

**AN INVESTIGATION OF ENVIRONMENTAL FACTORS IMPACTING ON  
DIARRHOEA IN CHILDREN UNDER FIVE YEARS OLD  
IN AKAKIKALITY SUB CITY, ADDIS ABABA, ETHIOPIA**

by

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submitted in accordance with the requirements

for the degree of

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at the

**UNIVERSITY OF SOUTH AFRICA**

SUPERVISOR: PROF ADH BOTHA

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*To my late biological sisters and brother who lost their life in early age.*

**DECLARATION**

I declare that INVESTIGATION OF ENVIRONMENTAL FACTORS FOR UNDER FIVE CHILDHOOD DIARRHOEA, is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

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Full names

*Aug 2012*  
Date

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**ABSTRACT**

The purpose of this study was to investigate the environmental factors that impact on childhood diarrhoea in children under five years old in Akakikality sub city Addis Ababa, Ethiopia. Objectives of the study were to determine the prevalence of diarrhoea and to determine the environmental factors that impact on diarrhoea in children under five years old.

A survey was done and a non-experimental approach was used in this descriptive and analytical quantitative study using a cross sectional study design. The instrument was a self-designed questionnaire. The target population for this study was all mothers or caretakers of children under five years found in the described study context – the sample size was 299.

In this study 12.7% of the children had diarrhoea during the survey. Proper utilization of toilets, hand washing and safe storage of water in the households using narrow mouthed water containers were significant predictors of diarrhoea in the children.

**KEY CONCEPTS**

Diarrhoea in children under five years old, Environmental factors impacting on diarrhoea.

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**LIST OF ABBREVIATIONS**

AIDS	Acquired Immune Deficiency Syndrome
AMCOW	African Minister's Council of Water
AWD	Acute Watery Diarrhoea
CI	Confidence Interval
EDHS	Ethiopian Demographic Health Survey
HH	House Hold
JMP	Joint Monitoring Plan
MDG	Millennium Development Goals
OR	Odds Ratio
ORS	Oral Rehydration Salt
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations Children's Fund
VIP	Ventilated Improved Pit Latrine
WHO	World Health Organization

# CHAPTER 1

## ORIENTATION TO THE STUDY

### 1.1 INTRODUCTION

The purpose of chapter 1 is to orientate the readers to the study in terms of background; context, research problem, approach; principles of validity and reliability and ethical principles.

### 1.2 BACKGROUND AND CONTEXT

Demographic statistics from Ethiopian Census conducted in 2007 shows an extremely diverse population of 73.9 million making Ethiopia the third most populous nation next to Nigeria and Egypt in Africa (Ethiopian Demographic and Health Survey (EDHS) 2011:2-3). In Ethiopia the most recent Infant mortality rates (IMR) are 59 /1000 while the under five mortality rate is 88/1000 live births (EDHS 2011:31).

Most (88.5%) of the residents in Addis Ababa have access to improved water supply mainly from piped water either into the dwelling or into the yard (67.2%). There are, however, large disparities between Addis Ababa sub cities, with Bole sub city having the highest access to improved water (98.9%) and Akakikality having the least (67.8%) (Addis Ababa Key Demographic and Economic Indicators 2010:13-15).

Many households in Yeka, Akakikality and Nefas Silk sub cities depend on unprotected wells and springs for their water supply, which exposes them to health risks, like diarrhoea. This risk is compounded by the fact that most households (91.5%) do not treat their water before consumption (Addis Ababa Key Demographic and Economic Indicators 2010:18).

The incidence of illness contributing to avoidable deaths caused by diarrhoea (23.6%) is higher among under five children in Ethiopia than in Sub-Saharan African's comparison countries. In Ethiopia, on average, children under five-years-old experience about two



episodes of serious diarrheal illness per year (Africa Region Human Development & Ministry of Health Ethiopia 2007:32).

Diarrhoea remains the second leading cause of death among under five children globally. Nearly one in five children die from diarrhoea; about 1.5 million children deaths each year are due to diarrhoea (WHO/UNICEF 2009:5). Diarrhoea kills more young children than AIDS, malaria and measles combined. According to WHO and UNICEF, every year an estimated 2.5 billion cases of diarrhoea occur among children under five years of age; estimates suggest that overall incidence has remained relatively stable over the past two decades; more than half of these cases are in Africa and South Asia, where bouts of diarrhoea are more likely to result in death or other severe outcome (WHO/UNICEF 2009:4-7).

The incidence of diarrhoea varies with child's age and season, youngest children are most vulnerable and during summer diarrhoea is common (UNICEF 2009:2). Incidence is highest in the first two years of age and declines as the child grows older. Likewise, diarrhoea is common in rainy seasons where floods can contaminate poorly constructed headworks and pipe networks of drinking water by disease causing organisms (UNICEF 2009:6-12).

### **1.3 THE RESEARCH PROBLEM**

In this section, the origin, background and statement of the research problems are presented.

#### **The source of the research problem**

The investigator during his clinical practice, observed that there is a disproportionate flow of sick children with diarrhoea to the clinic, where these massive and revisit, sparked a question to the investigator that why children in the area are mostly sick with diarrhoea that threaten their life? These many sick children may be due to the environmental and the magnitude of the problem should be known, through the investigation of environmental factors that contribute for childhood diarrhoea. After knowing the magnitude and contributing factors it is possible to recommend strategies that can help in the prevention and control of childhood diarrhoea.

Diarrhoea is most common among children age 6–23 months (23-25%), its prevalence is highest among children residing in households that drink water from unprotected wells (18%) and those residing in rural areas (14%) (EDHS 2011:146-153).

Akakikality sub city is an industrial area and infrastructures are found more scattered and rarely available, aggravating the health problem of the local community, especially children. Majority of the inhabitants of Akakikality sub city are migrants, coming from other regions and rural areas of the country in search of jobs in the factory and are daily labourers. The sub city is characterised by densely populated slum houses with no improved water sources and proper waste disposal system (Akakikality Health Office 2012).

As a result it is common to see open defecation near the road side, open spaces and using flying toilets (defecation and throwing with plastic bag) and continuous draining of toilet seepage to the down stream rivers and road sides.

In the sub city there are two hospitals one privately owned and one government hospital. There are also 13 health centre and 108 private clinics of which 26 of them are factory clinics, providing curative health care for factory workers but are not providing health care for children. According to the sub city office data, Akakikality sub city health coverage is 61.5%, which is the lowest compared to other sub cities of Addis Ababa (Akakikality Sub city Health Office 2012).

Ten top diseases in the sub city are (in order of magnitude), diarrheal and intestinal diseases, respiratory diseases, malnutrition and associated diseases, HIV/ AIDS, Skin diseases, motor accident, malaria, peptic ulcer disease and other acute febrile illnesses like typhoid and other enteric diseases (Akakikality Sub city Health Office 2012). These shows that in Akakikality sub city diarrhoeal disease is the leading problem of the sub city that should be addressed promptly.

Diarrhoeal disease is a leading cause of child morbidity and mortality in the world, and mostly resulted from contaminated food and water sources (WHO 2007:15). An estimated 94% of the diarrhoea burden is attributed to environment and associated risk factors such as unsafe drinking water, poor sanitation and hygiene (WHO 2007).

Worldwide, around 1.1 billion people lack access to improved water and 2.4 billion have no access to basic sanitation (WHO/UNICEF 2012:12-16). The WHO and UNICEF (2012) reported that children under three years old experience on average three episodes of diarrhoea every year. Each episode deprives the child's nutrition necessary for growth. As a result, diarrhoea is a major cause of malnutrition (under nutrition), and malnourished children are more likely to fall ill from diarrhoea (WHO/UNICEF 2012:8-10).

Of the 44 countries in Sub-Saharan African countries only 4 are currently on the track to meet the Millennium Development Goals (MDGs) 7 target on sanitation. Diarrhoea is a major cause of death in Sub-Saharan Africa and clearly linked to inadequate sanitation, hygiene and water supply. There are an estimated 565 million people in Sub-Saharan Africa with out access to improved sanitation and worse, 224 million who practice – the riskiest sanitation practice of all (Community Lead Total Sanitation in Africa 2010:20).

Each year an estimated 472,000 children under the age of five die in Ethiopia, of every 100 children 14 will not live to celebrate their fifth birthday, of those, about ten will not see their first birthday and five will not live beyond their first month of life (EDHS 2011:134-138).

More than thirty percent of households in Akakikality sub city are inaccessible to improved water sources and the households are using unprotected wells and springs for their domestic purposes which expose them especially children to health risks like diarrhoea (Addis Ababa, Key Demographic and Economic Indicators 2010).

In Addis Ababa 50.3% of the households have no standardised toilet facility and two fifth (40.2%) of the household in Akakikality sub city dispose their waste on the street, practice open defecation which leads children vulnerable to diarrhoeal diseases. Overcrowding is also the major problem for the Akakikality sub city, 32.2% of the household are living under crowded condition, exacerbate poor hygienic situation (Addis Ababa Key Demographic and Economic Indicators 2010). Due to these practices, the community of the sub city are more vulnerable to health risks than community living in Addis Ababa sub cities (Addis Ababa, Key Demographic and Economic Indicators 2010).

Studies conducted on investigation of environmental factors of childhood diarrhoea in Nekemtie town, Western Ethiopia, by Girma et al showed that there is a 28.9 % two week period prevalence of childhood diarrhoea. In this study it is also indicated that proper refuse disposal and toilet use can reduce diarrhoea morbidity. However, there is no similar studies conducted in Addis Ababa and there is knowledge gap related to the role of environmental factors in occurrence of childhood diarrhea in cities. According the health office data, the number of children who have been visiting the sub city clinic because of diarrhoea are very high (about 6,500 child/year) and the death is also high (about 15 children/ year) (Akakikality Health Office 2012).

