

**Risk factors of Diarrheal Diseases among adult People living
with HIV/AIDS attending ART clinics in Jimma town, South
Western Ethiopia**



By

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Risk factors of Diarrheal Diseases among adult People living with HIV/AIDS attending ART clinics in Jimma town, South Western Ethiopia: Unmatched case control

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ABSTRACT

Background: Human immunodeficiency virus/acquired immunodeficiency syndrome is among the leading causes of infectious diseases morbidity and mortality worldwide. A common manifestation of enteric involvement of HIV is diarrhea. Diarrhea affects approximately 90% of patients with AIDS in developing countries and 30-60% of AIDS patients in developed countries. Different studies indicate there are many risk factors for the occurrence of the diarrheal diseases among peoples living with HIV/AIDS: socio demographic factors like age and income, environmental factors like water, hygiene, sanitation, and housing condition related factors. CD4 count, stage of the disease, prophylaxis and pre ART status are also among the factors that affect the occurrence of diarrheal diseases. Even though these are the factors identified so far, the study is going to explore more factors and fill the gap seen in the study area.

Objective: The objective of the study is to identify potential factors associated with occurrence of diarrheal diseases among peoples living with HIV attending ART clinics in Jimma town.

Methodology: Institutional based unmatched case control study was conducted among 268 PLWHAs using consecutive sampling from January 20 - March 23. Structured questionnaire were used and data were edited, coded and entered into Epidata then cleaned and analyzed using SPSS version 16 for Windows.

Result: Male sex (AOR= 2.276; 95% CI:1.079, 4.800), public water point (AOR= 4.972; 95% CI: 2.408, 10.266), absence of squat hole cover (AOR= 2.763; 95% CI: 1.276, 5.980), waste disposal in garbage container (AOR= 7.676; 95% CI: 1.776, 33.188), having pets/animals in the house (AOR= 2.260; 95% CI: 1.153, 4.427), not having refrigerator (AOR= 3.343; 95% CI: 1.274, 8.774), previous GIT disorder (AOR= 4.254; 95% CI: 1.647, 10.987) and history of diarrhea (AOR= 3.966; 95% CI: 1.896, 8.295) were found to be potential risk factors of diarrheal diseases.

Conclusion and recommendation: Male sex, public water point, absence squat hole cover, waste disposal in garbage container, presence of pets in the house, absence of refrigerator, history of diarrhea and GIT disorder were potential risk factors of diarrheal diseases which show that hygiene and sanitation should be the core of intervention in prevention of diarrheal diseases.

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TABLE OF CONTENTS

Contents	Pages
ABSTRACT.....	i
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURES.....	vi
ACRONYMS.....	vii
INTRODUCTION.....	1
1.1. Background	1
1.2. Statement of the problem	3
LITERATURE REVIEW	7
2.1. Literature Review	7
2.1.1. Socio demographic factors	7
2.1.2 Environmental factors	8
2.1.3 Clinical factors.....	11
2. 2. Conceptual framework.....	14
2.3. Significance of the study	15
OBJECTIVES	16
3.1. General Objective	16
3.2. Specific objectives	16
METHODS AND MATERIALS	17
4.1. Study area and period.....	17
4.2. Study Design	17
4.3. Source population	17
4.4. Study population.....	17
4.4.1. Definition of Cases:.....	17
4.4.2. Definition of Controls:	18
4.4.3. Study population for cases:.....	18
4.4.4. Study population for controls:	18

4.5. Inclusion and Exclusion criteria	18
4.5.1. Inclusion criteria:	18
4.5.2. Exclusion criteria:	18
4.6. Sample size and Sampling techniques	18
4.6.1. Sample size determination.....	18
4.7. Variables	20
4.7.1. Dependent variable.....	20
4.7.2. Independent variables.....	20
4.8. Data collection techniques and instruments	21
4.8.1. Data collection technique	21
4.8.2. Data collection instrument.....	22
4.9. Data analysis.....	22
4.10. Data quality control.....	23
4.11. Pre-test	23
4.12. Ethical consideration.....	23
4.13. Dissemination plan	24
4.14. Operational definition and definition of terms	24
RESULT	26
5.1. Socio-demographic and Socio-economic characteristics	26
5.2. Environmental factors	28
5.2.1. Housing characteristics.....	28
5.2.2. Water supply and hygiene related factors.....	29
5.2.3. Sanitation related factors	33
5.3. Clinical factors.....	36
5.4. Overall predictors of diarrheal diseases	39
DISCUSSION	41
STRENGTH AND LIMITATION OF THE STUDY	46
CONCLUSION AND RECOMMENDATION	47
References.....	48
Annex I: English Version Questionnaires.....	53
Annex II: Amharic Version Questionnaire	67
Annex III: Afaan Oromoo Version Questionnaire	78

LIST OF TABLES

Table 1: Socio-demographic characteristics and diarrheal disease status of the respondents attending ART clinics in Jimma town, March 2013.....	27
Table 2: Housing characteristics and diarrheal disease status among clients attending ART clinics in Jimma town, March 2013.....	29
Table 3: Water supply and hygiene related factors and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	30
Table 4: Sanitation related factors and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	34
Table 5: Clinical factors and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	37
Table 6: Overall predictors of diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	40

LIST OF FIGURES

Figure 1: Conceptual framework developed for studying risk factors of diarrheal diseases among adult peoples living with HIV/AIDS after reviewing different literatures.....	14
Figure 2: Water treatment methods and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	31
Figure 3: Hand washing after defecation and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	32
Figure 4: Toilet location and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	35
Figure 5: Liquid waste disposal site and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	36
Figure 6: ART regimen and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013.....	38

ACRONYMS

3TC	Lamivudine
ART	Anti Retroviral Therapy
AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
AZT	Zidovudine
D4T	Stavudine
EFV	Efavirenz
GIT	Gastro Intestinal Tract
HAART	Highly Active Anti Retroviral Therapy
HIV	Human Immuno Deficiency virus
JUSH	Jimma University Specialized Hospital
NVP	Nevirapine
PI	Principal Investigator
PLWHA	People Living With HIV/ AIDS
SWS	Safe Water System
TDF	Tenofovir
UNAIDS	United Nations program on HIV/AIDS
USAID	United States Agency for International Development
WC	Water Carriage
WHO	World Health Organization

INTRODUCTION

1.1. Background

Human immunodeficiency virus/acquired immunodeficiency syndrome is among the leading causes of infectious disease morbidity and mortality worldwide [1]. As a result, it is increasingly difficult to ignore the public health impact of human immunodeficiency virus/acquired immunodeficiency syndrome. Even during current continuous advancement in Medicine; many still live with HIV. About 34 million people [31.6million-35.2million] were living HIV worldwide by 2010. Sub-Saharan Africa region was the most affected area of the world by HIV/AIDS. Even though, the region contributes 12% of the global population, about 68% of all people living with HIV resided in this region in 2010. Moreover, 70% of new HIV infections were recorded during 2010 in Sub-Saharan Africa [2]. Ethiopia is not an exception when considering HIV/AIDS as the prevalence among adults is 1.5 [3]; in 2010 it was estimated that about 1.2 million were living with HIV/AIDS [4].

One of the important problems related to HIV is its ability of depleting of hosts' immune system and leading to Acquired Immune Deficiency Syndrome (AIDS) [2, 4, 5]. Moreover, AIDS leads to often-fatal opportunistic infections due to poor functioning of immune system. Not only immune system but almost every system from nervous system to the gastrointestinal (GI) tract is affected by HIV. A common manifestation of enteric involvement of HIV is diarrhea leading to life threatening complications [5]. Diarrhea can be defined as watery or liquid bowel movements that are more frequent than usual for an HIV/AIDS patient. Acute diarrhea lasts for a few days while chronic diarrhea lasts longer. The Centers for Disease Control defines chronic diarrhea as two or more loose or watery stools a day for at least thirty days. HIV can cause diarrhea by causing changes in intestinal transit and absorption and alterations of the immune system leading to opportunistic infections [5]. The virus also leads to enteropathy, causing a partial villous atrophy with subsequent malabsorption [6].

HIV has been suggested to cause direct changes to intestinal mucosa. The term enteropathy has been used to describe pathogen negative diarrhea. However, it is impossible to completely rule out a pathogen association, thus this is a diagnosis of exclusion. Possible mechanisms include a

direct effect by HIV to causing gastrointestinal malfunction and malabsorption. Further, diarrhea can be caused by medication side effects [5].

One major issue that peoples living with HIV faces is compromised immune systems, which make them more susceptible to opportunistic infections, such as diarrhea and skin diseases. Diarrhea are occurring in highest rate in peoples living with HIV, 2–6 times higher than in those who are not infected, and rates of acute and persistent diarrhea are twice as high in infected than uninfected populations [7].

There is an increasing concern that the quality of life of people living with HIV (PLHIV) is reduced due to infection which can also speed up the progression from HIV to AIDS. Moreover, diarrheal diseases challenge the progress of PLHIV as it reduces the absorption of antiretroviral medicines and essential nutrients [8].

To date, it has been known that diarrheal diseases are endemic to areas with poor socio economic conditions (i.e. poor nutritional status, poor sanitation and lack of access to safe drinking water) [9]. Besides, infectious diarrhea is the most prevalent illness in people infected with HIV [1]. In developed countries diarrhea occurs in 30-60 percent of AIDS patients and the figure is as high as 90% of AIDS patients in developing countries [1, 10]. In a large proportion of this population, the diarrhea may become prolonged and life-threatening, and chronic diarrhea is an independent marker of poor prognosis in patients with AIDS [1, 11, 12].

Chronic diarrhea (lasting for more than one month) being one of the major complaints of AIDS patients occurring in about 40% of cases, it is also one of the WHO-staging criteria for AIDS [11]. It is not a life-threatening condition, but it can severely diminish quality of life. In conditions of poor sanitation it places a particularly heavy psychological and social burden on afflicted patients [6, 12]. Cumulative risk for chronic diarrhea after development of AIDS increases from 48.5% in the first year to 95.6% in the third year [12].

In patients with HIV in Africa, diarrheal disease and wasting are a more common complication of HIV infection than they are in the United States and Western Europe [13]. Several factors may

contribute to the increased prevalence of diarrhea in Central African HIV patients, amongst them are poor sanitation, contaminated food and water supplies, higher mean ambient temperature, unhealthy methods of food preservation and close proximity to livestock [14].

Generally, Gastrointestinal and hepatobiliary disorders are among the most frequent complaints in patients with HIV disease. Advances in antiretroviral therapy are changing the nature of HIV disease and affecting many of the gastrointestinal manifestations. If there were no advances in antiretroviral therapy and their combination treatment, about 50 to 93% of all patients with HIV disease had marked GI symptoms during the course of their illness. In other hand effective anti HIV therapy and chemoprophylaxis for *Pneumocystiscarinii* (PCP), *Mycobacterium avium* (MAC) and cytomegalovirus (CMV) may delay/prevent the occurrence of gastrointestinal opportunistic infections. Given fewer late-stage immune compromised patients, clinicians must recognize the shifts in the spectrum of pathogens, recognize the need to maintain good nutrition, and facilitate outpatient management directed at identifying treatable causes and ameliorating symptoms [15].

Because of abovementioned reasons, People living with HIV/AIDS (PLWHA) have greater need for hygiene than those whose immune systems are not compromised and they require good nutrition for antiretroviral therapy (ART) to be more effective [16].

1.2. Statement of the problem

The HIV/AIDS pandemic is everywhere, though sub-Saharan Africa is the most severely affected region with 22.5 million HIV-positive adults and children followed by South Asia and South-East Asia with 4.0 million. These regions have high levels of poverty and low access to the water supply and sanitation services critically needed to prevent and treat the disease. In Ethiopia, a high population growth rate, poverty, food shortages, low access to clean water, sanitation and quality health services, and other socioeconomic factors continue to fuel the HIV epidemics [3, 4, 11].

Large proportions, 90% of PLWHAs in developing country are affected by diarrheal diseases compared to 30% to 50% in developed countries [1, 10, 15]. Diarrhea in persons with advanced disease is usually chronic (two or more daily loose or watery stools for at least 30 days) and associated with significant morbidity, weight loss, and severe malnutrition. The pathogenesis of chronic diarrhea in HIV is complex and associated with multi factorial etiologies [17]. It is the second leading cause of hospital visits in developing nations and is among the top ten diseases worldwide [18]. A retrospective analysis of patients with AIDS and diarrhea done in Mexico revealed that 77% of the patients suffered at least one diarrheal episode and diarrhea was in fact the most common AIDS-related complication. It was the first HIV-related symptom in 51% of the total cases. The diarrheal pattern was intermittent in 47% of the cases, chronic in 36% and acute in the remaining 17%. It is also revealed that chronic diarrhea is associated with lower survival probability at one year which is 60% compared with intermittent diarrhea (90%) and acute diarrhea (95%) at $P < 0.001$ [19].

There is an increasing concern that PLWHAs in tropical region are disadvantaged as intestinal pathogen infections are already common in this area. Diarrhea by itself needs a great concern as this group is susceptible to classic pathogens and different opportunistic agents, malnutrition and ultimately death may be associated to these co-infections. HIV commonly destroys the immune system and renders patients susceptible to opportunistic infections [6, 19]. Furthermore, the commonly prescribed antibacterial chemoprophylaxis is aggravating this condition by creating damage to gastrointestinal flora [6]. Therefore, it is hard to ignore the fact that diarrhea is a significant cause of morbidity and mortality among HIV/AIDS patients [20]. In developing countries, various data indicate that close to 100% of HIV-positive patients may suffer from chronic diarrhea, as estimated on a cumulative life-time incidence, but the situation in the developed world is better [10, 19].

Not only, diarrhea causes decrease food intake and nutrient absorption, malnutrition, reduced resistance to infection, and impaired physical growth and cognitive development; but also it creates multiple burden for PLWHAs and their families [20]. Diarrheal illness adversely affects quality of life/is an independent predictor of reduced quality of life and is associated with decreased survival after AIDS has developed. Chronic diarrhea in patients with HIV infection is

an independent marker of poor prognosis [21]. The severity of the illness varies, but it is responsible for substantial morbidity and mortality. This morbidity has an effect on whole families, making demands financially as well as posing a sanitary threat. The relatives of AIDS in-patients stressed that diarrheal disease is such a heavy burden on families that they preferred the patient to remain in hospital with obvious implications for hospital overcrowding [20, 22]. In other study it was found that some AIDS patients were heavily stigmatized, including refusal of access to communal sanitation facilities [23].

Diarrhea in patients with HIV infection is a big challenge because, in addition to etiologies common to the general population, non-infectious diarrhea may be seen due to the well-known adverse reaction to antiretroviral drugs [17, 24]. Despite its long clinical success in chronic diarrhea by clearing protozoan oocysts/spores from stool, highly active antiretroviral therapy (HAART) has also been associated with inducing diarrhea. Majority of currently approved antiretroviral medications have diarrhea listed as adverse side effects [1, 17]. However, non-infectious diarrhea, for the majority of patients, is limited to a period of one to two months. On the other hand, individuals with low CD4+ cell counts (≤ 200 cells/mm³) require greater medical attention as they are highly susceptible to the infectious form [24]. About 50% of chronic diarrhea in AIDS patients may be due to enteric infections with one or more species of pathogenic organisms, commonly opportunistic ones. Gut architectural alteration secondary to local HIV infection, (usually referred to as HIV enteropathy) is a condition characterizing chronic diarrhea in AIDS patients in whom no identifiable etiological agent has been found for the diarrhea [11]. In severe cases, the patient may pass between 10 to 20 or more watery stools in a day with associated extreme dehydration and is followed by different medical complications [25].

In South Africa, data indicated that HIV/AIDS is the leading cause of premature mortality due to pre transitional causes, such as diarrhea which can be more pronounced in the poorer and more rural provinces [26]. Persistent diarrhea is a common manifestation of AIDS in Africa. Recent evidence suggests that 4.8% per year in Rwanda in HIV infected persons and 40-80% of AIDS patients experience this complication. The severity of the illness varies, but it is responsible for substantial morbidity and mortality [27, 28].

To date there has been various studies undertaken by many to identify the possible intervention of measures of diarrheal diseases. In Nigeria research have showed that an intervention (point of use water chlorination and storage) on diarrheal-disease risk in a population of HIV-infected women was associated with a reducing the risk of diarrhea in PLHIV by 36%; $P=0.04$ [27]. Similarly, CDC, Global AIDS Program, Uganda Viral Research Institute, and the AIDS Support Organization studies indicated that use of the Safe Water System reduced the risk of diarrhea by 25% and the total number of days ill from diarrhea by 33% in PLWHAs [20].

