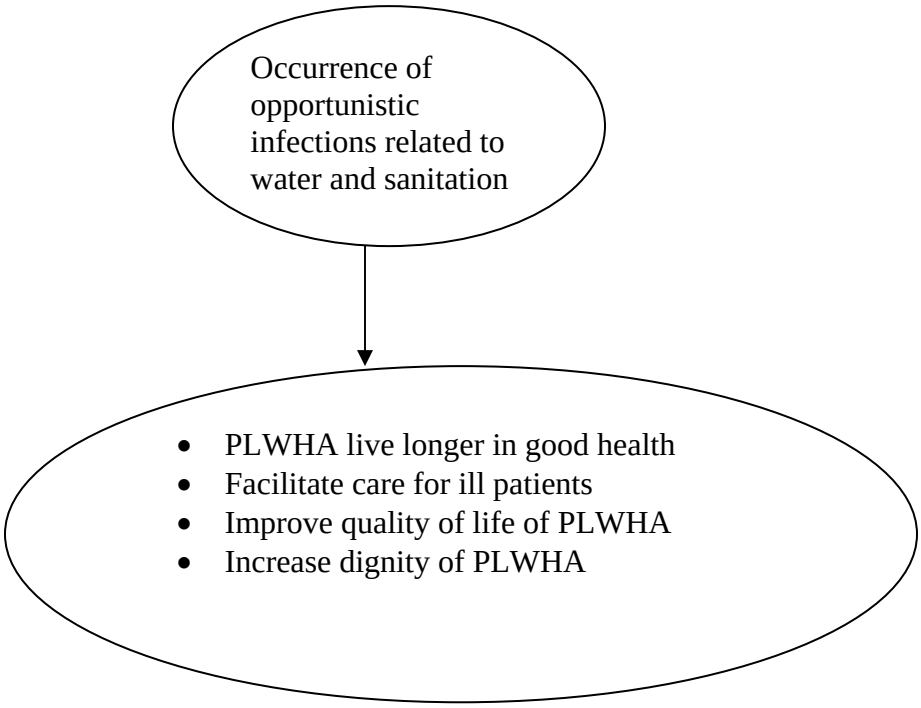
Diarrhea and skin diseases are among the most common water and sanitation related opportunistic infections which affect those living with HIV/AIDS. A cross sectional study in Zambia and Malawi indicated that the two weeks period prevalence of diarrhea was 27.5% and 43.3% respectively (14, 15). Another study conducted in India showed that 25% of PLWHA experienced diarrhea during three months prior to the survey (28).

Indeed, hand washing, sanitation and water disinfection & safe storage have each been proven to reduce diarrhea rates significantly. This was demonstrated in Bangladeshi's SAFE program of CARE which demonstrated a 65% decrease in diarrhea rates when all three components of hygiene improvement were presented in a program (29).

Generally, household water treatment methods like safe storage and inhibiting manual contact; proper disposal of feces and promotion of hand washing with soap are recommended for people living with HIV/AIDS and their households to reduce diarrhea and other water and sanitation related opportunistic infections. Thus knowing the situation in our country and taking appropriate measures will be important both for fighting the pandemic and improving the quality of life of people living with the disease.

CONCEPTUAL FRAME WORK





III. OBJECTIVE OF THE STUDY

GENERAL OBJECTIVE

To assess the situation of water, sanitation and hygiene in home -based care clients of people living with HIV/AIDS in Addis Ababa.

SPECIFIC OBJECTIVES

The specific objectives of the study were

- To assess availability, accessibility and adequacy of improved water source for home-based care clients.

- To assess availability of improved sanitation and hygiene keeping facilities in home based care clients.
- To assess basic hygiene practice of clients.
- To identify the factors contributing for the availability of improved water sources, improved sanitation and hand washing practices at critical times.

IV. METHODOLOGY

STUDY DESIGN

A cross-sectional survey design technique, using quantitative method was used to approach participants and elicit information on the variables of the study from March 31 to April 14/2009.

STUDY AREA

Addis Ababa was established in 1886 by Emperor Taitu and Minilik II and is the capital city of Federal Democratic Republic of Ethiopia. Currently it is serving

as the Capital of African Union, international organizations and one of the most important diplomatic centers in Africa. The city is divided into 10 sub cities and 99 kebeles.

It has an area of 540 square kilometers, lies between 2000-3000 meters above sea level with lowest and highest annual temperature about $10^{O}C$ and $25^{O}C$ respectively and annual rain fall around 1200mm. Despite its proximity to the equator, the city enjoys Afro-Alpine temperature and warm temperate climate (30).

The population of Addis Ababa was estimated to be 2,848,873 in 2007(31). Its potential health service coverage was 34 %(32). According to rapid assessment report of drinking water quality by Department of Hygiene and Environmental health, the potential water sources for Addis Ababa said to be: piped water (82.1%), boreholes (12.5%), hand dug wells (4.8%) and protected springs (0.6%) (33).

The HIV/AIDS epidemic is claiming the lives of the most productive, energetic and educated segment of the population the city. The Adult prevalence of HIV/AIDS in the city has increased from 7.2% in 2004 to 7.5% in 2007. It is projected to be 8.5% in 2009 and incidence rate was estimated to be 1.5% in 2007. The number of new HIV infection was 808 and the death decreased from 892 in 2005 to 539 in 2007(3). This decrease was as a result of ART services. One of the costs of HIV/AIDS is leaving children with out father, mother or both. In line with this the total number of AIDS orphan in 2007 was 112647. The number of HIV positive pregnant women increases at annual rate of 3 %(3).

Home based care was mostly provided by NGO's and Idirs in the city. The practice shows that each patient typically receives a care giver visit three times a week. Care givers provide basic nursing care, offer psychological support, wash clothes, clean the house, prepare food and facilitate referrals to other service in the community (34).

SOURCE AND STUDY POPULATION

The source population was all home- based care clients in Addis Ababa served by Hiwot HIV/AIDS prevention, care and support organization during the study period. This organization was selected because it covers all the ten sub cities, had large number of home-based care clients and registration that can be used as sampling frame work. The situation of others considered to be the same since they live in the same areas and exposure. The study subjects were randomly selected home based care clients who were $\geq$ 18 years of age and gave verbal informed consent.

SAMPLE SIZE DETERMINATION

Sample size (n) was determined using single population proportion formula (35)

$$n = \frac{(Z\alpha_{/2})^2 P(1-P)}{d^2}$$

Where "n" is sample size and P is the proportion of PLWHA using improved water and sanitation. Hence

1. Since local data for the value of P was not available 50% (p=0.5) was taken to allow maximum sample size by taking others constant.
2. Standard score (z) for 95% confidence level is 1.96
3. Degree of accuracy required (sampling error) is 5% i.e. d= 0.05
4. Estimated number of home based care clients in Addis Ababa i.e. 6700 (4).
5. To get large sample size population correction was not made while 10% for non response rate was added (refusal to be enrolled and absenteeism during data collection period).

Based on the above assumptions the total sample size "n" was 422.

SAMPLING PROCEDURE

The total sample size was divided proportionally according to the number of home-based clients in the ten Sub-cities. Study house holds were identified using simple random sampling method from existing home-based care clients' registration. The

exclusion criteria used was age i.e. < 18 years. If there were more than one client in the household, preferably the female was selected to provide information since they have main responsibility in water and sanitation. For those unable to communicate immediate care giver were asked.

METHODS OF DATA COLLECTION

Data were collected by ten trained home-based care providers and 2 supervisors from March 31-April14 /2009. The Data collectors were trained one day on theoretical and practical session to familiarize them with the study objective. Special emphasis on establishing mutual trust before asking questions, sources of bias and observation techniques were discussed. Emphasis was also given for questionnaires that need careful attention and observation. The overall data collection was coordinated by the principal investigator.

The two principal data collection methods used in this study were;

1. **Household interview**

A structured and pre-tested questionnaire adapted from WHO/UNICEF core questions on drinking water and sanitation for household surveys was posed in face to face for home-based care client in the household.

2. **Observation**

Data on covering of water storage vessels, water container volume, presence of soap in the house, availability of hand washing facility, water and detergent near latrines, cleanliness of latrines, availability of pamphlets on hygiene were collected using check list.

VARIABLES

Sets of variables used in this study were:-

Independent variables: - Socio-demographic and economic variable like house ownership, income, educational status, sex of head of house hold.

Dependent variables: - outcome variables such as availability of improved water sources, improved sanitation, hand washing facilities and hygiene practices.

DATA QUALITY

Quality of data was assured through the following methods;

- Using standardized adapted questionnaire (25)
- The data collection tool was pre-tested with data collectors & supervisors and necessary correction was made after the pre-test to reach a common understanding prior to the study.
- Data collectors and supervisors were trained on objective of the study, sources of bias, observation and interview techniques.
- Questionnaire was checked for completeness on daily basis by immediate supervisors.
- Each questionnaire was manually cleaned up for completeness, missed values and inconsistent of responses.
- The data was entered by trained data entry clerk and ten percent of the entered data was checked by the principal investigator for its correctness.
- Frequencies and cross tabulations were used to check missed values and variables. Errors identified were corrected after revising the original questionnaire.

