Assessment of prevalence and associated Factors of Diarrheal Diseases among Under-Five Years Children living in Woreda 03 Residence of Yeka sub city, Addis Ababa Ethiopia

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Abstract

Background The main causes of under- five children morbidity and mortality in developing countries are related to exposures to poor environmental, socio-demographic and behavioral factors. Contaminated water consumption and poor hygienic practices are the leading causes of death among children worldwide especially in developing countries, including Ethiopia.

Objective To assess the prevalence and associated factors for the occurrence of diarrhea disease among under-five year's children

Method A Cross sectional study conducted in Woreda 03 Residence of Yeka sub city of Addis Ababa Ethiopia whereby 399 out of 400targeted sample households' caretaker with under- five children were interviewed by trained data collectors and alsofrom 34 household who have under- five children with diarrhea sample water were taken from usual water storage and examined and the collected data was entered using Epi Info and cleaned and analyzed using SPSS.Bivariate and multivariate logistic regression analyses were undertaken to identify factors for childhood diarrhea.

Result prevalence of diarrhea in under-five children was found 8.5 percent of the total 399 children from the socioeconomic variables entered the age of mother less than twenty five[AOR: 7.42, 95% CI: (1.64, 33.60)], from the Environmental variables entered in the model those house hold got water more than two week[AOR:4.56, 95% CI: (1.49, 13.93)] and from behavioral variables entered in the model caretaker who said I wash my hands after cleansing baby bottom and after using toilet [AOR:0.36, 95% CI: (0.15, 0.84)] and [AOR:0.23, 95% CI: (0.55, 0.96)]and also those caretaker who said I dispose child feces anywhere by covering with soil [AOR:0.7.9, 95% CI: (1.05, 59.89)]had significant in the final step or model. And the examined water sample result showed that from Ecoli point of view from thirty four 21 and from total coliform point from thirty four 29 sample showed unacceptable result

Conclusions and Recommendations Storing water for long time and not practicing of washing hands after cleansing baby bottom and after using toile and also disposing child feces by covering with soil were risk factors for the occurrence of diarrhea in under-five children. Therefore Knowledge and practice on hand washing at critical times should have to get great emphasis during health education in order to protect the children against diarrhea and also the demand and supply of water supply gap should be minimized.

1. Introduction

1.1 Background

The main Causes of under five children morbidity and mortality in developing countries are exposure to poor environmental situation, socio-demographic situation and behavioral factors(1). Most of the prevention plan stated out in the prevention package to reduce childhood diarrhea deaths and to make a lasting reduction in the diarrhea burden by United Nations Children's Fund (UNICEF) and the World Health Organization (WHO) are related to Hygiene and Environmental sanitation i.e. Promotion of hand washing with soap ,improved water supply quantity and quality, including treatment and safe storage of household water and Community-wide sanitation promotion (2).

Lack of adequate safe drinking water, absence of basic sanitation and poor hygienic practices are associated with high morbidity and mortality of excreta borne diseases .Water has a great chance of contamination by pathogens if the water source not protected and with the lack of the above mentioned factors this leads to contamination at house hold level. Diseases caused by contaminated water consumption and poor hygiene practices are the leading causes of death among children worldwide especially in developing countries(3).

According to the call to action on sanitation issued by the deputy secretary-general of the united nations in March 2013, those countries where open defecation is most widely practiced have the highest numbers of deaths of children under the age of five, as well as high levels of under nutrition and Ethiopia is one of the top 10 countries with the highest numbers of people practicing open defecation(4).

Mortality by diarrhea has declined over the past two decades including in Ethiopia but despite these declines, diarrhea remains the second most common cause of death among children under five globally and It is responsible for killing around 760,000childeren every year(5)

By considering the problem the Ethiopian Ministry of Health has been struggled to curb the morbidity and mortality of children by formulating and implementing different policies, strategies and by implementing health service extension program focusing on prevention(4).

1.2 Statement of the Problem

Even though Globally good progressachieved in decreasing under- five child mortality, the number of under-five deaths for the past two decades is shocking.ie between 1990 and 2013, 223 million children worldwide died before their fifth birthday (6)In our context also even though much progress achieved still nationally 88 deaths per 1,000 live births are recorded in 2011(53 per 1,000 live births in Addis Ababa to a high of 169 per 1,000 live births in BenishangulGumuz)and according to WHO 2013 report diarrhea disease is one of the top leading causes of mortality accounting for 19% of all deaths (7).

In most urban developing countries even though the water is obtained from centrally treated source, intermittent water pressure, losses and other intermittent supply, deteriorating, open or leaking conveyances and other distribution system deficiencies lead to infiltration of contaminated water and increased waterborne disease risks. Such risks result in the delivery of unsafe water to consumer(8).

According to Federal Ministry of Health, Healthand health related indicator repot of EFY, 2005 all forms of diarrhea diseases accounts almost 20% of total causes of under five children morbidity

Addis Ababa is one of the cities where there are many in-migrants resulting in severe overcrowding, shortage of housing, shortage of water and sanitation service and high unemployment rate exist. The city water supply authority can supply 350,000 cubic meters water per day out of the total demand of 670,000 cubic meters according to special bullet on December 2007 eth.cal. Therefore because of this gap there exists intermittent supply leading to cross contamination due to leakage, deterioration etc. in the supply chain and also because of this intermittent the community are forced to store water for their daily consumption and this can expose to contamination to house hold level and even there is still open defecation in the city because sanitation coverage is 57% in according to health bureau 2007 E.C report and also according to the document presented by FMOH on training on the second health transformation plan in September 2008 eth.cal ,the urban Health extension program was not as effective as rural extension program to improve the community health

1.3 Rational of the study

Despite of improvement in the past years, still there is many numbers of morbidity and mortality rate of under- five children. And also even though efforts are being under taken still there is a gap in urban setup like Addis Ababa such as:

- High flows of in-migrants resulting in severe overcrowding, shortage of housing, shortage of water and sanitation service and high unemployment rate exist
- Even though the water supply coverage increased from 56% (at the middle of 2007 Eth.cal) to 88% (near end of 2007 Eth.cal) according to Addis Ababa Water supply and sewerage authority June 2007 Eth. Cal bulletin, there still exists intermittent supply leading to cross contamination due to leakage, deterioration etc. in the supply chain and also because of this intermittent the community are forced to store water for their daily consumption and this can leads to contamination to house hold level if not properly stored.
- And even the city sanitation coverage was around 57% means there was still open defecation in the city in according to health bureau 2007 E.C report and this would contributed for the occurrence of diarrhea
- Even though Hygiene and Environmental health service have great impact on reducing under-five diarrheas, there was no structure of Hygiene and Environmental health unit at regional, sub city and Woreda level.
- Also the urban Health extension program is not as effective as rural extension program to improve the community health according to the document presented by FMOH on training on the second health transformation plan on September 2008 eth.cal

Therefore because of the above reasons it was planned to assess the prevalence and associated factors for the occurrence of diarrhea disease among under-five year children's and based on finding of the research to show the burden and give possible recommendation.

2. Literature review

2.1 The Extent of Diarrhea diseases and under five children

In the study conducted in Tanzania showed that the prevalence of reported under five diarrheas was found to be 32.7% (9).

Studies and reports on child morbidity and mortality in Ethiopia show that diarrhea is a major public health problem. According to the 2010 report of the Ministry of Finance and Economic Development's (MOFED), 20% of the childhood death in the country was due to diarrhea. The 2011 Ethiopian Demographic and Health Survey (EDHS) reported that 13% of the children had diarrhea in the two weeks preceding the survey at the national level. Different community based surveys on childhood morbidity and mortality in Ethiopia at different places disclosed three episodes of diarrhea per child per year (4).

Different Morbidity reports and community-based studies conducted in Ethiopia indicate that diarrheal diseases are a major public health problem that causes excess morbidity and mortality among children. And also published studies conducted between 1994 and 2000 in Ethiopia on the prevalence of under-five diarrhea showed the variability of the diseases across the country, 11.4% to 37% (1).

The overall prevalence of diarrhea among under-five children in the study conducted in predictors of under-five childhood diarrhea in Mecha District, West Gojam, was 18 %, i.e.12.5% in urban and 20.6% in the rural of the study area(1)

In the study conducted to asses' environmental determinant of diarrhea among under- five children on Nekemte town of western Ethiopia showed that the two-week period prevalence of childhood diarrhea morbidity was 28.9%(10)

2.2 Factors affecting Diarrhea

2.2.1 Type, quality, Storage situation and continuity of the water supply

Lack of access to adequate and safe water supply leads to the spread of water borne diseases children take the greatest health burden associated with poor water and sanitation. Diarrheal diseases attributed to poor water supply, sanitation and hygiene account for 1.73 million deaths each year and contribute over 54 million Disability Adjusted Life Years, a total equivalent to

3.7% of the global burden of disease (WHO, 2002). This places diarrheal disease due to unsafe water, sanitation and hygiene as the 6th highest burden of disease on a global scale, a health burden that is largely preventable (11).

The most predominant waterborne disease, diarrhea, has an estimated annual incidence of 4,600 million episodes and causes 2.2 million deaths every year. In terms of global burden of disease, diarrhea ranks second after respiratory infections. Children under five years of age are most affected: some 1.33 million die each year of diarrhea, representing 15% of overall mortality in that age group (12).

According to strategy for comprehensive diarrhea control, adopted by the United Nations Children's Fund (UNICEF) and WHO in 2009Low-cost interventions for household-based treatment of drinking-water and safe storage can significantly reduce the pathogen load in drinking-water and, thereby reduce the risk of diarrheal diseases. (13).

Interventions in improving access to safe water that favor the poor in particular, whether in rural or urban areas, can be an effective part of poverty alleviation strategiesbecause those at greatest risk of waterborne disease are infants and young children, people who are debilitated and the elderly(14).

If public health is to be improved, provision of safe and adequate water supply quantity, quality, cost, coverage and continuity of supply have to be fulfilled. Based on the morbidity records, there is still a high occurrence of communicable diseases which most of the time is related with water supply conditions in the country among which about 60% of the top ten diseases are related to poor quality and scarcity of household water consumption(12).

Interventions to improve water quality at the source, along with treatment of household water and safe storage systems, have been shown to reduce diarrhea incidence by as much as 47 per cent (2).

Numerous studies have documented inappropriate storage conditions and vulnerable water storage containers are factors contributing to increased microbial contamination and decreased microbial quality compared to either source waters or water stored in improved vessels (8).

Fecal contamination of source and treated water is further worsen by increasing populations, urban growth and expansion, peri-urban settlement and perhaps increasing pollutant transport

into ground and surface water due to deforestation, , recurrent disastrous weather events like flood and increasing coverage of the earth's surface with impervious materials (15).

Study conducted in Tanzania found that water treatment with any method was significantly protective by 51% against diarrhea among under- five children and Treatment by boiling had a protective factor of 61% to diarrhea. Also storing water in a bucket with lid was significantly protective with the protective factor of 69% and storing water in bucket without lid significantly increased the risk to diarrhea. It was found that household which used drinking water with detectable E.coli and Total coli forms, their children were 21 times likely to significantly develop diarrhea as compared to that drinking water without microbial contamination. (9)

2.2.2 Other hygiene and environmental health Factors

Most recently, the UN General Assembly declared safe and clean drinking-water and sanitation as human right essential to the full enjoyment of life and all other human rights (14).

Globally, 2.5 billion people do not have access to improved sanitation facilities. Of the 2.5 billion people without access to an improved sanitation facility , 784 million people use a public/ shared facility, 732 million use a facility that does not meet minimum hygiene standards, whereas the remaining one billion practice open defecation and Southern Asia sub-Saharan Africa take the greatest number(16).

There are several options for the fecal-oral waterborne disease transmission. These include contamination of drinking-water from source to consumption by human ,animal feces and industrial waste through direct pollution and also result from contamination in the distribution system through “leaky” pipes, and inadequate treatment and storage of unhygienic handling of stored household water (12).

According to the 2014 update study report of JMP to estimate global exposure to fecal contamination in drinking water. The study estimates that 1.8 billion people globally use a source of drinking water that is fecal contaminated(16).

One of the Causes of under- five children morbidity and mortality is Environmental factors according to the study conducted in Mecha district because Families who had unimproved drinking water source, being rural and improper refuse disposal had a significantly increased the risk of childhood diarrhea. Also children living in households without latrine facilities were

about 92% more likely to develop diarrhea than children living in households with such facilities (1)

In the study conducted Nekemte town of western Ethiopia showed that Children from the households disposing refuse in pit/burn were 69% less likely to have diarrhea compared to children from the households who claimed disposing their refuse indiscriminately in open field and Children from households where there was feces around the pit-hole/on the slab were about three times more likely to have diarrhea than those children from the households where feces was not observed around the pit-hole [OR : 3.13, 95%CI (1.04,9.45)] (10)

2.2.3 Behavioral factors

As DHS 2011 report Under-five mortality among children born to mothers with no education (121 per 1,000 live births) is 2.6 times as high as that of children born to mothers with secondary education (46 per 1,000 live births) and more than five times as high as that of mothers with more than a secondary education (24 per 1,000 live births)(7).

