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PREDICTORS OF CHILD DIARRHEAL DISEASES IN CLTSH AND PHAST APPROACH IMPLEMENTED AREAS IN SHEBEDINO DISTRICT, SIDAMA ZONE, SOUTH ETHIOPIA

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ACRONYMS

AAU	Addis Ababa University
AOR	Adjusted Odds Ratio
CI	Confidence Interval
CHWs	Community Health Workers
CHAST	Children Hygiene and Sanitation Transformation
CLTSH	Community Lead Total Sanitation and Hygiene
CSA	Central Statistical Agency
COR	Cured Odds Ratio
df	Degree of Freedom
DHS	Demographic Health Survey
E.C	Ethiopian Calendar
ETB	Ethiopia Birr
HEWs	Health Extension Workers
HHs	Households
HINARI	Health Internet Work Access to Research Initiative
HM	Health Management
HOs	Health Officers
HSDP	Health Sector Development Program
IRC	International Rescue Committee
JMP	Joint Monitoring Program
MDG	Millennium Development Goal
MOWR	Ministry of Water Resource
MOH	Ministry of Health
ODF	Open Defecation Free
PHASE	Participatory Hygiene and Sanitation Education
PHAST	Participatory Hygiene and Sanitation Transformation
PH	Public Health
PHF	Public Health Faculty
PI	Principal Investigator
SE	Standard Error

SLTSH School Lead Total Sanitation and Hygiene

SNNPR Southern Nation and Nationalities Peoples Region

SPSS Statistical Packages of Social sciences

UNICEF United Nation Children Fund

WASH Water Sanitation and Hygiene

WHO World Health Organization

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ABSTRACT

Background: Diarrhea is mainly caused by poor water, sanitation and hygiene (WASH). It is the second largest single cause of death in sub-Saharan Africa. It kills more young children than AIDS, malaria, and measles combined. Direct consequences of diarrhea on children include growth faltering, malnutrition, and impaired cognitive development in resource-limited countries**.**

Objective: To identify predictors of diarrheal diseases among children in CLTSH and PHAST approaches implemented areas in Shebedino district, Sidama zone, south Ethiopia.

Methods: Unmatched case control study was conducted in ten Kebeles of Shebedino district. Census was done to identify all cases and controls. From 14,463 households a total of 294 samples (147 cases and 147 controls) were selected by simple random sampling technique. Cases were children in the age group of 6 to 24 months and who had three or more loose or watery stools in the last six months prior to survey. Pre-tested structured questionnaires were used for data collection. Collected data were entered in to Epi-info and transferred to SPSS version 16.0. Bivariate and multivariate stepwise logistic regression analyses were employed.

Results: Children in households with none out of five latrine components [Adj. OR: 3.79, 95% CI: 1.25, 9.46)] and one out of five components [Adj. OR: 4.58, 95% CI: 1.65, 12.75)] were more likely to develop diarrhea compared to counterparts. Hand washing practice showed a significant odds [Adj. OR: 4.78, 95% CI: (2.14, 8.94)] of developing diarrhea. Attitude of mothers showed a significant odds [Adj. OR=2.12, 95% CI: (1.93, 5.10) of developing diarrhea. Similarly, diarrheal diseases were higher among children fed with hand compared to those fed using cap and spoon [Adj. OR: 4.37, 95% CI: 1.54, 12.42)].

Conclusion: poor latrine components, poor practice of hand washing, negative attitude and poor child feeding practice were strongly associated with the occurrence of diarrheal disease among children in the age group of 6 to 24 months in CLTSH and PHAST approaches implemented areas. Affordable simple designs of latrines construction with entire components should be included in the approaches; the approaches should also give strong emphasis on hygiene components, and provide simple and "easy to understand" information to the mothers or caretakers on how to prevent child diarrheal diseases.

1. INTRODUCTION

1.1 Background

According to the World Health Organization (WHO) and UNICEF, every year there are about two billion cases of diarrheal disease worldwide, and 1.9 million children younger than 5 years of age die from diarrhea, mostly in developing countries. This amounts to 18% of all the deaths of children under the age of five; this means that more than 5000 children are dying every day as a result of diarrheal diseases. Of all these child deaths from diarrhea, 78% occurs in the African continent[1]. In the continent diarrhea kills more young children than AIDS, malaria, and measles combined. Each child under five years of age experiences an average of three annual episodes of acute diarrhea[2].

In sub-Saharan Africa, in the year 2008, 19% children die due to diarrhea and 18% die due to pneumonia. In Ethiopia under five child mortality rate was 101 per 1000 live birth in the year 2010, although the rate have declined in the past 15 years, these are still very high levels of diarrheal incidence. The SNNPR infant mortality rate in the same year was 85 per 1000 live births [3]. The main causes of diarrhea in children are inadequate water supply, poor sanitation and hygiene which can be alleviated through WASH approaches and programs. Without rapid progress in WASH, the growth of national economies will continue to be impeded. [2-7].

At a national level, the water supply, sanitation and hygiene (WASH) program is a decentralized, integrated program package that contains provision of safe and adequate water supply, provision of safe sanitary facilities and the promotion of improved hygiene behavior. In the program there are an increasing number of NGOs active in the implementation process. Almost all of these NGOs are involved in the actual implementation of hygiene and sanitation work at the grassroots level. In the past NGOs were known for doing the software component of the hygiene and sanitation along with financing household latrines to the extent of building themselves. At present most of the NGOs are abiding with government policy and strategy requirements, MDGs and have shifted all their focus to the software part of promotion and capacity building [4].

NGOs play a significant role in WASH particularly in introducing new promotion methods and approaches like participatory hygiene and sanitation transformation/education (PHAST/E) a step-by-step (seven steps) method. PHASE is a participatory approach adapted from PHAST, applied at school and CHAST is a participatory approach same as and adapted from PHAST and

applied on shool age children. The PHAST approach help to bring community hygiene behaviour change and to improve water, sanitation facilities and encourages the participation of individuals in a group process, no matter what their age, sex, social class or educational background [8].

Community/School Led Total Sanitation and Hygiene (CLTSH/ SLTSH) SLTSH is the same as CLTSH and applied at school. CLTSH has a huge potential for igniting communities through the shame it creates and it doesn"t involve providing subsidies, triggering is the vital core and it also under takes the community through the process of mapping and recognize open defecation, and take collective action to clean up and become "open defecation free" and prevent childhood diarrheal diseases. CLTSH is now well recognized nationwide; the government of Ethiopia also adopting CLTSH approach particularly in its UNICEF funded WASH program and CLTSH was first introduced by Plan Ethiopia, an international NGO since 2003; People in Need, International Rescure Committee [3, 8, 9].

1.2 Statement of the problem

Low prevalence of diarrheal disease among children under five years of age is a widely accepted public health indicator of adequate water supply, sanitation and hygiene practice. It indicated that more than one out of three cases of diarrheal disease might be avoided in children by consistent hands washing with soap. Improving sanitation and ensuring access to safe water at the point of use are of prime importance as well. Hygiene education on its own was related to a 27% reduction of diarrheal disease [9, 10].

In Ethiopia childhood diarrheal disease is most common among children age 6 to 23 months (23-25 %) and the two week period prevalence of diarrhea among under five children was estimated to be 13%. The prevalence varied across regions; the highest (22.6%) being in Benishangul-Gumuz and Gambella, the second (15.4%) being in SNNPR [11]. During HSDP III, the Ministry developed a national hygiene and sanitation strategy and a national protocol for hygiene. In this period the MOH commenced implementation of hygiene promotion approaches (CLTSH, PHAST). They also started a national millennium hygiene and sanitation movement with the development of a mass mobilization and communication strategy, while significant progress has been made, it seems the achievements in hygiene and environmental health are still well below target levels [3, 8, 11, 12].

1.3. Rationale of the study

WASH approaches are an important tool that we have in hand to alleviate problems associated with diarrhea. In general CLTSH and PHAST approaches are the prominent strategies that play crucial role in reducing infant and child mortalities. They contribute a lot in poverty reduction and have substantial impact on social, economic, political, and environmental issues.

Crucial as disease prevention and economic growth are, the benefits of investing in WASH which goes beyond health and beyond economic development. They touch on a range of critical issues that cannot easily be measured. These include contributing to every individual's personal dignity and comfort, social acceptance, security for women, school attendance, especially for girls, and productivity at school and work.

Furthermore, improvement of water sanitation and hygiene promotion approaches is still required to reduce the burden of diarrheal diseases in children in Ethiopia in general and SNNPR in particular. With this regard there are studies carried out to identify factors associated with diarrheal diseases, but there is no any research based empirical evidences regarding sanitation and hygiene promotion approaches effectiveness in CLTSH and PHAST implementation areas in the country. Hence this study will attempt to identify predictors of diarrheal diseases among children in CLTSH and PHAST approaches implemented areas.

2. LITERATURE REVIEW

2.1 Wash coverage

Worldwide between 1990 (the MDG baseline year) and 2008 efforts by governments, support agencies and people themselves resulted in additional 1.3 billion people using improved sanitation facilities and 1.8 billion improved drinking water systems. In that same period, the proportion of people using improved sanitation rose from 54 to 61% and drinking water from 77 to 87%. As a result, the world as a whole is on track to meet the MDG drinking water target and some regions will meet the sanitation target. The coverage of diarrheal ,pneumonia, malaria and all other combined were 19%, 18%, 16% and 47% respectively [2, 10].

The WASH sector in Ethiopia has changed significantly in the last five years. Investment, particularly in water supply has increased from approximately ETB 1.193 Billion in 2005 to ETB 1.66 Billion in 2010 One of the main challenges facing the sector is lack of reliable data and there is a great variation in official Government of Ethiopia figures and internationally accepted JMP figures. Official reports show access to water supply at 68.5 % to 81.5 % for urban and 65.8% for rural. Access to sanitation facilities is reported to be 60%. The same report highlights hand washing practice at 7% and open defecation at about 15% (JMP). The JMP figures, however, show that Ethiopia has among the lowest rates of safe water coverage in the world with only 41%. In Ethiopia 31% of the rural and 96% of the urban population is using an improved drinking water source. The national sanitation coverage is only 11% out of which 27% urban and 8% of the rural population are using an improved sanitation facility [10-12] .

2.2 Water supply

The government‟s main WASH plan sets ambitious targets, and clearly highlights the political commitment in the country towards achieving universal coverage, particularly for drinking water supply. As per the JMP estimates water coverage, 8% to 28% rural and (57% in 2015 required to achieve the MDGs) and 77% to 98% urban, this shows Ethiopia will need to make much stronger efforts to meet the MDG targets. Water supply and sanitation data is unreliable in Ethiopia, and considered to over-estimate coverage. The reported coverage for water supply in southern nation and nationalities peoples region (SNNPR) was 74.3% (74.2 rural and 74.9 urban) in 2010, calculated based on 20litter/Capita/day at radius of 0.5km for urban, 15litter/Capita/day at radius of 1.5km for rural [13, 14].

Countrywide data indicate that about 64% of the rural population had access within a radius of 1 km from water point. Drinking water use per capita is also one of the indicators for the provision of basic sanitation that is mainly used to rural areas. It appears that there was no significant improvement in water consumption rates over the last 20 years, the weighted median figure being about 8.5 L/C/day for the country as a whole. JMP classifies as “improved” water supply: piped water into dwelling, plot or yard; public tap; tube well or borehole; protected dug well or spring; and collected rainwater. To be classified as improved, at least 20 liters per capita per day from a protected source within one kilometer of the user‟s dwelling is required. The per capita amount of drinking water is not likely to satisfy 50% of the WHO guide line (20L/c/d for urban and 15L/c/d for rural) for the past and current situations for rural and urban population in Ethiopia [15, 16].

2.3 Sanitation

The national sanitation coverage is only 11% out of which 27% urban and 8% of the rural population are using an improved sanitation facility (MDG data base). Ethiopian‟s progress towards the sanitation and water MDGs 1900-2008 and progress required to achieve the MDGs (End water poverty, 2010), as per the JMP estimates sanitation coverage was 1% to 8% rural (51% in 2015 required to achieve the MDGs) and 21% to 29% urban (58% in 2015 required to achieve the MDGs), this also need to make much stronger efforts to meet the MDG targets. An episode of acute diarrhea on a child below the age of 5 years was estimated to be 4 to 7 cases per child per annum. The reported coverage of sanitation in SNNPR was 75% [13, 15, 17, 18].