DATA ANALYSIS

All responses to the survey questionnaires were coded against the original English version and entered using EPI-6 software. The final data file was exported into SPSS 11.0 statistical package for analysis. Recoding and re-categorizing was made for selected relevant variables. Cross tabulations were made to calculate crude odds ratios, p-values and X^2 for descriptive (univariate, bivariate and multivariate) analysis. The data was presented using tables, percentages, graphs and mean values.

ETHICAL CONSIDERATION

Ethical clearance was secured from ethical committee of Addis Ababa University, Medical faculty and Addis Ababa City Administration Health office. Participation in the study was voluntary, based on informed consent and the participants were free to leave the study at any time. Privacy and confidentiality was maintained during interview.

DISSIMINATION OF FINDINGS

The result of this study will be disseminated to Addis Ababa HIV/AIDS prevention and control office, Health office and Hiwot HIV/AIDS prevention, care and support organization (HAPCSO) which are concerned bodies on the provision of home-based care. The findings will also be provided to Ethiopian Public Health Association (E PHA), Center for Disease Control (CDC) that supports this study financially and presented in workshops, seminars and journals.

OPERATIONAL DEFINITION

- **Access to water supply** – Availability of improved water sources within 1km distance or 30 minutes round trip water hauling time (35).
- **Adequacy of safe water**- is the availability of at least 20 liters per person per day (35).
- **Clean latrine**- latrine which is not full, do not have fecal matter in the squat and not used as fly breading

- **Home-based care**- is a program that, through regular visits offers health care services to support the care process in the home environment of the person with HIV infection.
- **Home treatment of water**- involves any method proven to be effective in removing or killing pathogens such as boiling, adding bleach or chlorine, using water filter, solar disinfection and settling
- **Hygienic practices**- are washing hands at critical times, proper handling & storage of water, keeping latrines clean and proper disposal of child's feces.
- **Improved sanitation facilities**- are those more likely to ensure privacy and hygienic use /easily cleanable includes connection to public sewer, connection to septic tank, pour-flush latrine, simple pit latrine and ventilated improved pit latrine (35).
- **Improved water source**- includes household connection, public stand pipe, borehole, protected dug well, protected spring and rain water collection (35).
- **People living with HIV/AIDS**- individuals who are sero-positive for HIV test and manifested clinical symptoms.
- **Per capita daily water consumption=** $\frac{\text{Average amount of water used by house holds}}{\text{Average family size of house holds}}$
- **Potential health service coverage**- is calculated by multiplying the number of health centers with respective number of population to be served (40,000 for Addis Ababa) and dividing the product by the total population.
- **Safe handling of water**- getting water from a container by separate dipper or container with spigot of or narrow neck container.
- **Sanitation**- latrine

- **Unimproved sanitation**- includes bucket latrine where excreta are manually removed, public latrines and latrines with an open pit (35)

- **Un improved water source**- sources which includes unprotected well/spring, vendor-provided water, bottled water{due to its quantity} and tanker truck provider water{due to poor transportation & handling} (35).

V. RESULT

I. GENERAL CHARACTERSTICS OF STUDY SUBJECTS

Out of the total 422 home based care clients sampled, 420 clients were interviewed and included in the analysis, which makes the response rate 99.5%.

The large proportion of clients live in rented houses from kebele (40.5%) followed by rented from private (35%) and female by sex (81.2%).

Majority of (60.7%) of clients' household were headed by women. Two hundred eighty three (60.7%) of respondents were mothers. Above one third of the respondents (35.7%) were married (Table 1). Four out of five clients were orthodox (80.2%) by religion followed by protestant (10.5%), Muslim (8.1%) and catholic (1.2%).

Table1. General characteristics of home-based care clients in Addis Ababa, 2009

Category	Frequency	Percentage

House ownership		
Rented from kebele	171	40.7%
Rented from private	147	35%
Private	67	16%
Others	35	8.3%
Total	420	100%
Sex of client		
Female	341	81. 2%
Male	79	18.2%
Total	420	100%
Household headship		
Female	255	60.7%
Male	155	36.9%
Daughter/son	6	1.4%
Other	4	1%
Total	420	100%
Respondent's family status		
Mother	283	67.4%
Father	81	19.3%
Daughter/son	37	8.8%
Other	19	4.5%
Total	420	100%
Respondent's Marital status		
Married	150	35.7%
Widowed	128	30.5%
Single/never married	56	13.3%
Separated	45	10.7%
Divorced	41	9.8%
Total	420	100%

The median (SD) age of clients and mean (SD) household size of study population was 35 years (±8.9) and 4 (±2) persons respectively. One third of (34.8%) clients were illiterate and 65.2% attend some elementary school and above.

The majorities of clients were house-wife by occupation (35.5%) and similar proportions were married (35.7%) by marital status. About 48% of clients earn less than 150 birr monthly and 96.4% less than 500 birr (Table 2)

Table2. Socio-demographic and economic characteristics of home-based care clients in Addis Ababa, 2009

Category	Frequency	Percentage
Respondents' age in years		
18-24	24	5.7%
25-29	81	19.3%
30-34	74	17.6%
35-39	119	28.3%
40-44	54	12.9%
>45	68	16.2%
Total	420	100%
Number of usual members in HH		
<4	285	67.9%
5-7	113	26.9%
>8	22	5.2%
Total	420	100%
Respondents' educational status		
Illiterate	109	26%
Read and write	37	8.8%
1-4 grades	55	13.1%
5-8 grades	140	33.3%
9-12 grades	76	18.1%
12+	3	0.7%
Total	420	100%
Respondents' occupation		
Housewife	149	35.5%
Daily laborer	124	29.5%
Merchant	49	11.7%
Private/NGO Employee	35	8.3%
Government Employee	12	2.9%
Others	51	12.1%
Total	420	100%
Households' Monthly income		
≤150.00 birr	200	47.6%
151.00-500.00 birr	205	48.8%
501.00-1000.00 birr	14	3.3%
>1000.00 birr	1	0.2%
Total	420	100%

II. SAFE WATER SUPPLY

The principal sources for majority of households were either piped water to yard/plot (47%) or public tab/standpipe (39.3%). A small minority of clients got water from protected dug well and spring (0.4%). While only 9.5% of the clients got water from piped water into their dwelling (Fig 1)

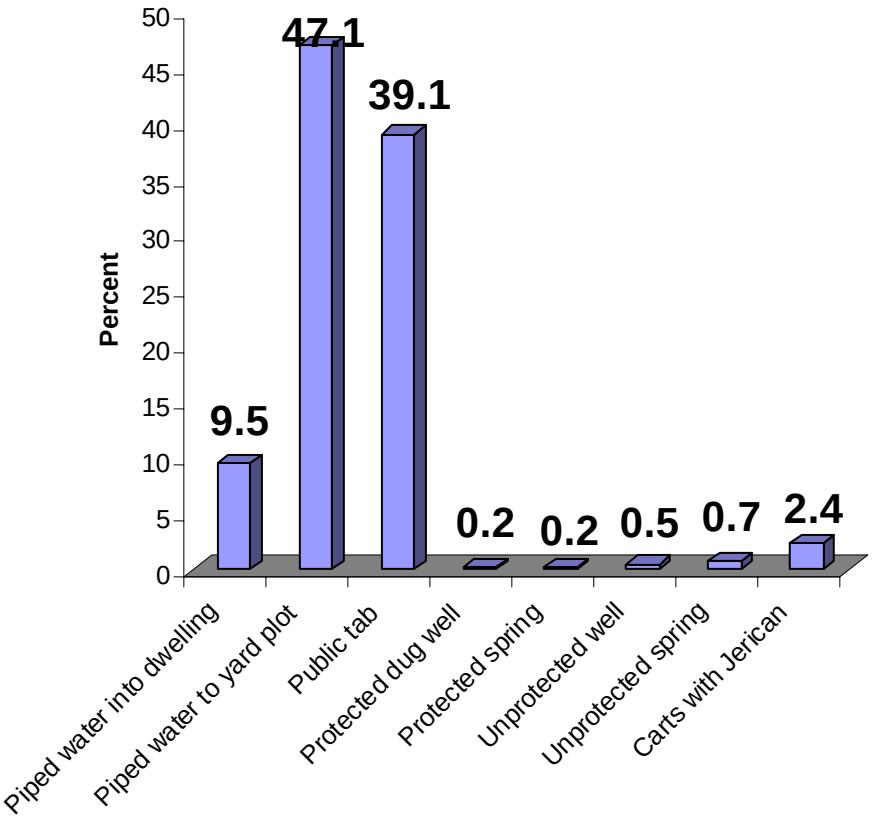


Fig 1- Drinking water sources of home-based care clients in Addis Ababa, 2009.