The water-storage containers used in developing countries households which are often not cleaned and opened are exposed to contamination due to children who put their hands into the water, unhygienic handling of the storage containers, use of dirty utensils to withdraw water, dust, animals, birds and various types of insects. Most of the time children are the first line of victims for the problem associated to it (2).

One of the Causes of under five children morbidity and mortality is behavioral factors according to the study conducted in Mecha district because in the study it was found that Children, who were partially on breast milk (COR [95% CI]= 2.4 [1.24, 4.88]) were more likely to have diarrhea than children who were exclusively on breast milk. Also maternal history of diarrheal morbidity was found to be significant predictors of diarrheal morbidity in children. (1)

A number of studies have shown that hand washing with soap can reduce the incidence of diarrheal disease by over 40 per cent (2).

2.2.4 Socio economic and demographic factors

The under-five mortality rate is a key indicator of child well-being, including health and nutrition status. It is also a key indicator of the coverage of child survival interventions and,

more broadly, of social and economic development. Millennium Development Goal 4 (MDG 4) calls for reducing the under-five mortality rate by two-thirds between 1990 and 2015 (6).

Reductions in child mortality are associated with improved coverage of effective interventions to prevent or treat the most important causes of child mortality in particular immunizations, malaria prevention and treatment, vitamin A supplementation, birth spacing, early and exclusive breast feeding ,Improving hygiene and Environmental sanitation and with improvements in socio-economic conditions (17).

There is public health, economic and human rights-related benefits from access to a sufficient supply of safe drinking water. In 2010 a United Nations General Assembly resolution recognized that a sufficient and safe supply of water is a human right and is essential for the realization of many other human rights. (18).

According to the study conducted in Mecha district on socio economic factors found that maternal education suggested that mothers with secondary and above education experienced better chance of a child being free of diarrhea (1)

2.2.5 Summary of conceptual framework

The conceptual framework model shown below explain how the five different factors are related for the occurrence of Diarrheal Diseases among Under-Five Year's Children that means

- Socioeconomic factors such as education, age and the family size have direct impact on childhood diarrhea because of knowledge gap and poverty and it has also indirect impact by reducing the bacteriological water quality level of drinking water
- The behavioral factors such us breast feeding situation and hand washing situation after critical times have direct impact on child hood diarrhea andbacteriological water quality level and the quality of water have impact on diarrhea happening
- Hygiene and environmental health factors also have direct impact on childhood diarrhea and it has also an indirect impact on child hood diarrhea by altering the bacteriological water quality level of drinking water by different means
- Type of the water source have direct impact on child hood diarrhea also the intermittent water supply and house hold water treatment can have indirect impact on child hood diarrhea by changing water quality level
- The bacteriological water quality situation which have great impact for the occurrence of child hood diarrhea are related to most of the factors

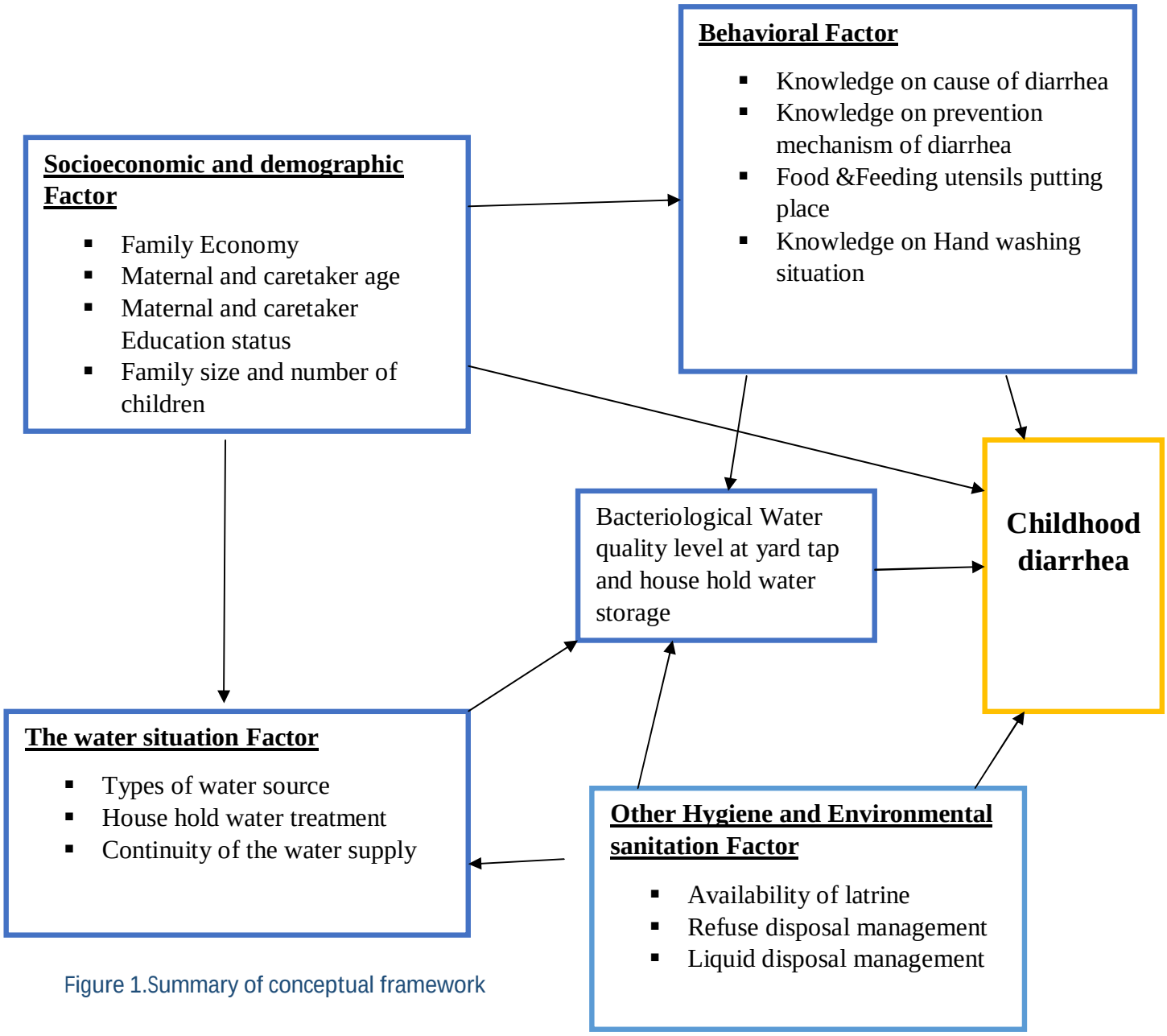


Figure 1.Summary of conceptual framework

3. Objectives

3.1 General Objective

To assess the prevalence and associated factors for the occurrence of diarrhea disease among under-five year children

3.2 Specific Objectives

3.2.1 To determine the prevalence of diarrhea diseases among under-five year children

3.2.2 To detect the bacteriological water quality of the stored water(which they used for drinking) in a Household where there were under five children with diarrhea

3.2.3 To assess socioeconomic, behavioral and environmental (which include the water situation and bacteriological water quality level that are associated with diarrheal diseases) factors

4. Methods

4.1 Study design and study period

The study design is Cross sectional and the duration of the study was conducted on May, 2016

4.2 Study Area

Addis Ababa is located in the center of Ethiopia and has an altitude of about 2,400 meters above sea level. It is the seat of the United Nations Economic Commission for Africa (UNECA) and the African Union (AU), what makes call Addis Ababa as the capital of Africa and it becomes the capital city of the country since 1886.

Addis Ababa has total population(according to 2007 Eth.cal Health bureau report)of 3,352,001 (FEMALE (51.6%) 1,729,632 and MALE (48.4%) 1,622,368) and divided in to 10 sub cities and 116 Woreda and it has total of 779268 household. and one of the sub city in which the study conducted was yeka sub city where a lot of slum and shortage of continuous supply of water exists relative to others and the sub city is further divided in two 13Woreda and one of the Woreda in which the study conducted was Woreda 03 with a population of 20448 and 1464 under five children . The reasons why the Woreda sleeted was that since the Woreda is found near rural area where most in-migrants are settled andalso because of its elevation' of the topography there was intermittent of water supply andalso because of existence of slum areas.

4.3 Source population

The source population was allhouseholds with under- five children living in Addis Ababa, Woreda 03of yeka sub city.

4.4Study Population

The study population was selected households with under- five children in Woreda 03 of yeka sub city whereby their caretakers were be interviewed.

4.5 Eligibility criteria

Inclusion criteria

- House hold who had at least one under five children for the study
- For water sampling house hold who had at least one under five children with diarrhea in the last two weeks

Exclusion criteria

- Those house hold who were not willing to be included in the study
- For water sampling house hold who were not willing to give sample water

4.6Study Variables

Dependent Variable

Under- five diarrhea

Independent Variable

1) **Socioeconomic status**

- Includes Family economy, house hold size, maternal age, and education, number of children, and marital Status etc.

2) **Environmental sanitation**

The water situation Factor

- This Includes types of water source, House hold water treatment, Continuity of the water supply andQuality of the stored water, etc.

Other Environmental Factors

- This includes availability of latrine, Liquid and Refuse disposal management, House hold situation and food handling mechanism.etc.

3) **Behavioral factors**

- Includes Knowledge on cause of diarrhea, Knowledge on prevention mechanism of diarrhea, Hand washing situation, duration of breast feeding and feeding situation etc.

4) **Bacteriological Water quality level includes** total and fecal colform level, etc.

4.7Operational Definitions

1. **Diarrhea** is defined as having three or more loose or watery stools in a twenty-four hours period, as reported by the mother/caretaker of the child.
2. **Refuse**: includes solidwastes such as ash, cow dung, home-sweepings; but not human excreta.
3. **Exclusive Brest feeding**: a child who receive only Brest milk for 6 months.
4. **Brest feeding**: a child who receive Brest feeding with supplementary food for two years.
5. **Prevalence**: the number of diarrhea cases at the time of the interview divided by the total number of households included in the study.

6. **Maternal education**: categorized into high and low. Low education is used to refer to mothers with less than secondary education while high education refers to those with at least secondary education. This distinction derives from previous research that suggested a minimum threshold of secondary education as necessary to realize the reproduction related benefits of maternal education
7. **Unimproved latrine**: Sanitation options which are not considered "improved" include: Public or shared toilet, Open pit toilet and Bucket toilet
8. **Improved latrine:** Latrine that have shelter, roof and have cleanable slab.
9. **Acceptable level of E. coli and Total coli form in drinking water** According to WHO standard on drinking water it is when there is no any E.coli or total coli form found in 100mL of water tested
10. **Unacceptable level of bacterial contamination in drinking water** Means any coli form or E.coli found in 100ml of water tested
11. **Disinfection** means the removal, deactivation or killing of pathogenic microorganisms
12. **Wealth index**were analyzed or computed using STATA softwareby including the property of house hold ,energy they used and household construction type.(Considered question were107, 108,109,110,111&112)
13. **Shared Latrine**means latrines which are used by more than one House holds
14. **Knowledge** means the caretaker stored information about the question asked and the result was scored based on their respond without mentioning the possible answers by enumerators.

4.8Sample Size

Percentage of children under age five who had diarrhea in the two weeks preceding the survey of Ethiopia DHS 2011, shows 12.4% and 9.5% respectively by improved source and Piped to yard/plot , by non-improved toilet facility is 13.7 %,by urban residence 11%, by region Addis Ababa 9.4% and by mothers education taking at least primary education shows 12.6%(7).