So far, there has been several risk factors identified that may contribute to increased prevalence of diarrhea in peoples living with HIV; amongst them are poor sanitation, contaminated food and water supplies, unhealthy methods of food preservation and close proximity to livestock [14], CD4 count, protease inhibitor use, cotrimoxazole use [18, 29], income, education, age and sex [29, 31, 32]. However, the risk factors seem to vary in different societies and depend on socio economic characteristic of the community. Moreover, study conducted in south western Ethiopia, indicated high rate of diarrheal disease among HIV positive patients (51.1%) compared to HIV non infected patients (29.5%) [28], but the risk factors are not studied among this population and data related to such studies is sparse in study area. Therefore the aim of this study is to fill the gap seen in study area by identifying potential risk factors associated with diarrheal diseases among peoples living with HIV/AIDS using case control study design and the findings of the study will also help to show critical areas of intervention of diarrheal diseases among peoples living with HIV/AIDS.

LITERATURE REVIEW

2.1. Literature Review

In this chapter, a review of literatures focused on risk factors of diarrheal diseases among peoples living with HIV/AIDS and the significance of the study will be addressed.

2.1.1. Socio demographic factors

Almost all studies done on similar area of concern so far have collected socio demographic information of the respondent and some of the factors are significantly related with occurrence of diarrheal disease.

In a research article by Siddiqui and colleagues, older age was associated with significantly increased risk of diarrhea ($P = 0.002$) [29]. Also, case control study in rural HIV/AIDS clinic in South Africa described also indicated older peoples living with HIV are nearly six times at risk of developing diarrheal diseases (AOR: 6.31, 95% CI 1.50-26.50) [30]. In other hand, the same study revealed, diarrhea remained associated with gender and females were two times more likely to develop diarrheal diseases as compared to males (AOR): 2.02, 95% CI: 1.10-3.73) [30]. In this study the researchers identified only clinical and social determinants of the diarrheal disease. Similarly, another study done in Swiss HIV cohort also showed that females are at a bit higher risk (AOR=1.8; 95% CI:1.09-3.11) of developing chronic diarrhea disease when compared to males but no significant association was seen regarding development of diarrheal diseases in general ($P = 0.39$) [31]. However, case control study done in center for AIDS and related diseases in New Delhi and Karnataka, India indicated that age and sex does not have association with diarrheal diseases occurrence among peoples living with HIV/AIDS [32,1].

Data from other case control study conducted in community-based HIV clinics in the large urban center of Bangalore in southern Karnataka and from the smaller rural community of Bagalkot district in northern Karnataka, India revealed that, peoples with primary education only and lower monthly income are 4.4 times and 5.5 times at risk of developing diarrheal disease respectively. Furthermore, the study also found PLWHAs who contribute monthly to savings (AOR= 0.38; 95%CI: 0.19 0.77) and work outside the home (AOR=0.44; 95% CI: 0.24–0.80) are less likely to have diarrheal diseases [1]. Similarly the study in Kampala, Uganda also

showed that income earning of member of the household is protective of diarrheal diseases development ($P < 0.05$) (AOR = 0.59) [33].

In addition, background of education and occupation groups among urban residents show statistically significant association ($P < 0.05$) with occurrence of diarrheal diseases according to study done in Beijing [34]. Dwivedi and his coworker described, peoples living in slums are 7.9 times at risk of developing diarrheal diseases compared to those living in urban areas and those living in rural areas are 2.7 times at risk compared to those living in urban ($P < 0.025$) [32]. Moshabela and colleagues explained that marital status of peoples living with HIV is significantly associated with diarrheal diseases development status. In other words divorced or separated ($P = 0.006$) are at higher risk compared to the married peoples [30].

Moreover, a cross sectional study conducted in Beijing by Ma and colleagues to identify the risk factors of diarrhea related behaviors showed that, not being used to regular physical exercise is a significant risk factor diarrheal disease development (AOR= 1.46; 95% CI:1.27 - 1.67) [34].

2.1.2 Environmental factors

It has been shown that several factors might contribute to the increased prevalence of diarrhea in developing countries; amongst them poor sanitation, contaminated food and water supplies, unhealthy methods of food preservation and close proximity to livestock are the common one.

In South Africa, lower prevalence of diarrhea is reported in the study conducted in urban areas where basic toilets and water are usually provided [14]. In 2012, Moshabela and coworkers reported, having inadequate access to sanitation facilities is significantly associated with development of diarrheal diseases among peoples living with HIV/AIDS ($P = 0.045$) in their study conducted in rural HIV/Clinics of South Africa. They also indentified, individuals who have limited access to water are 2.6 times at higher risk of developing diarrheal diseases (AOR: 2.66, 95% CI: 1.32-5.35, $P = 0.032$) [30].

Dwivedi and his collaborator examined enteric opportunistic parasites among HIV infected individuals: associated risk factors and immune status in New Delhi, India. They found that, contact with pets and animals are significant risk factor ($P < 0.01$) for occurrence of diarrheal disease, individuals who have contact with pets and animals are 7.5 times at higher risk of developing diarrheal diseases compared to those who do not have contact with pets or animals [32]. Other study by Becker and coworker showed that, peoples living in crowded condition are at two times risk of developing diarrheal diseases (AOR= 2.1; 95%CI: 1.2–3.9). In addition, individuals who have flies, ants, cockroaches and rats at home are (AOR=2.4; 95%CI: 1.3–4.5), (AOR=1.4; 95%CI: 0.77–2.6), (AOR=2.0; 95%CI: 1.1–3.6), (AOR=2.2; 95%CI: 1.2–4.0) times at risk of developing diarrhea respectively. They also showed, contact with livestock outside home is also significant risk factor of diarrheal disease in peoples living with HIV/AIDS (AOR =2.7; 95%CI: 1.4–5.5) [1]. Similarly another study conducted in Kampala, Uganda revealed that the odds of diarrhea were 2.6 times greater for individuals who reported a pest problem than for those who did not [33].

Regarding access to drinking water, Becker and colleague conducted to examine diarrheal disease among HIV-infected adults in Karnataka, India: evaluation of risk factors and etiology, in which they reported, cases had to travel further to access drinking water than controls, with 29% of cases versus 8% of controls having to travel more than 40 meters to obtain drinking water (AOR =3.6, 95% CI = 1.5– 8.9). They also reported, almost all participants had a storage container for water and there was no significant difference in sources of drinking water between the two groups [1]. In other report from USAID environmental health on Preventing Diarrhea in Persons Living with HIV and AIDS indicated that access to safe water reduces the risk of water-borne diarrheal diseases in developing country settings. Among persons with HIV, Safe water system was associated with a 25% reduction in diarrhea episodes ($P = 0.015$) and 33% fewer days with diarrhea ($P = 0.021$) [20]. On the other hand, Nasinyama and coworker assessed the risk factors for acute diarrhea among inhabitants of Kampala District, Uganda found source of water are not a risk factor; no significant difference was noticed in groups who use water tanker, hand pump and tap water ($P = 0.25$) [33].

The study of risk factors for acute diarrhea among inhabitants of Kampala District, Uganda by Nasinyama and coworker indicated that absence of toilet facility is significant risk factor of diarrhea in such a way that peoples who use open field are 9.6 times at higher risk of developing diarrhea compared to those who have their own latrine ($P < 0.001$) [33]. A Prospective community based cohort study of Weber and collaborators reported that the presence of a latrine in a compound, compared with those without a latrine, was associated with fewer episodes of diarrhea, (IRR = 0.69; 95% CI: 0.53–0.91, $P = 0.009$) and fewer days with diarrhea, (IRR = 0.63, 95% CI: 0.40–1.00, $P = 0.048$) [31]. Moreover, study from Becker and coworker described that individuals who doesn't have latrine at home are at (AOR= 2.2 95% CI: 1.2–4.0) times risk of developing diarrheal diseases but there was no significant difference between the two groups with respect to hand-washing practices [1].

Using water treated by chemical or filter treatment was found protective against the occurrence of diarrhea among peoples living with HIV/AIDS compared to those who use water without treating (AOR= 0.50; 95% CI: 0.26–0.96) [1]. A recent study of risk factors of diarrhea-related behaviors among adults in Beijing by Ma and coworker indicated , lack of hand-washing habit before eating or after toilet-using, eating raw seafood or freshwater products, using the same chopping block and knife at the time when processing raw and cooked food, are the risk factors on diarrhea among adults with the (AOR = 1.85; 95% CI: 1.51 - 2.25), (AOR=1.39 95%CI: 1.17 - 1.67) and (AOR=1.44 95%CI: 1.24 - 1.67), respectively [34]. Beside, Weber and collaborators reported the presence of soap in the house was also associated with fewer days with diarrhea, (IRR = 0.58; 95% CI: 0.35–0.97, $P = 0.038$), and fewer days of work or school lost due to diarrhea (IRR=0.56; 95% CI: 0.34–0.93, $P = 0.024$), but not episodes of diarrhea (IRR = 0.79; 95% CI: 0.60–1.07, $P = 0.134$) [31].

Moreover, the study of Becker and coworker showed that, individuals who cooked less than three meals per day are at three times (AOR= 2.7; 95%CI: 1.5–5.0) risks of developing diarrheal diseases compared with those who cook three meals and above per day [1]. But the study identified that, there was no significant difference seen between the two groups in the length of time for food preparation, eating meals outside the home, or eating vegetarian versus non-vegetarian food. Also, having refrigerator at home did not show significant effect on diarrheal

disease occurrence (AOR= 0.16 95%CI: 0.01–2.2) [1]. In other study done in Kampala, Uganda showed that, drinking raw chicken eggs was significantly ($P < 0.01$) and strongly (odds ratio (OR) = 9.9) associated with diarrhea among residents of Kampala district. The odds of diarrhea in households that 'cooked just enough food per meal' was significantly less (OR = 0.42) compared to those who cooked more than enough per meal. People who used municipal water supplies and those who boiled their drinking water were significantly less likely (OR = 0.27, OR = 0.33, respectively) than those who used other water sources and/or who did not boil drinking water to report an episode of diarrhea [33].

2.1.3 Clinical factors

Overall CD4 count, prophylaxis, stage of disease, previous diarrhea episode, pre ART status, presence of opportunistic infections and hospitalization were found to be associated with diarrheal diseases in peoples living With HIV/AIDS in most related studies.

Sanchez and Ponce examined clinical patterns of diarrhea in AIDS patients' in referral hospital of Mexico also showed that, diarrhea was the most common AIDS-related complication and it is the first HIV-related symptom in 51% of the total cases. It is also described that, the diarrheal pattern was intermittent in 47% of the cases, chronic in 36% and acute in the remaining 17% [19]. In Ethiopia Awole, Gebre-Selassie, Kassa and Kibru examined the prevalence of intestinal parasites in HIV-Infected adult patients in Southwestern Ethiopia and reported, among the 192 HIV infected patients 54 (28.1%) and 45 (23.4%) of them had chronic and acute diarrhea respectively [28]. In the study of prevalence and etiology of persistent diarrhea in adults in urban Zambia done by Kelly and collaborator, distribution of time of diarrhea is seen as 78 (78/1440, 5.4%) had had diarrhea for less than 2 weeks; 6 (6/1440, 0.4%) adults had had diarrhea of between 2 and 4 weeks; and 10 (10/1440, 0.7%) had had diarrhea for one month or more [22].

Study in Karnataka, India showed that, 45% of cases compared with 19% of controls gave a previous history of diarrhea (AOR = 4.2; 95% CI: 1.7–10.6 $P=0.002$) which explained that individuals who have previous history of diarrhea are at 4.2 times risk of developing diarrheal diseases. Forty-eight percent of the controls reported taking TMP/SMX (cotrimoxazole) for OI prophylaxis compared with only 16% of the cases (AOR =0.48; 95% CI =0.25–0.92) which

shows that individuals who are taking cotrimoxazole prophylaxis are at lower risk of developing diarrheal diseases [1].

Swiss HIV cohort reported that severe immunodeficiency increase the risk developing diarrhea was increased [31]. Similarly, Weber and coworker also reported high risk of bacterial diarrhea in peoples living with HIV/AIDS than control [12]. They also found hospitalization as a major risk factor for developing *Clostridium difficile* associated diarrhea. Treacle discussed opportunistic infection is an important cause of the morbidity and mortality of GI tract disorders in HIV [5]. These infections occur when the immune system is compromised, usually with CD4 counts < 200, but it may also occur with those on HAART and normal CD4 count.

Attili and colleagues indicated CD4 counts were significantly lower in those with diarrhea than in those without diarrhea ($P=0.02$). Also, patients with chronic diarrhea had lower CD4 counts than those with acute diarrhea which showed there was a strong negative association between the duration of diarrhea and CD4 levels ($P<0.05$) [18]. Similarly, Wanke and colleagues reported, the advancement of diarrheal disease differ by CD4cell count [13]. In addition, Becker and coworker indicated, individuals who have CD4 counts of less than 200 are at 2.8 times risk of developing diarrheal diseases (AOR = 2.8, 95% CI = 1.5–5.4) [1]. Dwivedi and colleagues reported that diarrhea is common among individuals who have lower CD4 count. The mean CD4⁺ count of diarrheal cases was 142 ± 97 cells/mm³, whereas, in non-diarrheal cases it was 390 ± 129 cells/mm³ and similarly among diarrheal cases, individuals with chronic diarrhea have lower CD4 count than the acute diarrheal cases [32]. Another study done in Cambodia showed, the median CD4+ cell count of subjects with chronic diarrhea was found lower than that of control group (6 vs. 14 cells/ mm³; $P=0.05$). Moreover, patients with chronic diarrhea showed a lower mean body mass index ($P=0.04$) and mid-arm circumference ($P=0.03$) than patients without diarrhea [21]. A recent study conducted in Hawassa referral hospital, Ethiopia, also showed HIV positive patients with CD4 counts less than 200 cells/ μ L had reported an excess risk of having diarrhea independent of parasitic infection compared with those having 500 cells/ μ L and above [35].

A case control study of Moshabela and coworkers displayed diarrhea remained associated with pre-ART status which showed that peoples living with HIV/AIDS who did not start taking HAART are at nearly six times risk of developing diarrheal diseases compared to those who is taking HAART (AOR: 5.87; 95% CI: 3.05-11.27) [30]. However, Weber and colleague reported PLWHAs taking antiretroviral therapy are at higher risk of diarrhea in contrary to the study done in South Africa which showed that being on HAART is protective [31]. Despite its valuable effect HAART has also been associated with inducing diarrhea in persons with HIV. Ten of sixteen currently approved antiretroviral medications have diarrhea listed as adverse side effects. [15]. Similarly, Siddiqui and collaborator showed that the use of protease inhibitor were significantly associated with increased incidence of diarrhea (P=0.004) [29].

A prospective community based cohort study of enteric infections and diarrhea in Human immunodeficiency virus- infected persons by Weber and coworker revealed that PLWHAs taking cotrimoxazole prophylaxis were at lower risk of developing diarrheal diseases compared to those who did not take the prophylaxis (0.9 versus 2.0 episodes per person-year; IRR = 0.42, 95% CI =0.34–0.51, $P < 0.0001$) [18]. However, this study and that of Weber and coworker showed that taking *pneumocystis carini* chemoprophylaxis did not reduce the risk of diarrhea and Chemoprophylaxis with sulfamethoxazole- trimethoprim or dapsone-pyrimethamine had no impact on the risk to develop diarrhea which is in contrary with study done in Varanasi [18, 31].

Study of the effect of alcohol consumption upon gastrointestinal tract conducted by Bujanda reported that the main alcohol-related intestinal alterations are diarrhea and malabsorption and it facilitates the development of oropharyngeal, esophageal, gastric, and colon cancer [36]. Al-Motarreb, Al-Habori and Broadley showed that Khat has effect on different organs like periodontal disease, stomatitis, oesophagitis and gastritis and it also showed that it will lead to duodenal ulcer and decreased appetite [37].