Moreover, the investigator, during his clinical practice in the sub city has observed that the area is debilitated and dirty and he has also seen a disproportionate flow of sick children with diarrhoea to the clinic where he was working. These all conditions has motivated the investigator to study the environmental factors that could contribute to childhood diarrhoea.

## **1.4 AIM OF THE STUDY**

### **1.4.1 Research purpose**

The purpose of this study is to investigate the environmental factors that impact on under five childhood diarrhoea in Akakikality sub city, Addis Ababa, Ethiopia.

### **1.4.2 Research objectives**

- To determine the prevalence of diarrhoea in children under five years old in Akakikality sub city
- To determine the environmental factors that impact on diarrhoea in children under five years old in Akakikality sub city.

## **1.5 TARGET POPULATION**

The target population for this study comprised of all mothers and caretakers having children under five years old in Addis Ababa at the time of the study.

## **1.6 STUDY POPULATION**

The study population for this study was mothers or caretakers of all children under five years old found in sections of Akakikality sub city.

## **1.7 SAMPLING**

The systematic random sampling method was employed in this study design. The researcher picked a pair of mother and caretakers of under fives and then picked every 5<sup>th</sup> pair found in districts, 5 and 8 of the Akakikality sub city at the time of the survey.

## **1.8 DATA COLLECTION**

The approach for data collection will be face-to-face interview with a pre-tested structured questionnaire instrument.

## **1.9 DATA ANALYSIS**

The collected and edited data was entered into SPSS version 20. Frequencies, variations and central tendency were calculated for each variable and displayed as tables and word expression as descriptive statistics.

## **1.10 VALDITY AND RELIABILITY**

The internal validity of this study was maintained by consistent and similar way of presenting the interview to all mothers and caregivers, use of female data collectors to increase mother's or caretakers freedom in responding the questions and application of random selection of participants for interview to reduce and prevent selection bias.

Heterogeneity, by sampling from three randomly selected districts, and attempts to improve representativeness through randomisation technique by systematic sampling methods was some of the measures taken to improve external validity in this study.

Some of the measures taken to ensure reliability of the measurement were through the use of standardised questionnaire, selection of interviewers with experience in data

collection technique, appropriate supervision and checks of the data collection process were some of the measures taken (Cynthia et al 2008:710-717).

### **1.11 ETHICAL PRINCIPLES**

Interview was carried out for mothers or caretakers above the age of 18 years voluntarily participating after they signed the informed consent form for their voluntary participation. Confidentiality and privacy was maintained anonymously during interview, names were not taken during the interview, sick children and mothers are advised to visit the nearest health facility to get appropriate medical support. Before the data collection, ethical clearance and site permission granted from the concerned institution (Cynthia et al 2008:710-717).

### **1.12 SIGNIFICANCE OF THE STUDY**

The study supports policy makers and implementers to provide more attention for the major killer of children at national level through identification of childhood diarrhoea magnitude and also it provides baseline data (prevalence and incidence) for the local authorities to design better strategies in the control and prevention of childhood diarrhoea.

The findings in this research can also provide baseline information for further research in childhood diarrhoea in the sub city, Addis Ababa and at national level, as literature shows, as such no research conducted towards childhood diarrhoea especially in Addis Ababa.

### **1.13 DEFINITION OF TERMS**

**Caretakers/ caregivers:** are persons other than mothers of the index child who are responsible to shelter and care the index child.

**Critical times for hand washing:** The times which include before meal, before breast feeding, after using toilets, after cleaning children's bottom or potty and before handling or serving food (Choyon et al 2012:11).

**Diarrhoea:** is defined as having three or more loose or watery stools in a 24 hours period (Diarrhoeal Disease WHO 2009:1)

**District:** The lowest Government Administrative structure where decentralisation of public services takes place and next to sub city in urban settings.

**Environmental factors:** Factors associated with childhood diarrhoea like, water, child playground, domestic animal, and garbage disposal and defecation pattern (Jahangiralam 2009:36).

**Improved toilet facility:** is defined as one that hygienically separates human excreta from human contact (WHO/UNICEF JMP 2010:4).

**Improved water source:** Access to an improved water source refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection (WHO/UNICEF JMP 2010:5).

**Incidence:** is the number of new diarrheal cases occurred within two weeks prior to the data collection.

**Index child:** refers to a child who is included in the study from a household to have information on the demographic factors.

**Prevalence:** is the number of existing cases of diarrhoea at a specific point in time divided by the number of under five children who are at risk at that time.

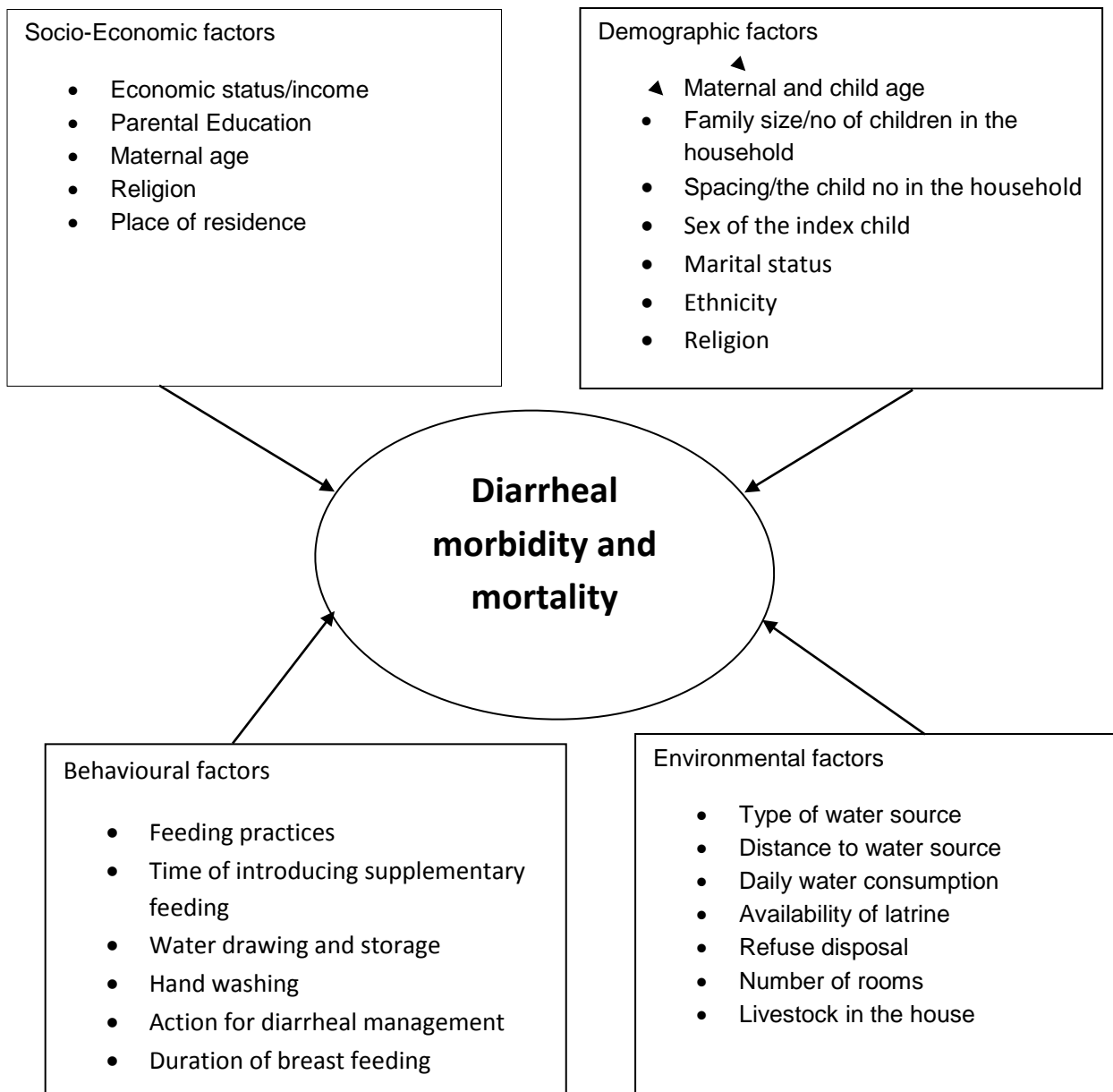
**Risk factors:** factors affecting diarrhoea disease in children under 5 years old in the

**Sub city:** The government administrative structure in major cities, higher than districts and contain many districts under it.

**Unimproved water sources:** include vendors, tanker trucks, and unprotected wells and springs (WHO/UNICEF JMP 2010:2).

## 1.14 FOUNDATIONS OF THE RESEARCH

The foundation of the research presents and describes the conceptual framework.



**Figure 1.1: Conceptual framework of potential determinants of childhood diarrhoeal morbidity**

(Muluken 2009:22)



## **1.15 RESEARCH METHDOLOGY**

### **1.15.1 Study design and method**

In this research, non-experimental, observational, descriptive and analytical quantitative component of community based cross sectional study design is applied to investigate the environmental factors as exposure variables and diarrhoeal morbidity in under five children as an outcome variable.

### **1.15.2 Study setting**

The study was conducted in Akakikality sub city, districts 4, 5 and 8, Addis Ababa, Ethiopia. There are 10 sub cities in Addis Ababa of which Akakikality sub city is one of the 10 sub cities of which this study was conducted. From the 11 districts of the Akakikality sub city, three of the districts were randomly selected by lottery methods; accordingly districts 4, 5 and 8 are selected for the study.

### **1.15.3 Target population**

The target population for this study comprised of pairs of mothers and caretakers of under five children found in Addis Ababa.

### **1.15.4 Study population**

The study population for this study are pairs of mothers and caretakers of under five children found in Akakikality sub city.

### **1.15.5 Sample**

The sample for this study was mothers and caretakers of under five children found in districts 4, 5 and 8 of Akakikality of Addis Ababa. Systematic sampling was used every **kth** mothers or caretakers having children under five years old. The first mother or caretakers with under five children was selected randomly, the sample size is determined based on the prevalence of diarrhoeal disease for Ethiopian under five children which is 13% (Ethiopian DHS 2011:168). The sample size for this study is 299 mothers or caretakers, pairs of under five index children.