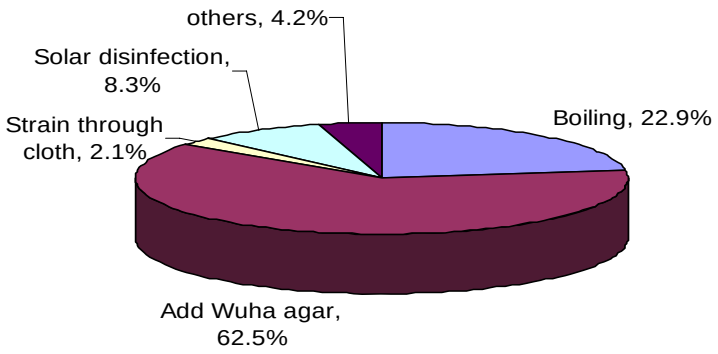
The average time taken to fetch water was 20 minutes. In the majority of households water was fetched by adult women (74.3%) and minority (1%) by care-givers. The average daily consumption of water by households was 40 liters (±20.4), which became 10 liters per person per day.

Out of the total households 47.4% use plastic bucket containers, 46.9% Jerican, 1.9% clay jars and 3.3% metal containers to fetch water. Of those not using Jerican as storage mechanism; their water getting practices were pouring (4.8%), dipping (41.9%), using spigot (2.1%) and both pouring and dipping (4.1%).

Observation was made whether the water container was covered or not and the result showed that majority (83.8%) covered while the rest (16.2%) did not covered their water containers.

Only 11.4% of households practiced home treatment to make their water safe. Of those who treated their water, the primary treatment method was adding Wuha Agar (62.5%) and boiling (22.9%) (Fig 2).

Fig 2- Methods of water treatment by home based care clients in Addis Ababa, 2009



The majority (88.8%) of the households did not treat their water at home. The reasons mentioned were lack of money (34.7%), lack of knowledge (45.4%), lack of treatment technologies and other reasons (11.6%) like considering the water was safe.

All of the selected socio-demographic and economic variables fail to show statically significant association with availability of improved water sources. However, those clients who were literate had more than two times higher odds of having improved water

sources than illiterate [OR:2.211, 95% CI:(0.785,6.225)] (Table 3). Water consumption was significantly associated with client's educational status. Households that had literate clients are about two times more likely to have more water consumption (62%) than of clients who were illiterate [OR: 1.623, 95%CI (1.069, 2.464).

Table 3- Selected socio-demographic and economic variables in relation to availability of improved water sources in home based care clients, Addis Ababa, 2009

Characteristics	Water sources		Crude OR
	Unimproved	Improved	(95% CI)
House ownership (n=420)			
Rented	10(2.8%)	343(97.2%)	0 .362 (0.119, 1.094)
Private	5(7.5%)	62 (92.5%)	1.00
Sex of head of HH (n=420)			
Male	6(3.9%)	149 (96.1%)	1.00
Female	9(3.5%)	246 (96.5%)	1.101 (0.384, 3.15)
Educational status (n=420)			
Illiterate	8(5.5%)	138 (94.5%)	2.211(0.785, 6.225)
Literate	7(2.6%)	267 (97.4%)	1.00
Monthly Income (n=420)			
<300 birr	15(3.7%)	390 (96.3%)	0.963 (0.945, 0.982)
≥300 birr	0 (0%)	15 (100%)	1.00

II. SANITATION

The majority (83.1%) of households has latrine and the predominant type of latrine was pit latrine with cement slab (32.7%) (Fig 3). Only 16.9% had no any kind of latrine and the reasons given for unavailability of facilities were lack of money (28.2%), lack of space (23.9%), lack of permission for construction (5.6%), lack of private house (36.6%) and other reason (5.6%) like living near streets.

From households using flush latrine half of them (50%) dispose their effluent to a river/elsewhere, 12.5% septic tank & 12.5% unknown place.

From the total latrines 69.1% were shared and 31.9% were private. On average one latrine was shared nearly by 6 households and used by 20 persons.

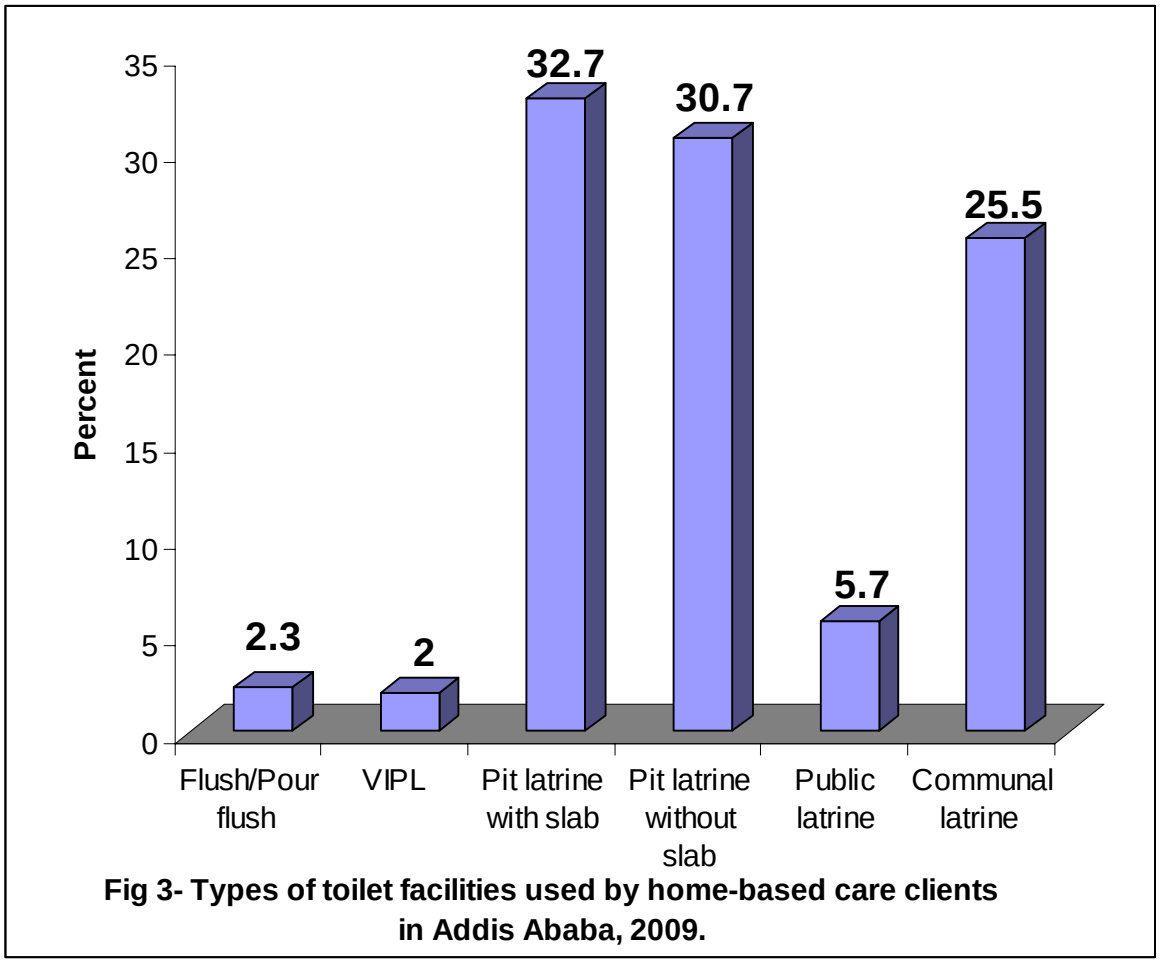


Fig 3- Types of toilet facilities used by home-based care clients in Addis Ababa, 2009.

Observation was made on current condition of latrine and the result showed that only 30.4% of latrines were clean but the other 24.4% had fecal matter, 37.5% had flies and 52.7% smells during the assessment period.

In addition to asking question the respondents about their sanitation, enumerators also observed the availability of hand washing facility near latrines. From those who had latrines only 4.3% of households had hand washing facility near latrines. Out of those who had hand washing facility near the latrine only 86.1% of facilities had water and 66.7% of facilities had detergent at the time of observation.

From the total households, 29.5% had Under five children. The ways used by parents to dispose children's feces were throw in to garbage (48.4%), used toilet (23.6%), buried

(9.7%), left in the open (2.4%) and other methods like used bed pan (16.9%). Generally, only one third of households who had Under five children's dispose children's feces properly.

Availability of improved sanitation was significantly associated with monthly income of house holds. Households who had ≥300 birr monthly income are four times more likely to have improved sanitation than of households who had <300 birr monthly [OR: 4.090, 95% CI: (0.908, 18.42 According to this study illiterates had more than about 28% higher odds of having unimproved sanitation than literates [OR: 1.276, 95% CI: (.808, 2.014). However, the association was not significant (Table 4).