2. 2. Conceptual framework

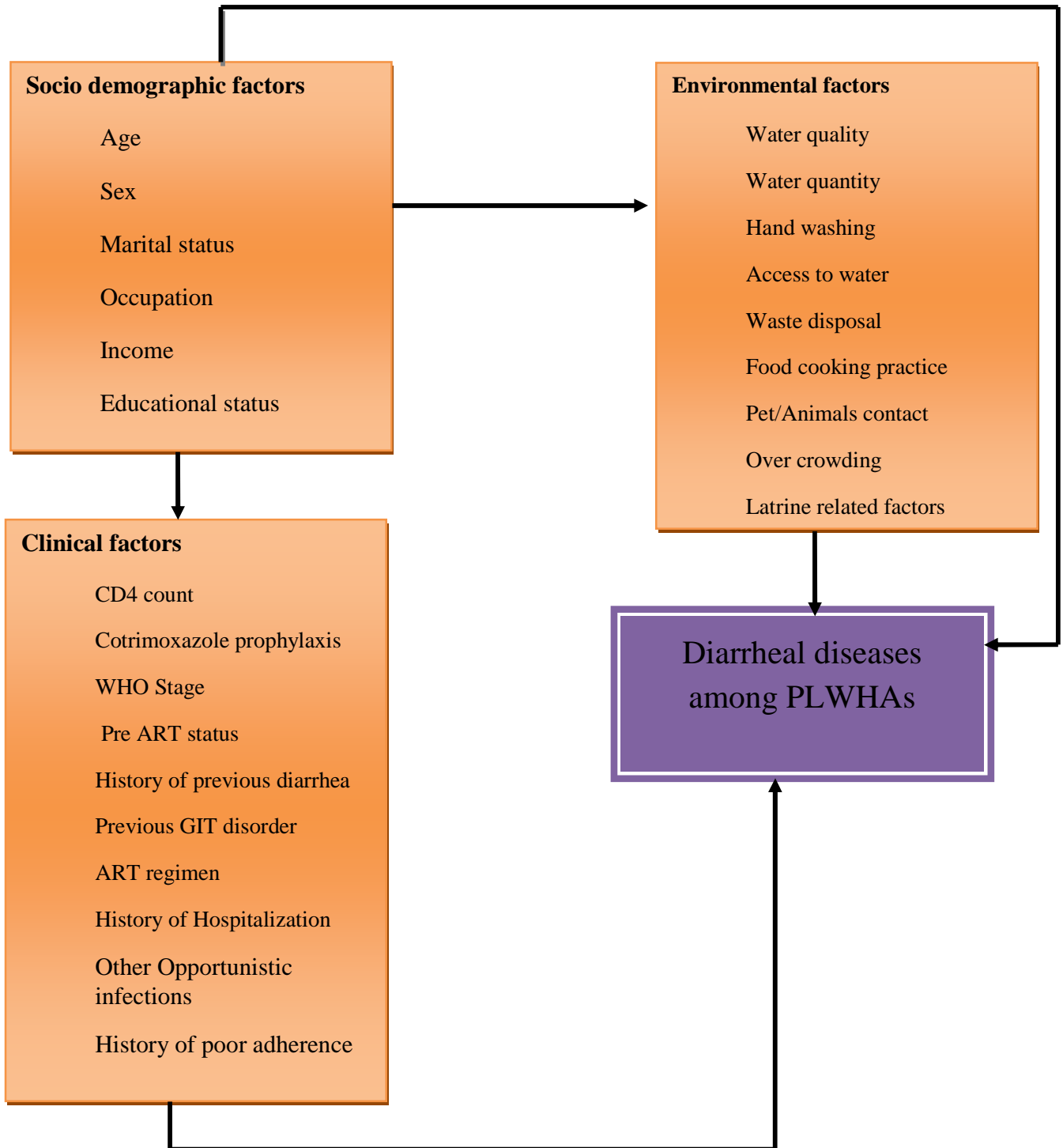


Figure 1: Conceptual framework developed for studying risk factors of diarrheal diseases among adult people living with HIV/AIDS after reviewing different literatures.

2.3. Significance of the study

As the AIDS pandemic has spread, Diarrhea can cause significant morbidity in HIV-infected patients and can be due to a multitude of etiologies. There is little information on possible risk factors for diarrhea in HIV-sero positive persons, although the importance of food and water safety in immune compromised populations is well known.

Therefore information obtained from this study is expected to fill gaps seen in study area by identifying potential risk factors of diarrheal diseases. It will also help as highlight for policy makers to consider the important contributing factors for occurrence of diarrheal diseases in PLWHAs while planning prevention and control measures of opportunistic infections.

The study will also be expected to shed light regarding knowledge on usage of resources by coming up with relevant, evidence-based recommendations for addressing issues related with diarrheal diseases in PLWHAs. It will also help other researchers as a base line data for their work.

OBJECTIVES

3.1. General Objective

- To identify the potential factors associated with occurrence of diarrheal diseases among adult peoples living with HIV/AIDS attending ART clinics in Jimma town, Southwestern Ethiopia.

3.2. Specific objectives

1. To identify socio demographic factors associated with diarrheal diseases occurrence among adult peoples living with HIV/AIDS.
2. To determine environmental risk factors of diarrheal diseases among adult peoples living with HIV/AIDS
3. To identify clinical risk factors of diarrheal diseases among adult peoples living with HIV/AIDS

METHODS AND MATERIALS

4.1. Study area and period

The study was conducted at Jimma University Specialized Hospital (JUSH) and Jimma Health Center which are located in Jimma town, which is found 352 km southwest of Addis Ababa, the capital city.

JUSH was established in 1922 by Italian invaders to give service for the soldiers. Currently it is the only teaching and referral hospital in the southwestern part of Ethiopia. It runs an annual governmental budget of 25.06 million Birr with bed capacity of 450 and a total of more than 750 of both supportive and professional staffs. It provides services for approximately 9000 inpatient and 80000 outpatient attendances a year. The hospital started to give ART service in 2004 and currently 3867 PLWHAs are enrolled and 3000 are on ART actively.

Jimma Health Center is established in 1953 and serving a catchment population of 42,164. It started to give ART service in 2007 with 1490 on pre ART and 661 are on ART actively. Services like VCT, PMTCT, ART and treatment of opportunistic infection are available in both above mentioned health facilities.

The data was collected from January 20 - March 23.

4.2. Study Design

Facility based unmatched case control study was used.

4.3. Source population

All PLWHAs who have ever enrolled in the ART clinics including those who came for the first time to the ART clinics in Jimma town during the study period.

4.4. Study population

4.4.1. Definition of Cases:

An HIV positive client presented with diarrhea whether or not on antiretroviral therapy.

4.4.2. Definition of Controls:

An HIV-positive client without diarrhea at the time of presentation and without history of diarrhea in the preceding 14 days.

4.4.3. Study population for cases:

A sample of PLWHAs (134 cases) who full fill the inclusion but not exclusion criteria and who are presented with diarrhea among those who attended the ART clinics in Jimma town health facilities during the study period.

4.4.4. Study population for controls:

A sample of PLWHAs (134 controls) who full fill the inclusion but not exclusion criteria and who had not had diarrhea in the previous 14 days among those who attended the ART clinics of Jimma town health facilities during the study period.

4.5. Inclusion and Exclusion criteria

4.5.1. Inclusion criteria:

To be participant of the study, an individual has to be at least 18 years old and diagnosed (tested) for HIV at least three months before the study.

4.5.2. Exclusion criteria:

Those PLWHAS who are seriously ill, mentally ill and who refuse to participate were excluded.

4.6. Sample size and Sampling techniques

4.6.1. Sample size determination

The sample size is determined based on sample size calculation for two population proportions formula using Epi Info version 3.5.1.database and statistics software. Proportion of different exposure variables in PLWHAs is considered during the calculation and the variable that bring the largest sample size is taken which is the proportion of diarrheal PLWHAs having contact with Pets and animals (cases) being: $P_1=87.1\%$ and the proportion of non diarrheal PLWHAs having contact with pets and animals (control) being: $P_2=72.7\%$ [32]. A 95% confidence interval is desired with 80% statistical power and 1: 1 ratio of controls to cases.

Finally a total of 268 samples (134 cases and 134 controls) are required. The formula to calculate the required sample size for cases and controls is:

$$n = \frac{(Z_{\alpha/2} \sqrt{\left(1 + \frac{1}{r}\right) P(1-P)} + Z_{\beta} \sqrt{P_1(1-P_1) + \frac{P_2(1-P_2)}{r}})^2}{(P_1 - P_2)^2}$$

Where; n= sample size

$$P = \text{pooled estimate of } P_1 \text{ and } P_2 = \frac{P_1 + rP_2}{1+r}$$

P_1 = the estimated proportion of diarrheal PLWHAs having contact with pets and animals
= 87.1%

P_2 = the estimated proportion of non diarrheal PLWHAs having contact with pets and animals = 72.7%

r = ratio of controls to cases = 1

$Z_{\alpha/2}$ = value of standard normal distribution (SND) corresponding to a significance level of 0.05 for two sided test = 1.96

$Z_{1-\beta}$ = value of (SND) corresponding to the desired level of power = 80%

4.6.2. Sampling technique

Samples were taken consecutively based on the inclusion and exclusion criteria to select cases and controls, while patients are waiting for ART services in the health facilities.

The total sample is allocated to the two health facilities proportionally as follows: a total of 156 PLWHAs (78 cases and 78 controls) in JUSH and a total of 112 PLWHAs (56 cases and 56 controls) in Jimma Health center.

Screening was conducted in order to identify eligible and non eligible study participants, as well as cases and controls while patients are waiting for different services in the ART clinic.

One nurse was assigned for the screening purpose only and one supervisor was supervising the screening as well as the main data collection. The data collector in the screening area were identifying HIV positive client whether he/she is eligible or not by interviewing using

short structured questionnaire to self report his/her age, HIV sero status, when does he/she receive HIV test (diagnosis). Once a person has been identified as an eligible participant of the study, he/she classified as a case or a control based on the case-control criteria. For privacy and convenience purpose, interviews for each group were made independently in two separate rooms.

Non respondents were replaced by next cases/controls. But background information of these respondents was taken for validity issue.

4.7. Variables

4.7.1. Dependent variable

Diarrheal diseases status among PLWHAs

4.7.2. Independent variables

- **Socio-demographic characteristics:** Age, sex, ethnicity, educational status, income, religion, marital status, occupational status, place of residence, physical exercise, alcohol use, substance use
- **Environmental factors:** Building materials of the wall, building materials of the roof, no of rooms in the house hold, family size, source of energy for cooking, meals cooked per day, eating raw foods, refrigerator ownership, access to water, source of water supply, method of water treatment, per capita water consumption, type of water storage container, hand washing practice, distance of water source, availability of latrine, type of latrine, distance of latrine from house and water source, latrine cover, site of solid waste disposal, site of liquid waste disposal, presence of pets/ animals in the house.
- **Clinical factors:** Pre ART status, previous gastrointestinal disorders, CD4 cell count, WHO stage, cotrimoxazole prophylaxis, ART regimen, stage of HIV/AIDS, other opportunistic infections, history of hospitalization, history of previous diarrhea, history of poor adherence

4.8. Data collection techniques and instruments

4.8.1. Data collection technique

Before the actual data collection days, the questionnaire was pre-tested on patients waiting for HIV chronic care in Serbo health center and then further improvements were made accordingly. One day training was given for data collectors and supervisors by the principal investigator.

A brief interviewer administered structured questionnaire was implemented to identify (to screen) eligible and non eligible participants as well as to classify those eligible clients as cases and controls by one data collector, who is assigned to screen participants at the waiting area of ART clinic during the study period .

After the study subjects were identified as cases and controls, they were sent to two separate rooms; one for the cases and the other for the controls but the data collectors are blinded for the status of the respondent. Then after, they were interviewed based on an interviewer administered structured questionnaire.

Record review were used to collect information about some clinical factors (CD4 count, stage of the disease, ART regimen, opportunistic infections, history of poor adherence) from registration and client card and the instrument for record review is part of the main questionnaire. At the end of each data collection day, the principal investigator and supervisors were checking the completeness of filled questionnaires.

Interviewer administered structured questionnaire is adopted and modified from the following Literatures [1, 32, 33, 34, 36, 37- 42].

Three data collectors and one supervisor were assigned and data collectors are Bsc and Diploma Nurses working in ART clinic.

4.8.2. Data collection instrument

4.8.2.1. Short structured interviewer administered questionnaire

It was employed for screening purpose, asks the respondent his/her age, HIV sero status and whether he/she have diarrhea which was presented as yes/no or written form.

4.8.2.2. Structured interviewer administered questionnaire

That was employed for the main body of data collection and it contains: socio-demographic, environmental and clinical variables which was presented as yes/no or written form.

4.8.2.3. Record review

Record review was used to collect information about some clinical variables from registration and client card in the ART clinic. Record review was used to collect data on stage of disease, CD4 cell count, opportunistic infections, ART regimen, prophylaxis taken, history of poor adherence and the instrument for record review is part of the main instrument (questionnaire) indicated by “observe”.

4.9. Data analysis

Data were edited and coded, before entry to a computer, then entered, and cleaned in Epidata and analyzed using SPSS version 16 for Windows after exporting the data from Epi data.

Both descriptive and inferential statistical techniques were employed. Summary statistics such as percentages and odds ratios were computed and graphical techniques are used.

Then bivariate analysis was done to test the association between the independent and the outcome variable.

All explanatory variables that were associated with the outcome variable in bivariate analysis, at a P-value of <0.25 were entered into multiple logistic regression model, based on backward LR technique using likelihood ratio test to identify the potential independent predictors of diarrhea among PLWHAs. P-value of < 0.05 was considered as a cut-off point for statistical significance.

Goodness of fit of the model was also assessed using Hosmer and Lemeshow and classification accuracy rate. Hosmer and Lemeshow test statistics (Chi-square=6.73, P= 0.56) indicates well fitting model. Similarly classification accuracy rate for the final model was 76.9% and proportional accuracy rate by chance criteria was 62.5 % ;76.9% was greater than 62.5%, which supports the utility of the model. Multicollinearity was checked between water point and water treatment from environmental factors and previous GIT disorder, history of diarrhea and history of hospitalization from clinical factors by using collinearity statistics (Tolerance and VIF) and no multicollinearity was detected. Effect modification was also checked between sex and residence & khat use and alcohol use in last one month and no interaction was detected.

4.10. Data quality control

Before data collection, the interview Questionnaire was translated from English into the local language Afan Oromo and Amharic and then back translation was done by another person to check for the consistency. And the questionnaire was pre-tested before the actual data collection days on patients waiting for HIV chronic care in Serbo Health Center. Moreover, data collectors and supervisors were trained for one day. During data collection, supervisors check how the data collection process is going on and at the end of each data collection days, the principal investigator and supervisors also check the completeness of filled questionnaire.

4.11. Pre-test

Pre-test on survey instruments was made on 5% of the sample size for cases and controls on patients waiting for HIV chronic care in Serbo Health center and the questions were checked for clarity, completeness, consistency, and setting of time required to conduct interviews and the questions which posed difficulty or unclear were rephrased, corrected and missed questions were incorporated accordingly. The pre-test allows for proper changes to be made to the data collection tools until intended state is achieved and finally the result was excluded from the analysis.

4.12. Ethical consideration

Permission to carry out the research study was sought from ethical review committee of Jimma University and a letter of cooperation was taken from the department of Epidemiology to the ART clinic.

A verbal consent was taken from all the study participants. Information was given to all participants about the objective, the contents of the study, as well as their right to refuse and discontinue the data collection. The study was undertaken with a care not to interfere with the normal service given to the patients and individuals who have diarrhea were managed accordingly. Besides to this, all the information collected from the study subjects was handled confidentially and data is used for the research purpose only.

4.13. Dissemination plan

The results of the study will be disseminated to the responsible administrators: - Jimma town health department and Woreda health office, Jimma University post graduate and research office, ART focal person and ART clinic staffs of Jimma University specialized hospital and Jimma health center and publication on international and national journals will be considered.

4.14. Operational definition and definition of terms

- **Diarrhea:** Passing of more than three loose or watery stools within 24 hours period
- **Seriously ill:** Unable to communicate
- **Effective water treatment:** The use of chlorine solution to purify the water from an unsafe source and prevent water from becoming contaminated, water filters, boiling (rolling boil for 1 minute)
- **Proper water storage containers:** Water storage containers should have a screw-on top/lid or a plate-like cover that completely covers the container (narrow-neck container)
- **Safe water/protected:** Water taken from a household connection, standpipe, borehole, protected dug well, protected spring, or closed containers that collect rainwater on household premises or public.
- **An unimproved/unprotected water source:** Unprotected dug well, unprotected spring, rainwater collection in open containers, surface water: lake, streams, puddles, and other sources on household premises or public
- **Daily water consumption:** Water the household collects and uses for drinking, cooking/food preparation, bathing, personal and household hygiene, and sanitation (including excreta disposal)
- **Sufficient water supply:** An absolute minimum of 20 liters per person per day

- **Access:** That any member of the household should be allowed to use the facility at any time day or night
- **Contact with pets:** When the pets like cats, dogs, sheep, goat, cows and other domestic animals live in the house premises and contacted while milking, cleaning etc.
- **Previous hospitalization history:** Indicates hospitalization due to any illness in the last 6 months
- **Previous GIT disorder:** Indicates any gastro intestinal problem diagnosed by clinician in the last 6 months
- **Other opportunistic infection:** Any opportunistic infection present currently except diarrheal diseases
- **History of poor adherence:** History of reported poor adherence from patient file at any time since enrolled in the care
- **Crowd index: Not crowded :** ≤ 2.5 person /room
Over crowded: >2.5 person/room
- **Physical exercise:** Any bodily activity done by an individual to enhance or maintain physical fitness and overall health and wellness at least twice per week.