2.3.1 Latrine

Time and larine coverage was too weak and the weakest association was seen for rural areas. The increase rate in proportion of population coverage in latrine use was less than 0.2% per year over the last 30 years at national level since 1970 (2005). On expert judgment using the trend analysis, the current latrine coverage for rural, urban, and the whole country is less or equal to 7%, 68% and 15%, respectively. In 2012 the SNNPR latrine coverage is the highest coverage ever achieved; it was 92 %, and in SNNPR Open Defecation free Kebele, and woreda are 1366 and 2 respectively, Annual Sidama zone health department performance report 2012 stated that about 70% the total population of the zone own individual traditional pit latrines. Eight Kebeles of Shebedino district were free of open defecation. Even thought the latrine coverage is high, diarrhea disease in under five OPD was the second leading cause of child mortality of top five diseases in most areas of the region [15, 19]**.**

2.4 Knowledge, attitudes, and practices (KAP) towards sanitation and hygiene

UNICEF in collaboration with the Ministry of Health had conducted studies on KAP of water supply, environmental sanitation, and hygiene education in selected "Woreda" involved under its Woreda Integrated Basic Services (WIBS) project. Findings of the study indicate that the respondents‟ status was very poor regarding KAP. More specifically, more than 60% and 42.2% of respondents in most of the rural and urban "Woredas" respectively, did not know that diseases could be transmitted through human excreta; 30-75% of respondents in different Woredas did not know that diseases could result from drinking water; and 23 to 87% of respondents did not know any method of treatment for drinking water**.** Drinking water handling practice is another major concern that determines possible contamination of drinking water. The overwhelming rural population uses the traditional pot ("Insra") (now it was jar can) for the collection and storage of drinking water. It holds an average of 15-20 liters of water. The proportion of households who put lids/cover for their stored water was found to be 57%, while those using pouring water collection method were 88% as seen in a rural study on determinants of diarrhea. The same study indicated that methods of drawing water from house hold water containers and covering status of water storage facilities determine the outcome of diarrhea [15, 20].

2.5 Water quality

The high prevalence of diarrheal disease among children and infants can be traced to the use of unsafe water and unhygienic practices. The overall concept adopted for microbiological quality is that no water intended for human consumption shall contain E. coli in 100 ml sample. But, a 1-10 E.coli count per 100 ml is acceptable that needs regular sanitary checks for non chlorinated water. Approximately three out of five persons in developing countries do not have access to safe drinking water and only about one in four has any kind of sanitary facilities.

A review of 28 studies carried out by the world bank gives the evidence that incidence of certain water borne, water washed, water based and water sanitation associated diseases are related to the quality and quantity of water and sanitation available to users provides information on the level of the safety of water. Indicator organisms of faecal pollution include the coli form group as a whole and particularly Escherichia coli, streptococcus feacalis and some thermo tolerant organisms such as clostridium perfringens. Treated water entering the distribution system should be 0 faecal coli forms and 0 coli form organisms per 100 ml of water. Seventy water samples were taken from the five types of water sources of protected springs, wells and water line/tap water and Analysis of protected springs, well and water line demonstrated 35.7%, 28.6% and 50% had fecal coli form and E.coli respectively [21-23].

2.6 Hygiene

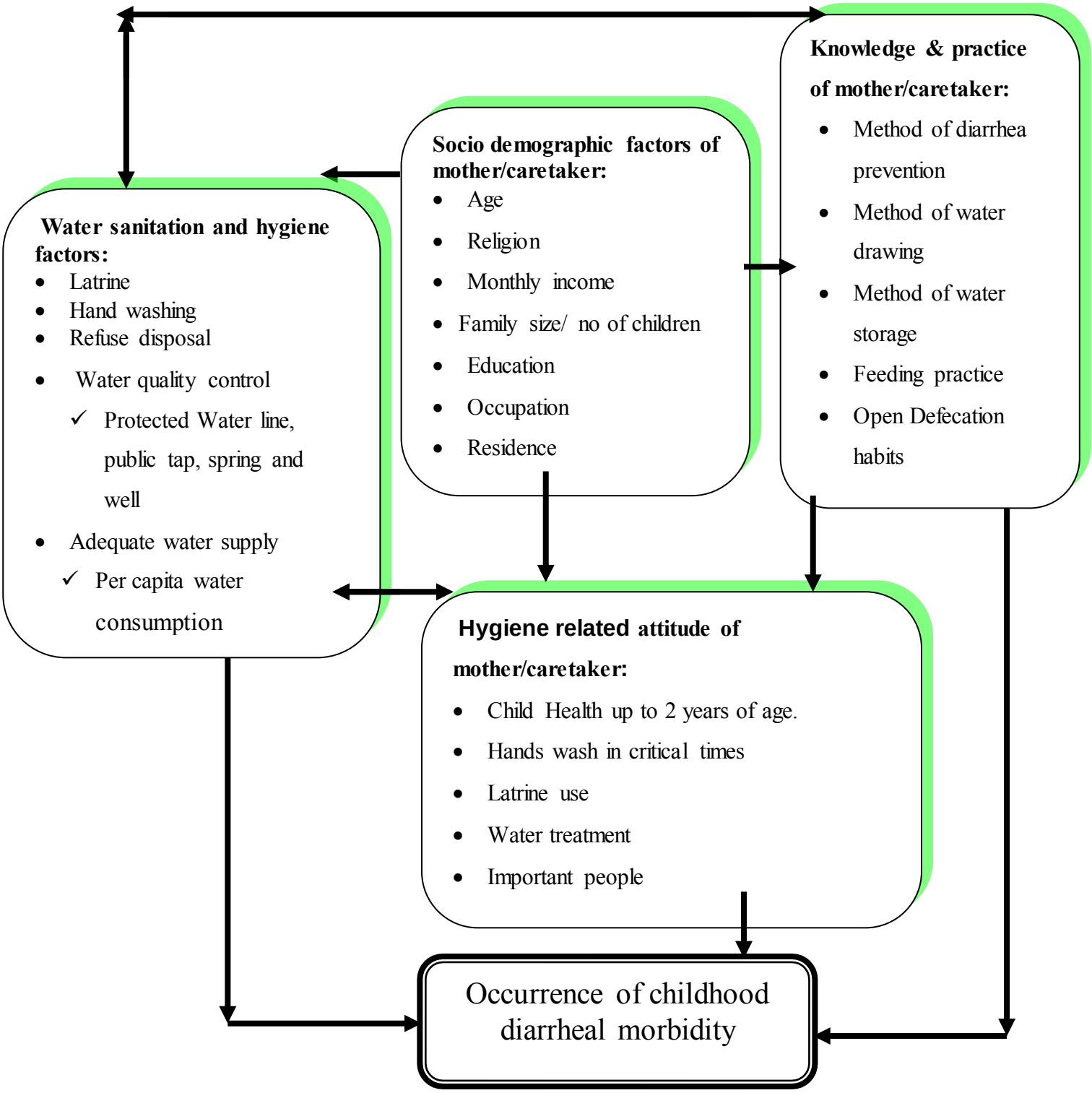
Promoting good hygiene practices in particular can be a low-cost, high impact intervention, especially when targeting specific disease threats**.** The word hygiene refers to the practice of keeping oneself and one‟s surrounding clean, especially in order to prevent illness or the spread of disease. So, hygiene refers to behaviors and practices that are used to break the chain of infection transmission in the home and community. Good hygiene and sanitation practices are closely linked and often difficult to distinguish. Therefore it is important to mention that the word sanitation refers to the individual management of human excreta and that sanitation in this sense is included in the concept of hygiene as defined above [1, 24].

2.6.1 Hand washing

The vast majority of child mortality occurs among the world‟s poorest populations in low- and middle-income countries. The results of an overall analysis of WASH-interventions point out that hygienic behavior is a vital element of the prevention of diarrhoeal diseases. It indicated that more than one out of three cases of diarrhoeal disease (37%) might be avoided in children younger than five years by consistent hand washing with soap**.** Hand washing with Soap is the Most Effective Vaccine against Childhood Infections. Hand washing interrupts the transmission of disease agents and so can significantly reduce diarrhea and respiratory infections, as well as skin infections and trachoma. A recent review suggests that hand washing with soap, particularly after contact with feces (post-defecation and after handling a child‟s stool), can reduce diarrheal incidence by 42 to 47 percent. This remains true even in areas that are highly focally contaminated and have poor sanitation. Hand washing was promoted on a wide-enough scale, hand washing with soap could be thought of as a „do-it-yourself‟ vaccine [1, 25].

Previous studies have also indicated that the occurrence of diarrhea is associated with poor environmental health and sanitary conditions and a lack of safe and adequate water supply. Age of the child and the mother, lower maternal education, bigger family size and lower socio economic status are also reported to have an impact on the incidence of diarrhea in children [26-29]

Figuer-1 CONCEPTUAL FRAME WORK



Source: Adapted from framework of the determinants of diarrhea in Ethiopia.[15].

3. OBJECTIVES

3.1 General Objectives:

- The general objective of this study was to identify predictors of childhood diarrheal diseases in CLTSH and PHAST approach implemented areas in Shebedino woreda, Sidama zone, SNNPR.

3.2 Specific Objectives:

The specific objectives were:

3.2.1 To identify water sanitation and hygiene related predictors of childhood diarrheal diseases in the CLTSH and PHAST approach implemented areas. .

3.2.2 To describe the knowledge and practice of mothers or caretakers of children in the CLTSH and PHAST approach implemented areas.

3.2.3 To determine the hygiene related attitude of mother or caretaker of a child in the CLTSH and PHAST approach implemented areas.

4. METHODOLOGY

4.1 Study Area and Period

The study was conducted from January to June, 2013 in Shebedino woreda, Sidama zone, SNNPR, Ethiopia. Shebedino woreda is one of the 19 woredas found in Sidama zone. It is located 27 kms south east of Hawassa- (the capital of SNNP regional state) and 327 kms south of Addis Ababa. The woreda has 24 rural Kebeles and 3 town Kebeles located at the main town of the woreda, Leku. The total population of the woreda is about 261,128 where 51% are males and 49% are females. Children aged from 6 to 59 months in the year 2012 in the woreda were about 37,658**.** The woreda, with an estimated 500 people per square Km is the second most densely populated woreda in Ethiopia.

The average household size is about 5 people and extends to 7 to 10 persons in poorest households. From the total population of the woreda only 3% live in towns like Leku and the rest 97% live in rural areas where there are no adequate socio-economic infrastructures like potable water, health and education facilities. The majority of the population belongs to Sidama ethnic group (93%) and "Sidamigna" is the official language of the woreda. A social system"OLA" exists where people shows solidarity by mobilizing support (material, labor and financial) to the family members of a deceased**.**

The woreda has an area of 411.7 square kilometer, where 0.2% of it is covered with forest, 72.3% under cultivation, 19.6% grazing land and 3.4% of potential land for future development. The major source of livelihood in the woreda is crop production, livestock rearing, petty trade, unskilled labor and semi skilled labor like carpentry. The major crops grown are inset, coffee, chat; maize, barely, wheat, and bean coffee are cash crops. Seasonal food insecurity and malnutrition characterized the woreda. About 49.5% the total population of the woreda own individual pit latrines which are traditional types without hand washing facilities and sanitation coverage (21, 33)**.**

MDGs and the associated water sector development plan of the Ministry of Water Resources were developed to realize the objective of supplying safe drinking water and providing basic sanitation and hygiene and enhance development. To reach this target scaling up of community managed water supply, sanitation and hygiene services (i.e. CLTSH/SLTSH, CHAST/PHAST approach) are established by a group of stockholders with the secretariat role of plan Ethiopia since 2003, in Shebedino woreda.

4.2 Study design

The study used community based unmatched case-control study design that examined socio demographic variables including water supply sanitation and hygiene factors, knowledge, practice, and hygiene related attitude of mothers or caretakers. These were considered as exposure variables and child diarrheal diseases as an outcome variable. The study attempted to compare these variables between cases and controls in CLTSH and PHAST approach implemented areas of Shebedino district. Cases were children in the age group of 6 to 24 months and who had three or more loose or watery stools in the last six months prior to enumeration.

4.3 Study Population

4.3.1 Source Population

The source population were all mothers or caretakers of children in the age group of 6 months up to 24 months living in the Shebedino woreda.

4.3.2 Sample population

The sample population were mothers or caretakers of children in the age group of 6 months up to 24 months living in the households that were selected from 10 Kebeles.

Cases and control definition

- **Cases** were children in the age group of 6 to 24 months and who had three or more loose or watery stools in the last six months.
- **Controls** were children in the age group of 6 to 24 months and who had no three or more loose or watery stools in the last six months.

Inclusion and Exclusion Criteria:

Inclusion Criteria:

- Mothers or immediate caretakers who had a child with diarrhea and lived in the study area for about 6 months were included in the study.

Exclusion Criteria:

- Mothers or immediate caretakers who were critically ill or those didn‟t live in the study area for at least 6 months were excluded from the study.

4.4 Sample Size Calculation

Sample size was calculated using double proportion formula. In the sample size calculation diarrheal disease prevalence from other studies were considered and assumed. In Ethiopia, the prevalence of respondents who did not know that diarrhea diseases could be transmitted through human excreta was 60% among cases and 42.2% among controls, therefore these prevalence rates along with 80% power, 95% confidence interval, and a 1:1 ratio of case and controls were used in the calculation. This gave 134 cases and 134 controls (total 268 study subjects) for the initial sample. 10% was added for non-response rate, and the total sample size was 294 (147 cases and 147 controls) [15, 26].