Table 4- Selected socio-demographic and economic variables in relation to availability of improved sanitation in home based care clients, Addis Ababa, 2009

Characteristics	Sanitation		Crude OR
	Unimproved	Improved	(95% CI)
House ownership (n=420)			
Rented	108(37.5%)	180(62.5%)	0.991 (0.561, 1.753)
Private	23(37.7%)	38(62.3%)	1.00
Sex of head of HH (n=420)			
Male	48(36.9%)	82 (63.1%)	1.00
Female	80(38.3%)	246 (61.7%)	0.944 (0.6, 1.484)
Educational status (n=420)			
Illiterate	48(41.4%)	68 (58.6%)	1.276 (0.808, 2.014)
Literate	83(35.6%)	150 (64.4%)	1.00
Monthly Income (n=420)			
<300 birr	129(38.6%)	205(61.4%)	4.090 (0.908, 18.421)
≥300 birr	2 (13.3%)	13 (86.7%)	1.00

III. HYGIENE

The majority (86.7%) of the households had a bar of soap on the day of assessment and overwhelming percentage (92.9%) of respondents reported using of soap to wash their hands during the previous 24 hours. The main reasons mentioned for using of soap were

to wash their hands (75.7%), washing of clothes (59.2%), washing of body (40.8%), washing their children's body (24.6%), washing their children's hand (21.9%) and 0.3% other purposes like washing utensils. Only 60.5% of respondents reported using soap for washing hands after defecating, but 70% reported knowing that it was important to wash hands after defecation (Fig 4).

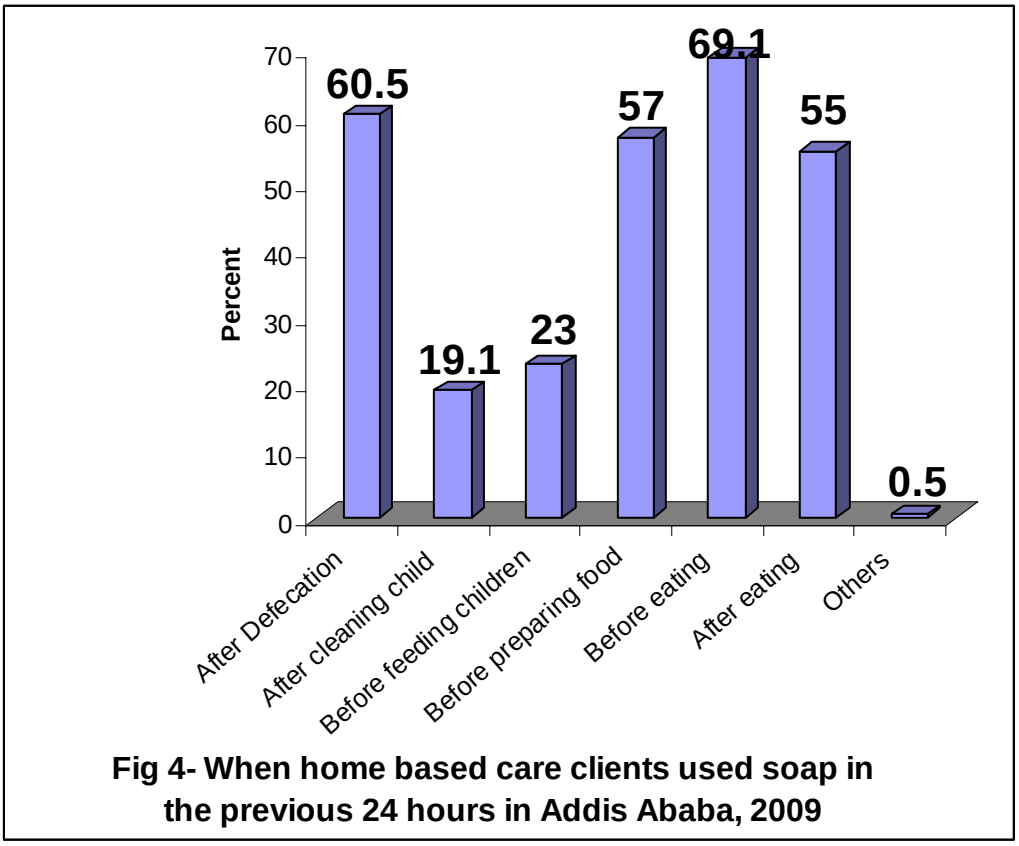


Fig 4- When home based care clients used soap in the previous 24 hours in Addis Ababa, 2009

Clients reported a variety of times when they believed hand washing was important including before eating (69.1%), after defecation (60.5%), before preparing food (57%) and after eating (55%) (Fig 5).

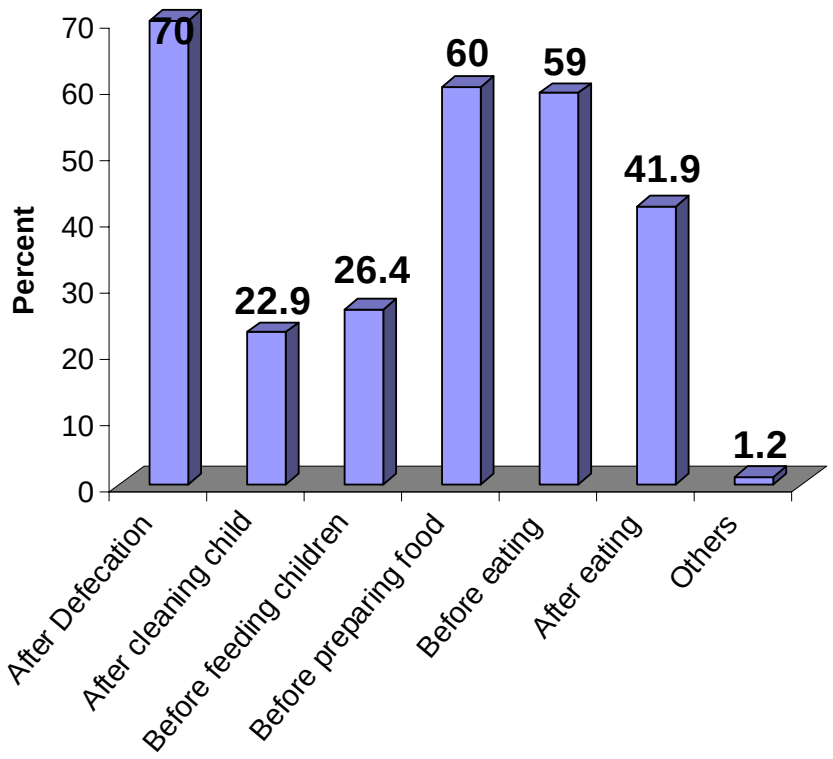


Fig 5- When home based care clients feel hand washing with soap was important in Addis Ababa, 2009

From the total respondents, only 24.3% of clients participated in hygiene education and an overwhelming majority (89.6%) reported not having access to pamphlets or visual aids depicting hygiene promotion.

Respondents were asked the usual place of taking bath and majority (93.1%) respond using bucket while 3.1% had their own shower. The frequency of bathing include every week (54.5%), as needed (34.5%), every two weeks (8.6%), every day (1.4%) and others (1%).

All of the selected socio-demographic variables fail to show statically significant association with availability of hand washing facilities in/by latrine. However, households whose monthly income was ≥300 birr had three times more likely to have hand washing facility near the latrine than of households who had <300 birr monthly

income [OR: 0.263, 95%, CI (0.054, 1.289). The result of this study also showed that the odds of having hand washing facility near a latrine in literate and male headed house holds were about two times higher than the odds in illiterate clients[OR:1.782, 95% CI (0.63,5.04)] and female headed households respectively [OR: 1.917, 95%CI (0.678,5.419) (Table 5).

Table 5- Selected socio-demographic and economic variables in relation to availability of hand washing facility near latrines in home based care clients, Addis Ababa, 2009.

Characteristics	Hand washing facility		Crude OR
	Yes	No	(95% CI)
House ownership (n=420)			
Rented	11(3.8%)	277(96.2%)	0.566 (0.174, 1.840)
Private	4(6.6%)	57(93.4%)	1.00
Sex of head of HH (n=420)			
Male	8(6.2%)	121(93.8%)	1.00
Female	7 (3.3%)	203 (96.6%)	0.944 (0.6, 1.484)
Educational status (n=420)			
Illiterate	7(6.0%)	110 (94.0%)	1.782(0.63, 5.04)
Literate	8 (3.4%)	224(96.6%)	1.00
Monthly Income (n=420)			
<300 birr	13(3.9%)	321(96.3%)	0.263 (0.054, 1.289)
≥300 birr	2 (13.3%)	13(86.7%)	1.00

Income and educational status of clients' fail to show statistically significant association with practice of hand washing at critical times.