### **1.15.6 Data sources and collection**

The data collection approach for this study was face-to-face interviews, using a pretested structured questionnaire. Interviews were conducted by trained female interviewers through house to house visit. The house number in each selected houses served as sampling frame. The data source for this study was mothers and caretakers who have under five children in the randomly selected households at the time of the survey.

### **1.15.7 Data handling and analysis**

At the end of each data collection day, the collected data was checked and reviewed for questionnaire completeness. The hard copy of the questionnaire is kept in a locked cabinet while the electronic data is locked by password. The collected and edited data was entered in to SPSS version 20 statistical software.

Frequencies, variations and central tendency were calculated for each variable and are displayed on tables and described in words as descriptive statistics.

### **1.15.8 Scope of the study**

This study tried to investigate the environmental factors that contribute for the occurrence of under five childhood diarrhoea in Addis Ababa, Ethiopia.

### **1.15.9 Structure of the dissertation**

The content of this dissertation is organised in to seven major parts described below.

**Abstracts:** gives an overview of the main events discussed in the dissertation and provides keywords pertaining to the study.

**Chapter 1 (Orientation to the study):** Provides orientation and introduction to the study.

**Chapter 2 (Literature review):** Discuss the literature reviewed in the context of the study.

**Chapter 3 (Research design and methods):** Gives an account of the research design, sampling procedures, data collection, methods and processes, and measures taken to improve validity and reliability of the study findings.

**Chapter 4 (Analysis, presentation and description of the research findings):** Describes procedures on data analysis, the research findings and their correlation and contrast to findings of literature reviewed.

**Chapter 5 (Conclusions and recommendations):** Draws conclusions generated in line with the research questions and the statement of the problem and makes recommendations based on the findings.

**Annexure:** this includes list of references, consent form, questionnaire, and letters ensuring site permission approval by Addis Ababa Health Bureau and ethical certificate from UNISA.

## **1.16 CONCLUSION**

In Addis Ababa 50.3% of the households have no standardised toilet facility and two fifth (40.2%) of the household in Akakikality sub city dispose their waste on the street, open defecation which leads children vulnerable to diarrhoeal diseases. Overcrowding is also the major problem for the Akakikality sub city of which 32.2% of the household are living under crowded condition, exacerbate poor hygienic situation (Addis Ababa, Key Demographic and Economic Indicators 2010:8).

The purpose of this cross sectional study is to determine the prevalence of under five diarrhoea through investigation of environmental factors in districts 4, 5 and 8 of Akakikality sub city, Addis Ababa, Ethiopia. The total sample size of the study was 299 of mothers/caretakers pairs of under five children.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

A literature review is a compilation of resources that lay the foundations or groundwork for the study (Fulton & Krainovich-Miller 2010:57; Polit & Beck 2010:170) and help to position the research problem in the context of what has been discovered (Brink 2006:12). It also directs the argument about the need for a new study, the research methods and the conceptual or theoretical framework (Polit & Beck 2010:170). In addition to this, a preliminary systematic search of literature was carried out to find out a more feasible research problem and methodology, and to write the research proposal and report.

The literature review chapter reviews the literature in terms of cause, classification, determinants, magnitude, general risk factors and strategies to control and prevention means of childhood diarrhoea. It covers the primary data sources used in investigating the research topic, developing the study design and methods, and formulating the framework of the study.

In summary the researcher conducted the literature review to obtain good understanding of the research topic, refine the research question and the framework, design and methodology, and guide the data collection, analysis and interpretation process (Brink 2006:67; Fulton & Krainovich-Miller 2010:59; Polit & Beck 2010:170; Volmink 2007:66).

#### **2.2 DIARRHOEA TRANSMISSION**

Diarrhoea is not a single condition but simply a clinical sign which has different causes. Diarrhoea is one of the commonest problems in childhood throughout the world. Diarrhoea can be life threatening condition if it is severe; it causes a loss of fluid and electrolytes in the stool, which can result in dehydration and electrolyte imbalance (David 2008:93).

The transmission cycle used by the agent to reach the host takes place within an environment which determines the success and severity of the infection. Environmental factors are subtle, diffuse and wide ranging. These environmental factors can be divided in to the social environment and the physical environment.

The physical environment contains all the climate, temperature, wind, and season (Webber 2009:12-13).

Diarrhoeal diseases are transmitted by faecal-oral transmission route, from person to person contact, through water or food or directly to the mouth. The absence of a proper water supply, with rubbish and dirty surroundings, and an abundance of flies, is the typical situation in which diarrhoeal diseases are transmitted (Webber 2009:79).

## **2.3 CAUSES AND DETERMINANTS OF DIARRHOEA**

### **2.3.1 Causes**

**Infection:** Diarrhoea is a symptom of infections caused by a host of bacterial, viral and parasitic organisms, most of which are spread by faeces, contaminated water. Infection is more common when there is a shortage of clean water for drinking, cooking and cleaning. Rotavirus and Escherichia coli are the two most common causes of diarrhoea in developing countries (Richard et al 2001; WHO 2009).

**Malnutrition:** Children who die from diarrhoea often suffer from underlying malnutrition, which makes them more vulnerable to diarrhoea. Each diarrhoeal episode, in turn, makes their malnutrition even worse. Diarrhoea is a leading cause of malnutrition in children under five years old (Mittal 2007; WHO 2009:3).

**Source:** Water contaminated with human faeces, for example, from sewage, septic tanks and latrines, is of particular concern. Animal faeces also contain microorganisms that can cause diarrhoea (International Institute for Environment & Development (IIED) 2010).

**Other causes:** Diarrhoeal disease can also spread from person-to-person, aggravated by poor personal hygiene. Food is another major cause of diarrhoea when it is prepared

or stored in unhygienic conditions. Water can contaminate food during irrigation. Fish and seafood from polluted water may also contribute to the disease (Jacques 2007; WHO 2009:3).

### **2.3.2 Determinants of diarrhoea**

Possible determinants or risk factors of childhood diarrhoea are : poverty, malnutrition, poor personal and community hygiene, inadequate or unsafe water supply, inadequate or absent sanitation facilities, inappropriate feeding and weaning practices, contaminated food, fly breeding in association with human or animal faeces (UNICEF/WHO 2009:38).

## **2.4 CLASSIFICATION OF DIARRHOEA**

Diarrhoea is classified as acute, persistent (chronic) and dysentery. Acute diarrhoea is watery diarrhoea which lasts less than two weeks (14 days). Diarrhoea usually recovers within seven days; however, if it does not recover within two weeks, it is called persistent (prolonged or chronic) diarrhoea. Persistent diarrhoea is common in malnourished children and in children with Human Immune Deficiency Virus (HIV) infection. Dysentery is a form of diarrhoea where the stool is not simply watery, but contains visible blood and mucus (David 2008:93).

## **2.5 STRATEGIES TO CONTROL AND PREVENT-DIARRHOEA**

Diarrhoea can be prevented and controlled both at community and health facilities with appropriate planning and community education.

### **2.5.1 Prevention and treatment**

Key measures to prevent diarrhoea include: access to safe drinking-water, improved sanitation, exclusive breastfeeding for the first six months of life, good personal and food hygiene, health education about how infections spread, measles and rotavirus vaccination (Mittal 2007).

Breaking the faecal-oral cycle is the basis of control by personal hygiene, increase in water quantity, improvement in water quality, food hygiene and the provision of sanitation. The disposal of garbage and the control of flies are also important in control of diarrhoeal diseases (WHO 2009:3-6).

Key measures to treat diarrhoea include the following. Rehydration with intravenous fluids in case of severe dehydration or shock and/or oral rehydration salt (ORS) solution for moderate or no dehydration. ORS is a mixture of clean water, salt and sugar, which can be prepared safely at home. It costs a few cents per treatment. ORS is absorbed in the small intestine and replaces the water and electrolytes lost in the faeces. Zinc supplements reduce the duration of a diarrhoea episode by 25% and are associated with a 30% reduction in stool volume. The vicious circle of malnutrition and diarrhoea can be broken by continuing to give nutrient-rich foods – including breast milk – during an episode, and by giving a nutritious diet – including exclusive breastfeeding for the first six months of life to children when they are well and consulting a health worker if there are signs of dehydration (UNICEF/WHO 2009:6).

## **2.6 DIARRHOEA MAGNITUDE AND GENERAL RISK FACTORS**

According to UNICEF and WHO (2009) report, diarrhoea remains the second leading cause of death among children under five globally. Nearly one in five child deaths – about 1.5 million each year – is due to diarrhoea. It kills more young children than AIDS, malaria and measles combined. In developing countries, morbidity and mortality associated with childhood diarrhoea still continues to be a challenge. Child mortality reduction, the fourth of the United Nation's Millennium Development Goals (MDGs) to reduce by two thirds the mortality rate of children under five between 1990 and 2015 has become a common agenda of public health and international development agencies (Clive 2007).

The Sub-Saharan Africa has been shown to have performed poorly in the effort to realise the Millennium Development Goals (MDGs) due partly to the soaring infant and childhood mortality (UNICEF/WHO 2012:5).

Global deaths from diarrhoea for children aged less than 5 years were estimated at 1.87 million, approximately 19% of total child deaths. WHO African and South-East Asia

regions combined contain 78% (1.46 million) of all diarrhoea deaths occurring among children in the developing world; 73% of these deaths are concentrated in just 15 developing countries. Nearly nine million children under five years of age die each year (WHO 2008:3).