Sample size was calculated using double proportion formula:

- $\mathbf{n_1}=$

$$\frac{\left[\boldsymbol{Z\alpha/2}\sqrt{\left(\mathbf{1}+\frac{\mathbf{1}}{\boldsymbol{r}}\right)\boldsymbol{P}(\mathbf{1}-\boldsymbol{P})}\ +\boldsymbol{Z\beta}\sqrt{P1(1-P1)+\frac{P2(1-P2)}{r}}\right]^{\mathbf{2}}}{(\mathbf{P1}-\mathbf{P2})^{\mathbf{2}}}$$

- $\mathbf{n_2}=\mathbf{n_1}$
- $\mathbf{n_1}$= sample in cases, $\mathbf{n_2}$=sample in controls
- α = level of significance=0.05, power= 80%
- **r**=ratio of cases to controls= n_1/n_2= 1:1
- $\mathbf{p_1}$= proportion of exposure in cases= 0.6
- $\mathbf{p_2}$=proportion of exposure in controls= 0.42

4.5 Sampling Technique

From the Shebedino woreda 8 rural and 2 urban Kebeles were randomly selected by lottery method and census was done by enumerators to identify cases and controls. Enumerators were asked for the presence of a case, and when they got a case, they registered name and age of the case and gave an ID number for households, if there were two or more case children in HHs that were eligible, a child with a recent diarrheal experience was selected. After identification of the HHs, 147 cases were proportionally distributed among the selected Kebeles. Children age group of 6 up to 24 months with three or more loose or watery stools in the last six month were recruited to the study as cases and the controls for each case were obtained in similar procedure. From the 568 case and 814 controls 147 case and controls were randomly selected.

Table 1: Distribution of the sample size in the study Kebeles in Shebedino District, June, 2013

			Children age b/n 6 to 24 months		Sample size in each Kebele		
Kebele	Total HHs	Total <5 children	Children without diarrhea	Children with diarrhea	Selected no of Cases	Selected no of Controls	Total
O1urban	1028	491	26	54	14	5	19
03urban	965	455	43	51	13	8	21
Morocho Negasha	1631	480	105	33	9	19	28
Mider-genet	1906	605	101	48	12	18	30
Morocho shondolo	1776	521	141	48	12	25	37
Diramo Anferara	1834	545	135	62	16	24	40
Dilla Aneferara	1798	478	106	60	16	19	35
Konsorano	1427	402	60	76	20	11	31
Dilla Chengea	1032	399	55	86	22	10	32
Selagano	1066	368	42	50	13	8	21
Total	14,463	4744	814	568	147	147	294

4.6 Data Collection process

- **Instrument*:*** The study instrument was a combination of open-ended and close-ended interviewer administered questionnaires and basically attempted to extract information regarding socio-demographic, WASH, and KAP aspect of diarrhea disease prevention.

4.7 Study Variable

Dependent Variable

- The occurrence of three or more episode of diarrhea in a child in the last six months before the time of survey.

Independent Variable

- ***Socio Demographic or personal predictors*** (place of residence, religion, ethnicity, age, sex, education of mother, family size, family income, family wealth, occupation of mother)
- ***Water sanitation and hygiene predictors*** (types of water source, amount of daily water consumption, distance to/from the water source, availability of latrine, hands wash, refuse disposal, pipe line, protected spring and well)
- ***Knowledge and practice of mother or caretaker*** (Method of water drawing, Method of water storage , feeding practice , and defecation habits)
- ***Hygiene related attitude of mother or caretaker*** **(**A child needs to be prevented against diarrheal diseases before he/she is two years of age, hands wash in critical times provide protection for children against diarrheal diseases, using latrine can prevent the spread of diarrheal disease, water treatment can kill pathogens and prevent diarrhea, most people who are important to you think that they are important to get children prevented from diarrhea)

- **Data Collection Method**

The data collectors were Sidam-uffa/ „‟Sidamigna‟‟; speakers diploma nurses and public health professionals. They were trained intensively for four days on the study instrument and data collection procedure. The principal investigator gave the training. Training manual was prepared to aid the training process. The training mainly focused on interviewing techniques, and emphasis was also given for questions that need careful attention and observation. Classroom lecture, mock interview and field practice were included in the training. The principal investigator and one public health officer (BSc) from Shebedino woreda health office supervise, assist interviewers and collect filled questionnaires every day and check for inconsistencies and omissions. Questionnaires with problem were sent back to interviewers for re-interview. The principal investigator was responsible for coordination and supervision of the overall data collection process.

4.8 Data Quality Assurance

The questionnaires were developed after reviewing relevant literature to all the possible variables that address the objective of the study. Questions were first prepared in English language and later were translated to Amharic language. Prior to the actual data collection, questionnaire was pre tested on 5% of the sample (29 households) in Shebedino woreda in 1 urban 2 rural Kebeles that had similar characteristics to the areas where the actual study was carried out. The pretest helped to identify problems that had to be addressed both in the questionnaire and shortcoming of data collectors. And vague terms, phrases and questions identified during the pretest were modified, changed and skipping patterns were also corrected. The completed questionnaires were checked every day during data collection for completeness, clarity and consistency. Any mistake detected was corrected the next day. Five percent of the households were re-interviewed by the supervisors and the PI to check for the consistency of data collection; and correction was made at the spot.

4.9 Data Analysis

The completed questionnaires were categorized into cases and controls. The data entry and cleaning were performed using EPI info version 3. 5.1 Statistical packages. The data entered were checked for consistency. Simple frequencies and cross tabulation were used to see the missing values and overall distribution of the study subject with the variables under study. Errors identified were corrected after revising the original questionnaire. Chi square test was used to determine the association between different factors and the outcome variable. Odds ratio was determined to measure the odds of independent variables that favor for child diarrheal diseases and the strength of association. Those variables which had significant association with diarrheal disease was entered to bivariate and multivariate analysis by forward selection and backward elimination, Further analysis was also performed using stepwise logistic regression analysis employing SPSS version 16 software package to assess the relative effect of selected predictor variables on the childhood diarrheal disease. Confidence interval of 95% was used to see the precision of the study and P-values of 0.05 or lower are taken to declare that the association is statistically significant.

4.10 Operational Definitions:

- **Diarrhea**: having three or more loose or watery stools in a 24 hours period for less than 2 weeks/14 days as reported by the mother or immediate caretaker of the child.
- **Refuse:** include solid wastes as ash, cow dung, home-sweepings, but not human excreta.
- **Per capita water consumption**: calculated by considering frequency of water collection in a day, volume of container and family size.
- P/c/day= freq. of collection in a day X capacity of volume of container / Family size
- **Index child**: refers to a child that was included in the study from a household to take information on the demographic and health characteristics
- **Attitude toward preventing diarrhea**: attitude toward latrine use, hands wash, water treatment, important people, immunization, favor or oppose WASH, preventability from diseases and spreads of diseases. (Likert-scale where 5= strongly accept or 1= strongly oppose) And it will be positive if the score greater than median = 6 and more question attempt.
- **Protected spring** - a spring that is properly covered by stone masonry with one or two boxes, and a distribution site somewhere near the protection or collection boxes.
- **Protected well** - a well that is properly covered by stone masonry, internally plastered at least 3 meters above and with pump at the top.
- **Knowledge:** Questions were presented about knowledge regarding Method of water drawing, Method of water storage, Feeding practice, Open Defecation habits and personal hygiene.
- **Latrine components:** There are five latrine components; hole cover, door, wall, roof and hand wash basin.
- **Diarrheal diseases prevention practices:** are hand washing, water treatment, using latrine, personal hygiene, and refuse disposal.

4.11 Ethical consideration

Ethical clearance was obtained from Addis Ababa University, Medical faculty ethical clearance committee. Informed verbal consent was obtained from the mothers or caretakers of the children. Privacy and confidentiality was maintained during interview. Also, written cooperation letter was submitted to all concerned bodies in the study area. Additionally, interviewers were gave information on child diarrheal diseases for care takers and mothers who did not had adequate information and also a contact address of the investigator was given for those who need further explanation. Children who were found to be sick during the visits were told to consult the nearby health institution or health post for better health information on diarrheal prevention. Finally, the dissemination of the finding did not refer specific respondents but the general source population.

5. RESULTS

5.1 Distributions of study subjects

As shown in table two, 81 (55.1%) of cases and 82 (55.8%) of controls were males and 66(44.9%) of cases and 65(44.2%) of controls were females. The mean age (with ±SD) of the case and control children were 16.81(±5.75) and 16.67 (±5.11) months respectively. 143 (97.3%) of cases and 139(94.6%) of controls had their biological mothers as caretakers, while others were with their caretakers. The mean ages of the case and control mothers were 29.14 (±5.35) and 31.14(±6.15) years respectively. Mothers in the case group were a little younger than those in control group. The majority of mothers or caretakers (n=139, 94.6%) of cases and of controls (n=145, 98.6%) were married. By religion, 121 (82.3%) of cases and 112(76.2%) of controls were protestant. Ethnically, 127(86.4%) mothers or caretakers of cases and 125(85.0%) of controls were Sidama, 126(85.7%) of cases and 123(83.7%) of controls mothers were housewives, and regarding mothers education 67 (45.6%) of cases and 22(15.0%) of controls had no formal education. The mean household family size were 5.12 (±1.78) for cases group and 5.24(±1.93) for the controls. This was almost the same for the two groups. Eighty two (55.8%) and 51(34.7%) households of cases, and 32(21.8%) and 36(24.5%) of controls had monthly family income less than 400 ETB and 800 ETB, respectively.

Table 2: Distribution of study subjects by Socio-demographic characteristics Shebedino woreda, June, 2013

Characteristics	Case N (%)	Control N (%)	Total N (%)
Age of child			
6-12	45(30.6)	30(20.4)	75(25.5)
13-18	36(24.5)	60(40.8)	96(32.7)
19-24	65(44.2)	57(38.8)	122(41.5)
Missing	1(0.7)	---	1(0.3)
Sex of child			
Male	81(55.1)	82(55.8)	163(55.4)
Female	66(44.9)	65(44.2)	131(44.6)
Place of birth			
Health institution	24(16.3)	26(17.7)	50(17.0)
Home	123(83.7)	121(82.3)	244(83.0)
Duration of BF(months)			
2	2(1.4)	---	2(0.7)
5	4(2.7)	1(0.7)	5(1.7)
6	141(95.9)	146(99.3)	287(97.6)
Measles vaccinated			
Yes	129(87.8)	129(87.8)	258(87.8)
No	18(12.2)	18(12.2)	36(12.2)
Age of mother			
15-24	27(18.4)	17(11.6)	44(14.9)
25-34	95(64.6)	88(59.9)	183(62.2)
>34	25(17.0)	42(28.6)	67(22.8)
Marital status			
Single	6(4.1)	2(1.4)	8(2.7)
Married	139(94.6)	145(98.6)	284(96.6)
Divorced	2(1.4)	----	2(1.4)
Ethnicity of mother			
Sidama	127(86.4)	125(85.0)	252(85.7)
Doreze	9(6.1)	4(2.7)	13(4.4)
Gedeo	2(1.4)	7(4.8)	9 (3.0)
Amahara	6(4.1)	5(3.4)	11(3.7)
Gurage	3(2.0)	1(0.7)	4(1.3)

Table 2 continued..

Characteristics	Case N (%)	Control N (%)	Total N (%)
Religion of mother			
Protestant	112(76.2)	121(82.3)	233(79.3)
Orthodox	16(10.9)	11(7.5)	27(9.2)
Muslim	14(9.5)	9(6.1)	23(7.8)
Catholic	5(3.4)	6(4.1)	11(3.7)
Resident			
Urban	31(21.1)	24(16.3)	55(18.7)
Semi urban	7(4.8)	13(8.8)	20(6.8)
Rural	109(74.1)	110(74.8)	219(74.5)
Monthly family income			
<400ETB	82(55.8)	32(21.8)	114(38.8)
401-800ETB	51(34.7)	36(24.5)	87(29.6)
>800ETB	14(9.5)	79(53.7)	93(31.6)
Education of mother			
Illiterate	67(45.6)	22(15.0)	89(30.3)
Read and write	25(17.0)	38(25.9)	63(21.4)
Elementary	35(23.8)	36(24.5)	71(24.1)
Junior secondary	12(8.2)	37(25.2)	49(16.7)
2^{ndry} & certificate	7(4.8)	10(6.8)	17(5.8)
College & above	1(0.7)	4(2.7)	5(1.7)
Family size			
<4	24(16.3)	24(16.3)	48(16.3)
4-6	96(65.3)	96(65.3)	192(65.3)
7-9	23(15.6)	22(15.0)	45(15.3)
>9	4(2.7)	5(3.4)	9(3.1)
Occupation of mother			
House wife	126(85.7)	123(83.7)	249(84.7)
Farmer	2(1.4)	8(5.4)	10(3.4)
Daily laborer	5(3.4)	6(4.1)	11(3.7)
Merchant	10(6.8)	7(4.8)	17(5.8)
Self & Gov't employ	5(1.4)	4(1.4)	9(1.4)

5.2 Bivariate results

5.2.1 Socio-demographic variables as predictors of diarrhea

Table 3 presents association of selected socio-demographic variables with child diarrheal status. From the socio demographic variables included, age, sex, place of birth, duration of breast feeding and measles vaccination of the child, religion, family size, marital status, ethnicity, and occupation of mothers or caretakers did not show significant association with diarrheal diseases. Childhood diarrheal diseases were significantly associated with mothers or immediate caretaker education status (Table 3). Children who are born to illiterate mothers are about 4.76 times more likely to have diarrhea than children of mothers who are literate or who had formal education [COR: 4.76, 95% CI: (2.73, 8.81)]. The Odds of developing diarrhea in children whose mother age between 15 and 24 years were three times greater than the odds in children whose mother were above 35 years [COR: 2.67, 95% CI: (1.22, 5.84)] and the odds of developing diarrhea in children whose mother age was between 25 and 34 years were two times greater than the odds in children whose mother were above 35 year [COR: 1.81, 95% CI: (1.02, 3.22)]. The odds of developing diarrhea were significantly higher among children whose family monthly income was below 400 ETB [COR: 14.46, 95% CI: (7.18, 29.12)].