For this study the 9.4% prevalence was taken and. By using this assumption: p = 9.4%= 0.094, z=critical value at 97% confidence interval (1.96)

e = desired precision (3%)

$$n = \frac{Z^2 * P(1-P)}{e^2}$$

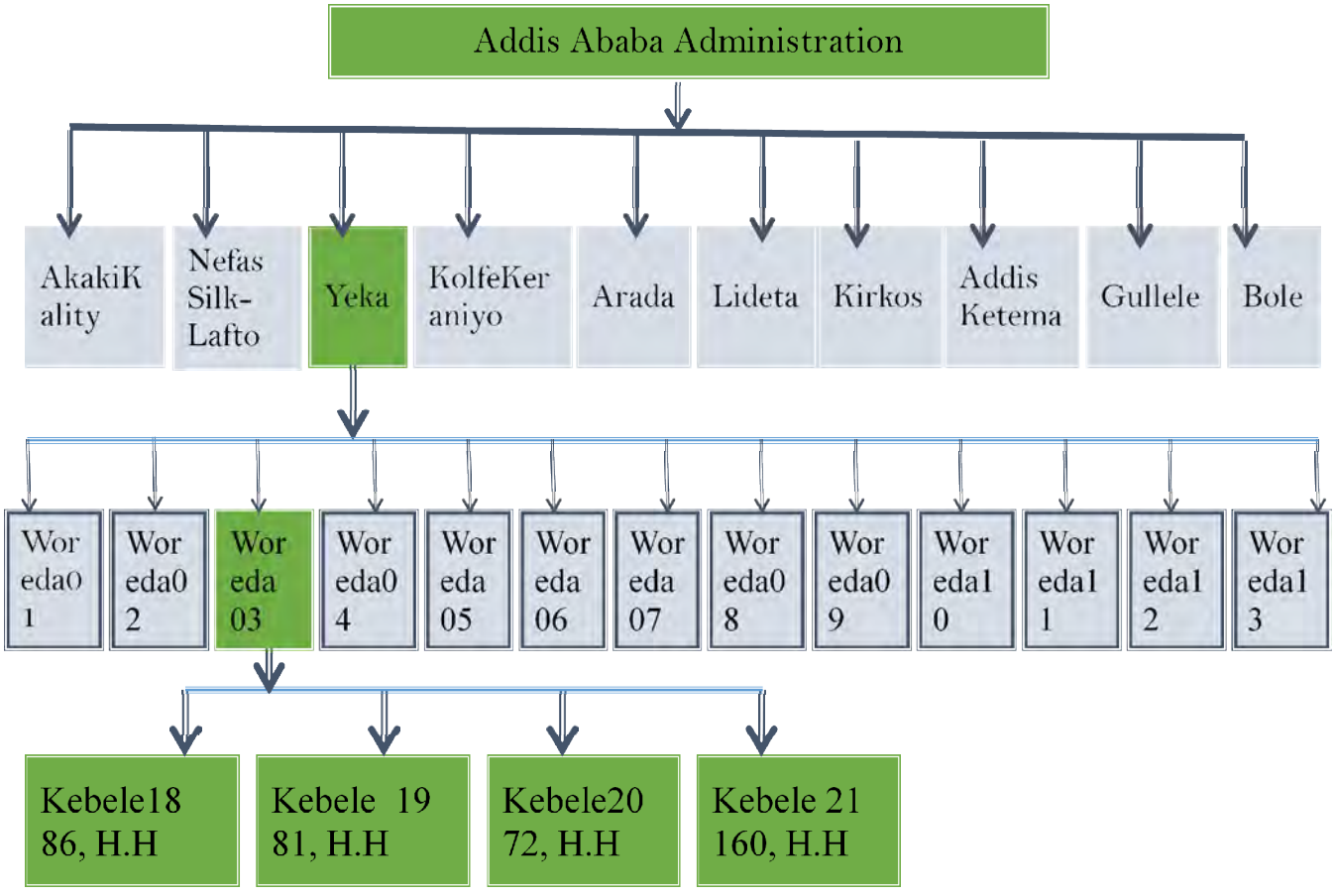
n= 1.96*1.96*0.094*0.906 =**363.6**

0.03*0.03

And we assumed non response rate of 10%, therefore the total sample size were 400

- Therefore for the prevalence of under- five diarrhea and other factors other than bacteriological water sample 400 household caretakers who had under five children planned to be interviewed
- Therefore based on study result from34 household who had under- five children with diarrhea in the last two weeks sample were takenfrom usual water storage by taking water using usual drawingcontainer.

4.9Sample Procedure



- Because the woreda is divided into four kebeles (Kebele 18, 19, 20 and 21) considering each kebele population and allocated urban health extension workers household to be studied were allocated. And the interval was calculated dividing total under five children of the Woreda by 400 (1464/400 =3.66) which is almost 4 then the first household were selected by selecting using lottery and using 4 house holdinterval interview were conducted
- The water sampling from yard tap and water storage samplewere taken focusing on the household who had under- five children with diarrhea case in the last two weeks prior to the survey day

4.10Data collection procedures

The Data collection wereconductedusing structured questionnaireto collect the socioeconomic, Environmental and behavioral factors and the data were recorded or collected using Urban Health extension workers with cloth supervision of Environmental health professional and also the collected data werecheeked daily.

Water sampling was done by the principal investigator using sterilized sampling bottle which were taken from the Addis Ababa Water supply and Sewerage Authority laboratorywhich had sodium thiosulfate in order to stop the action of chlorine. The sample water was taken from the storage container usingtheir drawing canthey normally used and poured to sample bottle without contact and sample water taken from the tap first by turned the tap full on and allow the water to run to waste then disinfected the tap using flame then following disinfection, by adjusting the flow to deliver a gentle stream of water and removing the screw cap sample water was taken.

The bacteriological water analysis was done by Addis Ababa Water and Sewerage Authority using Most Probable Number (MPN) methodwhich uses test tubes containing lactose medium for total coliform detection and EC Mediumfor Ecoli detection. The sample first detected for total coliform in an incubator for 35degre centigrade for 48 hours then those test tubes that formed gas and had smell transferred to Ecoli detection at 44degree centigrade incubation for 24 hours. And the result interpreted based on World Health Organization standard

4.11Data Processing and Analysis

The data were entered using Epi Info version 3.6.1 and cleaned and analyzed usingSPSS software. The frequency distribution of all variables was examined to check for data entry errors (e.g. unrecognized or missing codes). For each variable, frequencies, odds ratios (OR), 95% CI and p-value at 5% computed to assess the degree of association between dependent and independent variables. To identify independent variables which had statistically significant association with diarrhea diseases Bivariate&multivariate analysis were computed and also the data were described and presented using narrative and tables.

In multivariate analysis a hierarchical logistic regression technique was used to assess the relative effect of the explanatory factors on the outcome factor. To avoid an excessive number of variables in the subsequent threemodels, only variables reached a p-value less than 0.3 were kept in the subsequent analyses.

4.12Data quality assurance

The questionnaires were structured. The data collectors trained in order to be familiarized with the questioner and the procedure which have to be followed. The questionnaires were been pre-tested on 5% of the sample population who was not the part of the study group. Based on the result of pre-testing a necessary revision was undertaken.

Data collectors submitted the collected data to the supervisors on daily basis. The name of interviewer was recorded so as to enhance the responsibility to any in complete question. Data coding and data entry were been checked at the beginning and at the midway stage of the work and also Data chaining conducted at the end of data entry.

4.13Ethical consideration

Prior to the beginning of the study ethical clearance were obtained from Ethical Review Committee of Addis Ababa University School of public health and also from Ethical Review Committee ofAddis Ababa city Administration Health Bureau. Informed consent were been asked from each individual participant (parents, guardians) before commencement of an interview.

5. RESULTS

5.1. Households' Socio-economic, Environmental and Behavioral Descriptions

5.1.1. Socio-economic Characteristic and Child Demographic

A total of 399 households were included in this study with the response rate of 99.7%.Out of these households, 160 (40.1%) were from kebele 21, 86 (21.6%)werefrom kebele 18, 81(20.3%)werefrom kebele 19 and 72 (18%) were from Kebele 20.

The children demographic situation were 30 (7.5%) werefrom 0-6 months, 35(8.8%) were from7-11 months, 112(28.1%) were from 12-23, 74(18.**5**) were from 24-35, 81(20.3%) were from 36-47, 67(16.8%) were from 48-59.

Concerning the relationship of respondent 281(70.4%) were mother, 38(9.5%) was household servant and the rest were father, grandmother and aunt. The age group of respondent other than mother were 32 (26.9%) were<18 year, 36(30.3%)] were18-38 year, 29 (24.4%)were39-59 year and 60 and above year were 22 (18.5%) and the age group of mother were55 (13.8%) were15-24 year, 282(70.7%) were25-34 year and 62(15.5%) were>34 year. The majority of mothers were married (91.7%). Majority of respondent other than mother 89(74.8%) level of education were primary and less than it and out of them illiterate were 19(16%) and majority of respondent of mother287(71.9%) level of education were secondary and above and those mothers who are read and write only were 22(5.5%) .

Out of the 399 household visited majority of it 313(78.4%) of the households had less than 6 persons in their families and the majority of the house hold 313(78.4%) had 1-2 children.

Wealth index result showed that poor and middle class are almost same and the rich showed a slight decrease [Poor 134(33.6%), Meddle 136(34.1%) and Rich 129(32.3%)].

Table 1 Socioeconomic characteristics of the study Population

Characteristics		Freq	Percent
Age in Month (n=399)	0-6	30	7.5
	7-11	35	8.8
	12-23	112	28.1
	24-35	74	18.5
	36-47	81	20.3
	48-59	67	16.8
Relationship of respondent to a child (n=399)	Mother	281	70.4
	Grand Mother	49	12.3
	Father	7	1.8
	Household servant	38	9.5
	Others	24	6.0
Age group of mother (n=399)	15-24	55	13.8
	25-34	282	70.7
	>34	62	15.5
Level of education of respondent other than mother (n=119)	Primary	56	47.1
	Secondary	21	17.6
	College and above	7	5.9
	Read and write	16	13.4
	Illiterate	19	16.0
Level of education of mother (n=399)	Primary	90	22.6
	Secondary	170	42.6
	College and above	117	29.3
	Read and write	22	5.5
Number of people live in the household(n=399)	1-5	313	78.4
	>5	86	21.6
Number of the children are under age of five (n=399)	1-2	392	98.2
	>2	7	1.8
Wealth Index (n=399)	Poor	134	33.6
	Medium	136	34.1
	Rich	129	32.3

Table 2 Prevalence of diarrhea

Characteristics		frequency	Percent
Prevalence of diarrhea (n=399)	Yes	34	8.5
	No	365	91.5

Therefore the two weeks prevalence was 8.5%

5.1.2. Environmental Characteristics

5.1.2.1 Water related characteristics

As shown in table 2 below 392 households (98.2%) used tap water as the main source of water and 3(0.8%) used from water vendor and the rest used from bore hole and rain water. Concerning the source of water for the household when the main source is interrupted were 206(51.6%) from stored water, 123(30.8%) buy water from vendors and 3(0.8%) from borehole. Regarding the distance traveled to get water, 305 (76.4%) households got water in a 15 minutes walking distance from their home.

The caretaker perception rate for the question whether the water provided was free from disease organism, were 213caretaker (53.4%) said yes it is free and the rest said no and out of said no 88(47.3%) caretaker said they boiled the water to make safe and 24(12.4%) said they use disinfectant to make it safe anddid not do anything to make their water safe, the response rate for reason of choosing the method were 81(43.5%) said because it is cheap,6(3.2) said because they don't know other option and 62(33.3%) said I don't know.

Out of the 399 households surveyed 388households (97.3%) stored water for household consumption and the type of container they used were pot/ jerry can with lid 298(76.98%), pot/ jerry can without lid 41(10.5%) and 49 (12.6%) were used highland. Method used to drown the water from the container 357(92%) households pour directly from the container and those whose fetched by putting the can in to the water were 28(7.2%)

The bacteriological water analysis was done by Addis Ababa Water and Sewerage Authority using Most Probable Number (MPN) method. And the result interpreted based on World Health Organization standard Therefore the final result showed that out of 34 samples examined from E.coli point of view 21water sample result showed unacceptable and from Total coliform point view 29 water sample result showed unacceptable result.

Sample from two household tap out of the under five children who had diarrhea and also sample water from water tinkering by Addis Ababa Water and Sewerage Authority were examined and the result showed zero coliform.

Table 3 Water related characteristics of the study Population

Characteristics		frequency	Percent
Water source (n=399)	Piped water	392	98.2
	Water from bore hole	3	0.8
	Rain water	1	0.2
	Water vendors	3	0.8
Distance Travel to Fetch Water (n=399)	Less than 500 meters (<15 minutes)	305	76.4
	Greater than 500 meters (>15 minutes)	94	23.6
Time of interval of getting water at regular base (n=399)	Daily	135	33.8
	Once in a week	94	23.6
	Two times in a week	97	24.3
	In two weeks' time	25	6.3
	Other (greater than two weeks)	48	12
Whether they stored water or not(n=399)	Yes	381	95.5
	Sometimes	7	1.8
	No	11	2.8
container uses normally to store water for drinking (n=388)	pot with lid	8	2.1
	Pot without lid	9	2.3
	Small naked jerry cans with lid	290	74.7
	Small naked Jerry cans without lid	32	8.2
	Others (Highland)	49	12.6
Method of drawing water from containers (n=388)	Using small can and putting in the water	28	7.2
	Pour directly from the container	357	92
	Others	3	0.8
Lab. Parameter			
E.COLI(cfu) (n=34)	Present	21	61.8
	Absent	13	38.2
TOTAL COLI (cfu) (n=34)	Present	29	85.3
	Absent	5	14.7
Water safety remarks (n=34)	Acceptable	5	14.7
	Not acceptable	29	85.3

5.1.2.2 Sanitation and Hygiene related characteristics

From the total of 399 households 278(69.7%) were used shred latrine, 46(11.5%) were used latrine that have concrete slab, 9(2.3%) used bush/river for defecation and 5(1.3%) were used latrine constructed at the bank of river and out of the total surveyed 345(86.5%) of the households latrine areas did not have feces.