IV. PREVALENCE OF DIARRHEA IN HOME BASED CARE CLIENTS

The finding of this study showed that the two weeks period prevalence of diarrhea in home-based care clients was 15.5%. Of those experiencing diarrhea, 20 % had diarrhea with blood and 80% with out blood. The mean duration of diarrhea was about five days.

MULTIVARIATE ANALYSIS

To avoid an excessive number of variables and unstable estimate, socio-demographic and economic variables that had association at p-value less than 0.3 were analyzed on availability of improved water sources, sanitation and hand washing facilities near latrines.

Education and house ownership were analyzed with availability of water sources yet they fail to show statically significant association at $P<0.05$.

Education and income had relation with availability of improved sanitation but fail to show statically significant association at $P<0.05$.

Education, sex of head of households and income of clients were analyzed with availability of hand washing facilities near latrines yet both did not show statically significant association.

None of the socio-demographic and economic variables show association at $p<0.3$ with hand washing practice, so they were not analyzed.

VI. **DISCUSSION**

Safe drinking water, sanitation and good hygiene practice are fundamental to health, survival, growth and development since it reduces the occurrence of opportunistic infections particularly diarrhea among PLWHA. The provision of safe water and sanitation service will benefit the whole population but will be particularly important to PLWHA and success of home based care to improve the quality of life. When infected people have better access to basic sanitation services, treatment, and hygiene education they can live longer and continue to help themselves, family and nation. With enhanced access to water and sanitation services, ART and prevention programs AIDS related deaths will be improved.

In this study about 96% of home based care clients get water from improved sources. However, it was high compared to study in Malawi (53.3%) and Zambia (54%) (9,10). The average time taken to fetch water was 20 minutes which was less than the standard hauling time 30 minutes round trip and studies in Zambia (25.33 minutes) and Malawi (40 minutes) and (14,15). The difference might be the two studies were done both in urban and rural areas, while this study was done only in urban area. As known water sources in rural areas are far and take long time that made the average higher. Thus water source was accessible compared to accessibility standards 30 minutes round trip.

The result of this study revealed that, gender discrepancy was observed with respect to water hauling responsibilities. This result was similar with other findings.

The average amount of water fetched by households was 37.25 liters. This result was similar to the general households' water consumption (40liters) (17). The average per capita water daily consumption of clients (10l/c/d)) was very low even compared to basic access (20l/c/d/). Thus it was not enough for people living with HIV/AIDS to take ART drugs, keep personal and environmental hygiene. Significance increase in daily water consumption of clients' was observed in literate home-based care clients'.

Safe storage of water at households and proper dipping mechanism are important to avoid recontamination of water at home to reduce water borne diseases. In this study the

majority of households covered their container at the time of observation (83%) but the practice of getting water for those who did not have narrow neck water storage vessel was not good because about 87% of house hold used dipping or mixed as means of getting water. These results were similar with the findings of study in Zambia (83%) in covering of water container and dipping by cup (87%) (14).

Low cost strategies for treating, storing water and proper practice of getting water from the storage at house hold level recommended for PLWHA to improve the microbial quality of water and resulted in reduction of water related diseases like diarrhea (10). In this study only 11.4% of households treat their water at home using scientific methods which was lower compared study in study in Zambia (35%) and Malawi (16.7%) and (14, 15) but higher than the practice in the general population of Ethiopia (8%) (6). The primary method used to treat water at home was water guard (Wuha Agar) (62.5%) The difference might be attributed due to the fact that little promotion activities was done related to home water treatment as evidenced by low awareness of clients (45.4%).

From the socio-demographic and economic variables tested house ownership, sex of head of house hold and income had no significant association with availability of improved water sources. This might be due to low sample size and the higher percent of clients live in rented houses, female by sex and their income was very low, which affects random distribution of variables. Meanwhile, those clients who were literate had odds of having two times greater improved water sources than illiterate clients yet the association was not significant. Significant association was observed between educational status of clients and daily per capita water consumption. Those clients who were literate used two times higher quantity of water than illiterate.

Proper disposal of feces in toilet, latrine or at a minimum, buried in the ground is recommended for people living with HIV/AIDS and their families (10). Accordingly, result of this study showed that about 83% of house holds had latrine facilities. However, 20.2% had fecal matter in external areas of the latrine, 37.5% had flies and 52.7% smells indicating that those latrines were not well maintained and that spread of diarrheol disease could be more common. In other words two-third of (69.6%) the latrines were not clean and the reason might be most of the latrines were shared (69.1%) and simple pit latrines with out slab (30.7%). The availability of latrine was lower than the general

population in Addis Ababa (90.7%) (17) and findings in Malawi (96.7%) (15), but higher than study done in Zambia's (75%) (14). Reasons mentioned by the clients for unavailability of latrines were lack of money, space, construction license and private house to construct. Moreover, the coverage was further low (62.5%) when compared with improved sanitation definition.

Young children should defecate in hygienic latrine, potty or fixed place and caregivers should dispose of very young children's feces in a latrine is to prevent transmission of diarrheol disease. In this study, only half of the households properly dispose children's feces which will make most of the clients vulnerable to diarrhoel disease.

From the socio-demographic and economic variables tested; house ownership and sex of head of household had no association with availability of improved sanitation facilities. However, s households who had ≥300.00 birr monthly income had more than four times to have improved sanitation than those whose monthly income was <300.00 birr. Yet, the association was not statistically significant at 95% CI. This might be due the fact that monthly income of clients was homogenous.

Availability of hand washing near latrines make people to use them after visiting latrine to prevent sanitation related diseases. The finding of this study revealed that only 4.3% of the households had hand washing facilities located near the latrine which make hand washing after defecation impractical. Despite the low coverage, only 86.1% and 66.7% of them had water and detergent at the time of observation respectively. This figure is very low compared to findings in Malawi (11.8%) (15). Though, the association was not statically significant, income of households had association with availability of hand washing facilities near latrines. Clients who had ≥300 birr monthly income had odds of having three times hand washing facilities higher than those who earn <300 birr.

Hand washing is an effective means of preventing diarrhea when done properly at critical times. Promotion of hand washing with soap after defecation and handling of human or animal feces and before food preparation and eating, along with provision of soap, are recommended for people with HIV and their families (10). In this study, soap was available in large number (86.7%) of households and from these households 92.9%

of clients used soap in the previous 24. But only 60.5% of them reported using soap for washing hands after defecation despite 70.5% reported knowledge of importance to wash hands after defecation. This figure is higher than studies in Zambia (49%) and Malawi (55%) (14, 15). The reason might be due to the fact that, this study was done only in urban areas which make soap more available in the house.

Proper disposing of effluent was important to improve the sanitation of surroundings and general environment and but in this study half of the clients dispose the effluent from the flush latrine to a river or elsewhere which was a bad practice of waste disposal mechanism. This result was similar with findings in Malawi (50.9%) and slightly lower than findings in Zambia (45%) (15, 14).

Hygiene education was the first step to raise awareness of home-based care clients in the linkage between HIV/AIDS and water and sanitation. However, the result of this study showed only 24.3% of clients exposed to hygiene education and 10.6% had resources materials that promote hygiene. So, this might be the cause for most of the lower hygiene practices.

Despite low percentage of home based care clients (3.1%) having bathing places, majority (90.5%) had good practice of washing body less than a week.

The two weeks period prevalence of diarrhea among home based care clients in this study was 15.5%, but only 80% of them were related to water and sanitation that characterized by loose stool without blood. This prevalence was lower than the findings in Zambia (27.5%) and Malawi (43.3%) and (14, 15). The lower prevalence might be explained by the fact that most of the home based care clients were ART users.

None of the socio-demographic and economic variables tested in multivariate analysis showed significant association with availability of improved water sources, sanitation and hand washing facilities near latrines.

STRENGTH AND LIMITATION OF THE STUDY

STRENGTHS

- Address the most marginalized group i.e. HBC and emerging public health issue.

LIMITATION

- Since the data collectors were home based care givers with their respective clients, this might introduce observation and interviewer bias (social desirability). They may relate with their daily activities inflate results related to hygiene practices compared to the real findings.
- As being a cross-sectional in the design, this study shares the draw backs of similar cross-sectional studies. The information on the prevalence of diarrhoea may not reflect the actual situation that may be observed in the various seasons of the year, as the information on diarrhoea was collected in April, which is a dry season.
- Collecting information about behavior by interviewing might not be the correct way to get accurate hygiene practice however proxies like observation of hand washing facilities (basin, soap) were used.
- Using of only quantitative method.