According to Christa et al (2010), in their systematic review studies on diarrheal incidence from 139 countries, found that overall children experienced 3.4 episodes of diarrhoea per year. For 2010 diarrhoea incidence rates remained highest among infants 6-11 months of age and dropped from 5.3 to 4.5 episodes per year during this 20-year period. Again, children 24-59 months of age had the lowest estimated incidence rate at 2.3 episodes/child year. Overall incidence rates declined from 1990 to 2010 in all regions with the greatest decline observed in Africa (4.2 to 3.3 episodes/child-year). In 2010, each child experienced an estimated 2.9 episodes resulting in nearly 1.7 billion diarrhoea episodes among children less than 5 years of age in low- and middle income countries.

Siraj et al (2008) conducted a cross sectional study on the prevalence of diarrheal disease, its seasonal and age variation in under five children in Kashmir, India and estimated that an overall period (last 15 days) and point (24 hours) prevalence rates of diarrhoeal diseases among children under age of five years were calculated to be 25.2% and 9.3% respectively. The same study showed that both period and point prevalence rates of diarrhoea decreased significantly with increased age and during winter season, for the high prevalence of diarrhoea during the summer months, (42.6%) was because in hot and humid weather, the growth of pathogenic organisms in the food and other material is increased. Summer is also the breeding season for flies that act as mechanical vectors carrying enter pathogens to food and water. Where as in winter, there is intense cold in this part of the country and all the routes of spread decline because of lower proliferation of organisms and lesser contact between people due to cold.

A study conducted in Ghana, Tamale Metropolitan area by Issaka (2007) on the household environmental and behavioural determinants of childhood diarrhoea morbidity showed that 38% of children had had diarrhoea two weeks before their survey. A survey conducted by Jacques, 2007 to determine the trends of under five



diarrhoea in the Democratic Republic of Congo (DRC) showed that the prevalence of under five diarrhoea was 16%.

In Ethiopia, as in other developing countries, diarrheal diseases are important child health problems. According to the Ethiopian Demographic and Health Survey (EDHS 2011), the prevalence of diarrhoeal disease for children under five years old is 13%.

According to Girma et al (2007), in their studies on environmental determinants of diarrhoea in under five children in Nekemte Town, west Ethiopia the prevalence of diarrheal morbidity over a period of two weeks preceding the study was about 28.9%. In the Bivariate analysis a number of risk factors including distance from drinking water sources (time taken to-and-from the sources), availability and ownership of the latrine, refuse disposal, the presence of faeces around the pit-hole and presence or absence of pit-hole cover and faeces seen in the compound appeared to be significantly associated with under five childhood diarrheal morbidity. However, absence of refuse disposal facility and presence of faeces around the pit-hole were the only significant variables on multivariate analyses.

A case control study on determinants of mortality in children under five years old in Gelgel Gibe, Jimma, southern part of Ethiopia, conducted by Amare et al (2005) showed that acute diarrhoeal disease is contributed for 30 % of death in the post natal period.

A community based cross-sectional study on the effect and variation of water and sanitation by maternal education on childhood diarrhoea among under five children conducted in Mecha district West Gojam, Ethiopia by Muluken (2009) showed that the prevalence of under five diarrhoea was 18.0%.

Girma et al (2007) in their study identified that inadequate maternal care giving practices, poor hygiene,uncovered container during drinking water transportation, faeces seen around the pit-hole and bottle feeding were the risk factors associated with under five childhood diarrhoea.

According to the result of cross-sectional study conducted in Mecha district, west Gojam, Ethiopia by Muluken (2009): children of less educated mother or caregiver, a

history of recent maternal or care giver diarrhoea, unavailability of latrine facility, short duration of breast feeding and small age of the child were identified risk factors for under five diarrhoea.

## **2.7 DIARRHOEA MORBIDITY AND ENVIRONMENTAL FACTORS**

The relationship between environmental factors and the occurrence of diarrhoea in children has been addressed in a number of studies. Environmental factors associated with childhood diarrhoea include: water quality and quantity, access to improved water sources, availability of toilet facilities, compound hygiene, housing condition, and refuse disposal.

It is well documented that poor environmental situation is a major risk factor for diarrhoeal disease, as young children are often exposed to the ground, the dirt, and the contamination in the environment (Choyon et al 2012).

According to World Bank (2001) in a recent study, environmental risk factors were estimated to account for about one-fifth of the total burden of disease in low income countries. The WHO (2002) similarly, reported in Mutunga (2007) that among the ten identified leading mortality risks in high mortality developing countries, unsafe water, sanitation and hygiene ranked second. About 3% (1.7 million) of the resulting deaths are attributable to environmental risk factors and child deaths account for about 90% of the total. The environmental burden of disease as noted by Choyon et al (2008) was highest in Sub-Saharan Africa with 26.5% while the average for all less developed countries was 18%.

According to the WHO (2004), at least three million children die before their fifth birth day due to environment related diseases. For instance, acute respiratory infections killed an estimated two million children under the age of five years as much as 60% of these infections, worldwide, are related to environmental conditions especially contaminated water and inadequate sanitation .the quality of community environment is therefore, essential for health of both adults and children.

According to study conducted in Ghana by Issaka (2007), the differences in diarrhoea morbidity in across residential areas and socio economic groups were striking and

reflected the wide variation in access to environmental services in the metropolis: the most deprived communities in terms of access to water supply and sanitation services had the highest prevalence of children with diarrhoea and there was a higher diarrhoea incidence in the children whose households depend on water from water vendors and boreholes/wells/dugouts. In addition, there were more cases of diarrhoea in households that shared toilets with more than four other households.

A study conducted in Nigeria by Mesike (2011) shows that household environmental characteristics do have significant impact on child mortality.

According to UNICEF and WHO (2009) report, childhood diarrhoea is more prevalent in the developing world due, in large part, to the lack of safe drinking water, sanitation and hygiene, as well as poorer overall health and nutritional status. According to the latest available figures, an estimated 2.5 billion people lack improved sanitation facilities, and nearly one billion people do not have access to safe drinking water. These unsanitary environments allow diarrhoea-causing pathogens to spread more easily. Improving unsanitary environments alone, however, will not be enough as long as children continue to remain susceptible to the disease and are not effectively treated once it begins. Evidence has shown that children with poor health and nutritional status are more vulnerable to serious infections like acute diarrhoea and suffer multiple episodes every year.

The WHO and UNICEF (2012) progress report of the Joint Monitoring Programme (JMP) indicates signs of acceleration in progress towards the sanitation target, in 2010 some 2.5 billion people remained without access to improved sanitation facilities. A staggering 1.1 billion these doesn't have any sanitation facility, what so ever and therefore has no choice but to defecate in the open field.

Improving access to safe drinking water and adequate sanitation, as well as promoting good hygiene, are key components in preventing diarrhoea. Urban sanitation coverage in Africa is 53 percent while rural coverage is only 29 percent. Urban drinking water coverage in Africa is 85%, rural drinking water coverage is 51 percent (A Snapshot of Drinking Water and Sanitation in Africa 2008).

According to the UNICEF (2009) report, in Ethiopia acute watery diarrhoea (AWD) remained a challenge mainly from April to September 2008. The disease is mainly attributed to poor access to safe water and sanitation, together with extremely poor hygiene and limited capacity to contain the disease by adequate regulations and practices. As of 19 October, 2008, the WHO reported a total of 3,710 AWD cases and 20 deaths in 49 districts of Addis Ababa.

## **2.8 CONCLUSION**

Diarrhoea is not a single condition but simply a clinical sign, which has different causes. Diarrhoea is one of the commonest problems in childhood throughout the world. Diarrhoea can be a life-threatening condition if it is severe; it causes a loss of fluid and electrolytes in the stool, which can result in dehydration and electrolyte imbalance (David 2008:93).

Possible determinants or risk factors of childhood diarrhoea are: Poverty, Malnutrition, Poor personal and community hygiene, Inadequate or unsafe water supply, Inadequate or absent sanitation facilities, Inappropriate feeding and weaning practices, Contaminated food, Fly breeding in association with human or animal faeces (UNICEF/WHO 2009).

Global deaths from diarrhoea, children aged less than 5 years were estimated at 1.87 million, approximately 19% of total child deaths. The WHO African and South-East Asia Regions combined contain 78% (1.46 million) of all diarrhoea deaths occurring among children in the developing world; 73% of these deaths are concentrated in just 15 developing countries. Nearly nine million children under five years of age die each year (WHO 2008).

## **CHAPTER 3**

### **RESEARCH DESIGN AND METHODS**

#### **3.1 INTRODUCTION**

This section elaborates on the research design adopted by describing and justifying research procedures used. It describes the design, the study population, the sampling methods and sample size, the research instrument, data collection process, ethical considerations, and the data analysis process.

#### **3.2 RESEARCH DESIGN**

According to Burns and Grove (2005:211), a research design is a blue print for conducting a study. This is a quantitative study in which a non-experimental, descriptive cross sectional study design is applied. It is an epidemiological study in which cross-sectional study design is applied to investigate the environmental effects of childhood diarrhoea in under five children in Akakikality sub city of Addis Ababa, Ethiopia (Polit & Beck 2008:248; Joubert 2009:77-93).

##### **3.2.1 Quantitative**

The quantitative research is used numeric values or quantity that gathers empirical evidence grounded in reality than subjective or personal belief, or in other words it gathers numeric information that results from some type of formal measurement and that is analysed with statistical procedures.

The requirement to use empirical evidence as the bases for knowledge means that findings are grounded in reality rather than in researchers' personal beliefs. The quantitative research design is used random sampling technique (Polit & Beck 2009:16-17).

### **3.2.2 Epidemiological studies**

Epidemiological studies focuses on gathering information on health related conditions in groups of people and on agents in the environment that contribute to or prevent changes in such a health condition (Brink 2006:106). This study focused on mothers or caretakers who have under five children to investigate environmental factors contributing to childhood diarrhoea (Brink 2006:106).

### **3.2.3 Descriptive studies**

Descriptive study is a non - experimental study, in which it describes, observes and documents aspects of a situation as it naturally occurs. Descriptive studies can be done to determine the prevalence rate of some condition or diseases. This study will be a descriptive study that investigates the prevalence rate of under five child-hood diarrhoea (Polit & Beck 2009:274:275).