Concerning disposal of solid waste those who used private collector were 380(95.2%) and in municipality container were 14(3.5%)

Table 4.*Sanitation and Hygiene related* characteristics of the study Population

Characteristics		**frequency**	**Percent**
Type of toilet (n=399)	Pour-flush toilet connected to septic tank	-	-
	Pour-flush toilet connected to municipal sewer line	18	4.5
	Ventilated improved pit latrine	3	8
	Pit latrine with concrete slab	46	11.5
	Pit latrine without concrete slab	40	10
	Shared latrine	278	69.7
	No facility/bush	9	2.3
	Other (Near River)	5	1.3
Whether feces around the pit hole/slab/floor or not (n=399)	Yes	37	9.3
	No	362	90.7
Whether hand washing facility around toilet or not (n=399)	Yes	54	13.5
	No	345	86.5
primarily disposal of household solid waste (n=399)	In refuse pit collected by municipality	14	3.5
	collected by private establishment	380	95.2
	dumped in street/open space	1	0.3
	Others	4	1.0
Disposal of liquid waste(n=399)	In septic tank/latrine pit	20	5.0
	In seepage pit	72	18.0
	Anywhere in open space	193	48.4
	Others (ditch & river)	114	28.6

5.1.3. Behavioral and Child Health Characteristic

Out Of the total 30childeren whose age were less than 6 months during the survey, 96.7% of the children were in exclusive breastfeeding , out of 369 children whose age were greater than 6 months during the survey, 85.4% of the children were exclusively breastfeed for last 6 months, out of 150 children whose age were less than 2 years during the survey 75.3% of the children were in breastfeeding with supplementary food , out of 219 children whose age were greater than 2 years during the survey 75.3% of the children were in breastfeeding with supplementary food for last 2 years.

The overall two-week period prevalence of diarrhea in under-five children was found to be 8.5 percent of the total 399 children and 2.8% of the caretaker had diarrhea in the past two weeks.

According to this survey, those caretaker who mentioned on the mechanism used to prevent diarrhea knowledge question were 62.2% said wash hands prevent diarrohea,14.3% mentioned treating /disinfecting water prevent diaorhea,15% mentioned covering water prevent diarrhea and 8% did not know the mechanism on prevention of diarrhea. And concerning time of washing of hands were 83.5% said after using toilet,17.9% said after cleansing baby bottom,15.3% said before breast feeding

Out of the 399 surveyed household on place of putting children food and drink utensils showed that 362(90.7%) said they put in the shelf by covering and 6(1.5%) said they put anywhere by not covering and also concerning the place where they put the children food/drink showed that 351(88%) said in covered shelf, 16(4%) in Refrigetor and10 (2.5%) said anywhere. The survey result on children feces disposal showed that 351(88%) said that they dispose in toilet, 40(10.1%) said they left it open and 8(2%) said that they covered by soil.

Table 5 Behavioral and Child Health Characteristic of the study Population

Characteristics		frequency	Percent
Satisfaction with the taste and odor of drinking water (n=399)	Yes	239	59.9
	No	153	38.3
	Don't know	7	1.8
Whether the caretaker know causes diarrhea(n=399)	Yes	399	100
	No		
If yes what do you think that causes diarrhea?			
Drinking unsafe water (n=399)	Yes	215	53.9
	No	184	46.1
Eating contaminated food(n=399)	Yes	214	53.6
	No	185	46.4
Flies/Insects(n=399)	Yes	113	28.3
	No	286	71.7
Poor Personal hygiene (n=399)	Yes	284	71.2
	No	115	28.8
Sprites (n=399)	Yes	5	1.3
	No	394	98.7
Weather (n= 399)	Yes	5	1.3
	No	394	98.7
Others (n=399)	Yes	4	1
	No	395	99
Don't know (n=399)	Yes	1	3
	No	398	99.7
Do you wash your hands (n=399)	Yes	399	100.0
	No		
If yes, When do you wash hands (n=399)			
After using Toilet	Yes	333	83.5
	No	66	16.5
After touching and cleaning babies bottom	Yes	179	44.9
	No	220	55.1
Before and after meals	Yes	345	86.5
	No	54	13.5
Before cooking/Preparing food	Yes	276	69.2
	No	123	30.8
Before Brest feeding of the child	Yes	61	15.3
	No	338	84.7
Others	Yes	11	2.8
	No	388	97.2
Wash hands with(n=399)	Water only	9	2.3
	Water and soap	390	97.7
Availability of soap (n=399)	Yes	152	38.1
	No	247	61.9

5.2. Socio-economic, Environmental and Behavioral Determinants in relation to under five diarrhea

5.2.1. Socio-economic Determinants in relation to under five diarrhea

Table 5 presents selected socio-economic variables of the households in relation to under-five diarrheal morbidity. From the socioeconomic variables included only mother age group less than twenty five showed significant association with under-five diarrheal morbidity

Children who were born to mothers whose age were less than twenty five are about three times more likely to have diarrhea than age were greater than twenty five years [COR: 3.04, 95% CI: (1.36, 6.78)].

The following variables other than mentioned in the following table i.e. relation of respondent to a child, age group of respondent other than mother, marital status, number of children under the age of five and wealth index also does not showed significant with under-five diarrheal morbidity.

Table 6 Households' selected socio-economic factors in relation to childhood diarrheal morbidity

Characteristics		**Prevalence of Diarrhea**		**COR (95%)**
		Yes	**No**	
Age group of the child(n=399)	0-6	0	30(8.2%)	
	7-11	2(5.9%)	33(9.0%)	1
	12-23	14(41.2%)	98(26.8%)	2.35(0.5-10.9)
	24-35	4(11.8%)	70(19.2%)	0.94(0.16-5.41)
	36-47	7(20.6%)	74(20.3%)	1.56(0.30-7.92)
	48-59	7(20.6%)	60(16.4%)	1.92(0.37-9.8)
Age group of mother(n=34)	15-24	10(29.4%)	45(12.3%)	4.37(1.13-16.85)**
	25-34	21(61.8%)	261(71.5%)	1.58(0.45-5.4)
	>34	3(8.8%)	59(16.2%)	1
Level of education of other than mother (n=8)	Lower Education	6(75%)	85(76.6%)	0.9(0.17-4.8)
	Higher Education	2(25%)	26(23.4%)	1
Level of education of mother cat (n=34)	Lower Education	14(41.2%)	98(26.8%)	1.9(0.9-3.9)
	Higher Education	20(58.8%)	267(73.2%)	

Those Variables which are Significant at p<0.05 marked (**)

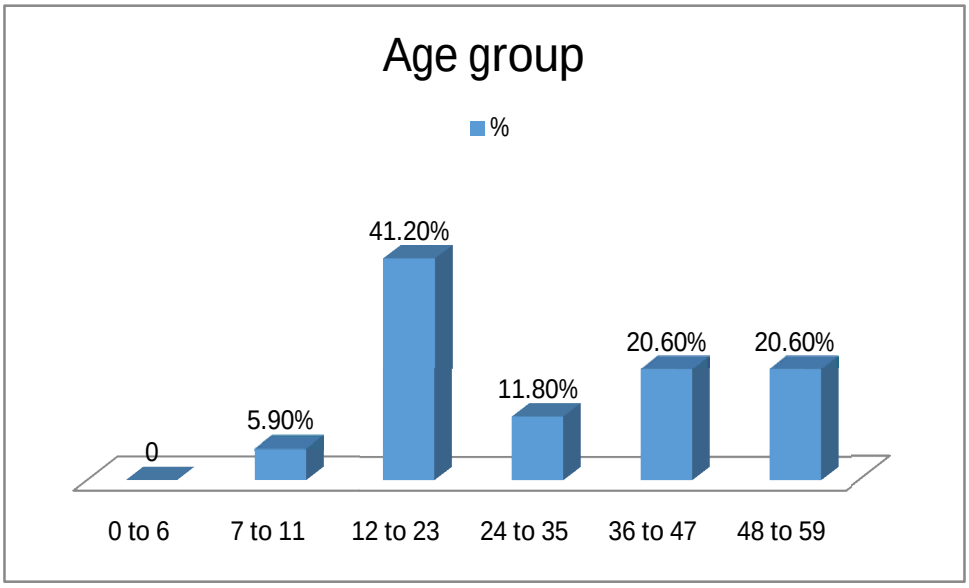


Figure 2: Distribution of prevalence of childhood diarrheal morbidity by age group in Woreda 03 of yeka sub city, 2016

The above figure showed that diarrhea prevalence was higher among children between 12 to 23 months which was 41.20% and almost the prevalence between age of 36-47 and 48-59 months were equal which were 20.6% and no data was recorded between the ages of 0-6 months during the surveyed period.

5.2.2. Environmental Determinants in relation to under five diarrhea

The households' selected environmental variables and their relation to childhood diarrhea is presented in Table 6 but from the Environmental variables included time of getting of water more than two weeks and type of toilet facility showed significant association with under-five diarrheal morbidity

According to this study, those house hold got water more than two week had more than three times higher odds of having diarrhea than those house hold who got water daily [COR:3.28, 95% CI: (1.27, 8.49)]. , and those house hold who used unimproved toilet had more than two times higher odds of having diarrhea than those house hold who used improved [COR:2.9, 95% CI: (1.01, 8.6)]

The following variables other than mentioned in the following table i.e. water source, water source when the main source interrupted ,distance travel to fetch water, satisfaction level with taste and odor of water and type of container normally used for storage also does not showed significant with under-five diarrheal morbidity

Table 7 .Households' selected Environmental factors in relation to childhood diarrhea morbidity

Characteristics		Yes	No	COR (95%)
Time of interval of getting water at regular base (n=34)	Daily	10(29.4%)	125(34.2%)	1
	Once in a week	8(23.5%)	86(23.6%)	1.163(0.441-3.066)
	Two times in a week	5(14.7%)	92(25.2%)	0.679(0.225-2.05)
	In two weeks' time	1(2.9%)	24(6.6%)	0.521(0.64-4.26)
	Other (greater than two weeks)	10(29.4%)	38(10.4%)	3.28(1.27-8.49)**
Method used to make water safe to drink (n=14)	H.H treatment	10(71.4%)	126(73.3%	1
	No treatment	4(28.6%)	46(26.7%)	1.09(0.32-3.67)
Whether they store water for drinking or not (n=34)	Yes & Sometimes	32(94.1%)	356(97.5%	0.4(0.08-1.95)
	No	2(5.9%)	9(2.5%)	1
Method used to draw water from container(n=32)	putting can in the water	2(6.3%)	26(7.3%)	0.85(0.19-3.79)
	Pour directly	30(93.8%)	330(92.7%	1
Type of toilet (n=34)	Improved	4(11.8%)	103(28,2%	1
	Non Improved	34(88.2%)	262(71.8%	2.9(1.01-8.6)**
Feces around the pit hole/slab/floor of latrine (n=34)	Yes	4(11.8%)	33(9%)	1.34(0.445-4.04)
	No	30(88.2%)	332(91%)	1
Availability of hand washing facility (n=34)	Yes	1(2.9%)	53(14.5%)	1
	No	33(97.1%)	312(85.5%)	5.6(0.75-41.86)
Primarily dispose of household solid waste (n=34)	bymunicipality& private	33(97.1%)	361(98.9%	1
	Anywhere	1(2.9%)	4(1.1%)	2.73(0.29-25.2)
Dispose your liquid waste? (n=34)	septic tank & seepage pit	5(14.7%)	87(23.8%)	1
	open space	29(85.3%)	278(76.2%	1.82(0.68-4.83)

Those Variables which are Significant at p<0.05 marked (**)

5.2.3. Behavioral and Child Demographic Determinants in relation to under five diarrhea

The households' selected behavioral variables and their relation to childhood diarrhea is presented in Table 6 but from the behavioral variables included only those caretaker who said I wash my hands after cleansing baby bottom, wash hands frequently can prevent diarrhea and eating contaminated food can cause diarrhea had significant association with under-five diarrheal morbidity

According to this study those caretaker who said I wash my hands after cleansing baby bottom at the time of the survey have about 53% less likely to develop diarrhea than those said no [COR:0.47, 95% CI: (0.23, 0.97)] , those caretaker who did notmentioned that wash hands frequently can prevent diarrhea had more than two times higher odds of having diarrhea than said yes [COR: 2.24, 95% CI: (1.09, 4.53)] and those care taker who did notmentioned that eating contaminated food can cause diarrhea at the time of the survey had more than two times higher odds of having diarrhea than those yes [OR: 2.27, 95% CI: (1.09, 4.7)]

The following variables other than mentioned in the following table i.e. breast feeding (exclusive and for two years), usual place for putting babiesfood and drinking,usual place for putting babiesfood and drinking utensils,and those care takers who said I wash my hands before and after meals, before cooking or preparing food and before breast feeding also does not showed significant with under-five diarrheal morbidity

Table 8 Households' selected Behavioral factors in relation to childhood diarrhea morbidity