VII. CONCLUSION

Based the findings of this study the following conclusions were made;

- The daily per capita water consumption among home-based care clients was less than of minimum requirements of basic consumption which was much lower than the actual demand of PLWHA.
- Availability of hand washing facilities near a latrine was very low among home-based care clients.
- Home-based care clients were less exposed to hygiene education and materials depicting hygiene promotion.
- Hand-washing practice at critical times of home based care clients was not good.
- Home-based care clients were accessible to improved water sources with reasonable time taken to fetch.
- Water treatment at point of use of home-based care clients' was low.
- Home based care clients had poor practice of keeping latrines clean.
- Availability of sanitation facilities among home based care clients' was low. Meanwhile, improved sanitation coverage became very low compared to standard definition improved sanitation
- Practice of proper water vessels covering of home based care clients' was good.
- Only half of home based care clients practice proper way of child faces and effluent disposal methods.
- Body washing practice of home-based care clients' was reasonably good, despite lack of proper shower facilities.
- House ownership and sex of head of house hold were not the determinants for availability of improved water sources, sanitation and hand washing facilities near a latrine ($P<0.05$)
- Educational status of home based care clients had association with availability of improved water sources and hand washing facilities near latrine but the associations were not statically significant ($P<0.05$).

- Educational status of clients was significantly associated with per capita water consumption of home based care clients' ($P<0.05$).
- Monthly income of households had association with availability of improved sanitation and hand washing facilities near latrine yet the association was not statically significant.
- Income and educational status of clients' do not showed significant association with hand washing practice at critical times of home based care clients.
- Multivariate analysis of socio-demographic and economic variables showing P-values <0.3 do not showed statically significant association with availability of water and sanitation facilities while the relation in the bivariate analysis remains the same.

VIII. RECOMMENDATIONS

Based on the findings of the study the investigator recommends the following;

1. Include safe water, sanitation and hygiene as essential components of basic preventive care package for home based care clients.
2. Promote and demonstrate simple and low cost effective water treatment methods at the point of use like boiling, water guard (Wuha Agar), solar disinfection.
3. Promote use of narrow necked water container and spigot to avoid re-contaminations and facilitate proper dipping at households.
4. Promote hand washing stations located outside the latrine and optimal hand washing at critical times.
5. Develop correct and comprehensive behavior change communication material for people living with HIV/AIDS on water, sanitation and hygiene, building on existing materials.
6. Further nation wide study with large sample size to examine the status of water, sanitation and hygiene in PLWHA and prevalence of water and sanitation related diseases that lead to national policy, legal and program interventions.

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ANNEX I

ADDIS ABAB UNIVERSITY

FACULITY OF MEDICINE

SCHOOL OF PUBLIC HEALTH

Questionnaire for assessment of water, sanitation and hygiene in home-based clients in Addis Ababa, 2008/09

Verbal consent form for conducting interview

Greeting:

Hello, my name is ----------. I am working as home- care provider in the kebele. Your house hold has been randomly chosen to participate in this partial fulfillment of master thesis in public health. I would like to ask you a series of questions related to water and sanitation in your household focusing on use of water, latrines and hand washing practices. As part of this survey we will look at all the sanitary facilities. The survey is confidential exercise and your name will not be disclosed anywhere. You have the right not to participate and the right to answer or not for questions which might be inconvenient for you. But your cooperation and willingness is helpful in identifying problems related to the study. Please fill free to answer these questions as they will help in future community development.

Would you be willing to have a discussion with you?

Yes _____ No _____

If yes, thanks her/him and continue the next page

Date of interview _____Time started _____Time finished _____

Name of interviewer _____ Signature _____

Name of supervisor _____ Signature _____

I. Socio-demographic and economic data

No	Questions	Coding categories	Skip
1	House owner ship	Private -----1 Rented from kebele ------- 2 Rented from private -------3 Others, specify -------- 99	
2	Sex of client	Male---------1 Female ------2	
3	Head of household	Male------1 Female ------2 Daughter/son ------3 Other, specify -------99	
4	Respondent's family status	Father ---------1 Mother ------- 2 Daughter/son ---3 Other, specify ---99	
5	Respondent's marital status	Single/never married-----1 Married----------2 Divorced----------3 Separated----------4 Widowed----------5	
6	Respondent's age in year	_____	
7	Respondent's educational status	_____	
8	Household family size	_____	

9	Respondent's religion	Orthodox----------1 Muslim ---------- 2 Catholic ----------3 Protestant ----------4 Others, specify ____99	
10	Respondent's occupation	House wife ----------1 Merchant ----------2 Government employee-----3 Private/NGO employee ---4 Daily laborer---------5 Other, specify -------99	
11	Respondent's monthly income in birr	_____	

II. Water supplies

12	What is the principal source of drinking water for members of your household {check one}	Piped water into dwelling ---1 Piped water to yard/plot ---- 2 Public tab/standpipe --------- 3 Protected dug well ---------- 4 Protected spring ---------- 5 Unprotected dug well ------- 6 Unprotected spring ---------- 7 Rain water collection --------8 Cart with small tank/jerican-- 9 Surface water ---------- ---- 10	
13	How long does it take to go there, get water and come back{In minutes}	_____	
14	Who usually goes to these sources to fetch the water for your household?	Adult women----------1 Adult man ---------- 2 Female child {under 15 years} 3 Male child {under 15 years)--- 4	

		Care giver ---------- 5 Others, specify ---------- 99	
15	Yesterday, how much water did you fetch for household domestic use?	Number of container ----------1 Don't know---------88	
16	Container volume in liter {Check by observation}	_____	
17	Total amount of water fetched daily (Number of container multiplied by volume of container)	_____	
18	What is the primary vessel{s} you use for storing water? {Observe the vessel/s)	Plastic bucket container --- 1 Jerican ---------- 2 Clay Jars ---------- 3 Metal containers ---------- 4 Other, specify----------99	
19	Does the container covered? (Observe the container)	Yes----------1 No----------2	
20	If container does not have narrow neck, how do you get water from the drinking water container?	Pouring ----------1 dipping ---------- 2 Container has a spigot -------3 Both pouring & dipping ---- 4 Other, specify ----------99	
21	Do you treat your water in any way to make it safer to drink?	Yes----------1 No ----------2 I don't know----88	 Skip-23 Skip-23
22	What do you usually do to the water to make it safer to drink?	Boil----------1 Add Agar -----2 Filter it through a cloth ------- 3 Use a water filter ---------- 4 Solar disinfection ----------5 Let it stand and settle--------- 6 Other, specify ----------99	
23	If do not practice any home treatment	Lack of money ----------1	

	method, why?	Lack of knowledge ------ 2 Lack of treatment mechanisms 3 Other, specify ----------99	
III. Sanitation			
24	Does this household have a latrine?	Yes ----------1 No ----------2	Skip-35
25	What kind of toilet facility do members of your household usually use?	Flush/pour flush ----------1 Ventilated improved pit latrine – 2 Pit latrine with slab ---------- 3 Pit latrine without slab/wood ---- 4 Public latrine ----------5 Communal latrine ---------- 6	
26	If flush/pour flush, where does the flush goes to?	Piped sewer system ---------- 1 Septic tank ---------- 2 Pit latrine ---------- 3 River/elsewhere ---------- 4 Unknown place ------- 5	
27	Do you share this facility with other households?	Yes ----------1 No ----------2	Skip-29
28	If yes, How many households share this toilet facility? How many people use it?	_____ _____	
29	State the current condition of the latrine? (Observe carefully)	Fecal matter found in squat------1 Flies found in the latrine --------- 2 Smells ---------- 3 It is clean ----------4	
30	Do hand washing facility available in/by latrine facility? (Observe)	Yes----------1 No ---------- 2	Skip-33

31	Is there water? (observe by turning on tap and check container if water is available)	Yes -------1 No---------2	
32	Is there soap or detergent or ash near the hand washing place? (observe)	Yes --------1 No --------- 2	
33	Do you have under 5 children?	Yes ----------1 No ----------2	Skip-35
34	What was done to dispose of the stool of the youngest child?	Child used toilet/latrine ----------1 Thrown into garbage ---------- 2 Buried ---------- 3 Left in the open ---------- 4 Other, specify ----------99	
35	If they do not have toilet facility, what is the reason?	Lack of money--------1 Lack of space --------- 2 Lack of permission for construction -3 The house is rented ---------- 4 Others, specify ---------- 99	
IV. Hygiene practice and prevalence of diarrhea			
36	Do you have a bar of soap for hand washing in your house hold today?	Yes ----------1 No ----------2	Skip40
37	Have you used soap for washing during the past 24 hours?	Yes ---------- 1 No ----------2	Skip40
38	If you used soap during the last 24 hours, what did you used it for (Circle all the replies)	Washing clothes --------1 Washing my body-------2 Washing my children's body --3 Washing my children's hand ---4 Washing my hands ------5 Other, specify ----------99	

39	If for washing hands is mentioned, probe what was the occasion, but do not read the answer {circle all that apply}	Washing hands after defecating -1 Washing hands after cleaning child - 2 Washing hands before feeding children 3 Washing hands before preparing food--4 Washing hands before eating ------5 Washing hands after eating----6 Other, specify ---------- 99	
40	When is important to wash hands? {circle all replies}	Before preparing food or cooking -1 Before eating ---------- 2 Before feeding children ----------3 After defecating ----------4 After cleaning children's faces ---- 5 After eating food ----------6 Other, specify----------99	
41	Have you participated in any hygiene promotion meetings?	Yes -------- 1 No --------- 2 I do not remember ---------88	 Skip-45 Skip-45
42	If you participated can you mention the topics covered?(list the topics covered)	_____ _____	
43	Are there any pamphlets/visual aids in this house depicting hygiene promotion?	Yes ----------1 No ----------2	 Skip-45
44	If yes, please ask them to see and record what they cover?	_____ _____	
45	Did you have diarrhea in the past two weeks?	Yes ----------1 No ---------- 2	 Skip-48
46	What is the duration of diarrhea?	_____ days	
47	Did the diarrhea have blood?	Yes ---------- 1 No ---------- 2	
48	Where did you take bath?	I have shower in my house --------1	

		I used neighbor's shower --------- 2 I have bath ----------3 I used public bath ---------- 4 I used bucket ----------5	
49	How often did you take shower?	Every day----------1 As needed ---------- 2 Every week ---------- 3 Every two week -------4 Other, specify ----------99	

THANK YOU!