Table 3: Association of socio demographic variables with diarrheal status, Shebedino Woreda, May, 2013

Characteristics of Mother/Caretaker	Diarrheal status		Crude OR & 95% CI
	Case N=147(%)	Control N= 147(%)	
Age			
15-24	27(18.4)	17(11.6)	2.67(1.22, 5.84)*
25-34	95(64.6)	88(59.9)	1.81(1.02, 3.22)*
>34	25(17.0)	42(28.6)	1
Monthly income (ETB)			
<400	82(55.6)	32(21.8)	14.46(7.18, 29.12)*
401-800	51(34.7)	36(24.5)	7.99(3.93, 16.27)*
>801	14(9.5)	79(53.7)	1
Education			
Illiterate	67(45.6)	22(15.0)	1
Literate	80(54.4)	125(85.0)	4.76(2,73, 8.31)*

Note: *Significant at significance level 0.05

5.2.2 Water supply, sanitation and hygiene variables as predictors of diarrhea

Table 4 presents association of selected WASH variables with child diarrheal status below. As shown in the Table, in the crude analysis, the odds of developing diarrhea were significantly higher among children whose mothers reported latrine components; none out of five [COR: 10.52, 95% CI: (6.11, 18.12)], one out of five [COR: 6.98, 95% CI: (3.73, 13.04)], two out of five [COR: 5.68, 95% CI: (3.42, 9.63)], three out of five [COR: 4.06, 95% CI: (2.11, 7.81)]. Again, living in houses with feces seen around the latrine hole [COR: 4.31, 95% CI: (2.12, 8.83)] and feces seen in the compound [COR: 3.93, 95% CI: (1.79, 8.62)] had significant association with diarrheal diseases. Open field waste disposal also showed significant association with diarrhea diseases. The odds of developing diarrhea diseases were significantly higher among Children whose mothers disposed waste in open field, [COR: 2.12, 95% CI: (1.15, 3.90)].

In this study demographic and health characteristics of the index children were not significantly associated with childhood diarrheal diseases.

Table 4: Association of selected WASH variables with child diarrheal status, Shebedino Woreda, June, 2013

Variables	Diarrheal status		Crude OR and 95% CI
	Case N= 147(%)	Control N= 147(%)	
Latrine available			
Yes	133(90.4)	140(95.2)	1.00
No	14(9.5)	7(4.8)	0.21(0.04, 1.06)
Latrine components			
None out of five	23(15.6)	6(4.10)	10.52(6.11, 18.12)*
One out of five	39(26.5)	8(5.44)	6.98.(3.73, 13.04)*
Two out of five	41(27.9)	18(12.2)	5.68(3.42, 9.63)*
Three out of five	32(21.8)	24(16.3)	4.06(2.11, 7.81)*
Four out of and Above	12(8.16)	91(61.90)	1.00
Feces seen around the hole			
Yes	38(27.5)	9(6.2)	1.00
No	100(72.5)	136(93.8)	4.31(2.12, 8.83)*
Feces seen in the compound			
Yes	30(20.4)	9(6.1)	1.00
No	117(79.6)	138(93.9)	3.93(1.79, 8.62)*
West disposal			
Burning	71(48.3)	87(59.2)	1.00
Open field	38(25.9)	22(15.0)	2.12(1.15, 3.90)*
Dry pit	32(21.8)	23(15.6)	1.71(0.92, 3.17)
Pit latrine	6(4.1)	10(6.8)	0.7(0.26, 2.12)
Drinking water source			
Public tap/ line	130(88.4)	261(88.8)	1.00
Protected spring/well	8(5.4)	21(7.1)	0.62(0.25, 1.55)
Unprotected spring/well	8(5.4)	11(3.7)	2.35(0.59, 9.21)
Per capita water consumption			
< 15 letter	113(76.9)	120(81.6)	1.00
>15 letter	33(22.4)	27(18.4)	0.77(0.44, 1.36)
Distance to water source			
< 1500 meters	139(94.6)	142(96.6)	1.00
>1500 meters	8(5.4)	5(3.4)	0.49(0.14, 1.65)

Note: ******* Significant at significance level 0.05.

5.2.3 Knowledge and Practice of mothers or caretakers as predictors of diarrhea

Table 4 presents association of selected knowledge and practice variables with child diarrheal status. The odds of developing diarrhea were significantly higher among children whose mothers knew hand washing critical times, one out of four [COR: 16.76, 95% CI: (6.03, 46.56)], two out of four [COR: 15.02, 95% CI: (6.92, 32.63)], and three out of four [COR: 2.99, 95% CI: (1.57, 5.67)]. Diarrheal diseases prevention practice and feeding was significantly associated with diarrheal diseases. The odds of developing diarrhea in hand-fed children were about 6.77 times higher than the odds in children who were fed using cup and spoon [COR: 6.77, 95% CI: (3.71, 12.33)]. Children whose mother draw water from a storage container by dipping, storage water in pot and didn't covered water storage container at the time of survey had significant association of [COR: 5.27, 95% CI: (2.89, 9.64); (COR: 4.05, 95% CI: (2.29, 7.19) and (COR: 4.55, 95% CI: (2.33, 8.88)] respectively. (Table 5)

Table 5: Association of knowledge and practice variables with child diarrheal status, Shebedino Woreda, June, 2013

Variables	Diarrheal status		Crude OR and 95% CI
	Case N (%)	Control N (%)	
Modes of transmission			
One out of five	20(13.6)	22(14.9)	1.14(0.57, 2.28)
Two out of five	21(14.3)	33(22.4)	1.55(0.81, 4.38)
Three out of five	31(21.1)	19(12.9)	0.95(0.59, 1.49)
Four and above out of five	75(51.0)	76(51.7)	1
Hand washing Critical times			
One out of four	29(19.7)	5(3.4)	16.76(6.03, 46.56)*
Two out of four	52(35.4)	10(6.8)	15.02(6.92, 32.63)*
Three out of four	29(19.7)	28(19.0)	2.99(1.57, 5.67)*
All the four	36(24.5)	104(70.7)	1
Diarrheal disease prevention practice			
Using latrine			
Yes	118(80.3)	142(96.6)	1
No	29(19.7)	5(3.4)	3.71(1.33, 10.35)*
Water treatment			
Yes	59(40.1)	127(86.4)	1
No	88(59.9)	20(13.6)	4.68(2.34, 5.94)*
Hand washing			
Yes	102(69.4)	146(99.3)	1
No	45(30.6)	1(0.7)	7.0(3.6, 11.4)*
Refuse disposal			
Yes	59(40.1)	127(86.4)	1
No	88(59.9)	20(13.6)	7.45(4.35, 12.88) *
Personal hygiene			
Yes	22(15.0)	61(41.5)	1
No	125(85.0)	86(58.5)	4.03(2.3, 7.05)*
Water collection container			
Jerri can	130(88.4)	125(85.0)	1
Plastic bucket	11(7.5)	7(4.8)	0.47(0.04, 5.26)
Pot	6(4.1)	13(8.8)	0.44(0.16, 1.18)
Water storage had cover			
Yes	102(69.4)	134(91.2)	1
No	45(30.6)	13(8.8)	4.55(2.33, 8.88)*

Table 5 continued…

Variables	Diarrheal status		Crude OR and 95% CI
	Case (%)	Control (%)	
Method of water drawing			
By Pouring	17(11.6)	60(40.8)	1
By Dipping	130(88.4)	87(59.2)	5.27(2.89, 9.64)*
Start supplementary food			
At 6 months	108(73.5)	119(80.9)	1
Below 6 months	7(4.8)	6(4.08)	
Above 6 month	32(21.8)	22(15.0)	1.53(0.23, 9.30)
Feeding methods			
Cup and spoon	78(53.1)	130(88.4)	1
Hand	69(46.9)	17(11.6)	6.77(3.71, 12.33)*

Note: ******* Significant at significance level 0.05

5.2.4 Mother or caretaker WASH related attitude as predictors

Attitude questions on self trust to prevent diarrhea, people who are important to get children prevented against diarrhea, how strongly you favor or oppose water sanitation and hygiene practice when a child got diarrhea, immunization before two years of age, Hand washing, latrine use, and water treatment can prevent diarrheal disease, and open defecation can spread diarrheal were assessed using Likert Scale questions. Sum score for each constructs was computed and dichotomized into positive and negative attitude. If respondents scored below the median, he/she would be labeled as having negative attitude.

Attitude of mothers or immediate caretakers towards prevention of child diarrhea disease had significant association (p-value < 0.0001). the odds of developing diarrhea among children of negative attitude mothers or caretakers towards prevention of diarrhea disease were 6.53 times more likely compared to their counterparts, [COR = 6.53,(95% CI: 3.34, 12.62)]. (Table 6)

Table 6: Association of Mothers or caretakers WASH related attitude **with diarrheal status, Shebedino Woreda, June, 2013**

Attitude	Diarrhea status		P-value	COR (95% CI)
	Case N (%)	Control N (%)		
Positive	90(38.8)	134(91.2)		1
Negative	57(61.2)	13(8.8)	0.0001	6.53(3.34, 12.62)

5.3. Multivariate analysis

The multivariate analysis is performed by taking the conceptual framework (Fig.1) into consideration. All variables that have associations at 0.05 significance level with outcome variable in the bivariate were entered stepwise forward multiple logistic regressions**.** From a total 13 Variables entered in to multiple logistic regression 5 variables found to have significant independent association with diarrheal status.

The overall effect of the selected socio demographic variables (table 3) on childhood diarrheal diseases was assessed in the first step. In the second step of the analysis, the WASH variables and WASH related attitude were added (table 4) and (table 6), and their effect was assessed in the presence of the socio demographic variables. Knowledge and practice factors (tables 5) were entered in the third step. In this step, the effect of the selected Knowledge and practice factors was assessed in the presence of both socio demographic and WASH factors. (table7) presents the socio demographic, WASH factors and knowledge and practice variable which remained in each step of the analysis. From the socio demographic variables entered in the first step of the analysis, only family monthly income remained significant in the final step (table 7). Cases were about 5.48 times higher among families perceived that they were economically poor (<400ETB) when compared to families perceived they were rich (>800ETB) [Adj. OR: 5.48, 95% CI: (3.10, 7.77)]. Educational status of mothers showed significant association with diarrhea diseases in the first [Adj. OR: 4.76, 95% CI: (2.73, 8.31)] and second [Adj. OR: 3.37, 95% CI: (1.82, 6.14)] step of the analysis. However, their significance disappeared in the third level of the analysis. Age of Mothers or caretakers remained significant in the first model. The odds of developing diarrhea were higher among children whose households had none out of five components and one out of five components [Adj. OR: 3.79, 95% CI: (1.52, 9.46)] and [Adj. OR: 4.58, 95% CI: (1.65, 12.75)] respectively. Children whose mothers or caretakers had negative attitude towards prevention of diarrhea were 3.43 and 2.12 times more likely to develop diarrhea as compared to their counterparts, in the second model [Adj. OR = 3.43,(95% CI: 2.67, 6.97)] and final model [Adj. OR = 2.12,(95% CI: 1.93, 5.10)] respectively. Even though west disposal to open field showed significant association with diarrheal in the second step of the analysis, the significance disappeared in the final step.

Concerning Mothers or caretakers diarrhea prevention practice; hand washing showed a significant odds [Adj. OR: 4.78, 95% CI: (2.14, 8.94)] developing diarrhea, however, using latrine [COR: 3.71, 95% CI: (1.33, 10.35), water treatment [COR: 4.68, 95% CI: 2.61, 5.94)], and personal hygiene [COR: 4.03 95% CI: (2.3, 7.05)] showed significant association in the bivariate analysis but the association disappeared in multivariate analysis. And also critical hand washing times showed a significant association in the crud and in the second step analysis but the association disappeared in final step analysis. Feeding methods were significant in the final step of multivariable analysis, the odds of developing diarrhea were significantly higher among Children whose mother used hand to feed [Adj. OR: 4.37, 95% CI: (1.54, 12.42)]. Even though method of water drawing and storage container cover showed significant association in the bivariate analysis, their significance disappeared in the final step of the multivariate analysis [Adj. OR: 1.61, 95% CI: (0.49, 5.24) and Adj. OR: 2.94, 95% CI: (0.49, 8.92)] respectively.