Characteristics		Diarrhea		COR (95%)
		Yes	No	
what do you think that causes diarrhea?				
Drinking unsafe water (n=34)	Yes	19(55.9%)	196(53.7%)	1
	No	15(44.1%)	169(46.3%)	0.916(0.45-1.85)
Eating contaminated food (n=34)	Yes	12(35.3%)	202(55.3%)	1
	No	22(64.7%)	163(44.7%)	2.27(1.09-4.7)**
Flies/Insects (n=34)	Yes	10(29.4%)	103(28.2%)	1
	No	24(70.6%)	262(71.8%)	0.944(4.36-2.04)
Poor Personal hygiene (n=34)	Yes	24(70.6%)	260(71.2%)	1
	No	10(29.4%)	105(28.8%)	1.03(0.47-2.23)
What mechanism should be used to prevent diarrhea?				
Wash hands frequently (n=34)	Yes	15(44.1%)	233(63.8%)	1
	No	19(55.9%)	132(36.2%)	2.24(1.09-4.53)**
Cover prepared food (n=34)	Yes	9(26.5%)	108(29.6%)	1
	No	25(73.5%)	257(70.4%)	1.17(0.53-2.58)
Cleanness of utensils (n=34)	Yes	26(76.5%)	270(74%)	1
	No	8(23.5%)	95(26%)	0.87(0.38-1.99)
Treating/ Disinfecting water (n=34)	Yes	5(14.7%)	52(14.2%)	1
	No	29(85.3%)	313(85.8%)	0.96(0.34-2.6)
Covering water storage (34)	Yes	5(14.7%)	55(15.1%)	1
	No	29(85.3%)	310(84.9%)	1.03(0.38-2.77)
Do you wash your hands (n=34)	Yes	34(100%)	365(100%)	
	No			
If yes, When do you wash hands				
After using Toilet (n=34)	Yes	31(91.2%)	302(82.7%)	1
	No	3(8.8%)	63(17.3%)	0.46(0.14-1.56)
After touching and cleaning babies bottom (n=34)	Yes	21(61.8%)	158(43.3%)	1
	No	13(38.2%)	207(56.7%)	0.473(0.230-0.973)**
Place for disposal of under-five child feces (n=34)	toilet	27(79.4%)	324(88.8%)	1
	Left it open	5(14.7%)	35(9.6%)	1.71(0.6-4.73)
	Covered by soil	2(5.9%)	6(1.6%)	4(0.7-20.78)

Those Variables which are Significant at p<0.05 marked (**)

5.3. MULTIVARIATE ANALYSIS

From the socioeconomic variables entered (Age of under-five, Age of mother, Education of mother) the age of mother less than twenty five showed significant in the final model as shown in the following table. According to this study,. The odds of having diarrhea in mothers whose age were less than twenty five were more than seven times higher than the odds in children mothers age greater than 34 [COR: 7.42, 95% CI: (1.64, 33.60)]

From the Environmental variables entered (whether they stored water or not, toilet facility, availability of hand washing, situation and liquid waste disposal situation) in the model those house hold got water more than two week had significant in the final step or model as shown in the following table. According to this study, those house hold got water more than two week had more than four times higher odds of having diarrhea than those house hold who got water daily [COR:4.56, 95% CI: (1.49, 13.93)].

From the six Behavioral variables entered in the model caretaker who said I wash my hands after cleansing baby bottom and after using toilet and also those caretaker who said I dispose child feces anywhere by covering with soil had significant in the final step or model as shown in the following table. According to this study those caretaker who said I wash my hands after cleansing baby bottom and after using toilet have about 63% and 77% less likely to develop diarrhea than those said no [COR:0.36, 95% CI: (0.15, 0.84)] and [COR:0.23, 95% CI: (0.55, 0.96)]. And also according to this study, those house hold who said I dispose child feces anywhere by covering with soil had more than seven times higher odds of having diarrhea than those house hold who dispose in the toilet [COR:0.7.9, 95% CI: (1.05, 59.89)]Even though those caretaker who said wash hands frequently can prevent diarrhea and eating contaminated food can cause diarrhea at the time of the survey showed significant association in the bivariate analysis [COR: 2.24, 95% CI: (1.09, 4.53)], [COR: 2.27, 95% CI: (1.09, 4.7)] however, the association disappeared in the models.

Table 9 Summary of the hierarchical regression analysis of the relative effect of socioeconomic, environmental and behavioral factors on the prevalence of childhood diarrhea

Characteristics	Crude odd Ratio (95%)	Adjusted odd ratio (95%)		
		Model 1	Model 2	Model 3
Socioeconomic Variables				
Age of Mother (*>34vs15-24)	4.37(1.13-16.85)**	4.72(1.19-18.75) **	6.56(1.51-28.36)	7.428(1.64-33.60) **
Age of Mother (*>34vs25-34)	1.58(0.45-5.4)	1.68(0.48-5.94)	1.89(0.51-6.98)	1.840(0.48-6.96)
Model 2 (Socioeconomic + Environmental Variables)				
Time of interval of got water (*Daily vs. once in a week)	1.16(0.44-3.06)		1.304(0.45-3.77)	1.385(0.46-4.15)
Time of interval of got water (*Daily vs. two times in a week)	0.67(0.22-2.05)		0.795(0.24-2.58)	0.983(0.28-3.36)
Time of interval of got water (*Daily vs. in two week time)	0.52(0.64-4.26)		0.780(0.87-6.96)	0.818(0.08-7.9)
Time of interval of got water (*Daily vs. other (more than two week)	3.28(1.27-8.49)		3.927(1.33-11.51) **	4.560(1.49-13.93) **
Model 3 (Socioeconomic + Environmental + Behavioral Variables)				
Eating contaminated food cause diarrhea (*yes vs. no)	2.27(1.09-4.7)			1.372(0.57-3.28)
Wash hands after using toilet (*yes vs. no)	0.46(0.14-1.56)			0.232(0.55-0.96) **
Wash hands after touching and cleaning babies bottom(yes vs. no)	0.47(0.23-0.97)			0.367(0.15-0.84) **
Child feces disposal place (*Toilet vs. anywhere)	1.71(0.6-4.73)			1.513(0.47-4.84)
Child feces disposal place(*Toilet vs. anywhere with soil cover)	4(0.7-20.78)			7.949(1.05-59.89**)

Only variables reached p-value less than 0.3 were kept in the subsequent analyses,

Reference group (*) Significant at p<0.05 (**)

6. DISCUSSION

This study was conducted with the purpose to determine the prevalence of diarrhea with under-five children and its associated factors including water scarcity in the study area.

Accordingly,The findings of this study revealed that the two-week period prevalence of diarrhea in under-five was 8.5 %with 95% confidence interval of (5.8-11.5). This figure is slightly less compared with the finding of the demographic health survey result of 2011 which is 9.4%. The difference in prevalence could be the time of collection of the data that means the DHS was conducted five year before this survey as interventions had been going on since 2011 survey time especially in the areas of urban health extension program Therefore it may be consistent to the DHS finding of trend of subsequent survey (19).

The study finding also showed that the odd of having diarrhea was significantly higher among mothers younger than twenty five years of age compared to the odds in older than thirty four years of age. Even though number of studies showed age of mother were not significantly associated with child hood diarrhea morbidity, studies done in Burundi maternal age showed significant association with childhood diarrhea morbidity that means higher rates of diarrhea prevalence were seen in children under the age of 25 years (OR 1.40; 95% CI: 1.02_1.91; p_0.035) and it was found that children whose primary caretakers aged 40 or older (OR 0.51; 95% CI: 0.30_0.85; p_0.009) were 49% less likely to suffer from diarrhea(20). The association between the age of the mother less than twenty five years and odd of having diarrhea may be explained through lower experience in childcare, feeding practicesand responsivenessthan advanced age.

The bacteriological result of the water sample from water storage containers of the household showed contamination of water by fecal material That means from E.coli point of view out of thirty four sampled examined 21(61.8%) water sample result showed E.coli presence and the rest 13(38.2%) showed negative result, and even though representative sample from each household tap not examined ,tap water from two household and from water distribution by vehicle were taken and the result showed that it was potable for human consumption and this result shows that even though the source of water is free from E.coli it was contaminated either from the water fetching container or at household level storage.

Due to intermittent water supply in the community, the house hold are forced to store water for their daily domestic uses and whichmight be leads to lower free residual chlorine (FRC) levelsdue

to unhygienic practice Therefore from E.coli point of view out of the thirty four 21water sample unacceptable result might be related to under- five diarrhea.

Improving access, availability of improved water sources, promoting more frequent water collection and the use of safe water storage containers by caretakers, and educating them about safe water handling could further reduce contamination of water in the home and the associated risk of waterborne disease transmission by pathogens, including those that are chlorine-resistant, within households. According to our study it was showed that, children who live in households where time of interval of getting water were above 15 days had higher odds of having diarrhea than those household getting daily [OR: 4.56, 95%(1.49- 13.93)] and studies done in Malawi showed that Chlorine concentrations in water that was stored overnight were significantly lower than from freshly collected water that means it declined from the WHO minimum recommended concentration of 0.2 mg/L FRC for preventing microbial growth in stored water(21).

The association between longer storage and diarrhea might be due to household who had inconsistent access to water supply forced to increase storage time depending on availabilitytime and this might be leads to declining chlorine concentrations as a result increase microbial contamination in stored water and this may contributed to the occurrence of diarrheal diseases.

Initiatives adopted by International Forum of Hygiene, Global Hygiene Council and World Health Organization and celebrations such as Global Hand washing Day (15 October) emphasizes on various avenue which promote behavior change towards improved hand washing practices. These may include improvement of water supply at the household or community level as well as hygiene promotion interventions. According to our study although the significance does not exist in the multivariate analysis, wash hands frequently is one of the mechanisms to prevent diarrhea significantly associated with the occurrence of diarrhea in the bivariate analysis. But, those caretaker who said I wash my hands after cleansing baby bottom and after using toilet have about 63% and 77% less likely to develop diarrhea than those said no [OR: 0.36, 95% CI: (0.15, 0.84)] and [OR: 0.23, 95% CI: (0.55, 0.96)] and in consistence to our study other study conducted in rural Zaire for measuring hygiene practices: a comparison of questionnaires with direct observations showed the frequencies of observed hygiene behaviors and interview responses were not compatible .(Hand-washing before food preparation was reported somewhat more often than it

was observed (44% versus 33%). Hand-washing before eating was similarly over-reported (76% versus 60%). Mothers reported disposing of the child's stools in a latrine much more frequently than was observed in practice (75% versus 40%). On the other hand, hand washing before feeding the child was rarely mentioned (7%) but frequently observed (64%)), This shows that not all caretakers who have the knowledge of washing hands after critical times does not mean that they all practice it inactual(22). The association of our study finding may be explained that because all those caretakers who had the knowledge would not be practiced in actual

The Literature Review of thirty-seven publications on Children's Feces Disposal Practices in developing Countries and Interventions to Prevent Diarrheal Diseases are classified studies linking defecation practices or their hygiene-related behaviors with diarrheal diseases either as protective (use of latrines, nappies, potties, toilets, washing diapers) or risky (open defecation, open stool disposal, stools not removed from soil or observed on the ground, child seen eating feces). Then according to this analysis finding risky behaviors were associated with a significant increased risk for diarrheal diseases (risk ratio 1.23, 95% CI: 1.15-1.32) while those classified as protective had borderline protection (risk ratio 0.93, 95% CI: 0.86-1.00) (23).And also according to the study conducted in Derashi district, southern Ethiopia Children whose family improperly dispose infant feces were 3.35 times more likely to have diarrhea when compared to those children whose family properly dispose infant feces [AOR:3.35, 95% CI (1.45-4.13)](24).our study finding showed that, those house hold who said I dispose infant feces anywhere by covering with soil had more than seven times higher odds of having diarrhea than those house hold who dispose in the toilet [OR: 7.9, 95% CI: (1.05, 59.89)] and this shows that consistency to above studies because covering of child feces by soil are considered or grouped as risky because the child feces was not isolated from the area and this increase chance of getting exposed the persons while waking and while the child crawl or play on the ground and this increased at the same time chance of contamination at house hold level.

7. Strength and Limitations of the Study

7.1 Strength

This study assessed the households' socioeconomic, environmental and behavioral characteristics that are considered to have effects on childhood diarrhea. Considering multiple contributing factors that affect child health may help use the limited resources more effectively, by identifying the most important risk factors for proper intervention.

Theinclusion of factors such as water supplying frequency makes it strong compared to many which do not consider it being important factor

7.2 Limitations

As being cross-sectional in the design, this study shares the drawbacks of similar cross-sectional studies. In cross-sectional studies, it is difficult to entertain the seasonal differences in the occurrence of diarrheal diseases. The information on the prevalence of diarrhea may not reflect the actual situation that may be observed in the various seasons of the year, as the information on diarrhea was collected in March, which is a dry season Therefore, it may undermine the prevalence of diarrhea which tend to increase often with rainy season

The other limitation was budget because due to the shortage of budget ,representative sample water from the household yard tap who had under five diarrhea did not taken to know the situation of the yard tap water.