ANNEX II

በአዲስ አበባ ዩኒቨርሲቲ፣
ሕክምና ፋካልቲ፣
ህብረተሰብ ጤና ትምህርት ቤት

በአዲስ አበባ ከተማ አስተዳደር የቤት ለቤት እንክብካቤ አገልግሎት የሚያገኙ የኤድስ በሽተኞችን የውኃ፣ የሳኒታሽንና ንጽህና አጠባበቅ ለማጥናት የተዘጋጀ መጠይቅ፡፡

<u>የቃል ስምምነት መግቢያ ፎርም</u>

እንደምን ሰነበቱ?

የእኔ ስም---------- ሲባል የምሰራውም በዚህ ቀበሌ ውስጥ በቤት ለቤት እንክብካቤ አገልግሎት መስጠት ነው፡፡ የዕረሰዎ ቤት በአዲስ አበባ ዩንቨርሲቲይ የህብረተስ ጤና የማስተር ተማሪ ለመመረቂያ ማሙያ ጽሁፍ ለሚያደርገው ጥናት በዕጣ ተመርጧል፡፡ የጥናቱም አላማ የቤት ለቤት አገልግሎት በሚያገኙ የአድስ ህሙማን የንፁህ ውኃ፣ ሳኒቴሽንና ንጽህን አጠባበቅ ያለውን ሁኔታ ለማወቅ ነው፡፡ በዚህም ተከታታይ ጥያቄ የምጠይቀዎት ሲሆን ያሉትንም መገልገያዎች እመለከታለሁ፡፡ በመጠይቁ ውስጥ የእርስዎ ስምና አድራሻ አይካተትም፡፡ የሰጡትም አስተያየት የእርስዎ ስለመሆኑ በምንም ሁኔታ አይገለፅም፡፡ በዚህ ጥናት ለመሳተፍ እኛ የእርስዎን ሙሉ ፈቃደኛነት ስንጠይቅ ያለምንም አስገዳጅነት ሲሆን ፈቀደኛ ካልሆኑ ከመጀመሪያውም ሆነ ቃለመጠይቁን ከጀመሩ በኋላ ከመሃል ማቋረጥ ይችላሉ፡፡በጥናቱ ውስጥ መሳተፈዎ ግን ለጥናቱ መደረግና ያሉትን ችግሮች አውቆ መፍትሄ ለመፈለግ ከፍተኛ አስተዋፅኦ ይኖረዋል፡፡ ስለዚህ ለመሳተፍ ፈቃደኛ ነዎት?

አዎ ---------- አይደለሁም ----------

ለመሳተፍ ፈቃደኛ ከሆኑ ጥያቄውን በሚቀጥለው ገጽ ይቀጥሉ፡፡

መረጃው የተሰበሰበበት ቀን --- የተጀመረበት ሰዓት ------- ያለቀበት ሰዓት -------

የመረጃ ሰብሳቢው ስም ---------- ፊርማ ----------

የተቆጣጣሪው ስም ---------- ፊርማ ----------

ማህበራዊ፣ ቤተሰባዊና ኢኮኖሚያዊ መረጃዎች

ተ.ቁ	ጥያቄዎች	ምርጫዎችና ኮድ	ዕለፍ
1	የሚኖሩበት ቤት የማን ነው?	የግል ----------1 ከቀበሌ ኪራይ-----2 ከግለሰብ ኪራይ ------3 ሌላ ካለ ይግለጹ----------99	
2	የተጠያቂው ፆታ	ወንድ ---------1 ሴት -------2	
3	የቤቱ አባዎራ	ወንድ ---------1 ሴት ----------2 ሴት/ወንድ ልጅ -------3 ሌላ ካለ ይገለጽ ----------99	
4	መላሹ ከቤተሰብ ጋር ያለው ግንኙነት	አባት ---------1 እናት ----------2 ሴት/ወንድ ልጅ -------3 ሌላ ካለ ይገለጽ ----------99	
5	የመለሹ የጋብቻ ሁኔታ	ያለገባ ----------1 ያገባ ----------2 የተፋታ ----------3 የተለያየ---------- 4 ባሏ/ሚስቱ የሞተችበት ---------5	
6	የመላሹ ዕድሜ	---------- ዓመት	

7	የመላሹ የትምህርት ደረጃ	----------	
8	የቤተሰብ ብዛት	----------	
9	የመለሹ ኃይማኖት	ኦርቶዶክስ ----------1 እስልምና ----------2 ካቶሊክ ----------3 ፕሮቴስታንት ----------4 ሌላ ካለ ይገለጽ ----------99	
10	የመላሹ ስራ	የቤት እመቤት ----------1 ነጋዴ ----------2 የመንግስት ሰራታኛ ---------3 የግል/የእርዳታ ድርጅት ሰራተኛ--4 የቀን ሰራተኛ ----------5 ሌላ ካለ ይገለጽ ----------99	
11	የመላሹ የወር ገቢ	---------- ብር	
ንፁህ ውኃ አጠቃቀም			
12	ቤተሰቡ ለመጠጥ የሚጠቀምበትን ውኃ ከየትነው የሚያገኘው?	ቤት ውስጥ ካለ ቧንቧ --------1 ግቢ ውስጥ ካለ ቧንቧ --------2 ከቦኖ ውኃ ----------3 ከተጠበቅ ጉዳንድ ----------4 ከተጠበቀ ምንጭ ----------5 ያልተጠበቀ ጉድንድ ----------6 ያልተጠበቀ ምንጭ ----------7 ከዝናብ ውኃ ----------8 በጀሪካና/በረሜል በጋሪ ከሚቀዳ--9 ከወራጅ ወንዝ/ኩሬ----------10	
13	ወረፋ ጠብቆ ውኃ ቀድቶ ለመመለስ ምን ያህል ደቂቃ ይፈጃል?	---------- ደቂቃ	
14	ከቤተሰብ አባላት ውስጥ በአብዛኛው ውኃ የሚቀዳው ማን ነው?	ትልልቅ ሴቶች ----------1 ትልልቅ ወንዶች ----------2 ከ15 ዓመት በታች ሴት ልጆች ---3	

		ከ15 ዓመት በታች ወንድ ልጆች----4 ተንከባካቢዎች ----------5 ሌላ ካለ ይገለጽ ----------99	
15	በትናንተናው ዕለት ምን ያህል ውኃ ቀድተዋል?	የእቃው ብዛት ----------1 አላስታውስም ----------2	
16	መቅጃ ዕቃው የሚይዘው የውኃ መጠን	---------- ሊትር	
17	አጠቃላይ በቀን የቀዱት ውኃ በሊትር(የእቃው ብዛትም የሚይዘው መጠን)	----------ሊትር	
18	በዋናነት ቤት ውስጥ የሚያጠራቅሙት በምንድን ነው (ዕቃውን ተመልክተው ያረጋግጡ)	ፕላቲክ ባልዲ ----------1 ጀሪካ ----------2 እንስራ ----------3 የብርት ባልዲ -----4 ሌላ ካለ ይገለጽ ----------99	
19	የማጠራቀሚያ ዕቃው ተከድኗልን? (ተመልክተው ይሙሉ)	አዎ----------1 አልተከደነም ---------2	
20	የውኃ ማጠራቀሚያው ጠባብ አፍ ከሌለው ውኃ ለመጠቀም እንዴት ነው የምተቀዱት?	በማስጎንበስ ----------1 በመጥለቅ ----------2 ዕቃው መቅጃ ቧንቧ አለው -----3 በማስጎነበስና በመጠለቅ -------4 ሌላ ካለ ይገለጽ ----------99	
21	ውኃዎ ንፁህ እንዲሆን በቤት ውስጥ የሚያደረጉት ህክምና አለን?	አዎ ----------1 የለም ------2 አላውቅም --------88	ወደ23 ይለፉ
22	ውኃዎን በቤት ውስጥ ለማከም የሚጠቀሙት ምንድን ነው?	ማፍላት ----------1 ውኃ አጋር መጨመር ----2 ውኃን በጨርቅ ማጥለል -------3 ውኃን በአሸዋ/ሌላ ነገር ማጣራት -4 በፀሀይ ብርሃን ----------5 እቃ ውስጥ ተረጋግቶ እንዲቀመጥ በማድረግ--5 ሌላ ካለ ይገለጽ ----------99	