### **3.2.4 Cross-sectional studies**

In cross-sectional studies all the information is collected during one data collection period (Polit & Beck 2010:239). A cross-sectional study describes the frequency of an attribute (health related event) in the sample of a population at a given point in time (Martin 2005:120).

In this study a standardised questionnaire was used to collect information on factors which contribute to under five childhood diarrhoea. Collecting information at one point in time makes this research a cross-sectional study design.

## **3.3 RESEARCH METHODOLOGY**

According to Polit and Beck (2010:567), a research methodology refers to techniques and practices used in the course of sampling, data collection, data processing and analysis.

### **3.3.1 Population and Sampling**

Population includes all member of a defined group that the researcher studying or collecting information for data driven decisions. A part of a population is called a sample. Sample is a proportion of a population, a slice of it, a part of it and all its characteristics (Polit & Beck 2010:207). The population of this study was all mothers or caregivers of under five children found in Akakikality sub city.

#### **3.3.1.1 Target population**

The target population refers to the entire set of individuals who meet the sampling criteria (Burns & Grove 2005:342). It is thus the group which interest the researcher (Babbie 2007:190; Haber 2010:222), Polit & Beck 2010:207). The target population for this study is comprised of all mothers and caregivers of under five children found in Addis Ababa at the time of the study.

#### **3.3.1.2 Study population**

The study population for this study were mothers or caretakers of under five children found in Akakikality sub city at the time of the survey. Two hundred ninety nine (299) mothers or caretakers of under five children living in the households were selected from districts in the Akakikality sub city and formed the study population.

#### **3.3.1.3 Sample size determination**

The total of under five populations in Addis Ababa is 195,932 (M 99,661, F 96,271) (Census Ethiopia 2007). The total population of the Akakikality sub city was 181,202 (Males 88,676, Females 92,526) (Census Ethiopia 2007). In this study, from the eleven districts of the Akakikality sub city, three of the districts were randomly selected by a lottery method and accordingly districts 4, 5 and 8 were selected for the study.

A single population proportion sample calculation is used to determine the sample size. The proportion of children with diarrhoea is 13%  $p$  and the proportion of children without diarrhoea is  $q = 1 - p$  and is 87%. Whereas the significance of the study is 95% and the degree of error  $d = 4\%$ .

$$N1 = Z^2 [p (1-p)/d^2]$$

$$N = N1 + 0.13 (N1)$$

N1=Sample size assuming 100% response rate

N= Sample size adjusted for a non-response rate of 10%

P=prevalence of diarrhoea in Ethiopian children 13 % (EDHS 2011:168)

Z = Cut off (critical value) at 95% confidence level of certainty

D = The margin of error between the sample and the population assumed to be 4%.

Thus the calculated sample size N is 299.

The total under five populations and the house hold size in Akakikality sub city is 10,047 and 17,645 respectively .The number of households for the three districts is 5723, 6198 and 5724 for districts 4, 5 and 8 respectively (census Ethiopia 2007; Nick et al 2009).Then the sample size (299) was proportionally allocated for the three randomly selected districts based on their number of households. Accordingly, the sample size for the districts 4, 5 and 8 is 97,105 and 97 households respectively (census Ethiopia 2007)

#### **3.3.1.4 Population and sampling**

Sampling is a process of selecting a sample that is a representative portion of the target population (Babbie 2007:190; Brink 2006:124; Polit & Beck 2010:307). Researchers do a study using a sample rather than the whole population because it is more economical and practical to do so (Polit & Beck 2010:307). A carefully selected sample and well executed study can provide data allowing the drawing of findings from the sample to the total population.

Sampling methods are categorised under probability sampling methods, an approach that selects elements randomly and every sampling element has a known chance of being included in the study and also non-probability sampling methods.(Non-probability sampling technique is a technique that selects elements not randomly) (Polit & Beck 2010:313).

In this study a combination of probability and non-probability sampling was used. Three districts were selected randomly. The sample size (299) was proportionally allocated for the three randomly selected districts based on their number of households. Accordingly,



the sample size for the districts 4, 5 and 8 is 97,105 and 97 households respectively (Trochim et al 2008; Census Ethiopia 2007).

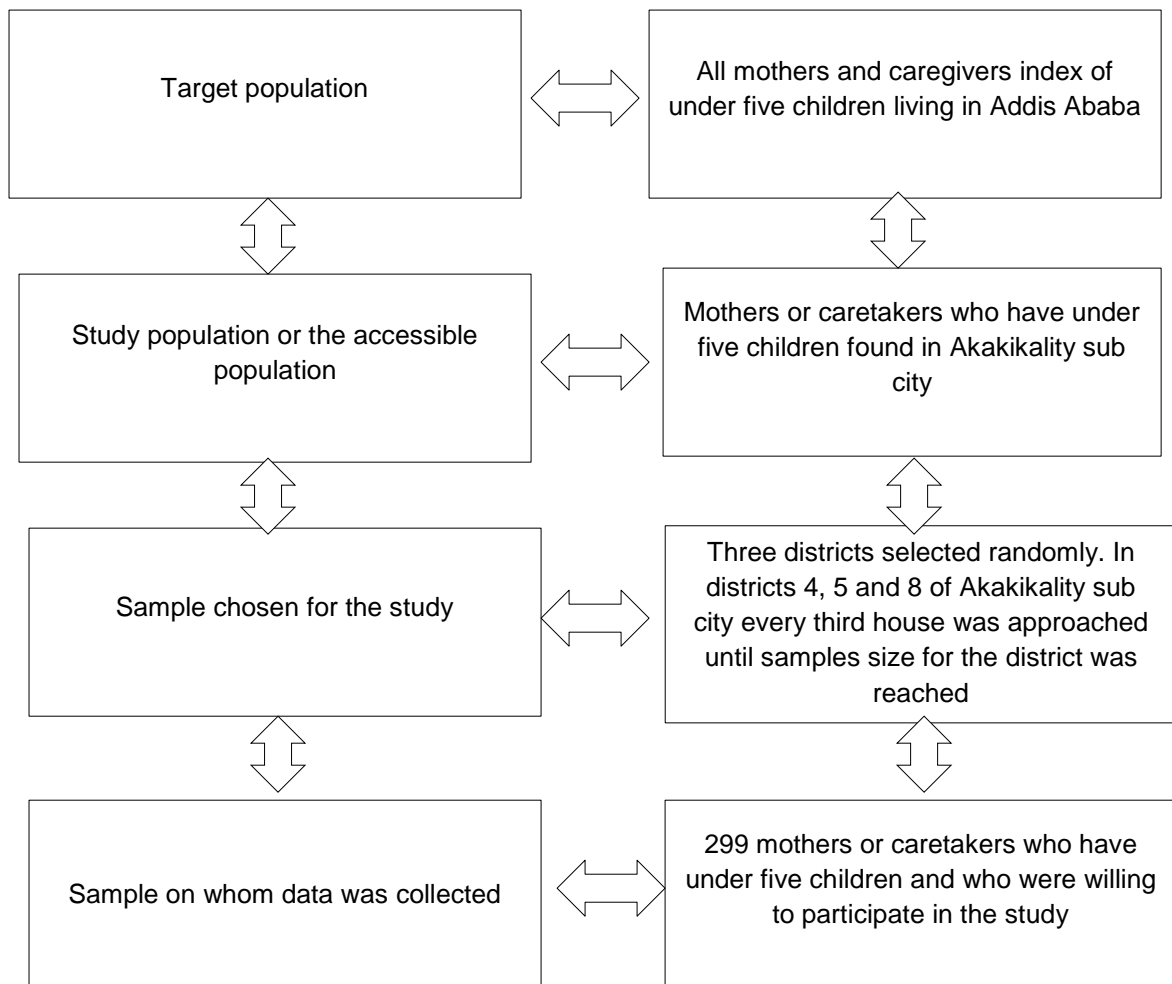
When the data was gathered, a form of non-probability sampling, namely quota sampling was used.

Quota sampling is a type of non-probability sampling technique in which the researcher identifies population strata and determines how many participants are needed from each stratum, the researcher can ensure that diverse segments are represented in the sample, preferably in the proportion in which they occur in the population (Polit & Beck 2009:342).

The first mother or caretaker with under five children was selected randomly, and then further, in a systematic way every third house was targeted for this study.

Houses with no under five children were skipped to the next until under five children were obtained. Participation in the study was voluntary and if a mother or caregiver did not wish to participate, they were skipped to the next willing respondent was then interviewed, this process continued until the sample size for each of the districts was reached.

- **Schematic representation of sampling procedure**



**Figure 2.1: Schematic representation of target population accessible population and sample for the study**

### 3.4 DATA COLLECTION AND DATA COLLECTION INSTRUMENT

#### 3.4.1 Data collection approach and method

The data collection section describes the data collection approach development of the data collection instrument, its structure and the variables it measures and the data collection process, all the ethical considerations in one section.

In this study the approach for data collection was face-to-face interview using a pretested structured questionnaire as instrument.

The advantage of questionnaire used for structured interviews are that the same sets of questions are asked in the same order and this increases the objectivities of the collected data (Polit & Beck 2010:345).

It also allows for the collection of unambiguous answers that can easily be calculated leading to straight forward quantitative data for analysis (Bowling 2009:283). It need not be dependent on literacy levels of respondents and it usually has a higher response rate (Bowling 2009:282). There is also a greater likelihood for completion of the questionnaire and less likelihood of misinterpretations of questions.

The major disadvantage of this data collection approach is that it tends to be biased because there is an interviewer, which leads to social desirability biases (Bowling 2009:282).

### **3.4.2 Development of the data collection instrument**

A structured questionnaire was developed based on the literature review and reference was also made to the problem identified and objectives set. Assistance in development of the instrument was sought from the research supervisors and colleagues with research experience. Questions developed are closed ended.