8. CONCLUSION

Even though the finding of 8.5% prevalence of diarrhea had progress compared to 2011 DHS report, the progress is low compared to DHS 2005 report because from DHS 2011 afterwards Urban Health Extension was introduced.

The overall results of this study showed that being mothers age under age of twenty five, storing water for long time and not practicing the knowledge of wash hands after cleansing baby bottom and after using toilet and also disposing child feces anywhere by covering with soil were risk factors for the occurrence of diarrhea in under-five children

Because of the intermittent supply of water and storing water for household water consumption for long time the quality of stored water bacteriological examination result deteriorate due to unhygienic practice at household level.

9. RECOMMENDATION

Depending on the finding the following recommendations are provided

To Federal ministry of health and Addis Ababa Administration Health Bureau

1. The health education which will be given by different actors should be focused considering target group
2. Health education focus area should include on the importance of cleaning and safe handling of house hold water container and water drawing can.
3. Knowledge and practice of hand washing of under- five children caretakers at critical times should have to get great emphasis as it protects the children against diarrhea.
4. The authors recommend that future studies that includes Hygiene behavior observation will be helpful to identify the risk factors with less bias of social desirability

To Addis Ababa Water supply and Sewerage Authority

5. In order to minimize water borne diseases the demand and supply of water gap should be improved by Addis Ababa Water supply and Sewerage Authority

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11. AnnexInformation Sheet to get Permission for the Research

This sheet is to be read for the participants of the study.

Good morning/afternoon, my name is -------- and I am one of the data collectors for the study being conducted by Addis Ababa University, College of Health Sciences, School of Public Health on the Assessment of the Prevalence and Associated Factors of Diarrheal Diseases among Under-Five Year's Children living in Woreda 03 Residence of Yeka sub city, Addis Ababa Ethiopia This Woreda is selected purposely to be under study if you give me consent after you have understood the following information sheet:

Title of the study: Assessment of the Prevalence and Associated Factors of Diarrheal Diseases among Under-Five Year's Children living in Woreda 03 Residence of Yeka sub city, Addis Ababa Ethiopia

Investigator: Yared Tadesse

Advisor: Mr. Worku Tefera **(MPH, PhD Candidate)**

Ms. Meaza Gezu (**MPH, PhD Candidate**)

Sponsoring Organization: Addis Ababa University School of Public Health

Introduction: The main causes of under- five children morbidity and mortality in developing countries are related to exposures to poor environmental socio-demographic and behavioral factors. And most under- five morbidity and mortality cases can be prevented by improving the above factors, awareness creation and improving the basic needs Therefore in order to assess the gap this study is planned

Purpose: The objective is to assess the prevalence and associated factors for the occurrence of diarrhea disease among under-five year children's

Procedure and Participation: The method of this study is Household -based Cross–sectional study. The expected duration of the participant's contact with the interviewer will be not more than forty five minutes. You asked to participate in this research because the trustful information which you will provide is important for the understanding of the proposed subject matter and improvement of the water quality. You will be asked about your Socio-demographic, behavioral characteristics, environmental factors and water handling condition and sample water may be taken from your storage and yard tap.

Confidentiality: to establish secured safeguards of the confidentiality of research data, the principal investigator (PI) will use codes during data collection period instead of using names. The original data will be locked in cabinets until the data analysis carryout and no person shall access except the principal investigator and the advisor for data checking and cleaning purpose. The use of information for any purpose other than that to which participants consented is unethical to the participants. The information you provide is not disclosed in the way it identified your personal characteristics and privacy. After the research defense and final work is approved by the school of public health and academic commission and university senate, the original data questionnaire will be incinerated in secure manner.

Benefit of the study: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and policy makers to have a policy consideration and direction and formulation of strategy and design to supply of safe water, improving the promotional activities in the area of urban health extension program based on the recommendations and the findings. The result can be used as a baseline for further studies that can be done in the area of urban safe water supply and urban health extension program areas. If there will be any under- five morbidity case the data collector will advise the care taker to take the child to the nearer by health institution and also if there is any urban water supply line contamination seen during data collection period the data collector or investigator will report to concerned sectors for immediate action.

Risk and /discomfort of the study: The study has no any risk for the participants and interview also will be private to make safe participants except spending few minutes for interviewing

Inducement, incentive and Compensation: This study process has no any form of inducement, coercion and the study does not bring any risks that incur compensation.

Results Dissemination: The result will be disseminated to the concerned Health, water and municipality sectors for designing and implementing remedial action.

Right of the participant: Participating and not participating is the full right and participants can stop from participation in the study at any time. This would have no effect at all on your

health benefit or other administrative effect and nobody will enforce you to explain the reason of withdrawal. Participant can skip question which the care taker does not want to respond.

Person to Contact: The participant has the right to ask information that is not clear about the research context and content before and or during the research work. You can contact the principal investigator and his advisor. Moreover this research undergone ethical reviewed and approved by Addis Ababa university school of public health. The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm.

If you want more information and check about this study you can contact through the following address.

Addis Ababa University School of public health: Secretary Office Tel. 0115157701

Investigator: Mr. Yared Tadesse Tel: 0911649824 (Mobile)

Advisor: Mr. Worku Tefera and Ms. Meaza Gezu School of Public Health, Addis Ababa University; Mobile: 0913620514 and 0912032797; Office: 011-5157701

12. AnnexII INFORMED CONSENT FORM

Title of the study: Assessment of the Prevalence and Associated Factors of Diarrheal Diseases among Under-Five Year's Children living in Woreda 03 Residence of Yeka sub city, Addis Ababa Ethiopia

I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by AAU School of Public Health and the designate investigator is Yared Tadesse I have been fully informed in the language I understand about the research project objective is to Prevalence and Associated Factors of Diarrheal Diseases among Under-Five Year's Children living in Woreda 03 Residence of Yeka sub city, Addis Ababa Ethiopia..

I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no any risk. I also knew that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have acquainted nobody will impose me to explain the reason of withdrawal. I have assured that the

right to ask information that is not clear about the research before and or during the research work and to contact

Addis Ababa University School of public health: Secretary Office Tel. 0115157701

Investigator: Mr. Yared Tadesse Tel: 0911649824 (Mobile)

Advisor: Mr. Worku Tefera and Ms. Meaza Gezu School of Public Health, Addis Ababa University; Mobile: 0913620514 and 0912032797; Office: 011-5157701

I have read this form, or it has been read to me in the language I comprehend and understood the condition stated above, therefore, I am willing and confirm my participation by signing the consent.

Name of the participant _____

Agreed to participate in the study: Yes /No (mark one of them for verbal consent)

Signature _____ (if written consent)

Name of witness signature_____ (Data collector, supervisor, any third person)

Signature _____ Date_____

[For Written Consent form

I, the undersigned, confirm that, as I give consent to participate in the study, it is with a clear understanding of the objectives and conditions of the study and with recognitions of the study and with recognition of my right to withdraw from the study].

የአማርኛትርጉም

ይህ መጠይቅ በአዲስ አበባ ከተማ ውስጥ ፣በየካ ክፍለ ከተማ፣ በወረዳ 03 ውስጥ በሚኖሩከአምስት አመት በታች ባሉህጻናት ቤተሰብ ውስጥ ከተቅማጥ ጋር ተያያዥ የሆኑ መንስኤዎችና ከአምስት አመት በታች ያሉ ህጻናት ተቅማጥ በተመለከተ የዳሰሳ ጥናት ለማካሂድ የተዘጋጀ መጠይቅ ነው

የመጠይቁ መለያ ቁጥር _____

የመኖሪያ ቤቱ ኮድ _____ አድራሻ _____አባሪ

ለተጠያቂዎች የሚሰጥ መረጃ (informed concent form)

ጤና ይስጥልኝ እንደምን አሉ? እኔ _____ እባላለሁ እዚህ የመጣሁት ይህንን ጥናት የሚያካሄድ የአዲስ አበባ ዩኒቨርሲቲ ሕክምና ፋኩልቲ የሕብረተሰብ ጤና ትምህርት ክፍል ቡድን አባል ሆኜ በወረዳ 03 ውስጥ በሚኖሩከአምስት አመት በታች ባሉህጻናት ቤተሰብ ውስጥ ከተቅማጥ ጋር ተያያዥ የሆኑ መንስኤዎችና ከአምስት አመት በታች ያሉ ህጻናት ተቅማጥ በተመለከተ የዳሰሳ ጥናት ለማካሄድ ነው ወረዳችሁም ከዚሁ ጋር በተያያዘ መልኩ የተመረጠ ነውስለሆነም እርስዎ ከዚህ በታች የተሰጠውን የጥናቱን መግለጫ ተገንዝበው ፍቃደኛ ከሆኑ መረጃ በመስጠት የዚህ ጥናት ተሳታፊ እንዲሆኑ ተመርጠዋል፡፡

የጥናቱ ርዕስ፡- በአዲስ አበባ ከተማ ውስጥ ፣በየካ ክፍለ ከተማ፣ በወረዳ 03 ውስጥ በሚኖሩከአምስት አመት በታች ባሉህጻናት ቤተሰብ ውስጥ ከተቅማጥ ጋር ተያያዥ የሆኑ መንስኤዎችና ከአምስት አመት በታች ያሉ ህጻናት ተቅማጥ በተመለከተ የዳሰሳ ጥናት ማካሄድ ነው

የአጥኝዉ ስም፡ ያሬድ ታደሰ

የጥናቱ አማካሪ ስም፡ አቶ ወርቁ ተፈራ (MPH, PhD Candidate) እና

ወ/ት መአዛ ገዙ (MPH, PhD Candidate)

የጥናቱ አስተባባሪ፡ በአዲስ አበባ ዩኒቨሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት

መግቢያ፡- በታዳጊ ሀገራት ከአምስት አመት በታች ላሉ ህጻናት ህመምና ሞት መንስኤዎች ከማህበራዊ፣ ከዘልማዳዊድርጊቶች፣ ከኢኮኖሚያዊና ከሀይጅንና ሳኒቴሽን ጋር የተያያዙ ናቸው በመሆኑም አብዛኛዎችን መንስኢዎች በቀላሉ መከላከል የሚቻልና ህብረተሰቡን ማስተማርና መሚላት የሚገባቸውንም ማሚላት ተገቤ በመሆኑ ያለውን ክፍት ለማየት ይህ ጥናጥ ታቅዷል፡፡

የጥናቱ ጥቅም: ተሳታፊው ተሳታፊ በመሆናቸው በቀጥታ የሚያገኙት ምንም ጥቅም የለም

ከዚህ ጥናት የሚገኘው ውጤት ለከተማው ወደፊት ለሚጠኑ ተመሳሳይ ጥናቶች ፅንደመነሻ ግብአት ያገለግላል፡፡

- የጥናቱ ውጤት ለከተማው ጤናና ውሀ ቢሮ እና ሊሎች ለሚመለከታቸው ቢሮዎች ይፋ ስለሚደረግ መንስኤ የሆኑ ምክንያቶች ለመከላከልና ለመቆጣጠር የሚያስችሉ መፍትሄዎችን ለመንደፍ ይጠቅማል፡፡
- ይህ መረጃ በሚሰበሰብበት ወቅት የታመመ ህጻን ከተገኘ በቅርብ በሚገኝ ጤና ተቋም እንዲረዳ ይደረጋል፡፡ ከተቻለም መጀመሪያ ሕክምና ይሰጣል፡፡

የጥናቱ ጉዳት፡ የቃለ መጠይቁ ተሳታፊ በጥናቱ የሚደርስባቸው ምንም ዓይነት ጉዳት አይደርስባቸውም፡፡ ተሳታፊው የሚሰጠው መረጃ ሚስጥራዊነት ስለሚኖረው ተሳታፊው ከአስተዳደራዊ ጫና ነፃ ነው፡፡

የቃለ መጠይቁ ተሳታፊ መብቶች፡-

- ተሳታፊው በዚህ ጥናት ላይ የመሳተፍ ወይም አለመሳተፎ መብቱ የተጠበቀ ነው፡፡
- በመሳተፍ ላይ እያሉ በማንኛውም ሰዓት ማቋረጥ ወይም ከጥያቄዎቹ ውስጥ ለመመለስ የማይፈልጉትን ጥያቄ አለመመለስ ይቻላል፡፡
- በቃለ መጠይቁ ወቅት ግልጽ ያልሆነን ነገር መጠየቅ ይቻላል፡፡ የጥናቱ ሚስጥራዊነት፡- የተሳታፊው ማንነት በሚስጥር ይያዛል፡፡

የተሳታፊው የፈቃደኝነት ቅጽ

ከዚህ ቀጥሎ የተሰጠኝን መረጃ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ በትክክል ተረድችያለሁ