RESULT

5.1. Socio-demographic and Socio-economic characteristics

A total of 268 eligible subjects were enrolled, 134 cases (those with diarrhea) and 134 controls (those without diarrhea). One hundred fifty six (58.2%) of the respondents are from clients attending ART clinic of Jimma University Specialized Hospital and 112(41.8%) are from clients attending ART clinic of Jimma Health Center. As displayed in Table 1, Ninety nine (73.9%) cases and 111(82.8%) controls were in the age range of 25-45 years with the mean age of 35.5(SD=9.3) and 33.7(SD=7.9) respectively. Ninety (67.2%) cases and 103(76.9%) controls were females while 116(86.6 %) cases and 117(87.3%) controls were from urban.

Majority of subjects, 49(36.6%) cases and 54(40.3%) controls were Oromo in ethnicity followed by Amhara which accounts for 32(23.9%) cases and 28(20.9%) controls. Out of the study participants, 71(53.0%) cases and 64(47.8) controls were Orthodox in religion followed by Muslim 38(28.4%) cases and 37(27.6%). Concerning marital status, 65(48.5%) cases and 58(43.3%) controls are married. Seventy seven (57.5%) cases and 91(67.9%) controls were unemployed. Moreover, the majority of the study subjects, 91(67.9%) cases and 93(69.4%) controls earn 500ETB or less per month respectively.

Regarding their substance use habit, 101(75.4%) cases and 110(82.1%) controls never chewed Khat in the last one month. Similarly, the majority 105(78.4%) of cases and 114(85.1%) controls have no history of alcohol intake in the last one month. In addition, only 14(10.4%) cases and 15(11.2%) controls perform physical exercise at least twice per week (Table 1).

Table 1: Socio-demographic characteristics and diarrheal diseases status of the respondents attending ART clinics in Jimma town, March 2013

Variable	Categories	Cases	Controls	COR(95%CI)	P-value
		No (%)	No (%)		
Sex					
	Female	90(67.2)	103(76.9)	1.000	
	Male	44(32.8)	31(23.1)	1.624(.94, 2.786)	.078*
Age					
	18-24	11(8.2)	10(7.5)	.596(.200,1.773)	.352
	25-45	99(73.9)	111(82.8)	.483(.233,1.000)	.050*
	>45	24(17.9)	13(9.7)	1.000	
Residence					
	Rural	18(13.4)	17(12.7)	1.068(.525, 2.174)	.856
	Urban	116(86.6)	117(87.3)	1.000	
Occupation					
	Employed	39(29.1)	27(20.1)	1.000	
	Merchant	18(13.4)	16(11.9)	.779(.339, 1.792)	.557
	Unemployed	77(57.5)	91(67.9)	.586(.329, 1.043)	.069*
Educational status					
	1-12	51(38.1)	68(50.7)	.649(.357, 1.178)	.155*
	Certificate & diploma	46(34.3)	34(25.4)	1.170(.612, 2.238)	.635
	Illiterate	37(27.6)	32(23.9)	1.000	
Religion					
	Orthodox	71(53.0)	64(47.8)	1.000	
	Muslim	38(28.4)	37(27.6)	1.464(.788, 2.722)	.228
	Protestant	25(18.7)	33(24.6)	1.356(.681, 2.701)	.387
Ethnicity					
	Oromo	49(36.6)	54(40.3)	1.000	
	Amhara	32(23.9)	28(20.9)	1.259(.666, 2.383)	.478
	Dawro	29(21.6)	28(20.9)	1.141(.597, 2.181)	.689
	Others*	24(17.9)	24(17.9)	1.102(.555, 2.187)	.781
Marital status					
	Single	20(14.9)	23(17.2)	1.000	
	Married	65(48.5)	58 (43.3)	.776(.387, 1.556)	.475
	Divorced	22 (16.4)	29 (21.6)	1.146(.507, 2.593)	.743
	Widowed	27(20.1)	24(17.9)	.773(.343, 1.743)	.535
Monthly income					
	≤500ETB	91(67.9)	93(69.4)	1.094 (.535, 2.236)	.806
	501-999ETB	26(19.4)	22(16.4)	1.321 (.555, 3.141)	.529
	≥1000ETB	17(12.7)	19(14.2)	1.000	

Khat chewing in the last 1month					
Yes	33(24.6)	24(17.9)	1.498(.829, 2.705)	.181*	
No	101(75.4)	110(82.1)	1.000		
Alcohol intake in the last one month					
Once	12(9.0)	8(6.0)	1.629(.64, 4.140)	.306	
≥2 times/week	17(12.7)	12(9.0)	1.538(.701, 3.372)	.286	
Never	105(78.4)	114(85.1)	1.000		
Physical exercise					
Yes	14(10.4)	15(11.2)	.926(.428, 2.001)	.844	
No	120(89.6)	119(88.8)	1.000		

* Guraghe, Yem, Kefa

* Variables which show significant association during the bivariate analysis at $P < 0.25$

5.2. Environmental factors

5.2.1. Housing characteristics

The majority of respondents, 61(45.5%) cases and 68(50.7%) controls have a single room for the entire household members. Moreover, almost all respondents, 120(89.6%) cases and 126(94.0%) controls have five or less usual household members. Accordingly, 33(24.6%) cases and 29(21.6%) controls live in crowded condition.

The study also revealed that, 52(38.8%) cases and 70(52.2%) controls use charcoal and fire wood as source of energy for cooking (Table 2).

Table 2: Housing characteristics and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

Variable	Categories	Cases No (%)	Controls No (%)	COR(95%CI)	P-value
Roof					
	Iron sheet	125(93.3)	127(94.8)	1.000	
	Grass	9(6.7)	7(5.2)	1.306(.472, 3.616)	.607
Wall					
	Cement/ Brick	8(6.0)	10(7.5)	1.000	
	Mud/ Timber	126(94.3)	124(92.5)	1.270(.485, 3.325)	.626
No of rooms					
	1	61(45.5)	68(50.7)	.781(.420, 1.454)	.436
	2	42(31.3)	39(29.1)	.938(.477, 1.843)	.853
	≥3	31(23.1)	27(20.1)	1.000	
Usual members of the household					
	≤ 5	120(89.6)	126(94.0)	1.000	
	>5	14(10.4)	8(6.0)	1.837(.744, 4.537)	.187*
Crowd index					
	Uncrowded	101(75.4)	105(78.4)	1.000	
	Over Crowded	33(24.6%)	29(21.6)	1.183(.670, 2.089)	.563
Source of energy					
	Electricity/charcoal/kerosene	54(40.3)	48(35.8)	1.000	
	Charcoal/Fire wood	52(38.8)	70(52.2)	.670(.394, 1.138)	.138*
	Animal dung	28(20.9)	16(11.9)	1.464(.715, 2.999)	.297

* Variables which show significant association during the bivariate analysis at $P < 0.25$

5.2.2. Water supply and hygiene related factors

The study revealed, 111(82.8%) cases and 124(92.5%) controls use protected water source and 88(65.7%) cases and 52(38.8%) controls water point/source is public. In other hands, 72(53.7%) cases and 90(67.2%) controls wash their hands before food preparation. Likewise, respondents who store water in pot container were at more than three times risk of developing diarrhea compared to those who use Jerikan. It is also indicated that individuals who travel more than 5 minutes to fetch water are at three times more risk of developing diarrhea when the separate effect of a factor on the outcome is studied (Table 3).

Table 3: Water supply and hygiene related factors and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

Variable	Categories	Cases No (%)	Controls No (%)	COR(95%CI)	P-value
Water source					
	Protected	111(82.8)	124(92.5)	1.000	
	Unprotected	23(17.2)	10(7.5)	2.569(1.172, 5.635)	.019*
Water point					
	Private	46(34.3)	82(61.2)	1.000	
	Public	88(65.7)	52(38.8)	3.017(1.834, 4.963)	< 0.001*
Water distance from house(in minutes)					
	≤5minutes	20(37.7)	60(69.0)	1.000	
	>5minutes	33(62.3)	27(31.0)	3.667(1.789,7.514)	< 0.001*
Daily water consumption(L)					
	≥ 20/p/day	18(13.4)	25(18.7)	1.000	
	< 20/p/day	116(86.6)	109(81.3)	1.234(.65, 2.334)	.517
Water storage container					
	Jerikan	104(77.6)	118(88.1)	1.000	
	Pot	13(9.7)	4(3.0)	3.687(1.166, 11.66)	.026 *
	Bucket/tanker	17(12.7)	12(9.0)	1.607(.733, 3.523)	.236
Treat non potable water					
	Yes	45(33.6)	63(47.0)	1.000	
	No	89(66.4)	71(53.0)	1.755(1.071, 2.875)	.026*
Distance of water from latrine					
	≥ 30meter	36(26.9)	25(18.7)	1.000	
	< 30meter	98(73.1)	109(81.3)	1.602(.898, 2.857)	.111*
Hand washing before food preparation					
	Yes	72(53.7)	90(67.2)	1.000	
	No	62(46.3)	44(32.8)	1.761(1.073, 2.890)	.025*
Facility used for hand washing					
	Soap	103(76.9)	122(91.0)	1.000	
	Ash	11(8.2)	6(4.5)	2.172(.776, 6.075)	.140
	None	20(14.9)	6(4.5)	3.948(1.528, 10.201)	.005*

* Variables which show significant association during the bivariate analysis at P < 0.25

As it can be seen from figure 2, 28(62.2%) cases and 38(60.3%) controls treat non potable water using chemicals followed by boiling which is practiced by 11(24.4%) cases and 13(20.6%) controls respectively (Figure 2).

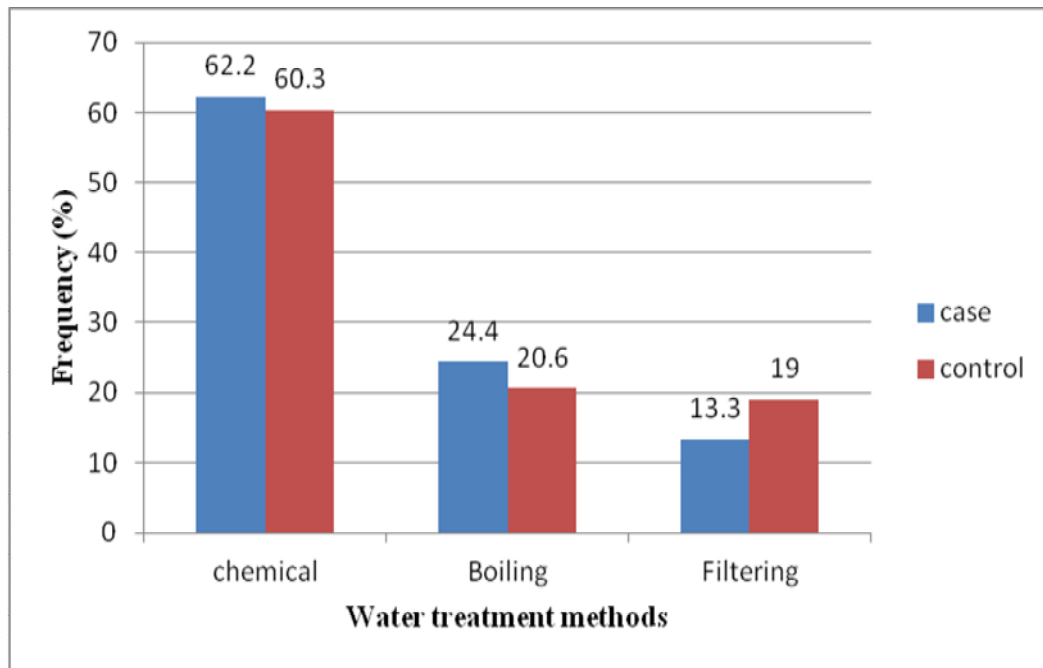


Figure 2: Water treatment methods and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

The analysis of the separate effect of hand washing after defecation on diarrheal diseases status implied that, not washing hands after defecation was significantly associated with occurrence of diarrheal diseases among PLWHAs ($P < 0.001$). In other words, those individuals who did not wash their hands after defecation are nearly three times more likely to develop diarrhea compared to their counterparts. The figure below implied that, 55(41.0%) cases and 88 (66.2%) controls always practice hand washing after defecation (Figure 3).

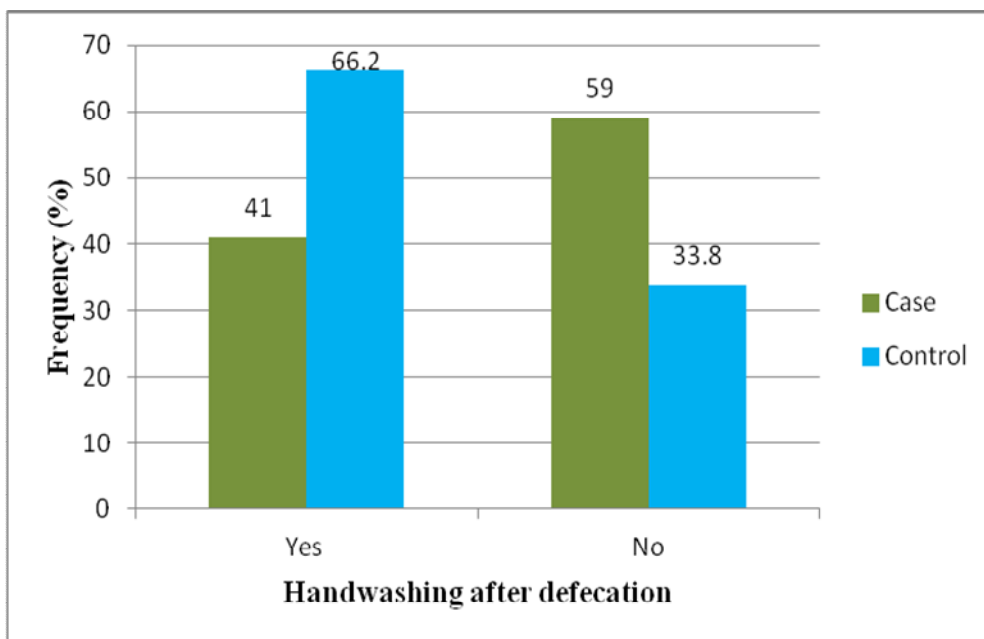


Figure 3: Hand washing after defecation and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

5.2.3. Sanitation related factors

The study found that, 120(89.6%) cases and 119(88.8%) controls have their own latrine and among those respondents who do not have their own latrine, 96.6% use public /shared latrine and the rest (3.4%) defecate on open field which are diarrheal cases. Among those respondents who have their own latrine, 34(25.6%) cases' and 52(38.8%) controls' latrine/squat hole has a cover. Pit latrine was the type of latrine owned by majority of cases, 105 (87.5%) and controls 102(85.7%). Concerning availability of hand washing facility near latrine, only 21(15.8%) cases and 16(11.9%) controls have the facility. Thirty seven (27.6%) cases and 40(29.9%) controls dispose their solid waste on open field. Absence of refrigerator and eating raw food are found to be significantly associated diarrheal diseases occurrence when their effect is separately studied (Table 4).

Table 4: Sanitation related factors and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

Variable	Categories	Cases	Controls	COR(95%CI)	P-value
		No (%)	No (%)		
Household latrine					
	Yes	120(89.6)	119(88.8)	1.000	
	No	14(10.4)	15(11.2)	1.080(.500, 2.336)	.844
Type of latrine					
	Flush /WC	8 (6.7)	3(2.5)	1.000	
	Pit Latrine	105 (87.5)	102(85.7)	2.590(.668, 10.039)	.168
	VIP Latrine	7 (5.8)	14(11.8)	5.333(1.069, 26.613)	.041*
Latrine cover presence					
	Present	34(25.6)	52(38.8)	1.000	
	Absent	99(74.4)	82(61.2)	1.794(1.068, 3.014)	.027*
Hand washing facility near latrine					
	Present	21(15.8)	16(11.9)	1.000	
	Absent	112(84.2)	118(88.1)	.723(.359, 1.456)	.364
Solid waste disposal site					
	On field	37(27.6)	40(29.9)	1.000	
	Pit	46(34.3)	54(40.3)	.921(.508, 1.670)	.786
	Garbage container	26(19.4)	7(5.2)	4.015(1.558, 10.349)	.004*
	Burn	25(18.7)	33(24.6)	.819(.413, 1.626)	.568
Pets in the house					
	Present	59(44.0)	46(34.3)	1.505(.919, 2.465)	.104*
	Absent	75(56.0)	88(65.7)	1.000	
Contact with pets					
	Present	58(98.3)	43(93.5)	4.047(.407, 40.251)	.233*
	Absent	1(1.7)	3(6.5)	1.000	
Insects and rats at home					
	Present	128(95.5)	120(89.6)	2.489 (.926, 6.687)	.071*
	Absent	6(4.5)	14(10.4)	1.000	
Refrigerator in the house					
	Present	20(14.9)	39(29.1)	1.000	
	Absent	114(85.1)	95(70.9)	2.340(1.279, 4.280)	.006*
Frequency of cooking					
	1-2	110(82.1)	109(81.3)	1.051(.566, 1.953)	.874
	≥ 3	24(17.9)	25(18.7)	1.000	
Eat Raw/uncooked food					
	Yes	34(25.4)	18(13.4)	2.191(1.166, 4.117)	.015*
	No	100(74.6)	116(86.6)	1.000	

* Variables which show significant association during the bivariate analysis at $P < 0.25$

The figure below shows the association of toilet location and diarrheal diseases status among clients attending ART clinics in Jimma town. It can be clearly seen from the figure, toilet location of 101(75.9%) cases and 112(83.6%) controls is outside house but in the compound. Moreover, twenty three (17.3%) cases' and 16 (11.9%) controls' toilet is found outside the compound (Figure 4).