Feces seen around hole showed significant association in the bivariate analysis [COR: 4.31, 95% CI: (2.12, 8.83)], however, the association disappeared and the direction of association was changed in the multivariate analysis [Adj. OR: 0.24, 95% CI: (0.69, 0.83)]. (Table 7)

Table 7: Independent factors associated with diarrhea diseases based on logistic regression model Shebedino woreda, June 2013

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)		
		Model 1	Model 2	Final model
Model 1 (Socio demographic vari.)				
Mothers age				
(15-24 Vs above 34 yrs*)	2.67 (1.22, 5.84)**	1.53 (0.59, 3.92)	1.07 (0.24, 4.70)	1.54 (0.33, 7.09)
(25-34Vs above 34 yrs*)	1.81 (1.02, 3.22)**	0.89 (0.43, 1.83)	0.91 (0.15, 1.59)	1.25 (0.42, 3.72)
Monthly income (ETB)				
(< 400 Vs above 801*)	14.46 (7.18, 29.12)**	11.32 (5.41,23.71)**	8.31 (6.05, 11.85)**	5.48 (3.26, 7.77)**
(401-800 Vs above 801*)	7.99 (3.93, 16.27)**	6.91 (3.24, 11.73)**	5.63 (2.65, 7.95)**	5.24 (1.47, 8.69)**
Education				
(illiterate Vs literate*)	4.76 (2.73, 8.31)**	3.37 (1.82, 6.14)**	1.68 (0.74, 3.83)	1.05 (0.39, 2.83)
Model 2 Socio dem. +env'tal + attitude				
Hand washing critical times				
(One out of four critical time Vs All the four*)	16.7 (6.03, 46.56)**		16.11 (4.27, 60.78)**	1.72 (0.38, 7.73)
(Two out of four critical time Vs All the four*)	15.02 (6.92,32.63)**		8.80 (3.56, 21.77)**	2.15 (0.72, 6.42)
(Three out of four critical time Vs All the four*)	2.99 (1.57, 5.67)**		3.83 (1.68, 8.74)**	1.89 (0.69, 5.18)
Latrine components				
(none out of five Vs four & above*)	10.52 (6.11, 18.12)**		7.43 (3.37, 16.34)**	3.79 (1.52, 9.46)**
(one out of five Vs four & above*)	6.98 (3.73, 13.04)**		3.49 (1.46, 8.31)**	4.58 (1.65,12.75)**
(two out of five Vs four & above*)	5.68 (3.42, 9.63)**		1.05 (0.46, 2.40)	0.87 (0.32, 2.37)
(three out of five Vs four & above*)	4.06 (2.11, 7.81)**		2.08 (0.71, 6.05)	1.10 (0.32, 3.78)

Table 7 continued…

Feces seen around the hole			
(No Vs Yes*)	4.31 (2.12, 8.83)**	0.44 (0.16, 1.26)	0.24 (0.69, 0.83)
Feces seen in the compound			
(No Vs Yes*)	3.93 (1.79, 8.62)**	0.51 (0.16, 1.61)	0.54 (0.13, 2.24)
West disposal			
(Open field Vs Burning*)	2.12 (1.15, 3.90)**	3.04 (1.19, 7.71)**	2.01 (0.64, 6.35)
Attitude towards WASH			
(Negative Vs Positive*)	6.53 (3.34, 12.62)**	3.43 (2.67, 6.97)**	2.12 (1.93, 5.10)**
Final model (socio demog+ env'tal+ Knowledge and Practice)			
Methods of diarrhea prevention			
Using latrine			
(No Vs Yes*)	3.71 (1.33,10.35)**		0.89 (0.14, 5.66)
Water treatment			
(No Vs Yes*)	4.68 (2.34, 5.94)**		2.07 (0.42, 10.29)
Hand washing			
(No Vs Yes*)	7.0 (3.6, 11.4) **		4.78 (2.14, 8.94)**
Refuse disposal			
(No Vs Yes*)	7.45 (4.35,12.88)**		0.85 (0.24, 3.02)
Personal hygiene			
(No Vs Yes*)	4.03 (2.3, 7.05)**		0.79 (0.32, 1.96)
Storage container had cover			
(No Vs Yes*)	4.55 (2.33, 8.88)**		2.94 (0.97, 8.92)
Method of water drawing			
(by dipping Vs by pouring*)	5.27 (2.89, 9.64)**		1.61 (0.49, 5.24)
Feeding method			
(hand Vs cup and spoon*)	6.77 (3.71,12.33)**		4.37 (1.54,12.42)**

Note: *Reference, ** significant

6. DISCUSSION

The study has indicated that in CLTSH and PHAST approach implemented areas the condition of childhood diarrhea mainly on knowledge, attitude and practice of water sanitation and hygiene was good. This may be due to hygiene promotion approaches implementation and related knowledge in the study area. The high converge of safe water supply and latrine can be linked to the reasonable construction of water supply and sanitation facilities by government and NGOs and focus of the promotion approaches. The availability of latrine is above 95% and is grossly adequate, but is characterized by poor maintenance and components. Although mother/caretaker education showed an association with the occurrence of childhood diarrhea in the bivariate analysis, it exhibited no significant association with diarrhea diseases once other variables were controlled for. In a case control study done in Wolayita Sodo, and a comparative cross sectional studies done in the Republic of Congo and Zimbabwe maternal education showed no significant association with childhood diarrheal morbidity. In a cohort study in Zaire, parental education was significantly associated with diarrheal incidence in children. However, some investigators agree that maternal education has a greater effect on diarrhea mortality than morbidity. This is so because educated mothers may be unable to reduce risk of exposure from a contaminated environment or lack of safe water, however, their knowledge allows them to early recognize the disease, and use health care facilities effectively [26, 29, 30] .

From all socio-demographic variables tested, only monthly family income of households persisted in its significance in the multivariate model. Similar studies have reported and documented that the amount of income of a family had impact on the occurrence of diarrhea in children. In these similar studies done in Mecha district west Gojam, Wolayita Sodo, and in Jimma town, family income were significantly associated with diarrhea morbidity [29, 31, 32].
In the multivariate analysis, none of the components of latrines out of five and one of five components were significantly associated with diarrhea. Feces seen around the hole and compound; and west disposal methods were significantly associated with the occurrence of diarrhea in the bivariate analysis but the association disappeared in final step analysis. The lack of association may be explained by that great differences may not exist in the sampled households with respect to the use of traditional pit latrine and dry pit respectively. From all the environmental variables considered in this study, larine components remained significant after

controlling for socioeconomic, behavioral and other environmental variables. Method of refuse disposal was found to be the only significant determinant of diarrhoeal morbidity from environmental variables measured in the Republic of Congo. Availability of latrine and poor environmental sanitation and water supply has been reported by many studies to increase the risk of morbidity and mortality from diarrhea. However, such associations of latrine components have not been consistently observed in different studies, especially of environmental health studies [26, 27, 31].

Critical hand washing times were significantly associated with the occurrence of diarrhea in the bivariate and second step analysis but the association disappeared in final multivariate analysis. The odds of developing diarrhea associated with the hand washing remained significant even after controlling for all WASH, KAP and other socio demographic variables considered in this study and it was similar with a study done in Arba-Minch district[33].

The results of an overall analysis of WASH-interventions point out that hygienic behavior is a vital element of the prevention of diarrheal diseases. It indicated that more than one out of three cases of diarrheal disease (37%) might be avoided in children younger than five years of age by consistent hand washing with soap. A systematic review effect of washing hands with soap on diarrhea risk in community has shown that hand washing could reduce diarrhea risk by 47%. [1, 33, 34].

Hygienic behaviors were not observed in accordance with established tools (CLTSH and PHAST) for keeping hygiene, sanitation practice better and has often been neglected and major emphasis was given to the hard ware component. Too often improvement in hygiene practice was thought to follow automatically once water and sanitation facilities are in place. But in practice improving hygiene behavior requires special attention. Hand washing with soap is the most effective and inexpensive way to prevent diarrhea, which take the lives of millions of children in developing countries every year. Yet, despite its lifesaving potential, hand washing with soap is rarely practiced and difficult to promote. The provision of safe water and sanitation is one of the keys to break the cycle of poverty. Access to safe drinking water and basic sanitation has therefore been included as a target in the Millennium Development Goals (MDGs). However, the risk is that if too much emphasis is given to the technical solutions to increase the number of people gaining access to water and sanitation, while the importance of hygiene practice in water and sanitation programs is overlooked. Promoting hygiene not only

contributes to improved health outcomes but is a crucial factor in the sustainability of water and sanitation programs. Diarrheal diseases are responsible for 1.9 million children deaths around the world each year. A substantial part of this can be prevented with safe hygiene practices.[35]

It is well documented that maternal childcare and hygiene practices have important impacts on the occurrence of diarrhea in children. In this study, maternal diarrheal morbidity and breastfeeding were found to be not significant predictors of diarrheal diseases in children. This result was different from past many studies may be explained by the fact that now a days there are a numerous NGOs with collaboration of government in different approaches that improve the maternal morbidity and breastfeeding behavior through home visit strategy by health extension worker and volunteer health messenger [26, 31].

This study was able to show that child's diarrheal diseases, among children whose age were between 6 to 24 months of age, because in most studies prevalence of diarrheal disease was declined in children older than two years and diarrhea was most common among children age 6 to 24 months. A study done in Jimma town revealed that children aged 24 months and younger were more likely to have had diarrhea than their older counterparts. Significant increase in diarrhea prevalence in this age group reflects effect of the introduction of food or liquid in to mouth that may be contaminated with pathogens; and direct contact with human and animal excreta when the child starts to move slowly [27, 32, 36].

It has been documented that there is a high chance of contamination, and greater risk of diarrhea associated with hand-feeding. The odds of developing diarrhea in hand-fed children were about four times greater than the odds among children who were fed using cap and spoon. Hand-feeding was significantly associated with diarrheal morbidity in the multivariate analysis [26, 31]. In different studies, it was observed that water-handling practices were associated with the occurrence of diarrhea. In this study, method of drawing water from the storage containers and storage container cover were considered from the water handling practices. In the bivariate analysis, odds of developing diarrhea were higher among children who lived in households where water storage container is not covered and draw water by dipping than counterparts[OR: 4.55, 95% CI: (2.33, 8.88)] and [OR: 5.27, 95% CI: (2.89, 9.64)] respectively. However, this significance disappeared in the multivariate analysis. dipping showed significant difference in the journal article of environmental determinant of diarrheal morbidity in under five children

Keffa Sheka, south west Ethiopia, and a case control study on determinant of diarrhea, Wolayita Sodo, south Ethiopia[OR: 6.51(4.34,9.78)] [28, 29].

Feces seen around the compound was a risk factor for diarrhea, In contrast to these findings, the present study showed that children who live in households where Feces seen around the compound are less likely to have diarrhea compared to those who live in households where Feces seen around the compound [OR: 0.24, 95% CI: (0.69, 0.83)] this association is observed in multivariate analyses. Further investigation is necessary to have clear idea on this variable, as it is one of the important variables that determine the transmission of diarrhea.

In this study 7 attitude indicator questions about mother‟s prevention of diarrhea were asked. The bivariate and multivariate analysis revealed significance of [COR: 6.53 (3.34, 12.62)] and [Adj. OR: 2.12 (1.93, 5. 10)] respectively. And it was coherent with a study On international journal of epidemiology about maternal KAP practice as predictors of diarrheal disease in young children, with perceived diarrhea as outcome question mothers were questioned on 11 attitude indictors of questions about diarrhea, result indicate significant elevated where to and how to treat diarrhea, logistic regression preformed on variables with significant prevalence findings indicates that mother‟s general knowledge of diarrhea were the most important predictive variables. Authors indicate that these conclusions suggest the importance of social and attitudinal variables in explaining differential diarrheal diseases among a homogeneous, poor population [37].

Strength and limitation of the study

Strength: the design being analytic approach and study subjects from community are the strong part of the study.

Limitation: this study acknowledges recall bias and outcome of interest preceded of occurrence of factors measured, misclassification and information bias during translation of Amharic to Sidamigna.

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusions

Behavioral factors like knowledge, attitude and practice of mother had strong association with child diarrheal disease. Monthly family income was also the other socio demographic independent predictors of diarrhea. Therefore, the approaches should be given emphasis on mother‟s hygiene practice and attitude, and slip in simple understandable hygiene practice methods. Construction of latrines with complete components should also be encouraged by the approaches.

7.2 Recommendation

As this study has revealed, monthly family income, latrine components, hand washing, child feeding practice and mother‟s attitude towards diarrhea prevention are associated with the occurrence of child diarrhea in areas where CLTSH and PHAST approach implemented. These problems may be alleviated in the long run, by integrated efforts of different stakeholders. However, there are activities that can be done before permanent solutions are obtained. Taking this into consideration, the following recommendations are forwarded:

1. Improve the poor latrines design at the household level by providing continuous information and model design of standard latrines. (MOH, Plan Ethiopia)
2. Strength, incorporate and give a special attention to hygiene and sanitation practice in either hygiene promotion approaches. (MOH, Plan Ethiopia and other implementing NGOs)
3. Provide simple and "easy to understand" information to the mothers or caretakers on how to prevent child diarrheal diseases. (HEWs, health workers, and health professionals)
4. Further study on the approaches in d/t area to identify the possible draw backs that are responsible for diarrhea.