- ይህ ጥናት በአዲስ አበባ ዩኒቨሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት ድጋፍና አስተባባሪነት ተማሪ ያሬድ ታደሰ ለምረቃ ጽሁፍ ጥናቱን እንደሚያካሂዱ
- የጥናቱ ርዕስ በወረዳ 03 ውስጥ በሚኖሩከአምስት አመት በታች ባሉህጻናት ቤተሰብ ውስጥ ከተቅማጥ ጋር ተያያዥ የሆኑ መንስኤዎችና ከአምስት አመት በታች ያሉ ህጻናት ተቅማጥ በተመለከተ የዳሰሳ ጥናት ማድረግ
- የጥናቱ ዋንኛ አላማ ከአምስት አመት በታች ባሉህጻናት ቤተሰብ ውስጥ ከተቅማጥ ጋር ተያያዥ የሆኑ መንስኤዎችና ከአምስት አመት በታች ያሉ ህጻናት ተቅማጥ በተመለከተ የዳሰሳ ጥናት ማድረግ
- የምሰጣቸዉ መረጃዎች በሚስጥር እንደሚያዙ
- ጥናቱ ምንም አይነት ጉዳት እንደማያደርስብኝ

- ጥያቀዉ ካልተስማማኝ ማቋረጥ ወይም ወደሌላ ጥያቄ መዝለል እንደምችልና ማንም ሰዉ ሊያስገድደኝ እንደማይችል
- በጥናቱ ምክንያት ምንም አይነት ጉዳት ሊያደርስብኝ እንደማይችል
- ጥናቱን በተመለከተ ያልገባኝን ነገር ቀጥሎ በተሰጠኝ አድራሻ ጠይቄ መረዳት እንደምችል ተገንዚቤአለሁ

አዲስ አበባ ዩኒቨሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት 011 51 57 7 01

የአጥኝዉ ስም፡ ያሪድ ታደሰ 09 11 649824

የጥናቱ አማካሪ ስም፡ አቶ ወርቁ ተፈራ (MPH, PhD Candidate) እና

ወ/ት መአዛ ገዙ (MPH, PhD Candidate)

ከላይ የተሰጠኝን መረጃ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ በትክክል ከተረዳሁ በኋላ በጥናቱ ለመሳተፍ ፈቃደኛ ሆኛለሁ፡፡

የተሳታፊ ስም _____ፊርማ _____

የአጥኝው ስም _____ፊርማ አድራሻ ስልክ /ኢ.ሜል/

የምስክር ስም _____ ፊርማ _____

13. ANNEXIII Questionnaire

Questionnaire for the assessment of prevalence and associated factors for the occurrence of diarrhea disease among under-five year children's living in Woreda 03 Residence of Yeka sub city, Addis Ababa Ethiopia
Woreda: _____ Kebele: _____ Ketena_____

House No: _____

Date of Interview: _____ Name of Interview: _____

Socioeconomic factor					
N0.	QUESTIONS&FILTERS	CODING CATEGORIES			SKIP
101	Caretaker relationship	Mother	1		
		Grand Mother	2		
		Father	3		
		Household servant	4		
		Others	5		
102	Age of caretaker (if not known estimate)	_____Years			If the respondent is not mother
103	Age of the Mother (if not known estimate)	_____Years			
104	Parent Marital status	Single	1		
		Married	2		
		Divorced	3		
		Widowed	4		
105	level of education of caretaker (The highest level of education reached)	Illiterate	1		If the respondent is not mother
		Read and write	2		
		Primary	3		
		Secondary and higher	4		
106	level of education of	Illiterate	1		

	mother(The highest level of education reached)	Read and write	2		
		Primary	3		
		Secondary and higher	4		
107	Does your household have any of the following property		Yes	No	
		Radio	1	2	
		Television	1	2	
		Mobile phone	1	2	
		Refrigerator	1	2	
108	What type of energy does your household normally use for cooking?	Electricity	1		
		Gas	2		
		Charcoal and firewood	3		
		Animal dung	4		
		Other	5		
109	House floor, (observation)	Earth, Sand. Dung	1		
		Wood,	2		
		Ceramic Tiles	3		
		Cement	4		
		Others	5		
110	Wall material, (observation)	Mud	1		
		Bricks	2		
		Cement blocks	3		
		Stones	4		
		Others	5		
111	Roofing material	Iron sheets	1		
		Concrete	2		
		Other	3		
112	Ownership of the house	Private	1		
		Rent from private	2		

		Rent from government	3		
123	How many people live in your household?	--			
124	How many of the children are under age of five?				
125	Age of the under-five child				

Behavioral factor					
NO.	QUESTIONS&FILTERS	CODING CATEGORIES			SKIP
201	Does the child are on exclusively breast feeding	Yes	1		If the child is >6 months
		No	2		
202	Does the child was exclusively breastfeed for last 6 months	Yes	1		If the child is <6 months
		No	2		
203	Does the child is on breastfed with supplementary food for two years	Yes	1		If the child is > two years
		No	2		
204	Does the child was on breastfeed with supplementary for the last two years	Yes	1		If the child is <two years
		No	2		
205	Have this child (under the age of five) in your household have diarrhea in the past 2 weeks (Past 14 days)	Yes	1		
		No	2		
206	Does the care taker /Mother	Yes	1		

	of the child have diarrhea in the past 2 weeks (Past 14 days)	No	2		
207	Do you know what causes diarrhea?	Yes	1		If no go to 301
		No	2		
208	If yes what do you think that causes diarrhea? (probe)	Drinking unsafe water	1		
		Eating contaminated food	2		
		Flies/Insects	3		
		Poor Personal hygiene	4		
		Sprites	5		
		Weather	6		
		Others	7		
		Don't know	8		
209	What mechanism should be used to prevent diarrhea? (probe)	Wash hands frequently	1		
		Cover prepared food	2		
		Cleanness of utensils	3		
		Treating/ Disinfecting water	4		
		Covering water storage	5		
		Other	6		
		Don't know	7		
Water situation factor					
301	What is the main source of drinking water for members of your household	Piped water	1		
		Water from bore hole	2		
		Rain water	3		
		Water vendors	4		
		Other	5		
302	Where do you get water when the main source interrupted?	Buy water from vendor or neighbor	1		
		From bore hole	2		
		Use of stored water from jerry can and other materials	3		

		It does not interrupted	4		
		Others	5		
303	Distance Travel to Fetch Water from main source	Less than 500 meters <15 minutes	1		
		Greater than 500 meters >15 minutes	2		
304	Are you satisfied with the taste and odor of your drinking water?	Yes	1		
		No	2		
		Don't know	3		
305	Do you think that the water you provided is free from disease causing organism?	Yes	1		If no go to 308
		No	2		
306	If the answer for question305 is no, what do you usually do to make the water free from disease organism?	Boiling			
		Use of Disinfectant at home	1		
		Use of water filter at home	2		
		Solar Disinfection	3		
		By allow it to settle	4		
		Filter it with cloth	5		
		Nothing	6		
		Others	7		
307	Why do choose this water treatment method?	Because it is cheap	1		
		I don't know other option	2		
		I don't know	3		
		Others	4		
308	At what time of interval you will get water at regular base?	Daily	1		
		Once in a week	2		
		Two times in a week	3		
		In two weeks' time	4		
		Other(greater than two weeks)	5		

Behavioral factor					
NO.	QUESTIONS&FILTERS	CODING CATEGORIES			SKIP
210	Do you store water for drinking	Yes	1		
		Sometimes	2		
		No	3		
211	If yes or sometimes Which container do you normally use store water for drinking (observe and write answers)	pot with lid	1		
		Pot without lid	2		
		Small naked jerry cans with lid	3		
		Small naked Jerry cans without lid	4		
		Others	5		
212	How do you draw water from your container	Using small can and putting in the water	1		
		Pour directly from the container	2		
		Others	3		
213	Do you wash your hands?	Yes	1		
		No	2		
214	If yes, When do you wash hands? (probe)		yes	no	
		After using Toilet	1	2	
		After touching and cleaning babies bottom	1	2	
		Before and after meals	1	2	
		Before cooking/Preparing food	1	2	
		Before Brest feeding of the child	1	2	
		Others	1	2	
215	What Do you usually use to wash your hands?	Water only	1	2	
		Water and soap	2		

216	If it is with soap ,Is there a soap in a place where they wash their hands (observe)	Yes	1		
		No	2		
Other Hygiene and environmental Sanitation factor					
NO.	QUESTIONS&FILTERS	CODING CATEGORIES			SKIP
401	Where do you usually put your baby's food/drinking utensils? (observe)	Putting anywhere by covering	1		
		Putting anywhere by not covering	2		
		Putting with covered utensils in the shelf	3		
		Putting with uncovered utensils in the shelf	4		
		Others	5		
402	Where do you usually put your baby food/drink? (observe)	Refrigerator	1		
		Open shelf	2		
		Covered shelf	3		
		Anywhere	4		
		Others	5		
403	What kind of toilet facility do members of household usually use (observe)	Flush connected to septic tank	1		
		Flush connected to Municipal sewer line	2		
		Ventilated improved pit latrine	3		
		Pit latrine with concrete slab	4		
		Pit latrine without concrete slab	5		
		Shared latrine	6		
		No Facility/Bush	7		
404	Is there feces around the pit hole/slab/floor of latrine (observe)	Yes	1		
		No	2		
405	Do you have hand washing facility around/beside the toilet?	Yes	1		
		No	2		

406	Where do you dispose your under- five child feces?	In the toilet	1		
		Left it open every where	2		
		Covered by soil	3		
		Other	4		
407	Where do the household primarily dispose of household waste?	In refuse pit COLLECTED BY MUNICIPALITY	1		
		COLLECTED BY PRIVATE ESTABLISHMENT	2		
		DUMPED IN STREET/OPEN SPACE	3		
		Others	4		
408	Where do you dispose your liquid waste?	In septic tank/latrine pit	1		
		In seepage pit	2		
		Anywhere in open space	3		
		Others	4		

Bacteriological water quality					
501	Water analysis (E.coli)	Present	1		
		Absent	2		
502	Water analysis (Total coli forms)	Present	1		
		Absent	2		
503	Lab. Remarks	Acceptable	1		
		Not Acceptable	2		

AMHARIC QUESTINARIE

በኢትዮጵያ፣ በአዲስ አበባ ከተማ ውስጥ ፣በየካ ክፍለ ከተማ፣ በወረዳ 03 ውስጥ በሚኖሩከአምስት አመት በታች ባሉህጻናት ቤተሰብ ውስጥ ከተቅማጥ ጋር ተያያዥ የሆኑ መንስኤዎችና ከአምስት አመት በታች ያሉ ህጻናት ተቅማጥ በተመለከተ የዳሰሳ ጥናት ለማካሂድ የተዘጋጀ መጠይቅ

ወረዳ_____ ቀበሌ_____

ቀጠና_____ _የቤትቁጥር_____

መጠይቁ የተደረገበት ቀን_____ መጠይቁን ያደረገው ስም_____

		ማህበራዊ ኢኮኖሚያዊና ስነህዝብ ሁኒታዎችን በተመለከተ			
ተ.ቁ	ጥያቄዎች	የኮድ መለያ			ዝለል
101	የህጻኑ ተንከባካቢ ከህጻኑጋር ያለው ግንኙነት	እናት	1		
		የሴት አያት	2		
		አባት	3		
		የቤት ሰራተኛ	4		
		ሌላ	5		
102	የህጻኑ ተንከባካቢ እድሜ (የማያውቁት ከሆነ ግምት ይወሰድ)	_____አመት			ተጠያቂው ከእናት ውጭ ከሆኑ
103	የህጻኑ እናት እድሜ (የማያውቁት ከሆነ ግምት ይወሰድ)	_____አመት			
104	የወላጆች ጋብቻ ሁኔታ	ያላገባ/ች	1		
		ያገባ/ች	2		
		ፈት	3		
		የሞተባት	4		
105	የህጻኑ ተንከባካቢ የትምህርት ደረጃ (ከፍተኛው ይወሰድ)	የመጀመሪያ ደረጃ	1		ተጠያቂው ከእናት ውጭ ከሆኑ
		ሁለተኛ ደረጃ	2		
		ኮሌጅና ከዛ በላይ	3		
		ማንበብና መጻፍ	4		
		ያልተማረ	5		
106	የህጻኑ እናት የትምህርት ደረጃ (ከፍተኛው ይወሰድ)	የመጀመሪያ ደረጃ	1		
		ሁለተኛ ደረጃ	2		
		ኮሌጅና ከዛ በላይ	3		
		ማንበብና መጻፍ	4		
107	በቤታችሁ ውስጥ ከሚከተሉት ውስጥ የትኛው አላችሁ?		Yes	No	
		ራዲዩ	1	2	
		ቴሌቬቭን	1	2	
		የሞባይል ስልክ	1	2	
		ማቀዝቀዣ	1	2	
108	በቤት ውስጥ በተለምዶ ለማብሰያ የምትጠቀሙት ምንድ ነው?	የኤሌትሪክ መብራት	1		
		ጋዝ	2		
		ከሰልና እንጨት	3		
		ኩበት	4		
		ሌላ	5		
109	የቤቱ ወለል ሁኒታ (ተመልከት)	አፈር፣አሸዋ፣እበት የተለቀለቀ	1		
		እንጨት	2		