### **3.4.3 Layout of the data collection instrument**

A well-designed questionnaire is the following characteristics: Demonstrate a fit between its contents and the research problem and objectives, obtain the most complete and accurate information possible within reasonable time limit and resources and meets the objectives of the enquiry.

The questionnaire comprised of 71 questions and divided in to 5 sections: Identification, list of under five children in the household, demographic data, Environmental factors and Information about the index child. On the front page of the questionnaire was an information leaflet followed by 5 sections. Part I required respondents to provide their address and the number of the household. Part II list of under five children in the household .Part III respondents are required to provide their basic demographic data.

Part IV to gather information on environmental factors associated with under five childhood diarrhoea and part V basic information was collected about the index child.

The contents of the questionnaire are discussed and presented in the form of a table (refer table 3.1). A copy of the information leaflet and questionnaire are attached in annexures III and I.

The information leaflet introduced the respondent to the researcher, whose aim was to provide information on the institutions who granted permission the research to be conducted, the purpose of the study, and to seek support for the research.

**Table 3.1: Layout and descriptions of questions on the questionnaire**

<b>PARTS</b>	<b>QUESTIONS: DESCRIPTION</b>
PART I. IDENTIFICATION	Questions 1-4. Identification card or code of the mother (001), Information was requested about address, house number (002), number of household male and female (003), number of under five children in the household male and female (004). The data was used to identify the house hold address, number of families and under five children in the household disaggregated by sex.
PART II. REGISTRATION OF UNDER FIVE CHILDREN WITH DIARRHOEA OR WITHOUT DIARRHOEA IN THE HOUSEHOLD	Question 4. All children were registered with their sex and age to know how many of them have diarrhoea during the interview date. This helps to measure the prevalence of diarrhoea at the time of the survey.
PART III. DEMOGRAPHIC DATA	Question 101-119. In this section basic demographic data on the child's parents or caretakers were collected.
PART IV. ENVIRONMENTAL FACTORS	Question 201-229. Respondents were requested to investigate the environmental factors associated with under five childhood diarrhoea.
PART V. BASIC INFORMATION ABOUT THE INDEX CHILD	Question 301-318. In this section age, sex and the health condition of the index child was assessed in relation to diarrhoea.

#### **3.4.4 Refinement and pre-testing of the data collection instrument**

In developing a questionnaire it was pre-tested with a few subjects (12) individuals) in order to refine the questionnaire. A pre-test was conducted at an early stage using colleagues in order to assess the wording and clarity of the questionnaire. They

commented on the wording and order of items and gave additional once for inclusion in the questionnaire.

Using the inputs from pre testing the questionnaire was refined and made ready for data collection. The instrument was translated into English and back to Amharic, local language, to ensure consistency of meaning.

The data from the pre-testing was not included in the final analysis of sampled data.

### **3.5 VALIDITY AND RELIABILITY OF THE STUDY**

In this section potential factors affecting validity and reliability are discussed.

#### **3.5.1 Validity**

Validity is concerned with the truthfulness or accuracy of the research findings and if the phenomenon of interest and also reflects the accuracy the phenomenon that was intended to be investigated (Myer 2007:156; Parahoo 2006:80).

The validity of an instrument determines the extent to which it actually reflects constructs being examined or measured (Burns & Grove 2005:375).

##### **3.5.1.1 Internal validity**

Internal validity encompasses whether the results of the study are legitimate, because of the way the groups were selected, data was recorded or analysis was performed (LoBiondo-Wood 2010:166). Threats to internal validity that could be relevant in this study are: selection bias for example non-random selection of study participants (Burns & Grove 2005:215-216). Pre-testing like familiarity because of previous exposure to data collection tool or pre-testing, instrumentation like lack of training of data collectors they may become more proficient in interviewing in the course of data collection. Mortality and diffusion of study information like the sharing of information with potential participants (LoBiondo-Wood 2010:167-169; Parahoo 2006: 237-240).

Internal validity was maintained in this study by training the field workers so that the interviews were conducted in a consistent and similar way with all mothers and caregivers. The use of female data collectors increased mothers' or caregivers' openness and honesty when responding to the questions, and application of random selection of participants for interview to reduce and prevent selection bias.

Mortality and dissemination of study information was not a problem in this study, because all the interviews took place within a short period of time. To the knowledge of the investigator, similar studies were not conducted in Addis Ababa prior to this research.

### **3.5.1.2 External validity**

The extent to which the results of the study can be applied to populations, situations, times and environments different from this study is called generalisability (Burns & Grove 2005:218-219).

Threats to external validity can include: reactive arrangements for example when people know they are part of a study, they may change their behaviour (Hawthorne Effect). Participants may be influenced by unintentional verbal or non-verbal cues from data collectors (Rosenthal effect) and the study setting. Selection bias could also affect external validity (LoBiondo-Wood 2010:171-172). The Rosenthal effect may affect the external validity of this study because data collectors could give cues. By sampling from three randomly selected districts and the attempts to improve representativeness through the use of a form of systematic sampling were measures taken to improve external validity (Burns & Grove 2005:220).

### **3.5.1.3 Validity of the data collection instrument**

In this section content and face validity are going to be presented, but criterion related validity can only be determined in further studies and construct validity is not applicable in this studies.

Content validity is where the accuracy of the instrument in measuring the factors of concern to the study is scrutinised.

Face validity refers to whether the instrument looks as though it is measuring the appropriate construct (Polit & Beck 2010:247-260).

Data collection instrument was developed through literature review done in the topic and related words. The draft instrument was mailed to experts in the topic, field, and to colleagues and they were reviewed and commented upon, and their inputs were incorporated for the refining and inclusion of items in the instrument.

Face validity was established in this study through consultation of various experts, like water and sanitation, vaccination, child development expertise from UNICEF.

### **3.5.2 Reliability**

Reliability of an instrument is the extent to which a questionnaire or test or any measurement procedure produces the same result over time (Burns & Grove 2005:374; Polit & Beck 2010:373).

The reliability of an instrument can be determined by using different methods like test-retest reliability, where the same subjects complete the questionnaire on two separate occasions using the same instrument and then comparing the scores. Other methods are: inter-rater reliability and internal consistency. In this study it was not possible to determine these mentioned forms of reliability, because it is a study of limited scope in which the designed instrument was used for the first time. A construct that had verified was also not used. However the use of the use of a self-designed pre tested questionnaire, selection of interviewers with experience in data collection technique and appropriate supervision and checks of the data collection process were some of the measures taken to ensure reliability (Katzenellenbogen 2007:119).

## **3.6 ETHICAL CONSIDERATIONS**

The following ethical considerations were looked into in the study and are discussed in this section.

### **3.6.1 Permission for the study**

Before data collection was undertaken, ethical approval or clearance was obtained in written form from the University of South Africa (UNISA), Department of Health Studies, Higher degree Committee. Formal ethical / site permission for data collection process was obtained from Addis Ababa health bureau and Akakikality sub city health office.

### **3.6.2 Respect for self-determination/Autonomy and human dignity**

Information was provided regarding the principles of voluntary participation and informed consent was signed to obtain their willingness to participate. If respondents were not willing to participate in the study they are not forced to be interviewed.

The age ranges for the data source were mothers or caregivers who were above the age of 18 years.

### **3.6.3 Beneficence / freedom from harm**

During the interview sick children and mothers were advised and counselled to visit health clinic to obtain appropriate medical care.

### **3.6.4 Anonymity and confidentiality**

Respondents were assured of anonymity and confidentiality of the data and information supplied. Respondents' names were not used during the interviews. Collected data were put in a computer with password and filled questionnaires were kept in a locked cabinet in the researcher's office.

### **3.6.5 Justice**

Seriously sick children and mothers or caretakers were excused from participating in the study. Rather they were advised and referred to visit the nearby clinic. Study participants were selected randomly.



In order, to avoid wastage of resources appropriate sample size was determined and used. Several research methodology and statistics books both published and unpublished articles were read and reviewed to ensure scientific sampling plan and methods. Moreover, professionals with background of statistics and experienced people with public health research were consulted and their advice was taken as an input.

### **3.7 CONCLUSION**

In this chapter the study design and methodology was described. A descriptive cross-sectional, quantitative study design was employed. In Akakikality sub city, districts 4, 5 and 8 data was collected by using a structured questionnaire in face-to-face interviews of mothers or caregivers. The chapter also described the potential threats to and measures taken to improve validity and reliability of the study. It also presented the ethical and legal considerations taken in this specific study

## **CHAPTER 4**

### **RESEARCH FINDINGS**

#### **4.1 INTRODUCTION**

Chapter 4 is the section in which findings and procedures used for analysing the data is reflected. Findings are compared with other results reported in the literature where possible.

#### **4.2 DATA MANAGEMENT AND ANALYSIS**

Data was collected between 25 March, 2013 to 18 April 2013 after permission was obtained from Addis Ababa Health Bureau and the Research Ethics Committee of UNISA granted ethical clearance.

The collected data was checked and reviewed daily for the completeness of the questionnaires by the researcher. Incomplete questionnaires were referred back to data collectors so that follow up visits could be made.

Data was cleaned and entered in to a computer using-the SPSS version 20 program, for analysis purposes. Frequencies, variations and central tendencies were calculated for variables. Tables were used to reflect the results. Percentages are rounded off to one place after the decimal point. This implies that percentage totals may sometimes not add up to exactly 100%.

Bivariate analysis was computed to determine associations. Logistic regression analysis was also used to determine odds ratio and 95% confidence interval (C.I).

#### **4.3 RESEARCH FINDINGS**

The research results are presented in this section.

### 4.3.1 General demographic data

The introductory section dealt with the demographic data in Part I of the questionnaire, namely items 001 to 004. The table in Part II of the questionnaire is also discussed here. Some questions of Part V of the questionnaire that are relevant for this section discussed here as well.