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ANNEXES

Annex I

QUESTIONNAIRES

PART ONE: INFORMATION SHEET

Zone----------District----------kebele----------No. Of HHs---------

(The interviewee could be kebele administrator or CHW)

Hello my name is Ato/ W/ro /W/t *(tell your name)*…….. I am working for research undertakings by Addis Ababa University.

The purpose of this study is to identify predictors of diarrheal disease among children age from 6 to 24 month in Shebedino woreda. Your area is selected to be one of the participants in the study. The study will be conducted through interviews. We are asking you for a little of your time, about thirty minutes, to help in this study. In the end, it is hoped that the Information you give us could help to design appropriate water sanitation and hygiene promotion tool to prevent diarrheal disease among children. The interview involves different questions regarding child diarrheal disease. We would like to assure you that confidentiality will be strictly secured throughout the study. All your information will be numbered and your name will not be used. Your answers to any of the questions will not be given to anyone else and no reports of the study will ever identify you. If a report of results is published, only information about the total group will appear and also the importance is for all. The interview is voluntary. Your participation or non-participation, or refusal to answer questions will have no effect now or in the future on services that you or any member of your family may receive from health service providers.

Are you willing to participate in this study?

[ ] Yes [ ] No

Thank you for your cooperation!!

Identification

District---------- Keble ---------- House No. ---------

Date of interview *(-------/----------/* ----------

Name of Interviewer……. and signature ----------

Mother or the immediate caretaker ID number: _____

Address: Shebedino Kebele: _____ House number: _____

PART TWO: QUESTIONNAIRES

S.No	Questions	Responses	Skip pattern	Code
101	Who is the immediate caretaker of the child?	1. Mother 2. Father 3. Sister 4. Relatives 5. Other specify…….		
102	Age of the immediate care taker	…….years		
103	Marital Status of the immediate care taker	1. Married 2. Single 3. Widowed 4. Divorced 5. Separated 6. Other specify…….		
104	Ethnicity	1. Sidama 2. Gedeo 3. Amahara 4. Guragae 5. Oromo 6. Other specify…….		
105	Religion	1. Protestant 2. Orthodox 3. Muslim 4. Catholic 5. Other specify…….		

106	Occupational Status	1. House wife 2. Farmer 3. Daily laborer 4. Merchant 5. Self employ 6. Government Employee 7. Other specify……		
107	Monthly income in birr	• ……..		
108	Educational Status	1. Illiterate 2. Read and write 3. Elementary 4. Junior secondary school 5. Secondary and certificate 6. College and above 7. Other specify……..		
109	Residence	1. Urban 2. Semi urban 3. Rural		
110	Family size	• …….		
111	Is there death of Child less than 5 years in the last one year?	1. Yes 2. No----------→	Q 114	
112	How many children less than five years died?	……		
113	Is there maternal morbidity in the last six months?	1. Yes 2. No ----------→	Q 116	
114	How many Episode of maternal illness	1. One times 2. Two times 3. Three times 4. Greater than three times		

115	Age of the child under investigation (In months)	……month		
116	Sex of the child under study	1. Male 2. Female		
117	Where was the child born	1. Health institution 2. Home 3. Others specify…….		
118	For how long did breastfed your child?	_____month		
119	At what age the child started supplementary food?	_____month		
120	Did the child received measles vaccination? (for > 9 month)	1. Yes (response of the respondent) 2. Yes (by checking the card) 3. No		
121	When did your child manifest diarrhea for the 1st time? (age in months)	---------- months		
II. Environmental health condition				
201	Did family members participate in any sanitation and hygiene promotion approach?	1. Yes 2. No ----------→	203	
202	Which Type?	1. CLTSH 2. SLTSH 3. PHAST 4. PHASE 5. CHAST 6. Others		
203	Does latrine available?	1. Yes 2. No----------→	Q206	

204	Type of latrine?	1. Traditional pit latrine 2. VIP 3. Water flash		
205	Dose the latrine contain components? (circle yes if available or circle no if not available)	1. Roof , yes/no 2. wall, (yes / no) 3. Door (yes/no) 4. Hole Cover (yes / no) 5. Hand wash basin (yes / no)		
206	If family has no latrine, where do you dispose feces/defecate?	1. Open filed 2. Others specify……		
207	Does feces seen around the hole/floor? (observation)	1. Yes 2. No		
208	Does feces seen around the compound? (observation)	1. Yes 2. No		
209	Where do you dispose refuse?	1. Pit 2. Burning 3. Open field 4. Pit latrine 5. Others specify……		
210	What was/ were your drinking water source? (observation)	1. Pipe 2. Protected well/ spring 3. Unprotected well/ spring 4. River 5. Others specify……		
211	Distance from the house to the water source?	_____meters		

212	How many times did you collect water for a day?	1. One 2. Two 3. Three 4. More than three		
213	What was the capacity of your water collection container?	_____ liters		
301	When dose a child need to prevent from diarrheal disease?	1. Before 2 years 2. Above 2 years 3. Up to 5 years 4. Above 5 years		
302	What was/were the diarrheal disease prevention methods? (circle)	1. Using latrine 2. Hand washing 3. Refuse disposal 4. Water treatments 5. Personal hygiene 6. Others specify……..		
303	Which method do you believe most important to prevent children against diarrhea?	1. Using latrine 2. Hand washing 3. Refuse disposal 4. Water treatments 5. Personal hygiene 6. Others specify……..		
304	Proper disposal of children excreta prevent diarrheal disease?	1. Yes 2. No		
305	Open defecation can result? (Circle)	1. Water contamination 2. Soil contamination 3. Site for fly breeding 4. Others specify……		
306	Does the use of latrine prevent spread of diarrheal disease?	1. Yes 2. No----------→	Q 308	

307	What is the evidence of diarrhea prevention?	…… …….		
308	If no, What do you suggest to prevent diarrheal disease?	…… ……		
309	Dose Water treatment prevent diarrhea?	1. Yes 2. No----------→	Q 312	
310	Which type of treatment methods do you use?	1. Chemical 2. Boiling 3. Filtration 4. Sedimentation 5. Others specify…….		
311	Dose you use the methods always?	1. Yes 2. No		
312	If no, What do you suggest about water treatment?	……. ……. ……		
313	Which health facility is/are most important to you to prevent your children from diarrhea?	1. Hospital 2. Health center 3. Health station 4. Health post 5. Private clinics 6. Others specify…….		
314	Who is/are most important to you to prevent your children from diarrhea? (circle)	1. Myself …… → 2. HEWs 3. Keble administration 4. Community health agent 5. Health professionals 6. Voluntary health messengers 7. Others specify……	Q315 Q316	

III	**Hygiene related Attitudes**			
315	You trust yourself to prevent diarrhea.	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree		
316	Most people who are important to you think that it is important to get children prevented against diarrhea.	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree		
317	Based on your feelings at the time your child got diarrhea, please indicate how strongly you favor or oppose water sanitation and hygiene.	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree.		
318	A child needs to be immunized against certain infectious diseases before he/she is two years of age.	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree.		
319	Hand washing can prevent diarrheal disease.	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree.		
320	Using latrine can prevent diarrheal disease	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree.		

321	Open defecation can spread diarrheal disease.	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree		
322	Water treatment can prevent diarrheal disease.	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree		

IV. KNOWLEDGE AND PRACTICES REGARDING CHILD DIARRHEA PREVANTION					
401	Have you ever been heard critical hand washing times?	1. Yes 2. No----------→	Q 503		
402	When to wash hands? (circle all answers attempted by the respondent)	1. After latrine use 2. Before food preparation 3. Before feeding children 4. Before eating			
403	If no, When do you think important to wash hands?	…….. ……. …….			
404	Did you ever use soup for hand washing?	1. Yes 2. No----------→	Q506		
405	Why did you wash your hands with soap?	…… …… ……...			
406	Did you know feces can transmit disease?	1. Yes 2. No ----------→	Q508		

407	If yes, can you tell me the name of the disease? (circle)	1. Diarrhea 2. Typhoid fever 3. Choler 4. Trachoma 5. Do not know the names 6. Other (specify)			
408	How did the feces get in touch with human being? (circle)	1. Flies 2. Fields 3. Fingers 4. Fluids 5. Food 6. Other specify……..			
409	Do you know that flies can transmit diarrheal disease?	1. Yes 2. No			
410	Type of water collection container?	1. Jerry can 2. Plastic bucket 3. Iron bucket 4. Pot 5. Others specify……			
411	What was/ were your water storage container?	1. Jerry can 2. Plastic bucket 3. Iron bucket 4. Pot 5. Roto/ big plastic bucket 6. Others specify……			
412	Dose storage container has a cover?	1. Yes 2. No			
413	How dose you take water from water storage container?	1. By Pouring 2. By Dipping			
414	When dose a child begin supplementary food?	1. Below 6 month (advise) 2. At 6 month 3. Above 6 month (advise) 4.			

415	What do you use to feed the child?	1. Hand 2. Bottle 3. Cup 4. Cup and spoon 5. Others specify…….			

V. General problems				
501	Have you ever taken your child to health institution for other services?	1. Yes 2. No ……. →	Q505	
502	Why did you taken him/her to health institution?	1. For diarrheal disease 2. Chronic care 3. Become sick 4. Check up 5. Other specify…….		
503	Did you informed or advised to water sanitation and hygiene?	1. Yes 2. No……. →	Q505	
504	Dose the information helpful?	1. Yes 2. No		
505	Have you ever been heard about water sanitation and hygiene?	1. Yes 2. No ……..→	Stop/finish	
506	From which source did you heard?	1. Family members 2. Mass media 3. Posters 4. Leaf letters 5. Health workers 6. Neighbors 7. Others specify……		
507	Dose the information is/are most important?	1. Yes 2. No		

508	Who did participate in the WASH promotion practice?	1. Father 2. Mather 3. Sister, age _____ 4. Brother, age_____ 5. Close Relatives, sex____ age_____ 6. Others specify…….. sex____ age_____		
509	How many times did you attend water sanitation and hygiene promotion practice in your community?	……		
510	Do you think the promotion practice be easy to children and aged peoples?	1. Yes 2. No		
511	Do you practice WASH practice throughout your life?	1. Yes ……..→ 2. No	Stop	

ANNEX II

Amharic version questionnaires

በአዲስአበባ ዩኒቨርሲቲ በሕብረተሰብ ጤና ትምህርት ቤት የህፃናት ተቅማጥ በሽታን በተመለከተ በሸበዲኖ ወረዳ የሚሰራ የመመረቂያ ጥናት

1. <u>አጠቃላይ መረጃ</u>:

ዞን_____ወረ□_____ቀበሌ_____የቤት መለያ ቁጥር

ሠላም ጤና ይስጥል፤ ስሜ_____ጁባላል::

ለአዲስአበባ ዩኒቨርሲቲ ጥናት መረጃ እየሰበሰብኩ እቸኛለዉ:: የርሶ ቀበሌ በጥናቱ ዉስጥ ተካቷል:: የጥናቱ ዓላማ ዕድሜቸዉ ከ 6 --- 24 ወር ያሉ ሕፃናትን ለተቅማጥ በሽታ □ሚ□ርቱ ነገሮችን ለይቶ ማዉጣት ነዉ:: ጥናቱ የሚኪያሄደዉ በቃለ መጠይቅ ሲሆን ሰላሳ ደቂቃ ይፈጃል:: የሰጡን መረጃ ተገቢ የሆነ የህፃናት ተቅማጥ በሽታ መከላከያ መንገድን ለመስጠት ጁረ□ል::

የሚሰጡን መረጃ በቁጥር ኮድ የሚደረግ ሲሆን ስምዎትም አይፃፍም:: ስለዚህ ሚስጥራዊነቱ የተጠበቀ ነዉ:: በአጠቃላዩ ሪፖርት መረጃዉ እንጂ ማንነትዎ ስለማይገለፅ ማንም ሰዉ እርሶዎን መለየት አይችልም::

ቃለ መጠይቁ በርሶዎ ሙሉ ፈቃድ ብቻ የሚደረግ ሲሆን የእርሶ- በቃለ መ□ጁቁ መሳተአ ወይም አለመሳተፍ ለወደፊት እርሶ- ወጁም □እርሶዎ ቤተሰብ የጤና ተቋም አገልግሎት አጠቃቀም ላይ የሚያመጣዉ ተፅዕኖ የለም::

ቃለ መ□ጁቁ ላጁ ለመሳተአ አ□ቻ ነዎት? አዎ [ ] አይደለሁም [ ]

አመሰግናለዉ!!