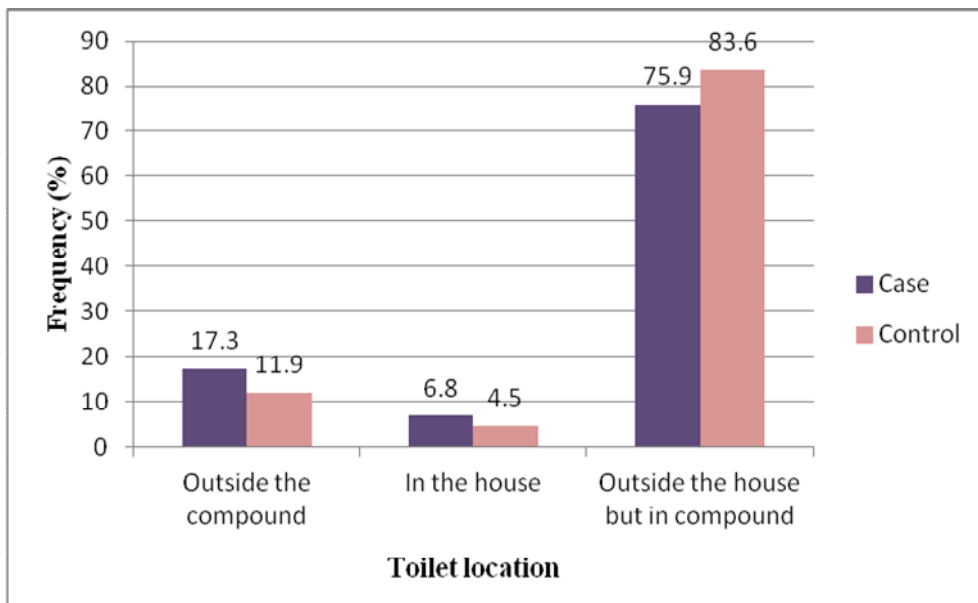


Figure 4: Toilet location and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

The finding of the study also revealed that, Sixty three (47.0%) cases and 43(32.1%) controls dispose liquid waste on open field followed by inside pit which is practiced by 69 (51.5%) cases and 89(66.4%) controls (Figure 5).

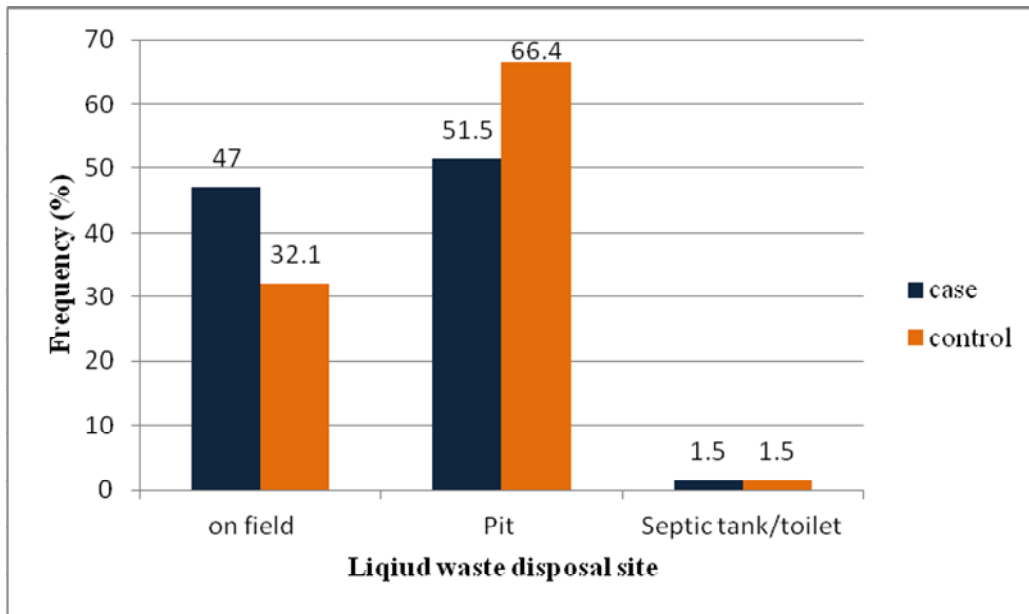


Figure 5: Liquid waste disposal site and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

5.3. Clinical factors

Among 246 participants who have a recorded CD4 cell count, 114 (91.2%) cases and 108(89.3%) controls have CD4 count of 200cells/mm³ or more. Majority of the participants are at WHO stage I or II for both cases (74.6%) and controls (93.3%). Ninety one (67.9 %), 80(59.7%) cases and 42(31.3%), 29 (21.6%) controls have other opportunistic infections and previous history of diarrhea respectively. The table also documented significant association between diarrheal diseases and having previous hospitalization history, having previous GIT disorder and other opportunistic infections when the separate effect of each factor on the outcome is studied (Table 5).

Table 5: Clinical factors and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

Variable	Categories	Cases	Controls	COR(95% CI)	P-value
		No (%)	No (%)		
CD4 count					
	<200	11(8.8)	13(10.7)	.802(.344, 1.866)	.608
	≥200	114(91.2)	108(89.3)	1.000	
WHO stage					
	Stage I/II	100(74.6)	125(93.3)	1.000	
	Stage III/IV	34(25.4)	9(6.7)	1.352(.629, 2.908)	.440
Previous Hospitalization history					
	Yes	20(14.9)	4(3.0)	5.702(1.893, 17.173)	.002*
	No	114(85.1)	130(97.0)	1.000	
Previous GIT Disorder					
	Yes	51(38.1)	12(9.0)	6.24(3.140, 12.429)	< 0.001*
	No	83(61.9)	122(91.0)	1.000	
Other opportunistic infection					
	Yes	91(67.9)	42(31.3)	4.636(2.771, 7.755)	< 0.001*
	No	43(32.1)	92(68.7)	1.000	
History of diarrhea					
	Yes	80(59.7)	29(21.6)	5.364(3.136, 9.176)	< 0.001*
	No	54(40.3)	105(78.4)	1.000	
Currently taking ART					
	Yes	106(79.1)	105(78.4)	1.046(.582, 1.877)	.881
	No	28(20.9)	29(21.6)	1.000	
Currently taking Cotrimoxazole Prophylaxis					
	Yes	88(65.7)	99(73.9)	1.000	
	No	46(34.3)	35(26.1)	1.479(.875, 2.500)	.144*
History of poor adherence					
	Yes	8(7.6)	16(15.1)	1.000	
	No	97(92.4)	90(84.9)	2.156(.880, 5.280)	.093*

* Variables which show significant association during the bivariate analysis at P < 0.25

The Figure below shows ART regimen taken by clients attending ART clinics in Jimma town and their diarrheal diseases status. As the figure clearly documented, majority 47(35.1%) cases and 34(25.4%) controls are taking Tenofovir, Lamivudine, Efavirenz followed by Zidovudine, Lamivudine, Neverapine which are being taken by 32(23.9%) cases and 28(20.9%) controls (Figure 6).

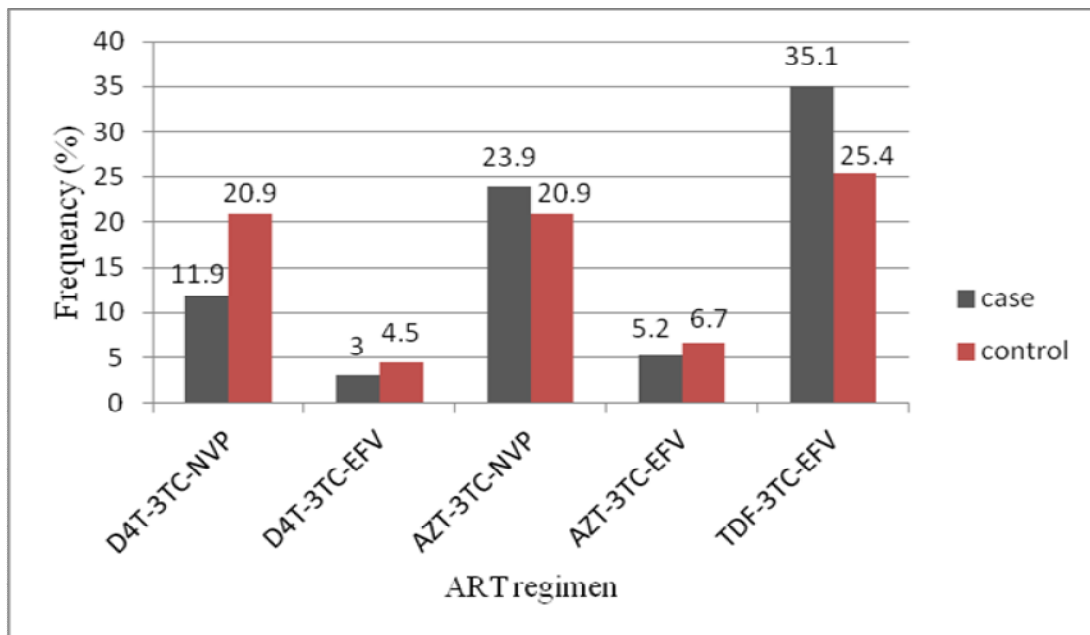


Figure 6: ART regimen and diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

5.4. Overall predictors of diarrheal diseases

Generally the study revealed that, males are at nearly two times risk of developing diarrheal diseases compared to females (AOR= 2.276; 95% CI: 1.079, 4.800; P = 0.031), individuals whose water point is public are at nearly five times risk of developing diarrheal diseases compared to the ones who have their own water point (AOR= 4.972; 95% CI: 2.408, 10.266; P < 0.001). Individuals whose latrine/squat hole do not have a cover are nearly three times more likely to have diarrhea compared to those whose latrine pit/hole have a cover (AOR= 2.763; 95% CI: 1.276, 5.980; P= 0.010).

The study also identified that, disposing solid waste in garbage container makes an individual at seven times risk of developing diarrhea compared to those who dispose on open field (AOR=7.676; 95% CI: 1.776, 33.188) and also burning solid waste is protective from diarrhea compared to disposing on open field (AOR= 0.290; 95% CI: 0.108, 0.780; P = 0.014).

The likelihood of diarrheal diseases among People living with HIV/AIDS who have pets in their house is two times compared to those who doesn't have pets in their house (AOR= 2.260; 95% CI: 1.153, 4.427; P = 0.018) and not having refrigerator makes an individual at three times more risk of developing diarrheal diseases compared to those who have refrigerator (AOR=3.343 95% CI: 1.274, 8.774; P= 0.014). Individuals having previous gastrointestinal disorder, in the last 6 months, are at four times risk of developing diarrheal diseases (AOR= 4.254; 95% CI: 1.647, 10.987; P = 0.003) and similarly individuals who have previous history of diarrhea are at nearly four times risk of developing diarrheal diseases compared to their counterparts (AOR= 3.966; 95%CI: 1.896, 8.295; P < 0.001).

Distance of water from the house, type of house hold latrine, having contact with pets/animals, ART regimen and history of poor adherence were not considered in multiple logistic regressions because of having small cell counts or missing values (Table 6).

Table 6: Overall predictors of diarrheal diseases status among clients attending ART clinics in Jimma town, March 2013

Variable	Categories	Cases No (%)	Controls No (%)	COR(95%CI)	AOR(95%CI)
Sex					
	Male	44(32.8)	31(23.1)	1.624(.94, 2.786)	2.276(1.079, 4.800) *
	Female	90(67.2)	103(76.9)	1.000	
Water point					
	Private	46(34.3)	82(61.2)	1.000	
	Public	88(65.7)	52(38.8)	3.017(1.834, 4.963)	4.972(2.408, 10.266) *
Latrine cover					
	Yes	34(25.6)	52(38.8)	1.000	
	No	99(74.4)	82(61.2)	1.794(1.068, 3.014)	2.763(1.276, 5.980) *
Solid waste disposal site					
	On field	37(27.6)	40(29.9)	1.000	
	Pit	46(34.3)	54(40.3)	0.921(.508, 1.670)	1.168(.539, 2.531)
	Garbage container	26(19.4)	7(5.2)	4.015(1.558, 10.349)	7.676(1.776, 33.188) *
	Burn	25(18.7)	33(24.6)	0.819(.413, 1.626)	0.290(.108, .780) *
Pets in the house					
	Present	59(44.0)	46(34.3)	1.505(.919, 2.465)	2.260(1.153, 4.427) *
	Absent	75(56.0)	88(65.7)	1.000	
Refrigerator					
	Present	20(14.9)	39(29.1)	1.000	
	Absent	114(85.1)	95(70.9)	2.340(1.279, 4.280)	3.343(1.274, 8.774) *
Previous GIT disorder					
	Yes	51(38.1)	12(9.0)	6.24(3.140, 12.429)	4.254(1.647, 10.987) *
	No	83(61.9)	122(91.0)	1.000	
History of diarrhea					
	Yes	80(59.7)	29(21.6)	5.364(3.136, 9.176)	3.966(1.896, 8.295) *
	No	54(40.3)	105(78.4)	1.000	

* Variables which show significant association during the multiple logistic regression at $P < 0.05$

DISCUSSION

Many efforts are undertaking throughout the world with the vision of zero AIDS related morbidity and mortality and also improvement of HIV/AIDS treatment and care program. However, the majority if not all of peoples living with HIV/AIDS are still suffering from diarrheal diseases in developing countries. Many study evidenced this fact that diarrhea is a significant cause of morbidity and mortality among HIV/AIDS patients, being the second most common diagnosis and affecting approximately 90% of patients with AIDS in developing countries and adversely affects quality of life [19, 20, 22]. Determining the possible determinant factors is important for proper management and prevention strategy of diarrheal diseases. The findings of this study will be contrasted and discussed in line with the existing body of knowledge in the literature as follows.

Socio demographic risk factors: Study of socio demographic risk factors of diarrhea in this study indicated, respondents' sex were potential risk factor of diarrheal diseases in PLWHAs. Males are at two times risk of developing diarrhea compared to females (AOR= 2.276; 95% CI 1.079, 4.800; P= 0.031). Probably, differences in study area and population used to study the potential risk factors of diarrhea could contribute to the difference between the current study and that of study done in Switzerland and South Africa [30, 31]. Other studies conducted in India (New Delhi and Karnataka) revealed that there is no significant association between sex of the respondent and diarrheal diseases occurrence [1, 32]. But this study's finding showed that males are at higher risk of developing diarrhea compared to females replicates the finding of study done in New York hospitals which showed that males are more likely to be admitted due to diarrheal diseases compared to females [17]. This probably might be due to the fact that males can easily be exposed to contaminated, undercooked/raw food and water while feeding outside home which is found to be one of the risk factor of diarrheal diseases in study done in Karnataka, India but did not show significant association in multivariate analysis of current study. In addition, they may have limited access to water and sanitary measures as much as they need in their work area in which case simple sanitary measures like hand washing may not be practiced.

Environmental risk factors: The finding implied that, individuals whose water point is public (who do not have their own water point) are nearly at five times risk of developing diarrhea compared to those who have their own (private) water point (AOR= 4.972; 95% CI: 2.408,

10.266; $P < 0.001$). The finding of using public water point is a risk factor of diarrheal diseases in PLWHAs is in agreement with several previous studies; in which they identified that water access is significant determinant of diarrheal diseases [1, 14, 30]. This could be due to the fact PLWHAs need for water access and clean water increase to protect them from infection or cope with the symptoms and when the water source is not private, households economize on water and tend not to wash their hands with soap. The other reason is that, PLWHAs households with access to more water have cleaner environments and therefore fewer routes for transmitting diarrhea-causing pathogens. Even though hand washing after defecation ($P < 0.001$) and before food preparation ($P = 0.025$) shown to be risk factors of diarrheal diseases among PLWHAs in bivariate analyses, it exhibited no significant association in the final model (multivariate analyses). However 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 to 44% [45].