#### 4.3.1.1 Residential section

The respondents of this study were all mothers or caretakers of children who are residents of Addis Ababa, Akakikality sub city, districts 4, 5 and 8. The total numbers of respondents were 299 mothers and caretakers of whom 32.5% was from district 4, 32.5% was from district 5 and 35% of the respondents were from district 8.

#### 4.3.1.2 Number of persons living in each household of the study

This section dealt with the number of persons living in the study households and the total amount of persons living in the households in the sample is reflected in Table 4.1.

**Table 4.1: SIZE OF FAMILIES LIVING IN THE HOUSEHOLDS (N=299)**

<b>CATEGORIES OF NUMBER OF PERSONS LIVING IN HOUSEHOLD</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Category1: Four or less persons	180	60.2
Category 2:Five to 9 persons	118	39.5
Category 3: More than 9 persons	1	0.3

It is clear that in the majority of cases, namely 60.2% there were four persons or less per household. Thirty nine point eight (39.8%) percent of the households were having five to nine persons in the household. Only one household had more than nine persons which is a percentage of only 0.3%. The mean size of the study population was 4.4 persons per household with a Standard Deviation (SD) of  $\pm 1.5$ .

#### **4.3.1.3 The number of children under five years old living per household**

The number of children under five years old per household is reflected in table 4.2.

**Table 4.2: NUMBER OF UNDER FIVE CHILDREN PER HOUSEHOLD (N=299)**

<b>NUMBER OF CHILDREN</b>	<b>FREQUENCY</b>	<b>CALCULATION OF ALL CHILDREN IN HOUSHOLDS OF STUDY SAMPLE</b>	<b>PERCENTAGE</b>
One child	250	250	83.6%
Two children	47	94	15.7%
Three children	2	6	0.7%

In this study, the majority (83.6%) of the households had only one child under five years old. If the total amount of children is calculated, there were 350 children in the 299 households.

For the purpose of this study the term “index child” is used in some of the questions, especially in Part II of the questionnaire. Index child refers to any of the children who currently may have diarrhoea. If there was not such a child, then the youngest child in the family under five years old is referred to as index child.

#### **4.3.1.4 Gender of index children under five years old**

The gender of index children under five years old is displayed in table 4.3.

**Table 4.3: CHILDREN UNDER FIVE (INDEX) DISAGREGATED BY GENDER (N=299)**

<b>GENDER OF INDEX CHILDREN</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Male	153	51.2%
Female	146	48.8%

In this study, male and female groups were very close to one another- a slight majority of 51.2% of the index under five children were male and 48.8% of them were female.

### 4.3.2 Diarrhoeal status of the index children

In order to discuss the diarrhoeal status of the index children, data from Part II as well as Part V of the questionnaire were used.

#### 4.3.2.1 *Diarrhoea incidence in the study population at the time of survey*

The incidence of diarrhoea in children under five years old at the time of the survey is displayed in table 4.4. Data from the table in Part II were used.

**Table 4.4: INCIDENCE OF DIARRHOEA IN CHILDREN UNDER FIVE (N=299)**

DIARRHOEA	FREQUENCY	PERCENTAGE
Currently present	38	12.7
Not present	261	87.3

Among 299 children under five years old included in this study, 12.7% of the children had diarrhoea during the time of the survey and 87.3% did not have diarrhoea.

#### 4.3.2.2 *Children with diarrhoea per district*

The distribution of diarrhoea at the time of the study in the selected study districts is presented in table 4.5.

**Table 4.5: DISTRIBUTION OF DIARRHOEA IN THREE STUDY DISTRICTS (N=38)**

DIARRHOEA CASES PER DISTRICT	FREQUENCY	PERCENTAGE
District 4	15	39.5
District 5	14	36.8
District 8	9	23.7

Compared to the other districts, District 8 had a relatively low number of cases, namely only 23.7% of the cases as compared to districts 4 and 5, which accounts for 76.3% of the total.

### **4.3.2.3 Duration of diarrhoea**

The duration of the diarrhoea in children under five years old that currently had diarrhoea was determined in question 312 at the end of the questionnaire (Part V) and it is reflected in table 4.6.

**Table 4.6: DURATION OF DIARRHOEA (N=38)**

<b>DIARRHOEA DURATION</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Up to 14 days	22	57.9
15 days or more	16	42.1

Diarrhoea that continues in a child for more than 14 days is considered as persistent diarrhoea. Usually this is a cause of malnutrition or other serious illnesses. Diarrhoea lasting less than 14 days is defined as acute diarrhoea (WHO/UNICEF 2009:10).

The majority of children under five years old, who had diarrhoea at the time of the study, namely 57.9%, had it for 14 days or less.

### **4.3.2.4 Frequency of diarrhoea per day**

The number of diarrhoea episodes per day was investigated (question 313) in the children who had diarrhoea and it is displayed in table 4.7.

**Table 4.7: FREQUENCY OF DIARRHOEA EPISODES PER DAY (N=38)**

<b>FREQUENCY OF DIARRHOEA PER DAY</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
3 times	30	78.9
4 times and more	8	21.1

The definition of diarrhoea for this study is stated on p 23 where it is specified that three loose stools or more considered as diarrhoea.

The majority of children with diarrhoea had three episodes of diarrhoea per day, which accounts for 78.9%.

#### **4.3.2.5 Measures taken to manage diarrhoea**

Measures taken to manage diarrhoea were determined in question 316 in Part V of the questionnaire and it is reflected in table 4.8.

**Table 4.8: MEASURES TAKEN TO MANAGE DIARRHOEA (N=38)**

<b>MEASURES TAKEN TO TREAT DIARRHOEA</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Taken to health institution	26	68.4
Administered homemade treatment	5	13.2
Managed at home with ORS	7	18.4
Take to traditional healer	0	0
Increase feeding	0	0
Give cereal based fluids	0	0
Stop/decrease feeding	0	0

As depicted in the table above, the majority of children (68.4%) with diarrhoea were taken to health institutions for medical care.

#### **4.3.2.6 The type of diarrhoea a child had**

The type of diarrhoea that the children had indicated in question 314 in Part V of the questionnaire and it is reflected in table 4.9.

**Table 4.9: THE TYPE OF DIARRHOEA CHILDREN HAD (N=38)**

<b>TYPE OF DIARRHOEA</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Watery	32	84.2
Bloody	6	15.8

The table above indicates that the majority, namely 84.2% of the children had watery diarrhoea.

#### **4.3.2.7 Diarrhoea present during the past two weeks or not**

In 4.3.2.1 the number of children that had diarrhoea at the time of the survey was mentioned and discussed. In the last column of the table in Part II, it was determined

how many children had diarrhoea during the past two weeks (which means that at the time of the survey the problem could have been resolved). Results are reflected in table 4.10.

**Table 4.10: CHILDREN WHO HAD DIARRHOEA DURING THE LAST TWO WEEKS (N= 299)**

<b>CHILDREN WHO HAD DIARRHOEA FOR THE LAST TWO WEEKS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	51	17.1
No	248	82.9

The table above indicates that the majority namely 82.9% of the children did not have diarrhoea for the two weeks prior to the survey. The 38 children who had diarrhoea during the time of the survey are included in this number of 51 cases.

**4.3.2.8 Opinion of mothers and caretakers regarding the cause of the diarrhoea**

The opinion of mothers and caretakers regarding the causes of the diarrhoea of the children was determined in question 317 in Part V of the questionnaire. This was an open-ended question and three options were mentioned by the respondents. Results are reflected in table 4.11.

**Table 4.11: OPINION OF MOTHERS OR CARETAKERS REGARDING CAUSE OF DIARRHOEA (N=38)**

<b>OPINION OF CAUSE OF DIARRHOEA</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Micro-organisms	22	57.9
Dirt and dirty objects	12	31
Unknown	4	11.1

Based on the table the majority of mothers or caretakers of children that had diarrhoea during the survey, namely 57.9%, believed that the diarrhoea is caused by micro-organisms and 31% mentioned that dirt or dirty objects could have something to do with it.



#### **4.3.2.9. Vaccination status of the child**

The vaccination status of the child for measles, Rota and H1N1 was determined in question 310 in Part V of the questionnaire and it is reflected in table 4.12. In this case N=215, because it takes up to the age of nine months for these vaccinations to be administered. There were 215 children (respondents) that could be included for this question of the study. Results are reflected in table 4.12.

**Table 4.12: VACCINATION STATUS OF THE CHILD (N=215)**

<b>VACCINATION STATUS</b>	<b>YES</b>	<b>PERCENTAGE</b>	<b>NO</b>	<b>PERCENTAGE</b>	<b>NO INFORMATION</b>	<b>PERCENTAGE</b>
Measles	211	98.1%	4	1.9%	0	0
Rota	18	6%	14	4%	267	90%
H1N1	18	6%	14	4%	267	90%

As the above table shows 98.1% of the children were vaccinated against measles. In 90% of the children it could not be determined if the Rota or H1N1 vaccines were administered and only 6% received it.

#### **4.3.3 Socio demographic and economic data of respondents and child's father**

This section dealt with the socio demographic and socio economic data. Items 101 to 119 of Part III of the questionnaires are discussed here.

##### **4.3.3.1 Relation of the respondent to the index child**

The relationship of the respondent to the index child is reflected in table 4.13:

**Table 4.13: RELATIONSHIP OF RESPONDENT TO INDEX CHILD (N=299)**

<b>RELATION</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Mother	261	87.3
Caretaker	38	12.7

The majority or 87.3% of the respondents were mothers and the rest, namely 12.7% were caretakers of the index child.

#### 4.3.3.2 Age of mother or caretaker

The result of the age of the respondents is depicted in table 4.14. Five cases were missed because these respondents did not know their exact age and therefore (N=294).

**Table 4.14: FREQUENCY DISTRIBUTION OF AGE OF RESPONDENTS (N= 294)**

<b>AGE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
18-23	27	9
24-29	142	48.2
30-35	91	30.9
36-41	20	6.8
42-47	5	1.7
48-53	7	2.3
>54	2	0.7

From the above data, it is clear that a large number of mothers' or caretakers' age was between 24-35 years old and this account for 79.1% of all the respondents. The mean age of the respondents was 29.8 years with S.D  $\pm$  6.2.