<u>መታወቂ□</u>:

ቃለ መጠይቁ የተደረገበት _____ቀን _____ ወር___2005_____□ም

የቃለ መጠይቁ አድራጊ ስም ----------

ኻርማ ----------

የህፃኑ እናት ወይም የመጀመሪያ ተንከባካቢ መለ□ ቁዓር ----------

አድራሻ፡ ሸበዲኖ ወረዳ ቀበሌ---------- የቤት መለያ ቁጥር ----------

2. መ□ጁቅ:

ተ.ቁ	ዓ□ቁ	መልስ	ወ□ ዓ.ቁ □ለል/ጁ	ኮት
101	የሕፃኑ የመጀመሪያ ተንከባካቢ ማነዉ?	1. እናት 2. አባት 3. እህት 4. ሌላ ቤተ □መት 5. ሌላ ከሆነ ይጥቀሱ ……		
102	የሕፃኑ እናት ወይም የመጀመሪያ ተንከባካቢ ዕድሜ ስንት ነዉ?	……ዓመት		
103	የሕፃኑ እናት ወይም የመጀመሪ□ ተንከባካቢ የጋብቻ ሁኔታ? (መልሱን አክብብ/ቢ)	1. ያገባ/ ያገባች 2. ያላገባ/ያላገባች 3. ሚስት የሞተበት/ባል የሞተባት 4. □□ታ/□□ታች 5. □ተለ□□ 6. ሌላ ከሆነ ይጥቀሱ……		
104	የሕፃኑ እናት ወይም የመጀመሪያ ተንከባካቢ ብሔር ምንድነዉ?	1. ሲ□ማ 2. አማራ 3. ቶራቴ 4. ኦሮሞ 5. ሌላ ከሆነ ይጥቀሱ …		
105	የሕፃኑ እናት ወይም የመጀመሪያ ተንከባካቢ ሐይማኖት ምንድነዉ?	1. □ሮተስታንት 2. ኦርቶዶክስ 3. ሙስሊም 4. ካቶሊክ 5. ሌላ ከሆነ ይጥቀስ		

106	**የሕፃኑ እናት ወይም የመጀመሪያ ተንከባካቢ የሥራ ሁኔታ?**	**1. የቤት እመቤት** **2. ቋሚ** **3. የቀን ሠራተኛ** **4. ነጋዴ** **5. □ዕል ተቀ□ሪ** **6. የመንግስት ሠራተኛ** **7. ሌላ ከሆነ ይጥቀሱ……**		
107	**አማካይ የቤተሰብ ወርሃዊ ገቢ በብር**	…… **ብር**		
108	**የሕፃኑ እናት ወይም የመጀመሪያ ተንከባካቢ የትምህርት ደረጃ ?**	**1. ያልተማረ/ች** **2. መጻፍና ማንበብ የሚችል/የምትችል** **3. አንደኛ □ረጃ** **4. መለስተኛ ሁለተኛ □ረጃ** **5. ሁለተኛደረጃና ሰርትፍኬት** **6. ኮሌጅና ከዚያ በላይ** **7. ሌላ ከሆነ ይጥቀሱ…**		
119	**የመኖሪያ አካባቢ**	**1. ከተማ** **2. በከፊል ከተማ** **3. ቸ□ር**		
110	**የቤተሰብ ብዛት በቁጥር**	……		
111	**ባለፈዉ አንድ ዓመት ዉስጥ ከቤተሰብ ዉስጥ ከ2 ዓመት በታች ሞት ነበር?**	**1. አዎ ነበር** **2. አይ አልነበረም-------→**	**ዓ.ቁ 114**	
112	**ከ2 ዓመት በታች የነበሩ ስንት ልጆች ሞቱ?**	……		
113	**ባለ□□ 6 ወር □ስዓ እርሶን ህመም አጋጥሞት ያዉቃል?**	**1. አዎ አጋጥሞኛል** **2. አይ አላጋጠመኝም---→**	**ዓ.ቁ 116**	

114	ባለ□□ 6 ወር □ ስዓ እርሶን ስንት ጊዜ ህመም አጋጥሞታል?	1. አንድ ጊዜ 2. ሁለት ጊዜ 3. ሦስት ጊዜ 4. ከሦስት ጊዜ በላይ		
115	የዚህ ህፃን ዕድሜ ስንት ነዉ?	.....ወር		
116	የዚህ ህፃን ጸታዉ ምንድነዉ?	1. ወንድ 2. ሴት		
117	ይህ ህጻን የተወለደዉ የት ነዉ?	1. ጤና ድርጅት 2. ቤት ዉስጥ 3. ሌላ ከሆነ ይጥቀሱ.....		
118	ልጅዎ ጡት ብቻ የጠባዉ ለምን ያህል ወር ነዉ?	..... ወር		
119	ለልፀ- ተፊ ማሪ ምፅብ □□መሩት በስንተኛዉ ወር ነዉ?	..... ወር		
120	ህፃኑ የኩፍኝ ክትባት ተከተቦአል? (ዘጠኝ ወር ለሞላቸዉና ከዚያ በላይ ህፃን ላለዉ/ላላት ብቻ)	1. አዎ በነገሩን መሰረት 2. አዎ በካርዱ መሰረት 3. አልተከተበም/ችም		
121	ልጅዎን ለመጀመሪያ ጊዜ የተቅማጥ በሽታ ያጋጠመዉ በስንት ወሩ ነዉ?	---------- ወር		
II. የአከባቢ ጤና አጠባበቅ በተመለከተ				
201	ከቤተሰቦ አባል በአከባበና በግል ንጽህና አጠባበቅ ዘዴዎች ዙሪያ ተሳትፎ አድርጎ □□ ቃል?	1. አዎ 2. አያዉቅም ----------→	ዓ.ቁ 203	
202	በየትኛዉ ደረጃ በሚሰጠዉ የአከባበና የግል ንጽህና አጠባበቅ ዘዴዎች ተሳትፈዎል?	1. CLTSH (በሁሉም ህብረተሰብ □ረጽ) 2. SLTSH (በትምህርት ቤት ደረጃ) 3. PHAST (የቡድን ተሳትፎ በህብረተሰብ □ረጽ)		

		4. PHASE **(የቡድን ተሳትፎ በት/ት ደረጃ)** **5.** CHAST (**ለት/ት በደረሱ ህፃናት ደረጃ)** **6. ሌላ ከሆነ ይጥቀሱ……**		
203	***መፀዳጃ ቤት አሎ*ምት?**	**1. አ*ዎ*** **2. □ለም----------→**	**ዓ.ቁ 207**	
204	***መፀዳጃዉ ምን ዓይነት ነዉ?***	1. TPL **(ባህላዊ ቶትንት)** 2. VIPL **(ሽታ*ማስወ□ □ለ□)** 3. Water flash (□□ **ሃ መና□ጽ)** 4. **ሌላ ከሆነ ይጥቀሱ……**		
205	***መፀዳጃ ቤቱ ያሉትን ክፍሎች <u>በማየት</u>* አለ ወይም የለም የሚለዉን አክብብ/ቢ**	**1. የቤት ክዳን = አለ / □ለም** **2. ግድግዳ = አለ / የለም** **3. *መዝጊያ*/በር = አለ / □ለም** **4. የቀዳዳ ክዳን= አለ / □ለም** **5. □እፀ መታ□ቢ□ = አለ / የለም**		
206	***መፀዳጃ ቤቱን <u>በማየት</u> መፀዳጃዉ* አፍ አከባቢ/ወለሉ ላይ ዓይነምድር ይገኛል?**	**1. አ*ዎ*** **2. □ለም**		
207	***መፀዳጃ* ቤት ከሌለ አሁን የት ነዉ ሚፀዳዱት?**	**1. ሜ□ ላጁ** **2. ሌላ ከሆነ ይጥቀሱ……**		
208	**የ*መኖሪያ* ቤት አከባቢዉን <u>በማየት</u> የሰዉ ዓይነ ምድር ይገኛል?**	**1. አ*ዎ*** **2. □ለም**		

209	ቆሻሻ የሚያሰግዱት የትኛዉን ዘዴ በመጠቀም ነዉ?	1. ቱትንት 2. ማቃ□ል 3. ሜ□ ላጁ 4. መፀዳጃ ቤት 5. ሌላ ካለ ጁዓ ቀሱ……		
210	የመጠጥ /ንጽሁ ዉሃ የሚጠቀሙት/ የሚቀዱት ከየት ነዉ?	1. □ባንባ 2. የተገነባ ጉድጓድ/ምንጭ 3. ያልተገነባ ቱትንድ/ምንጭ 4. □ወራጅ ወንዝ 5. ሌላ ካለ ጁዓ ቀሱ……		
211	ከመኖሪያ ቤት እስከ ዉሃ መገኛ □ለ□ ርቀት ምን ያህል ነዉ?	---------- ሜትር		
212	ዉሃ የሚቀዱበት ዕቃ ስንት ሊትር ዉሃ ጁጁ□ል?	---------- ሊትር		
213	ምን ያህል ጊዜ በቀን ዉሃ ይቀዳሉ?	1. አንድ ጊዜ 2. ሁለት ጊዜ 3. ሦስት ጊዜ 4. ከሦስት ጊዜ በላይ		
III	**ስለ ግል ንጽህና አጠባበቅ ዝንባሌዎች**			
301	ለህፃናት የተቅማጥ በሽታን መከላከል ተገቢ የሚሆነዉ ስንት አመታቸዉ ድረስ ነዉ?	1. ከ2 ዓመት በታች 2. ከ2 ዓመት በላይ 3. እስከ 5 ዓመት 4. ከ5 ዓመት በላይ		
302	የቱን የተቅማጥ በሽታ መከላኪያ ዘዴ ጁ□ቀማሉ? (የተጠቀሱ መልሶችን ያክብቡ)	1. መፀዳጃ ቤት መጠቀም 2. እፀ መታ□ብ 3. ቆሻሻ በአግባብ ማሶገድ 4. ዉሃ ማከም 5. የግል ንጽህና 6. ሌላ ካለ ጁዓ ቀሱ……		

303	የትኛዉን የተቅማዓ በሽታ መከላኪያ መንገድ ከሌሎቹ ይልቅ በጣም ያምኑበታል? (የተጠቀሱ መልሶችን ያክብቡ)	1. መፀዳጃ ቤት መጠቀም 2. እፀ መታ□ብ 3. ቆሻሻ በአግባብ ማሶገድ 4. ዉሃ ማከም 5. የግል ንጽህና 6. ሌላ ካለ ጁዓ ቀሱ.....		
304	የህፃናትን ዓይነ ምድር በአግባቡ ማሶገድ ተቅማዓ በሽታን ይከላከላል?	1. አዎ 2. □ለም		
305	ሜዳ ላይ መፀዳዳት ምን ሊያስከትል ይችላል?	1. የዉሃ ብክለት 2. የዐፈር ብክለት 3. ለነፍሳት መራቢያ 4. ሌላ ካለ ጁዓ ቀሱ.....		
306	መና□ጅ መ□ቀም □ተቅማዓ በሽታን ስርጭት ሊከላከላል ይችላል?	1. አዎ 2. □ለም----------→	ዓ.ቁ 308	
307	□ተቅማዓ በሽታን ስለመከላከለዎ ተጨባጭ መረጃ ምንድን ነዉ?	....		
308	□ተቅማዓ በሽታን ካልተከላከሉ፤ በሽታዉን ለመከላከል ምን አስተያየት ጁሰ□ሉ?	....		
309	ዉሃን ማከም ተቅማጥ በሽታን ሊከላከል ይችላል?	1. አዎ 2. □ለም----------→	ዓ.ቁ 312	
310	የትኛዉን ዉሃ ማከሚያ ዘዴ ጁ□ቀማሉ?	1. ኬሚካል 2. ማፍላት 3. ማጣራት 4. ማዓ ለል 5. ሌላ ካለ ጁዓ ቀሱ.....		
311	የዉሃ ማከሚያ ዘዴዉን ሁል ጊዜ ጁ□ቀማሉ?	1. አዎ 2. □ለም		
312	ዉሃ ማከሚያ ዘዴ ካልተጠቀሙ፡ ዉሃ ለማከም ምን አስተያየት ይሰ□ሉ?	....		