The result also indicated that the likelihood of diarrheal diseases among individuals whose latrine/squat hole do not have cover is nearly three times compared to those individuals whose latrine have a cover (AOR = 2.763; 95% CI: 1.276, 5.980; $P = 0.010$). This implies the fact that, if the latrine/squat hole is not covered, the houseflies breed and feed on human excreta, pick diarrhea causing pathogens in the process and contaminate the food and drinks of the individuals and expose them to diarrheal diseases. The finding that absence of latrine/squat hole cover increases the risk of diarrhea replicates the finding of cross sectional study done in Nekemte which showed that presence of squat hole cover is protective of diarrheal diseases (AOR= 1.58; 95% CI:1.02, 2.45) [42]. The other reason is that, once squat hole is kept closed, it helps to avoid flies attraction to the latrine because flies are attracted by light and odor, and avoid darkness and dark surfaces. Even though safe disposal and handling of feces is the most important factor in the prevention of diarrheal disease, no significant association was seen between diarrheal disease status and presence of latrine in the current study. This might be due to the fact that, no great differences exist with respect to the presence of latrine between the cases and controls.

Another important finding of this study is, individuals who dispose solid waste inside garbage container are at seven times risk of developing diarrhea compared to those who dispose on open field (AOR= 7.676; 95%CI: 1.776, 33.188; $P = 0.006$). This might be because of garbage

container is placed near the house most of the time and it will become an ideal place for breeding of flies and different insects which in turn contaminate the food and drinks of the household. This finding is in agreement with study done in Ghana which explained waste storage near the home is associated with the presence of houseflies in the kitchen ($P < 0.001$) [46]. In addition, when waste materials are disposed inside garbage container around house, it can easily accessed by other reservoirs and vectors of microorganisms like pets, small ruminants and rats living inside home which is found to be a risk factor of diarrheal diseases among PLWHAs on study done in Karnataka [1]. The study also revealed that individuals who burn the solid waste are at lower risk of developing diarrhea compared to those who dispose on open field (AOR= 0.290; 95%CI: 0.108, 0.780; $P = 0.014$). This is because poor handling and disposal of waste are major causes of environmental pollution, which creates breeding grounds for pathogenic organisms, and the spread of infectious diseases mainly diarrhea.

The study also suggested that the likelihood of diarrhea among participants who have pets/animals in their house is two times compared to those who do not have pets/animals in their house (AOR= 2.260; 95% CI: 1.153, 4.427; $P = 0.018$) which is in line with study findings done in India, Uganda and South Africa [1, 14, 32, 33,] which revealed that having exposure to pets and animals accounted for significant diarrheagenic parasitic burden. This might be because, pets and animals can act as reservoir of diarrhea causing organisms and presence of pets/animals inside house is a proxy for possible contact with individuals as indicated in the study in which 98.3% of cases and 93.5% of controls who have pets in house have contact with them which may indicate possible transmission of diarrhea causing microorganisms from animals to the individuals. Though it did not show significant association in the current study, contact with pets/animals was found to be potential risk factor of diarrheal diseases in the abovementioned studies.

In contrary to the study done in India which identified no association between refrigerator ownership and diarrhea [1], absence of refrigerator at home is significantly associated with diarrheal diseases status in the current study indicating individuals who do not have refrigerator at home are at more than three times risk of having diarrhea compared to those who have refrigerator (AOR = 3.343; 95% CI: 1.274, 8.774; $P = 0.014$). The difference may be due to difference in socio economic difference of study participants. An implication of the finding is the

possibility that the individuals who have refrigerator can reserve perishable foods, such a meat, vegetables and milk (foods which are very liable to be spoiled) for much longer periods than are otherwise possible before or after cooking. It also helps to protect against the contamination by pets/animals in the house. Even though it is not identified as a significant risk factor ($P = 0.874$), majority of the participants in this study cooked 1-2 meals per day, so this can show that at least one meal is going to be stored for a while. Therefore individuals who did not have refrigerator are more likely to store their food in a room temperature and expose it to possible contamination.

Clinical factors: Among the clinical factors, the study indicated that individuals who have previous clinically diagnosed gastro intestinal disorder are at four times risk of developing diarrhea compared to those who did not have any previous GIT disorder (AOR = 4.254; 95% CI: 1.647, 10.987 $P = 0.003$). This finding is supported by different studies [1, 5] which show that having any previous gastrointestinal disorder puts an individual at more risk of diarrhea. An implication of this is the possibility that inadequate treatment of the previous GIT pathology may lead to recurrence at any time and diarrhea may be one way of manifestation of the disorder. Another possible explanation is that, once the individual had GIT disorder of any type in the past, the GIT mucosa will be more liable to be irritated by any factor and develop diarrheal diseases in the future easily. As abovementioned studies witnessed, presence of another opportunistic infection also facilitate the occurrence of diarrheal diseases as shown in bivariate analysis of this study. But it is not identified to be a potential risk factor in the final model.

Similarly, the study revealed that participants who had previous history of diarrhea are nearly four times more likely to have diarrhea compared to those who do not have previous history of diarrheal diseases (AOR= 3.966; 95% CI: 1.896, 8.295 $P < 0.001$). This is in line with other study which showed that history of previous diarrhea puts an individual at four times risk (AOR = 4.2; 95%CI: 1.7, 10.6 $P = 0.002$) of having diarrheal diseases [1]. This could be due to persistent exposure to risk factors in the home environment or hygiene-related risk factors. Recurrence of diarrhea that persisted due to inadequate treatment and continued carriage of the pathogen could also be another explanation.

CD4 count and WHO stages of the participants were found to be significant risk factors of diarrheal diseases among PLWHAs in studies conducted in India, Bangkok and Ethiopia [1, 13, 18, 32, 35] indicating that PLWHAs whose CD4 count is $<200\text{cells}/\text{mm}^3$ and WHO stage III/IV are at increased risk of diarrheal disease which directly indicate the level of their immunocompromisation and also their susceptibility to develop different opportunistic infections mainly diarrheal diseases. But these factors did not exhibit significant association in the current study and this might be due to the fact that no great difference exists with respect to CD4 count and WHO staging between cases and controls.

STRENGTH AND LIMITATION OF THE STUDY

Strength: The study covers a relatively wider range of factors affecting occurrence of diarrheal diseases which helps to identify independent predictors of diarrhea among peoples living with HIV/AIDS. The data collectors were blinded for the status of the respondents whether they are case or control during data collection. Furthermore, the case-control nature of the design could also be regarded as an additional advantage.

Limitation: Social desirability bias might have influenced responses to questions regarding substance use, sanitation and hygiene practices, and this might have limited our ability to detect differences between the two groups.

CONCLUSION AND RECOMMENDATION

Conclusion: In summary, this study identified some of the factors that facilitate the occurrence of diarrheal diseases among peoples living with HIV/AIDS which may inform possible interventions to prevent occurrence of diarrhea among these population.

Male sex, public water point, absence of latrine/squat hole cover, presence of pets in the house, solid waste disposal in garbage container, absence of refrigerator, having history of clinically diagnosed Gastro intestinal disorder and previous history of diarrhea were potential risk factors of diarrheal diseases among peoples living with HIV/AIDS.

Recommendation

- Health professional should give due attention to male PLWHAs, those individuals who have previous history of similar illness and who have pets/animals in their house during the provision of care.
- Health institutions should include safe water, sanitation and hygiene as essential components of basic preventive care package in strengthened way for PLWHAs while providing routine care.
- Woreda health office and Town health Office should work with the town municipality on improving access to water sources and solid waste disposal facilities
- Ministry of health should develop up-to-date and comprehensive behavior change communication material for people living with HIV/AIDS on water, sanitation and hygiene, building on existing materials.
- Other researchers can perform in the same area by considering the same cut off point of time for definition of cases and controls to see if there is any difference since this study considered controls as participants who do not have history of diarrhea during the presentation and the preceding 14 days and cases as participants who have diarrhea at time of presentation.

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Annex I: English Version Questionnaires

A Questionnaire for the Study of Diarrheal diseases and risk factors among clients attending ART clinics in at Jimma town, south western Ethiopia: Unmatched case control

Jimma University

Informed Consent Statement

Good morning/afternoon, my name is _____ and I represent (name of the health facility). We are conducting a study within southwest Ethiopia in collaboration with Jimma University and of course with the help of selected Peoples living with HIV. We would appreciate your participation in this survey very much. I would like to ask you questions about some important issues in relation to diarrheal disease. This information will help us to plan services that address the special needs of peoples living with HIV/AIDS. There is no right or wrong answer to each question.

The information you provide on the basis of your experiences, as a People living with HIV will help to make policies and programs related diarrheal disease intervention

Whatever information you provide will be kept strictly confidential and will not be shown to other individuals. Participation in this survey is voluntary, and you can choose not to answer any individual question or all of the questions. However, we hope that you will actively participate in this survey since your views are important.

The interview will take only about ___ to ___ minutes of your time.

At this time, do you want to ask me anything about the survey?

May I begin the interview now? (Circle)


1 = Yes 2 = No (End the interview)


Name &Signature of interviewer: _____ Date: _____

Name & Signature of Supervisor: _____ Date: _____

1. Screening questionnaire

Screening Questionnaire			
Instruction: circle the answer			
SN	Questions and Filters	Response & Coding Categories	Skip
01	How old are you?	(Years)=_____	If the age is <18 years, do not proceed.
02	If age is >=18 years, What is your HIV sero status?	1 = Positive 2 = Negative → 3 = Unknown →	Do not proceed. Do not proceed
03	Did you have diarrhea currently?	1 = Yes → 2 = No →	Code with A, send to data collection room Q.05
04	Did you have history of diarrhea within the last 14 days?	1 = Yes → 2=No →	Exclude this (Do not proceed). code with B, then send to data collection room

108	Are you able to write in any language?	1 = Yes 2 = No	
109	If the response for Q.107 and/or 108 is yes, have you ever attended formal school?	1 = Yes 2 = No 	Q.111
110	If the response for Q.109 is yes, what is your current educational status?	1 =If grade (1-12), Grade _____ 2 = certificate 3= diploma 4= degree 5= other(specify) _____	
111	Religion	1 = Orthodox 2 = Muslim 3 = Protestant 4 = Catholic 5 = Other, Specify _____	

112	Ethnicity	1 = Oromo 2 = Amhara 3 = Tigre 4 = Guraghe 5 = Dawro 6 = Yem 7 = Other, Specify _____	
113	What is your current marital status?	1 = single 2 = married 3 = divorced 4 = widowed	
114	Do you earn/make money by yourself?	1 = Yes 2 = No 	Q.116
115	If yes, what is the average monthly income you get yourself?	_____ Birr/month	
116	What is the monthly income (on average) of your household including your own?	_____ Birr/month	

117	What are your family's main sources of financial support (school fees, food, and health care, cloth)?	1=Spouse's earnings 2=Own earnings 3=Spouse's family's income 4= Your family of origin's income 5= Pension 6= Other, specify_____	
118	Do you ever use any substance (Khat, alcohol, shisha and cigarette)?	1=Yes 2=No _____ →	Q.201
119	What substance do you ever used?	1=Khat 2=cigarette 3=Alcohol 4=shisha 5=Other (specify)_____	
120	Do you ever use any substance (Khat, alcohol, shisha and cigarette) in the Last one month?	1=Yes 2=No _____ →	Q.201

121	What substance do you used in the Last 1 months?	1=Khat 2=cigarette 3=Alcohol 4=shisha 5=Other (specify)_____	
122	How often have you had an alcoholic drink in the last 30 days (one month)?	1=Never 2=Once 3=2-3 times 4=Once or twice a week 5=3-4 times a week 6=5-6 times a week (Nearly every day) 7=Daily	
123	Did you do physical exercise?	1=yes 2=No _____ →	Q.201
124	If yes, how often	_____ per week	

Section II Environmental related Information

Part i. Housing characteristics related information

SN	Questions and Filters	Response & Coding Categories	skip
201	What is the main building material used for the roof of the main	1=Iron sheets 2= Tiles 3= Concrete	

	dwelling?	4= grass 5= other, specify_____	
202	What are the main building materials used for the walls of the main dwelling?	1=Cement 2= bricks 3 = mud 4= timber 5= other, specify____	
203	How many rooms are there in the household (including rooms outside main dwelling)?	_____ (in number)	
204	What is the number of regular household members?	_____ (in number)	
205	What is the main source of energy for cooking in the household?	1=Electricity 2= Solar 4= Paraffin/Kerosene 5= Charcoal 6= Firewood 7= Animal dung 8= Other, Specify_____	

Part ii. water supply and hygiene related information			
206	What is the main type of water source used by your household use?	1= piped 2= borehole installed with pump 3= protected well 4=unprotected well 5=protected spring 6= unprotected spring 7= Surface source (dam, river, stream, pond) 8=Covered rainwater tank 9=Uncovered rainwater tank 10= Other (specify)_____	
207	Is the water point Private or Public?	1= private _____ → 2=public	Q.209
208	Distance of water source from the house (in minutes)	1. _____ 2. _____	
209	On average, how many liters of water do your HH use every day?	_____ (in liter)	
210	What type of water storage container did you use to store the water?	1=Jerikan 2=Pot 3=Pail/bucket 4=tanker 5. Other, specify_____	
211	If your water source is other than potable do you treat it?	1= Yes 2= No _____ →	Q.213

212	If yes, what method of water treatment did you use?	1=boiling 2=filtering 3=chemicals 4=other, specify _____	
213	What is the distance of water source from latrine?	_____ (in meter)	
214	When did you wash your hands?	1=After defecation 1=Yes 2=No 2=After handling child's feces or cleaning a child's bottom 1=Yes 2=No 3=Before feeding others 1=Yes 2=No 4=Before eating 1=Yes 2=No 5=Before preparing food 1=Yes 2=No	
215	What facilities do you use for hand washing?	1=Soap 2= Ash 3= None 4 Other (specify) _____	
Part iii. Sanitation related factors			
216	Did your house hold have a latrine?	1=yes 2=No _____ →	Q.218

217	If yes, what type of latrine?	1=Flush Toilet/Water carriage 2=Pit Latrine 3=VIP Latrine 4= Other (specify) _____	
218	If No, where did you use?	1=Public Latrine/Shared 2= open field 3= other, specify _____	
219	Where is the location of the toilet?	1=In the house 2.=outside the house but in compound 3.=outside the compound 4.=Other, specify ____	
220	Does the latrine have cover?	1=yes 2=No	
221	Does the latrine have hand washing facility/	1=yes 2=No	
222	How do you dispose solid wastes?	1= On field 2= Pit 3=Garbage container 4= Burn 5= Other, specify _____	

223	How do you dispose liquid wastes?	1=On field 2= Pit 3=Septic tank/toilet 4=Other, specify _____	
224	Are there pets/animals in the house?	1=yes 2=No	
225	If yes, Do you have contact with pets/animals in the house?	1=yes 2=No	
226	Are flies, cockroaches, or rats in the home?	1=yes 2=No	
227	Do you have refrigerator in your house?	1=yes 2=No	
228	How frequent you cooked a meal per day	_____/per day	
229	Did you eat raw foods?	1= Yes 2=No	

Section III. Clinical related Information			
SN	Questions and Filters	Response & Coding Categories	skip
301	What was your most recent CD4 cell count? (observe)	_____	
302	What is your recent WHO staging of the disease? (observe)	1=stage I 2=stage II 3=stage III 4=stage IV	

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303	Have you ever been hospitalized for HIV related problems in the last 6 months?	1=yes 2=No → Q.305	
304	For how long did you stay there, if you hospitalized more than once fill all?	1 st time _____ 2 nd time _____ 3 rd time _____	
305	Did you have previous gastro intestinal disorders in last 6 months confirmed by clinician?	1=Yes 2=No	
306	Did you have other opportunistic infections currently? (observe)	1=Yes 2=No	
307	Did you have history of previous diarrhea?	1=Yes 2=No	
308	Are you on ART currently? (did you start taking ART)	1 = Yes 2 = No → Q.309	
309	What are the regimens of ART are you currently taking? (observe)	_____	
310	Do you have a regular follow up visit in the ART clinic? (for those who are previously enrolled)	1 = Yes 2 = No	

311	Are you currently taking cotrimoxazole prophylaxis	1 = Yes 2 = No	
312	History of poor adherence for those on ART (observe)?	1 = Yes 2 = No	

THANK YOU FOR YOUR PARTICIPATION

Annex II: Amharic Version Questionnaire

ይህ መጠይቅ የአቶ አይ ቪ ቫይረስ በደማቸው ውስጥ ኑሮ በተቆማት የተጠቁ የጅም ዩኒቨርሲቲ ሆስፒታል ና ጅም ጤና ጠቢያ የፀረ ኤዲስ ማዕከልን ለሚከታተሉ ደንበኞች/ባለጉዳዮች የተዘጋጀ ነው።