		ሲራሚክ	3		
		ስሚንቶ	4		
		ሊላ	5		
110	የግድግዳው ሁኒታ (ተመልከት)	አፈር፣አሸዋ፣እበት የተለቀለቀ	1		
		እንጨት	2		
		ሲራሚክ	3		
		ስሚንቶ	4		
		ሊላ	5		
111	የጣሪያው ሁኒታ (ተመልከት)	ቆርቆሮ	1		
		ስሚንቶ	2		
		ሊላ	3		
112	የቤቱ ይዞታን በተመለከተ	የግል	1		
		ኪራይ ከግለሰብ	2		
		ኪራይ ከመንግስት	3		
113	በቤት ውስጥ ምን ያህል ሰዎች ይኖራሉ?	_____			
114	ምን ያህሉ ከአምስት አመት በታች ያሉ ህጻናት ናቸው	_____			
115	ከአምስት አመት በታች ያሉ ህጻናት እድሚያቸው	_____			
Behavioral factor					
ተ.ቁ	ጥያቄዎች	የኮድ መለያ			ዝለል
201	ህጻኑ ለስድስትወራት የእናት ጡት ብቻ እየጠባ ነው?	አዎ	1		ህጻኑ > ከስድስት ወር ከሆነ
		አይደለም	2		
202	ህጻኑ ለስድስትወራት የእናት ጡት ብቻ ጠብትዋል?	አዎ	1		ህጻኑ < ከስድስት ወር ከሆነ
		አይደለም	2		
203	ህጻኑ/ህጻናቱ ለሁለት አመት ከተጨማሪ ምግብ ጋር የእናት ጡት ብቻ እየጠባ ነው?	አዎ	1		ህጻኑ > ከሁለት አመት ከሆነ
		አይደለም	2		
204	ህጻኑ/ህጻናቱ ለሁለት አመት ከተጨማሪ ምግብ ጋርየእናት ጡት ብቻ ጠብትዋል?	አዎ	1		ህጻኑ < ከሁለት አመት ከሆነ
		አይደለም	2		
205	ከአምስት አመት በታች ያሉ ህጻናት ባለፉት ሁለት ሳምንታት ተቅማጥ ይዟቸው ነበር?	አዎ	1		
		አይደለም	2		
206	የ ህጻናቱ እናት ወይም ተንከባካቢ ባለፉት ሁለት ሳምንታት ተቅማጥ ይዟቸው ነበር?	አዎ	1		
		አይደለም	2		
207	ለተቅማጥ በሽታ ምክንያቶች/መንስኢዎች ምን እንደሆኑ ያውቃሉ	አዎ	1		መልሱ የለም ከሆነ ወደ 301
		አላውቅም	2		
208	ለላይኛው ጥያቄ መልሱ	ጥራቱን ያልጠበቀ ውሀ	1		

	አዎን ከሆነ ተቅማጥ በሽታያመጣሉ የሚሏቸውን ምክንያቶች/መንገዶች ቢነግሩን? (ሊላስ)	በመጠጣት			
		የተበከለ ምግብ በመብላት	2		
		በዝንቦች/በበራሪ ነፍሳት አማካይነት	3		
		በግል ንፅህና ጉድለት	4		
		በመለኮታዊ ሁኒታ	5		
		በአየር ሁኒታ	6		
		ሊላ	7		
		አላውቅም	8		
209	ተቅማጥን ለመከላከል ምን የመከላከል ስራ መደረግ አለበት?	አስፈላጊ በሆኑ ጊዜያት እጅን በመታጠብ	1		
		የተዘጋጁ ምግቦችን በመሸፈን	2		
		የምግብና የመጠጥ እቃዎችን ንጹህ በማድረግ	3		
		ውሀን በማከም	4		
		የውሀ ማጠራቀሚያዎችን በመሸፈን	5		
		ሊላ	6		
		አላውቅም	7		
				የውሀ ሁኒታ በተመለከተ	
301	ለቤተሰብዎ ዋንኛው የመጠጥ ውሀ መገኛ ምንጭ ምንድነው?	የቧንቧ ውሀ	1		
		የጉድንድ ውሀ	2		
		የዝናብ ውሀ	3		
		ውሀ ከሚሸጡ በመግዛት	4		
302	የቤተሰብዎ ዋንኛው የ ውሀ መገኛ ሲቋረጥ ውሀ ከየት ታገኛላችሁ?	ከአጎራባች/ ውሀከሚያስቀዱ በመግዛት	1		
		የጉድንድ ውሀ	2		
		ውሀን በጀሪካን/በሊላ ማጠራቀሚያ ከተጠራቅመ	3		
		አይቋረጥም	4		
		ሌላ	5		
303	ውሀ ለመቅዳት ምን ያህል ርቀት ይጓዛሉ?	ከ500 ሚትር በታች <15minutes	1		
		ከ500ሚትር በላይ >15minutes	2		
304	በመጠጥ ውሀው ጠረንና ጣእም ይደሰቱበታል?	አዎ	1		
		አይ	2		
		አላውቅም	3		
305	ለመጠጥ ውሀ እየቀረበ ያለው ውሀ ከበሽታ አምጪ ተህዋሲያን የጸዳ ነው ብለውያምናሉ?	አዎ			መልሶ አይ ከሆነ ወደ 308
		አይ			
306	ለላይኛው ጥያቂ መልሶት አይ ከሆነ ውሀውን ንጹህ ለማድረግ በተለምዶ ምን ያደርጋሉ?	ማፍላት	1		
		በቤት ውስጥ ውሀ ማከሚያ በመጠቀም በማከም	2		
		ውሀን በውሀ ማጣሪያ በመጠቀም በማጣራት	3		
		የጸሀይ ጨረር/መቀት	4		

		በመጠቀም			
		በማዘቀጥ	5		
		ውሀን ጨርቅ በመጠቀም በማጣራት	6		
		ምንም አላደርግም	7		
		ሊላ	8		
307	ለምን ይሂንን ውሀን የማከሚያ ዘዴ ለመጠቀም መረጡ?	ርካሽ ስለሆነ	1		
		ሊሎች ዘዲዎችን ስለማላውቅ	2		
		አላውቅም	3		
		ሊላ	4		
308	በተለምዶ በምን ያህል ጊዜ ነው ውሀ የሚያገኙት?	በየቀኑ	1		
		በሳምንት አንድ ቀን	2		
		በሳምንት ሁለት ቀን	3		
		በሁለት ሳምንት አንድ ቀን	4		
		ሊላ(ከሁለት ሳምንት በላይ)	5		

Behavioral factor					
ተ.ቁ	ጥያቄዎች	የኮድ መለያ			ገለለ
210	ለመጠጥ የሚጠቀሙበትን ውሀ በማጠራቀም ይጠቀማሉ?	አዎ	1		
		አንዳንዴ	2		
		አይ	3		
211	ለላይኛው ጥያቄ መልሱ አዎ ወይምአንዳንዲ ከሆነ ለማጠራቀሚያነት ምን ይጠቀማሉ?	ክዳን ያለው የሸክላ ማጠራቀሚያ	1		
		ክዳን የሊለው የሸክላ ማጠራቀሚያ	2		
		ክዳን ያለውጠባብ ጀሪካን	3		
		ክዳን የሊለው ጠባብ ጀሪካን	4		
		ሊላ	5		
212	ከማጠራቀሚያው ውሀ አንዴት ነው የሚቀዱት?	በውሀ መቅጃ በመጠቀም እጅን ውሀ ማጠራቀሚያ እቃ ውስጥ በመጥለቅ	1		
		ከማጠራቀሚያው በቀጥታ በማንቆርቆር	2		
		ሊላ	3		
213	እጆትን ይታጠባሉ	አዎ	1		
		አልታጠብም	2		
214	መልሶ አዎ ከሆነ እጆትን መቺ መቺ ነው የሚታጠቡት?	መጸዳጃ ቤት ከተጠቀምን በኋላ	1	2	
		ህጻናትን ካጸዳዳን በኋላ	1	2	
		ምግብ ከመብላታችንና ከበላን በኋላ	1	2	
		ምግብ ከማዘጋጀታችን በፊት	1	2	
		ጡት ከማጥባታችን በፊት	1	2	
		ሊላ	1	2	
215	በተለምዶ እጆትን ለመታጠብ ምን ይጠቀማሉ?	ውሀ	1		
		ውሀና ሳሙና	2		

216	ሳሙና የሚጠቀሙ ከሆነ እጅ በመታጠቢያ አካባቢ ሳሙና አለ? (ተመልከት)	አለ	1		
		የለም	2		
አገልግሎቶችን በተመለከተ			**ሊሎች የሀይጅንና የአካባቢ ጤና**		
401	በተለምዶየህጻኑን/የህጻናቱን መመገቢያና መጠጫ እቃዎች የት ነውየሚያስቀምጡት? (ተመልከት)	እቃዎቹን በመሸፈንና የትም ቦታ በማስቀመጥ	1		
		እቃዎቹ ሳይሸፈኑ የትም ቦታ በማስቀመጥ	2		
		እቃዎቹን በመሸፈንና እቃ መደርደሪያ ውስጥ በማስቀመጥ	3		
		የትም ቦታእቃዎቹን ሳይሸፈኑ እቃ መደርደሪያ ውስጥ በማስቀመጥ	4		
		ሊላ	5		
402	በተለምዶየህጻናቱን ምግብ የት ነው የሚያስቀምጡት? (ተመልከት)	ማቀዝቀዣ (ፍሪጅ) ውስጥ	1		
		መሸፈኛ የሌለው እቃ መደርደሪያ ውስጥ	2		
		መሸፈኛ ያለው እቃ መደርደሪያ ውስጥ	3		
		የትም ቦታ	4		
		ሊላ	5		
403	ቤተሰቡ የሚጠቀምበት የመጸዳጃ ቤት ምን አይነት ነው? (ተመልከት)	ከከተማ ፍሳሽ መስመር ጋር የተገናኘ በውሀ ግፊት የሚሰራ መጸዳጃቤት	1		
		ከሲፕቲክ ታንክ ጋር የተገናኘ በውሀ ግፊት የሚሰራ መጸዳጃ ቤት	2		
		ሽታ አልባ መጸዳጃ ቢት	3		
		ከኮንክሪት የተሰራ ስላብ ያለው የተለምዶ መጸዳጃ ቤት	4		
		ከኮንክሪት ውጭ የተሰራ ስላብ ያለው የተለምዶ መጸዳጃ ቤት	5		
		የጋራ መጸዳጃ ቤት	6		
		የትም ቦታ መጸዳዳት	7		
		ሊላ	8		
404	ሰገራ በመቀመጫው ቀዳዳ/በወለሉና በአካባቢው መኖሩን ተመልከት	አለ	1		
		የለም	2		
405	መጸዳጃ ቤቱ አጠገብ/ አካባቢያእጅ መታጠቢያ አለ?	አለ	1		
		የለም	2		
406	የ ህጻናቱን ሰገራ የት ነው የሚያስወግዱት;	መጸዳጃ ቤት	1		
		ክፍቱን የትም ቦታ ይተዋል	2		
		አፈር በመሸፈን የትም ቦታ ይተዋል	3		
		ሊላ	4		
407	ከቤት ውስጥ የሚወጡ ደረቅ ቆሻሻዎችን የት ነው የሚያስወግዱት? (ተመልከት)	የማዘጋጃ ደረቅ ቆሻሻ ማስወገጃ ገንዳ ውስጥ	1		
		ቆሻሻን በማጠራቀምና በዚህ	2		

		ስራ ለተሰማሩ የማዘጋጃም ሆነ የግል ሰብሳቢዎች በመስጠት			
		በቤትና በቤት አቅራቢያ የትም ቦታ በመጣል	3		
		ሊላ	4		
408	ከቤት ውስጥ የሚወጡ ፍሳሽ ቆሻሻዎችን የት ነው የሚያስወግዱት? (ተመልከት)	ወደ ሲፕቲክ ታንክ ወይም መጸዳጃቤት ጉድጓድ	1		
		ወደ ፍሳሽ ማስረጊያ ጉድጓድ	2		
		የትምቦታ	3		
		ሊላ	4		
የባክትሪዎሎጂካል የውሀ ጥራትን በተመለከተ					
501	የውሀ ምርመራ ውጤት (ኢኮላይ)	አለ	1		
		የለም	2		
502	የውሀ ምርመራ ውጤት (አጠቃላይ ኮሊፎርም)	አለ	1		
		የለም	2		
503	የላብራቶሪ አስተያየት	ተቀባይነት ያለው	1		
		ተቀባይነት የሊለው	2		

ጊዜዎን መስዋእት አድርገው ስለተባበሩን እጅግ በጣም እናመሰግናለን

DECLARATION

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

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