23	**በቤተሥ ውስጥ ውኃን የማያክሙ ከሆነ ለምን?**	**መግዣ ገንዘብ ስለሌለኝ ---------1** **እንዴት እንደሚታከም ስለማላውቅ2** **ለማከሚያ የሚሆኑ ዘዴዎች ስለማይገኝ ·3** **ሌላ ካለ ይገለጽ ----------99**	
ስለ መፀዳጃ ቤት ሁኔታ			
24	**ቤትሥ መፀዳጃ ቤት አለውን?**	**አሥ -------1** **የለም --------2**	**ወደ33 ይለፉ**
25	**የሚጠቀሙበት መፀዳጃ ቤት ምን አይነት ነው?**	**በውኃ የሚሰራ ----------1** **ሽታ አልባ ----------2** **ባህላዊ በሲምንቶ የተሰራ -------3** **ባህላዊ ከእንጨት የተሰራ --------4** **የህዝብ መፀዳጃ ቤት ----------5** **የጋራ መፀዳጃ ቤት ----------6**	
26	**በውኃ የሚሰራ ከሆን ፍሳሹ የሚሄደው ወዴት ነው?**	**ወደ ፍሳሽ መውረጃ ቦይ --------1** **ወደ ማጠራቀሚያ ሴፕቲክ ታነክ 2** **ወደ ሽንት ቤት ---------3** **ወደ ወንዝ/ሌላ ቦታ --------4** **የት እንደሚሄድ አላውቅም ------5**	
27	**የእናንተን መፀዳጃ ቤት የሚጠቀሙ ሌሎች ሰዎች/ቤቶች አሉን?**	**አሥ----------1** **የሉም ---------2**	**ወደ 29ይለፉ**
28	**ካሉ ፣የሚጠቀሙ ቤቶች ስንት ናቸው?** **ተጠቃሚ ሰዎችስ ብዛት ስንት ነው?**	**----------** **----------**	
29	**መፀዳጃ ቤቱ አሁን ያለበት ሁኔታ ምን ይመስላል? (ተመልከተው ይሙሉ)**	**ወለሉ ላይ ሰገራና ሽንት ይታያል1** **በመፀዳጃ ቤቱ አካባቢ ዝንቦች ይታያለ2** **መፀዳጃ ቤቱ ይሸታል ---------3** **መፀዳጃ ቤቱ ንፁህ ነው ---------4**	

30	**በመፀዳጃ ቤቱ አጠገብ የዕጅ መታጠቢያ አለን? (በመመልከት ይሙሉ)**	**አዎ-------1** **የለም ------2**	
31	**የዕጅ መታጠቢያው ውኃ አለውን? (ተመልክተው ይሙሉ)**	**አዎ ----------1** **የለውም -------2**	
32	**ዕጅ መታጠቢያው አጠገብ ሳሙና/አመድ አለን?**	**አዎ----------1** **የለም ---------**	
33	**በቤት ውስጥ ከ 5 ዓመት በታች ህፃን አለን?**	**አዎ----------1** **የለም --------2**	**ወደ 35ይለፉ**
34	**ካለ የህጻናት ሰገራ እንዴት ነው የምታስወግዱት?**	**ህጻናቶች መፀዳጃ ቤት የጠቀማሉ1** **ወደ ቆሻሻ እንጨምረዋለን --------2** **እንቀብረዋለን ---------3** **ዝም ብለን ባለበት እንተወዋለን -4** **ሌላ ካለ ይገለጽ ----------99**	
35	**መፀዳጅ ቤት ከሌላቸው ለምን?**	**ገነዘብ ስለሌለን --------1** **መስሪያ ቦታ በግቢያችን ስለሌለ---2** **ለመገንባት ፈቃድ ስለማናገኝ -----3** **ቤቱ የኪራይ ስለሆነ---------4** **ሌላ ካለ ይገለጽ ----------99**	
የንፅህና አጠባበቅና የተቅማጥ ሁኔታ			
36	**በቤተሥ ውስጥ ሳሙና አለን? (ካለ አይተው ያረጋግጡ)**	**አዎ----------1** **የለም --------2**	**ወደ 39 ይለፉ**
37	**ካለ ባለፉት 24 ሥዓታት ውስጥ ለመታጠብ ሳሙና ተጠቅመዋልን?**	**አዎ----------1** **የለም -------2**	**ወደ 40 ይለፉ**
38	**ተጠቅመው ከሆነ ለምንድን ነው የተጠቀሙት?**	**ልብስ ለማጠብ ------1** **ገላየን ለመታጠብ ------2** **የልጆቼን ገላ ለማጠብ ----3** **የልጆቼን እጅ ለማጠብ------4** **ዕጄን ለመታጠብ -------5** **ሌላ ካለ ይገለጽ ----------99**	
39	**ዕጃቸውን ለመታጠብ ከሆነ ምን ካደረጉ በኋላ ነው የተጠቀሙት?**	**መፀዳጃ ቤት ከተጠቀምኩ በኋላ ---1** **ህፃኑን ከጸዳሁ በኋላ -----2**	

	(ምርጫውን ሳያነቡ የተመለሰውን ብቻ ምልክት ያድርጉ)	ህፃኑን ከመመገቤ በፊት----------3 ምግብ ከማዘጋጀቴ በፊት -----4 ምግብ ከመብላቴ በፊት -----5 ምግብ ከበላሁ በኋላ -----6 ሌላ ካለ ይገለጽ ----------99	
40	እጅን በሳሙና መታጠብ በዋናነት የሚያስፈልገው መቼ ነው? (ምርጫውን ሳያነቡ የተመለሰውን ብቻ ምልክት ያድረጉ)	ምግብ ከማዘጋጀት በፊት -------1 ምግብ ከመብላት በፊት -------2 ህፃናትን ከመመገብ በፊት-----3 መፀዳጃ ቤት ከተጠቀሙ በኋላ ----4 የህጻናት ሰገራ ከጠረጉ በኋላ ------5 ምግብ ከበሉ በኋላ -------6 ሌላ ካለ ይገለጽ ----------99	
41	በጤና አጠባበቅ ትምህርት ላይ ተሳትፈው ያውቃሉ?	አዎ----------1 የለም ----------2	ወደ 45 ይለፉ
42	ተሳትፈው ከሆነ ትምህርቱ ስለምን ነበር? (የተማሩት ርዕስ ግለፅ)	---------- ----------	
43	በቤት ውስጥ ስለ ንፅህና አጠባበቅ የሚገልፁ ፅሑፎች አሉን?	አዎ---------1 የለም --------2	ወደ 45 ይለፉ
44	ካሉ ተመልከተና ስለምን እንደሚገለፁ መዝግብ?	---------- ----------	
45	ባለፈው ሁለት ሳምንት ውስጥ ተቅማጥ ነበረዎትን?	አዎ----------1 የለም ----------2	ወደ 48 ይለፉ
46	ከነበረዎት ደም ነበረው?	አዎ --------1 የለውም ----------2	
47	ተቅማጥ ከነበረዎት ለምን ያህል ጊዜ ቆየበዎት?	---------- ቀን	
48	ገላዎን የሚታጠቡት የት ነው?	ቤት ውስጥ ያለ ሻወር--------1 ጎረቤት ካለ ሻወር ---------2 መተጠቢያ ገንዳ አለኝ ----3	

		የህዝብ መታጠቢያ ቤት--------4 በገንዘብ አገለግሎት የሚሰጡበት ቦታ -5 ቤት ውስጥ በባልዲ ---------6	
49	ገላዎን በምን ያህል ጊዜ ይታጠባሉ?	በየቀኑ ---------1 እንደአስፈላጊነቱ ------2 በየሳምንቱ ----------3 በየሁለት ሳምንቱ ----4 ሌላ ካለ ይገለጽ ----------99	

አመሰግናለሁ!

ANNEX III

Number of home-based care clients in the ten Sub City and proportional allocation of sample size

No	Name of Sub City	Number of home-based care clients	Sample size allocation
1	Arada sub city	569	36
2	Addis Ketema sub city	873	55
3	Lideta sub city	461	29
4	Gulele sub city	681	43
5	Kirkos sub city	562	35
6	Bole sub city	536	34
7	Yeka sub city	904	57
8	Kolfe Keranyo sub city	1116	70
9	Nefas Silk Lafto sub city	571	36
10	Akaki Kality sub city	427	27
	Total	6700	422

DECLARATION

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

Name: - Manaye Siyoum Tariku

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Place: - _____

Date of submission: - _____

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

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Signature: - ___________________________

Date of submission: - _________________________