ጅም ዩኒቨርሲቲ

የስምምነት ሰነድ

ጤና ይስጥልን፣ ስሜ-----እባላለሁ፣ እኔ (ጤና ተቋም) በመወከል መረጃ ሰብሳቢ ሁኝ እየሰራው ነው። በደቡብ ምዕራብ ኢትዮጵያ ከጅም ዩኒቨርሲቲ እንድሁም በተመረጡት ከአቶ አይ ቪ ቫይረስ ጋር የሚኖሩ የጥናት ተሳታፊዎች ትብብር ይህን ጥናት እያካሄድን ነው። እርሶም በዚህ ጥናት ላይ ተሳትፎ ቢያረጉ በጣም ደስ ይለናል። ከተቆማጥ በሽታዎች ጋር ተያያዥ የሆኑ አንዳንድ ጠቃሚ ጥያቄዎችን ልጠይቅ እወዳለሁ። የሚሰጡን መረጃ ለህብረተሰቡ የተለያዩ የጤና አገልግሎቶችን ለማቀድ ይጠቅመናል። ለሚጠየቁት ጥያቄ ትክክለኛ የሆነና ያልሆነ መልስ የለም። ከአቶ አይ ቪ ቫይረስ ጋር እንደመኖር መጠን እርሶ ከልምዶ በመነሳት የሚሰጡን መረጃ ከተቆማጥ በሽታዎች ጋር በተያያዘ ፖሊሲዎችና ፕሮግራሞችን በመቅረፅ የተቆማጥ በሽታዎችን ለመከላከል እና ትምህርት ለመስጠት ይጠቅመናል። ማንኛውም የሚሰጡን መረጃ ሚስጢራዊነቱ እንደሚጠበቅ እና ለማንኛውም ሰው አሳልፈን የማንሰጥ መሆኑን እገልፀለሁ። በዚህ ጥናት የእርሶ ተሳትፎ በፍቃድኝነት ላይ የተመሰረተ ነው እንዲሁም ከጥያቄዎቹ ሙሉውን ወይም በከፊል መልስ አለመስጠት ይችላሉ። ሆኖም የሚሰጡን መረጃ ለዚህ ጥናት በጣም ስለሚጠቅመን በጥናቱ ንቁ ተሳትፎ እንደሚያረጉ ተስፋ አለን።

1. የማጣሪያ መጠይቅ

የማጣሪያ መጠይቅ-			
መመሪያ: መልሱን አክብቡት			
ተ.ቁ	ጥያቄ እና ማጥሪያ	መልሶችና መለያ ኮዶች	እለፍ
01	ዕድሜዎት ስንት ነው?	(ዓመት)= _____	ዕድሜአቸው ከ18 ዓመት በታች ከሆነ አትቀጥል።
02	ዕድሜአቸው ከ18 ዓመት በላይ ከሆነ፣ የአቶ አይ ቪ ምርመራ ወጠትዎ ምንድን ነው?	1 = ፖዘቲቭ 2 = ነገቲቭ 3 = አላወቅም	አትቀጥል አትቀጥል
03	አሁን የተቆማጥ በሽታ አለብዎት?	1 = አዎ 2 = አይ	A ኮድ በመስጠትና ወደ መረጃ መሰብሰቢያ ክፍል ለከው። ወደ ጥያቄ 04እለፍ

04	ባለፉት 14 ቀናት የተቆማጥ ምልክት ታይቶብዎታል?	<input type="checkbox"/> 1 = አዎ _____ → <input type="checkbox"/> 2 = አይ _____ →	አቋርጥ (ደንበኛዉን በመጠይቁ አታካት) ኮድ በመስጠትና ወደ መረጃ መሰብሰቢያ ክፍል ለከዉ::
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2.

አንኳር መጠይቅ

ተ.ቁ. ከ 001 ጀምር

ክፍል I አጠቃላይ መረጃዎች			
መመሪያ: መልሱን አክብቡት			
ተ.ቁ	ጥያቄ እና ማጥሪያ	መልሶችና መለያ ኮዶች	አለፍ
101	መለያ ቁጥር እና ኮድ (A or B)	_____	
102	የጠና ተቋም ስም	_____	
103	ፆታ (መልሱን አክብቦዉ)	1 = ወንድ 2 = ስት	
104	ዕድሜህ ስንት ነዉ?	_____ (በዓመት)	
105	ቋሚ መኖሪያዎት የት ነዉ?	1 = ገጠር : ወረዳ _____ : ቀበሌ _____ 2 = ከተማ: ከተማ _____ : ቀበሌ _____	
106	ሥራ	1 = የመንግስት 2 = መንግስታዊ ያልሆነ ድርጅት 3 = የንግድ ሰዉ 4 = ገበሬ	

		<p>5 = የበት እመቤት</p> <p>6 = የቀን ሰራተኛ</p> <p>7 = ለላ ካለ ይጥቀሱ _____</p>	
107	ማንበብ ይችላሉ?	<p>1 = አዎ</p> <p>2 = አይ</p> <p style="text-align: right;">—————→</p>	Q.111
108	መጻፍ ይችላሉ?	<p>1 = አዎ</p> <p>2 = አይ</p>	
109	የጥያቄ ተቁል 107 እና/ወይም 108 መልስ አዎ ከሆነ፣ የመደበኛ ትምህርት ቤትን ተከታትለዋል?	<p>1 = አዎ</p> <p>2 = አይ</p> <p style="text-align: right;">—————→</p>	Q.111
110	የጥያቄ ተቁል 109 መልስ አዎ ከሆነ፣ የትምህርት ደረጃዎ?	<p>1 = በክፍል (1-12), ክፍል _____</p> <p>2 = ሰርተፍኬት</p> <p>3 = ድፕሎማ</p> <p>4 = ድግሪ</p> <p>5 = ለላ፣ (ገለፅ) _____</p>	
111	ሀይማኖት	<p>1 = ኦርቶዶክስ</p> <p>2 = ሙስሊም</p> <p>3 = ፕሮተስታንት</p> <p>4 = ካቶሊክ</p> <p>5 = ለላ፣ (ገለፅ) _____</p>	
112	ብሄረሰብ	<p>1 = ኦሮሞ</p> <p>2 = አማህራ</p> <p>3 = ትግሬ</p> <p>4 = ጉራጌ</p>	

		5= ዳዉሮ 6 = የም 7= ለላ፣ (ገለፅ) _____	
113	የጋብቻ ሁኔታ?	1 = ያላገባ 2 = ያገባ 3 = የተፋታ 4 = በሞት የተለየ/ የተለየች	
114	የገንዘብ ምንጭ በራስዎ ነዉ የሚያገኙት?	1 = አዎ 2 = አይ	116
115	አዎ ከሆነ, አማካይ የገቢ መጠንዎ ስንት ነዉ?	_____ ብር/በወር	
116	የቤተሰብዎ የገቢ መጠን የእርስዎን ጨምሮ በአማካይ ስንት ነዉ?	_____ ብር/በወር	
117	ለቤተሰብዎ የገንዘብ ድጋፍ የሚያደርግ ማን ነዉ (የትምህርት፣ የምግብ፣ የመድሃኒት እና የአልባሳት)?	1=የባለቤትዎ ገቢ 2=የእርስዎ ገቢ 3=የባለቤትዎ ቤተሰብ ገቢ 4= የቤተሰብዎ (እናትዎ/አባትዎ) ገቢ 5= የጡረታ 6= ለላ፣ (ገለፅ) _____	
118	አደንዛኝ ሰዕን ተጠቅመዉ ያዉቃሉ (የጫት፣ የመጠጥ፣ የሽሻ እና የሲጋራ)?	1=አዎ 2=አይ	201

119	የትኛውን አደንዛኝ ዕፅ ተጠቀሙ?	1=የጫት 2=የሲጋራ 3=የመጠጥ 4=sየሽሻ 5=ለላ፣ (ገለፅ) _____	
120	ባለፈው አንድ ወር ውስጥ አደንዛኝ ዕፅን ተጠቅመዋል?	1=አዎ 2=አይ _____ →	Q.201
121	የትኛውን አደንዛኝ ዕፅ ተጠቀሙ (ባለፉት 6 ወራት ውስጥ)?	1=ጫት 2=ሲጋራ 3=መጠጥ 4=ሽሻ 5=ለላ፣ (ገለፅ) _____	
122	ባለፈው አንድ ወር ውስጥ ስነት ጊዜ መጠጥ ጠጥተዋል?	1=ምንም 2=አነዴ 3=2-3 ጊዜ 4=በሳምንት 1 ወይም 2 ጊዜ 5=በሳምንት 3 ወይም 4 ጊዜ 6=በሳምንት 5 ወይም 6 ጊዜ 7=በየቀኑ	
123	የሰውነት ማጎልመሻ እንቅስቃሴ ያደርጋሉ?	1=አዎ 2=አይ _____ →	Q.201

124	አዎ ከሆነ፣ በምን ያክል ጊዜ _____ በሳምንት	
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ክፍል I አከባቢን ዙርያ ያረጉ መረጃዎች			
ንዑስ ክፍል i. በትን የተመለከቱ መረጃዎች			
ተ.ቁ	ጥያቄ እና ማጥሪያ	መልሶችና መለያ ኮዶች	አለፍ
201	የዋና መኖሪያ ቤትዎ ጣሪያ በምንድን ነገር የተሸፈነው?	1=ቆረቆሮ 2= ኮርኒስ 3= አርማታ (ኮንክሪት) 4= መስታዎት 5= ለላ፣ ጥቀስ _____	
202	የዋና መኖሪያ ቤትዎ ግድግዳ ከምንድን ነገር የተሰራው?	1=ኮንክሪት 2= ብሎክት 3= ከጭቃ 4= ከእንጨት 5= ለላ፣ ጥቀስ _____	
203	በቤትዎ ስንት ክፍሎች አሉዎት (ከዋና መኖሪያ ቤትዎ ውጭ ያሉትን ጨምሮ)?	_____ (በቁጥር)	
204	በቤትዎ ስንት የቤተሰብ አባል ይኖራል?	_____ (በቁጥር)	
205	ምግብን ለማብሰል የምን ኃይል ይጠቀማሉ?	1=የአለክትሪክ 2= የፀሃይ 4= የኖፍጣ 5= ከሰል 6= የእንጨት 7= የእንስሳት ኩብት 8= ለላ፣ ጥቀስ _____	

ገጽ ii. ወሃ እና ቆሻሻ ጋር የተያያዙ መረጃዎች		
206	የሚጠቀሙትን ወሃ ከየት ነው የሚያገኙት?	1=ከባህር 2= በፓንፕ ከተቆፈር ጉርጓድ በማወጣት 3= ለጥንቃቄ ከተከለለ ቢር 4=ክፍት (ካልተከለለ) ቢር 5=ለመጠጥ ከተከለለ ምንጭ ወሃ 6= ካልተከለለ ምንጭ ወሃ 7= ክፍት ወሃ (ግድብ፣ ወንዝ፣ ኩሬ) 8= ከተሸፈነ የዝናብ ማጠራቀሚያ ታንክ 9= ካልተሸፈነ የዝናብ ማጠራቀሚያ ታንክ 10= ለላ፣ ጥቀስ _____
207	የሚጠቀሙት ወሃ ባለቤት?	1= የግል _____ → Q.209 2=የህዝብ
208	የሚጠቀሙት ወሃ ከቤትዎችምን ያክል ይረቃል (በደቂቃ)	1. _____ 2. _____
209	በቤተሰብዎ በአማካይ ምን ያክል ሊትር በቀን ይጠቀማሉ?	_____ (በሊትር)
210	ወሃውን ለማጠራቀም ምን አይነት ዕቃ ይጠቀማሉ?	1=ጀሪካን 2=እንስራ 3=ባልዲ 4=ታንክር 5= ለላ፣ ጥቀስ _____
211	የሚጠቀሙት ወሃ ለመጠጥ ከማይሆኑት ውስጥ የሚመደብ ከሆነ ያከሙታል?	<input type="checkbox"/> 1= አዎ <input type="checkbox"/> 2= አይ _____ → Q.213

212	አዎ ከሆነ፣ ለማከም ምን አይነት ዘዴ ይጠቀማሉ?	1=በማፍላት 2=ማጥለል 3=በኬሚካል 4=ለላ፣ ጥቀስ_____	
213	በመጠንቅቅ ቤትዎና በሚጠቀሙት ወሃ መካከል ያለው ርቀት ምን ያክል ይሆናል?	_____(በሜትር)	
214	መቶ ነዉ እጅትን የሚታጠቡት?	1=ከተፀዳዱ በኋላ 2=የልጅዎቻትን ሰገራ ከነኩ እና ካፀዱ በኋላ 3=ለሎችን ከመመገብ በፊት 4=ከመብላት በፊት 5=ምግብ ከማዘጋጀት በፊት	1=አዎ 2=አይ 1=አዎ 2=አይ 1=አዎ 2=አይ 1=አዎ 2=አይ
215	እጅዎን ለማፅዳት ምንን ይጠቀማሉ?	1=ሳሙና 2= አመድ 3= ምንም 4= ለላ፣ ጥቀስ_____	
ንዑስ ክፍል iii. ንፅህና ጋር የተያያዙ መረጃዎች			
216	የግል መጠንቅቅ ቤት አለዎት?	1=አዎ 2=አይ _____	→ Q.218

217	አዎ ከሆነ፣ ምን አይነት መጻፍት?	1= ማወረጃ ወ.ሃ ያለው መጻፍት 2=ደረቅ መጻፍት 3= መከደኛ ያለው ደረቅ መጻፍት 4= ለላ፣ ጥቀስ_____	
218	አይ ከሆነ፣ የት ነው የሚጻፉት?	1=በየጋራ መጻፍት 2= መዳ ላይ 3=ለላ፣ ጥቀስ_____	
219	መጻፍት ቤቱ የት ይገኛል?	1=ቤት ውስጥ 2.=ግቢ ውስጥ ከቤት ውጪ 3.=ከግቢ ውጪ 4=ለላ፣ ጥቀስ_____	
220	መጻፍት ቤቱ መከደኛ አለው?	1=አዎ 2=አይ	
221	ደረቅ ቆሻሻ የት ያስወግዳሉ?	1= ሜዳ ላይ 2= ጉድጓድ ውስጥ 3=የቆሻሻ ታንከር ውስጥ 4= በማቃጠል 5=ለላ፣ ጥቀስ_____	
222	ፈሳሽ ቆሻሻዎችን እንደት ያስወግዳሉ?	1=ሜዳ ላይ 2= ጉድጓድ ውስጥ	

		3=የቆሻሻ ታንከር/መፀዳጃ ዉስጥ 4=ለላ፣ ጥቀስ _____	
223	የቤት እንስሳ አለዎት?	1=አዎ 2=አይ	
224	ቤትዎ ዉስጥ ዝንብ፣ በረሮ ወይም አይጥ አሉ?	1=አዎ 2=አይ	
225	በቤትዎ ማቀዝቀዣ አልዎት?	1=አዎ 2=አይ	
226	በቀን ምን ያክል ጊዜ ምግብ ያበስላሉ?	በቀን _____ ጊዜ	
227	ያልበሰሉ (ጥሬ) ምግቦችን ይመገባሉ?	1=አዎ 2=አይ	

ክፍል III. ከሊኒካል መረጃዎች			
ተ.ቁ	ጥያቄ እና ማጥሪያ	መልሶችና መለያ ኮዶች	እለፍ
301	የቅርብ CD4 cell ቆጠራ ዉጠትዎ ስንት ነበር? (ዉጤቱን ተመልከት)	_____	
302	በWHO ደረጃ መሰረት አሁን የበሽታዎ ደረጃ ምን ላይ ነዉ? (ተመልከት)	1=ደረጃ I 2=ደረጃ II 3=ደረጃ III 4=ደረጃ IV	
303	ባለፉት 6 ወራት ሆስፕታል ተኝተዉ ያዉቃሉ ከHIV ጋር በተያያዘ ችግር	1=አዎ 2=አይ _____	Q.305
304	ለመን ያክል ጊዜ እዛ ቆዩ (ከአንድ ጊዜ በላይ ሆስፕታል ከተኙ ሁሉንም ሙላዉ)?	በመጀመሪያ ጊዜ _____ በሁለተኛ ጊዜ _____ በሶስተኛ ጊዜ _____	

305	በሐኪም የተረጋገጠ የሆድ በሽታ ባለፉት 6 ወራት ነበሮት?	1=አዎ 2=አይ	
306	ከHIV ጋር የተያያዙ ተጓዳኝ በሽታዎች አልዎት (የህክምና መረጃዉን ተመልከት)	1=አዎ 2=አይ	
307	አሁን ART (የዕድሜ ማራዘሚያ ህክምና) እየተከታተሉ ነዉ? (ART መወሰድ ጀምረዋል)	1 = አዎ 2 = አይ →	Q.309
308	አሁን እየወሰዱ ያለዉ ART መድሃኒት ምን ይባላል? (የህክምና መረጃዉን ተመልከት)	_____	
309	በመደበኛ ART ክሊንክን እየተከታተሉ ነዉ? (መከታተል ለጀመሩት ብቻ ነዉ)	1 = አዎ 2 = አይ	
310	አሁን ኮትሪሞክሳዞል የሚባል የቅድመ በሽታ ህክምና እየተከታተሉ ነዉ;	1 = አዎ 2 = አይ	

በጥናቱ ስለተሳተፉ ክልብ እናመሰግናለን!