313	ልጆትን ከተቅማጥ በሽታ ለመከላከል የትኛዉ የጤና ድርጅት ነዉ በ□ም □ቃሚ/ዓሩ ሊሆን የሚችለዉ?	1. ሆስ□ታል 2. ጤና ጣቢያ 3. ጤና ማዕከል 4. ጤና ኬላ 5. የግል ጤና ድርጅት 6. ሌላ ካለ ጁዓ ቀሱ……		
314	ልጆትን ከተቅማጥ በሽታ ለመከላከል የትኛዉ ሰዉ ነዉ በ□ም □ቃሚ/ዓሩ እር□ታ ሊሰጥ የሚችለዉ?	1. እራሴ…… → 2. □ና ኤክ/ሠራተኛ 3. የቀበሌ አመራሮች 4. የቀበሌ ጤና ተጠሪ 5. የጤና ባለሙያ 6. የጤና በጎ መልዕክተኞች 7. ሌላ ካለ ጁዓ ቀሱ……	ዓ.ቁ 315 ዓ.ቁ 316	
315	እኔ ራሴ ልጄን ተቅማጥ በሽታ እንዳይዘዉ መከላከል እንደምችል እምነቱ አለኝ።	1. በ□ም እስማማለሁ 2. እስማማለሁ 3. አላዉቅም/ እ□ራ□ራለሁ 4. አልስማማም 5. በጣም አልስማማም		
316	ለእኔ በ□ም □ቃሚ/ዓሩ □ሆኑ ሰዎች □ልጾ ተቅማዓ በሽታን ለመከላከል እንደሚችሉ/እንደሚያግዙ ዕምነቱ አለኝ።	1. በ□ም እስማማለሁ 2. እስማማለሁ 3. አላዉቅም/ እ□ራ□ራለሁ 4. አልስማማም 5. በጣም አልስማማም		
317	ልጾ በተቅማዓ በሽታ በታመመ ወቅት የዉሃ፤የአከባቢና የግል ንጽህና መጠበቅ እንደነበረብኝ ይሰማኛል።	1. በ□ም እስማማለሁ 2. እስማማለሁ 3. አላዉቅም/ እ□ራ□ራለሁ 4. አልስማማም 5. በጣም አልስማማም		

318	ልጇ ዕድሜዉ 2 ዓመት ከመሆኑ በፊት □ተላላኝ በሽታዎች መከላከያ ክትባት መዉሰድ አለበት።	1. በ□ም እስማማለሁ 2. እስማማለሁ 3. አላዉቅም/ እ□ራ□ራለሁ 4. አልስማማም 5. በጣም አልስማማም		
319	እጅን መታ□ብ ተቅማጓ በሽታን ይከላከላል።	1. በ□ም እስማማለሁ 2. እስማማለሁ 3. አላዉቅም/ እ□ራ□ራለሁ 4. አልስማማም 5. በ□ም አልስማማም		
320	መና□ጽ መ□ቀም ተቅማጓ በሽታን ይከላከላል።	1. በ□ም እስማማለሁ 2. እስማማለሁ 3. አላዉቅም/ እ□ራ□ራለሁ 4. አልስማማም 5. በጣም አልስማማም		
321	ሜዳ ላይ መፀዳዳት የተቅማጥ በሽታን ሥርጭት ያስፍፍል።	1. በ□ም እስማማለሁ 2. እስማማለሁ 3. አላዉቅም/ እ□ራ□ራለሁ 4. አልስማማም 5. በጣም አልስማማም		
322	ዉሃ ማከም ተቅማጥ በሽታን ይከላከላል።	1. በ□ም እስማማለሁ 2. እስማማለሁ 3. አላዉቅም/ እ□ራ□ራለሁ 4. አልስማማም 5. በጣም አልስማማም		

IV. ስለ ህፃናት ተቅማጥ በሽታመከላከል ግንዛቤና ድርጊት				
401	ካሁን በፊት በምን ጊዜ/መች መች እፀ መታ□ብ እንደተገባ/እንዳለቦት ሰምተ□ል?	1. አዎ 2. □ለም----------→	ዓ.ቁ 403	

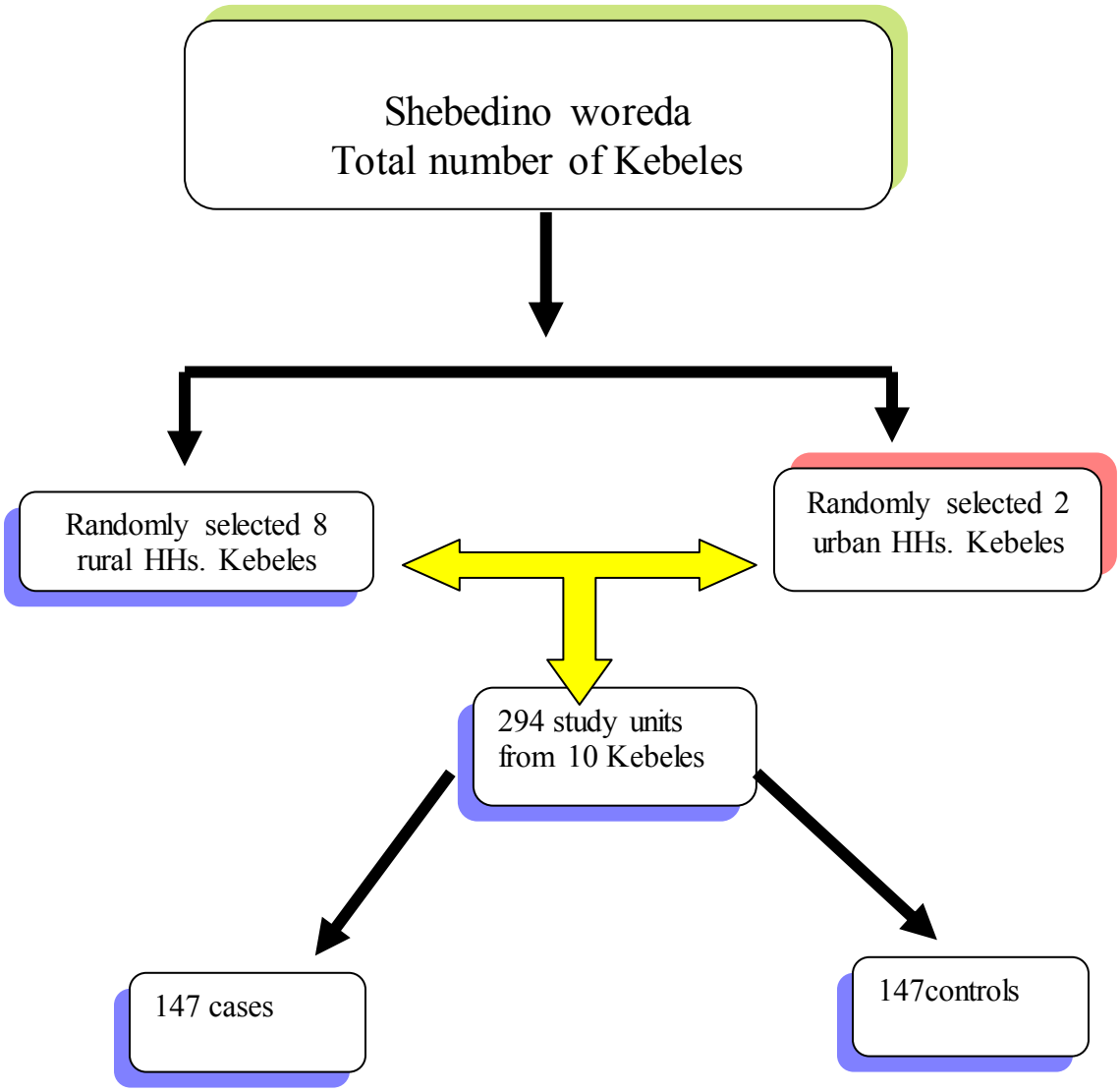
402	በምን ጊዜ/መች መች መታ□ብ አለቦት? (□ሞከሩትን መልሶች ብቻ አክብ/ቢ)	1. ከመፀዳጃ መልስ 2. ምግብ ከማዘጋጀት በፊት 3. ህፃናትን ከመመገብ በፊት 4. ከመመገባችን በፊት			
403	በምን ጊዜ እፀ መታ□ብ እንዳለብን ካላወቁ መች ብንታጠብ ነዉ ጠቃሚ የሚሆነዉ?	……. ፣…… ……. ፣…… ……. ፣……			
404	ካሁን በፊት እጆን በሳሙና ታዓበ□ □□ ቃሉ?	1. አዎ 2. □ለም----------→	ዓ.ቁ 406		
405	እጆን በሳሙና መታጠቡ ለምን አስፈለገ?	…… ……			
406	የሰዉ ዓይነ ምድር በሽታ እንደሚያስተላልፍ ያዉቃሉ?	1. አዎ 2. □ለም----------→	ዓ.ቁ 408		
407	አዎ ከሆነ መልሶ የሚያዉቋቸዉን በሽታዎች በስም ይጥቀሱ? (የሞከሩት መልስ አክብ/ቢ)	1. ተቅማዓ 2. ታጁ□ጁት 3. አተት 4. ትራኮማ 5. ስማቸዉን አላዉቅ 6. ሌላ ካለ ጁዓ ቀሱ.....			
408	ዓይነ ምድር ሰዉን በምን መንገድ/ሁኔታ ሊነካ ይችላል?	1. ዝንብ 2. በተበከለ አፈር/መሬት 3. እፀ 4. □ ሃ 5. ምፅብ 6. ሌላ ካለ ጁዓ ቀሱ……			
409	ዝንብ የተቅማጥ በሽታ እንደሚያስተላልፍ ያዉቃሉ?	1. አዎ 2. □ለም			
410	□ ሃ □ሚ□ንጉዙት/የሚቀዱት በምንድን ነዉ?	1. ጀሪካን 2. □□ላስቲ□ ባል□ 3. የብረት ባልዲ 4. እንስራ 5. ሌላ ካለ ጁዓ ቀሱ……			

411	ቤት ዉስጥ ዉሃ የሚያጠራቅሙት በምንድን ነዉ?	1. ጀሪካን 2. የፕላስቲክ ባልዲ/ ሮቶ 3. የብረት ባልዲ 4. እንስራ 5. ሌላ ካለ ጁዓ ቀሱ……			
412	ማጠራቀሚያዉ ክዳን አለዉ?	1. አዎ 2. □ለም			
413	ከማጠራቀሚያዉ ዉሃ እንዴት ነዉ የሚቀዱት?	1. በማንጋለል/በማስተኛት 2. አጥልቆ/ከቶ 3. ሌላ ካለ ጁዓ ቀሱ……			
414	የልጆን ተጨማሪ ምግብ በስንተኛ ወሩ/ወሯ ነዉ የጀመሩት?	1. ከ6 ወር በታች 2. ል□ 6 ወር 3. ከ6 ወር በላይ 4. ሌላ ካለ ጁዓ ቀሱ……			
415	ልጆን የሚመግቡት በምንድን ነዉ?	1. በእፀ 2. ጡጦ/በአፈ ጠባብ 3. ሲኒ 4. ማንኪያ 5. ሌላ ካለ ጁዓ ቀሱ……			

V. □ቅላላ / *መሠረታዊ* ችግር				
501	እስካሁን ለህክምና ልጆን ወደ ጤና ድርጅት ወስደዉ ያዉቃሉ?	1. አዎ 2. □ለም……. →	ዓ.ቁ 505	
502	ልጆን በዛ ጊዜ ወደ ጤና ድርጅት የወሰዱት በምን ምክንያት ነበር?	1. በተቅማጥ 2. በቆ□ ተመላላሽ ህክምና 3. በድንገተኛ ህመም 4. ለጤና ምርመራ 5. ሌላ ካለ ጁዓ ቀሱ…		
503	ልጆን በዛ ጊዜ ወደ ጤና ድርጅት በወሰዱት ወቅት ስለ ዉሃ፤የአከባቢና የግል ንጽህና ተመክረዋል/ተምረዋል?	1. አዎ 2. □ለም……. →	ዓ.ቁ 505	
504	በወቅቱ □ቶት ምክር/ትምህርት ልጆን	1. አዎ 2. □ለም		

	ከተቅማጥ በሽታ ለመከላከል ጠቃሚ ነበር/ጠቅሞታል?			
505	ከዚህ በፊት ስለ ዉሃ፤የአከባቢና የግል ንጽህና ሰምተዋል?	1. አዎ 2. □ለም……→	መጠይቁን እ□ህ ላጁ □ብቁ	
506	ከየትኛዉ የመረጃ ምንጭ ሰሙ?	1. ከቤተሰብ አባል 2. ከብዙሃን መገናኛ 3. ፖስተር/ከሚለጠፉ 4. ከበራሪ ወረቀት 5. ከጤና ጥበቃ ሠራተኞች 6. ጎረቤት 7. ሌላ ካለ ጁዓ ቀሱ…		
507	□ያዉት መረጃ ተቅማጥ በሽታን ለመከላከል በ□ም □ቅሞታል?	1. አዎ 2. □ለም		
508	በዉሃ፤የአከባቢና የግል ንጽህና ትምህርት/ምክር አገልግሎት ላይ የተሳተፈዉ የቤተሰብ አባል ማነዉ?	1. አባት 2. እናት 3. እህት =ዕድሜ---------- 4. ወንድም=ዕድሜ---------- 5. □ቀርብ □ሞት= 6. ሌላ ካለ ጁዓ ቀሰ		
509	በአከባቢዎ በዉሃ፤የአከባቢና የግል ንጽህና ትምህርት/ምክር አገልግሎት ላይ ስንት ጊዜ/ዙር ተሳትፎ አድርገዋል?	……		
510	የዉሃ፤የአከባቢና የግል ንጽህና ትምህርት/ምክር ተግባራዊ ለማድረግ ለህፃናትና ላረጁ ሰዎች ቀላል ጁመስሎታል?	1. አዎ 2. □ለም		
511	የዉሃ፤የአከባቢና የግል ንጽህና ትምህርት/ምክር ሁል ጊዜ ተግባራዊ □□ርፉሉ?	1. አዎ……..→ 2. □ለም	መጠይቁን አቁም/ሚ	

Figure 2: SAMPLING SCHEME OF THE STUDY



DECLARATION

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

Name: Bilutkenaw Tamiru

Signature:_____

Date: _____

This thesis work has been submitted for the examination with my approval as a university advisor.

Name: Dr. Ababi Zergaw

Signature:_____

Date:_____