Annex III: Afaan Oromoo Version Questionnaire

Waraqaan gaaffii kun qorannoo waa'ee sababiiwwaan garaa kaasaa namoota vaayirsiin HIV dhiiga isaanii kessa jiruu wal qabatee mamiltootaa kutaa ykn buufata qorichaa farraa Eedisii hoospitaala speshaalazashiin yuniveersitii Jimmaatti fi buufata fayyaa jimma hordoofaaniif qopha'ee.

GUCA WALII GALTEE

Akkam bultaan/oltaan Maqaan kiyyaa _____ yommun jedhamu, ani (maqaa buufata fayyaa) bakkaa bu'uudhaan raga sassabaa ta'ee hojjadha.

Nuhi qorannoo kibbaa dhihaa Itiyooiyaatti yuunirsitii Jimmaa waliin ta'uun gageessaa jirraa fi hundaafu gargaasaa namoota HIV waliin jiraatanii qorannoof filataman. Qorannaa kan keessaatti Hirmaachuu keessaaniif nuuyii baay'ee isiin dinqisifaana. Ammaa ani, gaafiileen sababiiwwan garaa kaasaan walqabatee isin gaafadhuuf deemaa. Gaaffii isin gaaffaadhuuf ifaa fi amanamaan deebiisuudhaan gargaarsii isin gootan baay'ee kan dinqiisifamu yammu ta'uu, kaayyoon qo'anno kana galmaan gahudhaaf qooda ofii ni qaba. odeeffannoon isiin kennitan karoora tajaajilaa fayyaa keessaattu fedhii addaa haawwasaa keeti sii dhuunfatee guutuuf oola ykn nu fayyada. Gaafiillee kanaaf deebiin dhugaa ykn sobaa hin jiruu. Odeeffannoon ati muuxannoo kee irratti hundoofte akka namaa HIV waliin jiraatu tokkootti kennitee poolisii fi sagaantaa wal'aansaa fi barumsaa fayyaa akkataa garaa kaasaa ofirra ittisan qopheessuuf ni fayyada. Iccitiin Odeeffannoo isiin kennitan eegama dha fi iccittii eegudhaaf jecha odeeffannoon isiin kennitan nama qorannoo kanarratti hirmaate malee dhaabbata kamiifiyyu dabarfame hin kennamu. Akkasumas iccitti eeguf, ragaan isiin kennitan kaayyoo qorannoo qofaaf oolaa. Hirmaanaan qorannoo kana fedhii fi bilisaan. Gaafiilee kanneen keessaa gaaffii deebii debisu kan hin barbaadne ykn gaafiilee hundaa deebii kennu yoo hin barbaadne mirgii keessan kan eegame dha. Haa ta'uu malee, odeeffannoon isiin kennitan baay'ee barbaachiisaa waan ta'eef haala ho'an ni hirmaattuu jenne amanna.

Gaaffiin kun yeroo kee _____ hamma _____ qofaa sirraa fudhata.

Yoo waan si hin gallee qabaatee gidduun gaafachuu ni dandeessaa.

Ammaa itti fuufu ni dandeenyaa? Eeyyee yoo jetan, gara fuula itti anuti darbina

Lakkii/Mitii/ yoo jetan, asuma irratti dhaabna.

Galatooma!!!

Maqaa Raga sasabaa _____ mallattoo _____ guyyaa _____

Maqaa Supeervaayizara _____ mallattoo _____ guyyaa _____

1. Gaaffii Calaallii

Gaaffii calaallii			
Lak	Gaaffii	Deebii	Irra Darbi
01	Umuriin kee meeqa?	(waggaa)= _____	Yoo <18 ta'e gaaffii kee assumati dhabi.
02	Yoo >=18, HIVn dhiiga kee keessa jira?	1 = eeyee 2 = lakki 3 = hin beeku	Itti hin fufin. Itti hin fufin
03	Garaa kaasaa qabda?	1 = eeyee 2 = lakki	Koodii A kennifii, kuuta odeeffano funanamutti ergi
04	Dhukkuba garaa kaasaa guyyota 14 darban kessa qabda turee?	1 = eeyee 2 = lakki	Itti hin fufin Koodii B, kennifii, kuuta odeeffano funanamutti ergi

1. safaraa haadhoo (waraqaa gaaffii)

Lakkofsa Eenyummaa: 001rraa jalqabi

Section I Kutaa I. Haala waliigalaa fi haala sadarkaa jireenyaa haawwasummaa			
Deebiiwan irratti marsi.			
Lakk.	Questions and Filters	Response & Coding Categories	Irra darbi
101	Lakkoofsa eenyumma koddi dhan (A ykn B)	_____	
102	Maqaa dhaabbata fayya	_____	
103	Saala <i>Itti marsi</i>	1 = Dhiira 2 = Dhalaa(dubara)	
104	Umriin kee meeqa?	_____ (waggaa)	
105	Bakki jireenyaa kee eessa?	1 = Badiyaa: Aanaa _____ Ganda _____ 2 = Magalaa: _____ Aana _____ Ganda _____	
106	Dalagaan kee maali?	1 = Hojjetaa mootumma 2 = Hojjeetaa mitimootumma 3= Daldalaa/tuu 4 = Qoteebulaa 5 = Haadhamanaa 6 = hojjetaa/ttu guyyaa 7= kan biraa(ibsi) _____	

107	Dubbisuu ni dandeessa?	1 = Eeyye 2 = Lakki →	gara Lk.11 1
108	Barreessuu ni dandeessa?	1 = Eeyye 2 = Lakki	
109	Yoo deebiin L.107 and/or 108 eeyyee ta'e, barumsa idilee barateeta??	1 = Eeyye 2 = Lakki →	Gara Lk.11 1
110	Yoo deebiin L.109 eeyee ta'e, sadarkaan barnotaa kee meqaa?	1 =yoo kutaa (1-12), kutaa _____ 2 = sartafikeetii 4= Diplomaa 5= Digrii 6= kan biraa(ibsi) _____	
111	Amantiin kee maalii?	1 = Ortodoksiii 2 = Musiliima 3 = Protestaantii 4 = kaatooliki 5 = Kan bira (Ibsi) _____	
112	Saba ykn qomoon kee maali?	1 = Oromoo 2 = Amaaraa 3 = Tigree 4 = Guragee 5= Dawro 6 = Yem 7= kan biraa(Ibsi) _____	

113	Yeroo amma kan sadarkaan gaa'ila/herumaa kee akkami?	1 = hin heerumne/hin fuune 2 = heerumeera 3 = walhiikeera 4 = jalaa du'eera	
114	Galiikee ofumaa argattaa?	1 = Eeyye 2 =Lakki →	gara Lk.11 6
115	Yoo eeyyye ta'e, galiin ati ji'atti argattu meeqa??	_____ qarshii/ji'atti	
116	Galiin gidugalessa maati ykn mana ji'an kan kee dabalee meqaa ta'a?	_____ qarshii/ji'atti	
117	Gargarsa kaneen akka kafalti mana barumisa, nyaata, kafalti walaansa fayyaa fi huccu eessa argattaa?	1= gali abba mana/hadhaa mana irraa 2=galii ofiikoo irraa 3=galii warra haadha/abbaa manaa irra 4= gali warrakoo irraa 5= soorama 6= kan biraa(ibsi)_____	
118	Waantoota sammu nama adoochanitti fayyadamtee ni beekta (Jimaa, alkoolii, shiishaa ykn sigaraa)?	1=Eeyye 2=Lakki →	gara Lk.20 1
119	Waantoota sammu nama adoochan keessa maal fayyadamtee?	1=Jimaa 2=Sigaraa 3=Alkoolii 4=shishaa 5=kanbiraa (ibsi)_____	

120	Guyyoota 30n darban keessatti waantoota akka Jimaa, alkooli, shiishaa ykn sigaraatti fayyadamteeta?	1=Eeyye 2=Lakki →	gara Lk.20 1
121	Guyyoota 30n darban keessatti waantoota sammu nama adoochan maalitti fayyadamtee?	1=Jimaa 2=Sii gaaraa(tamboo) 3=Alkoolii 4=shiishaa 5=kanbiraa (ibsi)_____	
122	Guyyoota 30n darban keessatti alkoolii yeroo meeqa dhugdee	1=tasumayyu hin dhugne 2=yeroo tokko 3= yeroo 2-3 4= torbanitti 5=3-4 times a week 6=5-6 times a week (Nearly every day) 7=Daily	
123	Sochii qaamaa(ispoortii) ni gootaa?	1=Eeyyee 2=lakki →	Lk.20 1
124	Yoo deebiin kee eeyyee ta'e, yeroo meeqa?	_____/ torbanitti	

Section I I Ragaalee Haala naanno ilaallatan			
Part i. Ragaalee haala manaa			
Lak	Gaaffiiwwan	Fillannoowwani fi deebiiwwan	skip
201	Xaaraan manaakee malirra hojjetamee?	1=qorqorroo 2= Taayls 3= konkriti 4= citaa 5= kan biraa(ibsi)_____	
202	Gidgiddan manaakee malirra hojjetamee?	1= simintoo 2= briikii 3 = dhoqqee 4= muka 5= kan biraa,(ibsi)____	
203	Manni kee kutaa meeqa qaba(kutaalee manaa ala jiran dabalatee)?	_____ (lakkofsaan)	
204	Mana keessan keessa nama meeqatu jirataa?	_____ (lakkofsaan)	
205	Nyaata keessan bilchessachuudhaaf maal fayyadamtu?	1=Elektriiksiitii 2= Annisaa aduu 4= Naafxaa 5= Kasala 6= Qoraan 7= Kuboota (Dikee) 8= kan biraa, (ibsi)_____	

Part ii. Ragaalee bishaanii fi haala qulqullina wajjan kan wal-qabatan			
206	Bishaan itti fayyadamtan eessaa waraabatuu?	1=bishaan ujummoo (buwambaa) 2= bishaan pampii 3= bolla biiriitii kan eggannoon godhamufii 4= bolla biiriitii eggannoon hin godhamnefii 5=bishaan burqaa egganoo qabu 6= bishaan burqaa egganoo kan hinqabne 7= bishaan bakke (bishaan hidhaa, lagaa) 8=tankii bishaan bokka kuusu kan qadaddi qabu 9= tankii bishaan bokka kuusu kan qadaddi hinqabne 10= kan biraa, (ibsi)_____	
207	Bakki isiin ittii bishaan warabattan kan dhunfaa moo kan ummataatii?	1= kan dhuunfaa → 2= kan ummataa	Q.209
208	Fageenyi iddoo bishaan warabattanii fi mana keessan gidduu jiruu meeqa (Daqiiqaadhaan)	1. _____ 2. _____	
209	Averejiitiin Guyyaatti bishaan litira meeqa fayyadamtu?	_____ (litiriidhan)	
210	Meeshaa maal jedhamu bishaan kuusudhaaf itti fayyadamtuu?	1=Jariikaanii 2=Okkotee 3=Baaldii 4=Taankii (rootto) 5 = kan biraa, (ibsi)_____	
211	Bishaan warabattan kan dhugaatiif hin taane yoo ta'e, bishaanicha ni wal'antuu?	1= Eeyyee 2= Lakki →	Q.213

212	Yoo deebiinkee eyyee ta'e, bishaan keessaan wal'aanuuf tooftaa maal fayyadamtu?	1=Danfisuu 2=Calaluu 3=kemiikaalan wal'anuun 4= kan biraa, (ibsi)_____	
213	Iddoo bishaan warabbatanii fi mana boobbaa keessan giddu fageenya hammamtu jira?	_____(Metiriidhaa)	
214	Yoom yoom harkaa kee dhiqata?	1=mana bobbaa ergaa deemtee booda 2=Bobbatii ijjoolee ergaa harkaan qabdee yokiin ergaa ijjoolee qaama 3=warra kaan nyaachiisuun dura 4=nyaata dura 5=Nyaata qopheessuun dura	
215	Harka kee maaliin dhiqatta?	1=Samunaadhaan 2= Daraadhan 3= Homaanuu 4 = kan biraa, (ibsi)_____	
Part iii. Ragaalee qulqullinaan wal qabataan			
216	Manni keessan mana bobbaatii/boolii qabaa?	1=Eeyyee 2=Lakkii →	Q.218
217	Yoo deebiin kee eeyyee ta'e, mana bobba akkamiitu jira?	1=kan bishaan ittiin bobba gad dhiisan qabu 2=mana bobba kan bishaan hin qabne 3=mana bobba kan qadaddi qabu	

		4= kan biraa, (ibsi)_____	
218	Yoo deebiin kee lakki ta'e, essati fayyadamta ree?	1=mana bobba kan waliinii 2= Dirrerratti 3= kan biraa, (ibsi)_____	
219	Manni bobba itti fayyadamaa jirtaan essatti argama?	1=mana keessa 2.=manaa ala garuu mooraa keessa 3.=mooraatiin ala 4= kan biraa, (ibsi)_____	
220	Manni bobbaa sun qadaaddi qabaa?	1=Eeyyee 2=Lakkii	
221	Kosii eessatii gattuu?	1= Dirree irratti 2= boolla keessatti 3=qodaa kosii keessatti 4= Ni guubna 5= kan biraa, (ibsi)_____	
222	Kosii dhangala'aawoo essatti dhanqalaastuu (gattuu)?	1=Dirre irratti 2= Boolla keessatti 3=tankii kosii/manaa bobbaatti 4= kan biraa, (ibsi)_____	
223	Bineensa manaa ykn beelladaa manaa qabduu?	1=Eeyyee 2=Lakki	
224	Tisiisa, Bararii fi Hantunni mana keessan keessa jiruu?	1=Eeyyee 2=Lakki	
225	Rifiriijiretara manaa qabduu?	1=Eeyyee 2=Lakki	
226	Guyyaatti almeeqa nyaata bilchessattu	Guyyaatii al_____	

227	Nyaata dheedhii ni nyaattuu?	1=Eeyyee 2=Lakkii	
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Section III. Ragaalee haala kilinikaalaa			
Lak	Gaaffii	Deebii	Irra Darbi
301	Amma dhihootti lakkofsii seelii CD4 kee meeqa lakka'ee? (waraqaa raga/mana yaala ilaali)	_____	
302	Sadarkaan dhukubakeetii akka sadarkaa WHO itti meeqa? (waraqaa raga ilaalii)	1=sadarkaa I 2= sadarkaa II 3= sadarkaa III 4= sadarkaa IV	
303	Batii 6 darban keessatti Hospitaala ciistee veektaa dhukuba HIV wajjiin wal qabee?	1=Eeyyee 2=Lakki_____→	Q.305
304	Hamamii hospitalaa keessa ciistee, yoo al takkoo ol ta'ee hunduma isaanii guutii?	Yeroo jalqabaa _____ Yeroo lammafaa _____ Yeroo sadaffaa _____	
305	Ogeessaan kan mirkana'ee dhukkubni garaa kanaan dura Batii 6 darban keessatti si qabeeraa?	1=Eeyyee 2=Lakkii	
306	Dhukkuboota kan HIV irran kan ka'e nama qaban si mudateeraa? (ragaa ilaalii)	1=Eeyyee 2=Lakkii	

307	Amma wal'aansa ART hordofaa jirtaa? (ART fudhachuu jalqabdeettaa?)	1 = Eeyyee 2 = Lakki →	Q.309
308	Qorichoonni ati amma ART dhaaf fudhattu maal maal jedhamuu? (raga ilaalii)	_____	
309	Amma kiliniika ART sirritti hordofaa jirtaa? (warra ART fudhachuu jalqabaniif)	1 = Eeyyee 2 = Lakkii	
310	Amma dhukuboota bira dursitee offirra ittisuuf qoricha kotriimoksazolee jedhamuu fudhachaa jirtaa?(ragaa ilaali)	1 = Eeyyee 2 = Lakkii	

WAAN QORANNOO KANA KEESSATTI HIRMATTANIIF GALATOOMAA!