#### 4.3.3.3 Marital status of mothers or caretakers

The result of the question (103) about the marital status of the respondents is presented in table 4.15.

**Table 4.15: MARITAL STATUS OF THE RESPONDENTS (N=299)**

<b>MARITAL STATUS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Single	7	2.3
Married	256	85.6
Divorced	22	7.4
Separated	2	0.7
Widow	12	4

The majority of mothers or caretakers, namely 85.6% were married.

#### **4.3.3.4 Type of marriage of the respondents**

The type of marriage, namely monogamous or polygamous (question 104) is presented in table 4.16.

**Table 4.16: TYPE OF MARRIAGE (N=299)**

<b>TYPE OF MARRIAGE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Monogamous	294	98.3
Polygamous	5	1.7

By far the majority of mothers or caretakers namely 98.3% were in a monogamous marriage.

#### **4.3.3.5 Religion of mothers or caretakers**

The religions of respondents (question 105) are presented in table 4.17.

**Table 4.17: RELIGION OF MOTHERS OR CARETAKERS (N=299)**

<b>RELIGION OF RESPONDENTS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Christian	177	59.2
Muslim	122	40.8
Other	0	0

The majority of mothers or caretakers were Christians which accounts for 59.2%. No respondents belonged to religions other than Christian or Muslim.

#### **4.3.3.6 Ethnic group of mothers or caretakers**

The result of the ethnicity of the respondents (question 106) is depicted in table 4.18.

**Table 4.18: ETHNIC GROUP OF RESPONDENTS (N=299)**

ETHNIC GROUP	FREQUENCY	PERCENTAGE
Amhara	150	50.2
Oromo	85	28.4
Tigre	51	17.1
Others	13	4.3

Most the mothers or caretakers, namely 50.2% were from the Amhara ethnic group followed by the Ormo ethnic group (28.4%).

#### **4.3.3.7 Educational level of mothers or caretakers**

The educational level (question 107) of mothers or caretakers is reflected in table 4.19.

**Table 4.19: EDUCATIONAL LEVEL OF RESPONDENTS (N=299)**

EDUCATIONAL LEVEL	FREQUENCY	PERCENTAGE
Illiterate	38	12.7
Read and Write	74	24.7
Read only	0	
Grade 1-4	62	20.7
Grade 5-8	53	17.7
Grade 9-12	48	16.1
Diploma	15	5
Degree	9	3

The above data indicates that 12.7% of the respondents were illiterate and 24.7% could read and write, but did not have formal education. The remainder, namely 62.5% had some form of education, ranging from the first grade in school to a degree.

#### **4.3.3.8 Occupational status of respondents**

Respondents' occupational status is presented in table 4.20.

**Table 4.20: OCCUPATIONAL STATUS (N=299)**

<b>CATEGORY OF OCCUPATION</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
House wife	198	66.2
State or other sector employee	65	21.7
Own private gainful work	13	4.3
Others	23	7.7

From the above data it is clear that the majority, namely 66.2% were house wives followed by state and other sector employment which accounts for 21.7%.

#### **4.3.3.9 Age of the index child's father**

Ages of children's fathers (question 110) are presented in table 4.21.

Three cases were missing because the respondents were not sure how old those fathers were. N therefore is 296 in this case.

**Table 4.21: AGES OF THE CHILDRENS' FATHERS (N=296)**

<b>AGE OF CHILD'S FATHER</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
19-23	2	0.7
24-29	38	12.8
30-35	113	38.2
36-41	84	28.3
42-47	36	12.2
48-53	20	6.7
54 and above	3	1.0

A large number of the fathers namely 66.6% were between the ages of 30-41 years old.

#### **4.3.3.10 Educational level of child's father**

Fathers' educational level is presented in table 4.22. Five values were not indicated, because the respondents didn't know the educational level of the father. N therefore is 294 in this case.

**Table 4.22: EDUCATIONAL STATUS OF INDEX CHILD'S FATHER (N=294)**

<b>EDUCATIONAL STATUS OF CHILD'S FATHER</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Illiterate	21	7.0
Able to read only	0	
Able to read and write	41	13.9
Grade 1-4	38	12.9
Grade 5-8	76	25.9
Grade 9-12	91	31
Diploma	23	7.8
Degree	4	1.3

From the above data it is clear that majority of fathers or 31% were able to complete grade 9-12 and 25.9% completed grade 5-8.

#### **4.3.3.11 Occupational status of fathers**

Occupational status of fathers (question 111) is presented in table 4.23. Fifteen values were missed because the caretakers didn't know the father's occupation or they might not want to reveal the occupation of the father. N is therefore 284 in this case.

**Table 4.23: OCCUPATION OF THE FATHER (N=284)**

<b>OCCUPATION OF FATHER</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Government employee	79	27.8
Private sector employee	115	40.4
Merchant	41	14.4
Jobless	6	2.0
Others	43	15.1

From the above data it is clear that majority of fathers, namely 40.4% were private sector employed followed by government employees at 27.8%.

#### **4.3.3.12 Monthly income of the household**

Monthly income (question 112) of the family in Ethiopian Birr is presented in table 4.24.

**Table 4.24: MONTHLY INCOME OF THE HOUSEHOLD (N=299)**

<b>MONTHLY INCOME IN ETHIOPIAN BIRR (N=299)</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Less than 500	45	15.1
500-1000	209	69.9
1001-1500	43	14.4
1501-2000	1	0.3
2001-2500	1	0.3

The majority of the families in this study, namely 69.9%, have an income of between 500 - 1000 Ethiopian Birr.

#### **4.3.3.13 Ownership of the house of the family**

The result of the house ownership (question 115) is presented in table 4.25.

**Table 4.25: HOUSE OWNERSHIP OF THE FAMILY (N=299)**

<b>OWNERSHIP</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Family owns private house	164	54.8
Family does not own private house	135	45.2

Fifty four point eight percent (54.8%) of the families in the study owns a private house.

The rented houses were deemed not to be important to the study (question 116) and therefore it is not discussed, and most of the respondents did not answer this question.

#### **4.3.3.14 Capacity to pay for rental house**

It was investigated in question 117 if families who are living in rental homes are able to pay the rental amount or not. From table 4.25 above, it is clear that 135 families do not own a home and therefore N=135. The data is presented in table 4.26.

**Table 4.26: CAPACITY TO PAY FOR RENTED HOUSE (N=135)**

<b>CAN AFFORD TO PAY FOR RENTAL HOUSE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	89	66
No	46	34

Of the families living in rental homes, 66% can afford to pay their house rent.

#### **4.3.3.15 Asset ownership**

Ownership of assets like television sets and refrigerators was investigated in questions 113 and 114 respectively in Part III of the questionnaire. The rationale behind this is that television broadcasts can be used by the family as a source of information about diarrhoea. In the refrigerator food can be preserved and that may reduce the prevalence of childhood diarrhoea. These two aspects are presented in table 4.27.

**Table 4.27: OWNERSHIP OF ASSETS (N=299)**

<b>ASSET TYPE</b>	<b>RESPONSE CATEGORY</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Television	Yes	235	78.6
	No	64	21.4
Refrigerator	Yes	97	32.4
	No	202	67.6

As the above table indicates, 78.6% of the households have a television but the majority of the households or 67.6% have no refrigerator.



#### **4.3.3.16 School attendance of school aged children**

School attendance of all school aged children living in the study households (question 119) is presented in table 4.28. Only 276 families have other children of school age.

**Table 4.28: ATTENDANCE OF SCHOOL BY SCHOOL AGED CHILDREN (N=267)**

<b>SCHOOL ATTENDANCE BY SCHOOL AGED CHILDREN</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	204	76.4
No	63	23.6

From table 4.28 it is clear that 76.4 % of the families were able to send their school aged children to school.

#### **4.3.3.17 Houses with kitchens**

Kitchens can be situated in- or outside of the homes in Addis Ababa. Availability of a kitchen is important in this study for safe food preparation. The number of homes in this study (question 118) that have kitchens are reflected in table 4.29.

**Table 4.29: AVAILABILITY OF KITCHEN (N=299)**

<b>KITCHEN PRESENT</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	239	79.9
No	60	20.1

The table above shows that the majority of houses inhabited by respondents involved in this study, namely 79.9%, have kitchens.

#### **4.3.4 Data related to environmental conditions of the study households**

Part IV of the questionnaire dealt with the environments that the respondents of this study are living in. Data gatherers had to both observe and ask questions in order to complete this part of the questionnaire. Items 201 to 229 of the questionnaire are discussed here.

#### **4.3.4.1 Number of rooms in the house**

The number of rooms in the houses where respondents of the study reside (question 204) is presented in table 4.30.

**Table 4.30: NUMBER OF ROOMS IN THE HOUSE (N=299)**

<b>NUMBER OF ROOMS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
One	121	40.5
Two	115	38.5.
Three	50	16.7
More than three	13	4.3

As the above table indicates majority of the houses were having either one or two rooms which accounts for 79% of the study households.

#### **4.3.4.2 Floor type of the house**

The type of floor in the houses of the study households (question 201) are presented in table 4.31. Mud floors are not easy to keep clean.

**Table 4.31: FLOOR TYPE OF THE HOUSE (N=299)**

<b>FLOOR TYPE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Mud	132	44.1
Cement	161	53.8
Wood	4	1.3
Others	2	0.6

Many of the houses, namely 53.8 % had cement floors and a fair amount, namely 44.1% had mud floors.

#### **4.3.4.3 Ceiling in the home**

The availability of ceilings in the rooms of the houses (question 202) is presented in table 4.32. Homes with ceilings are less dusty and hot than houses without ceilings.

**Table 4.32: CEILING IN THE HOUSE (N=299)**

<b>CEILING PRESENT</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	256	85.6
No	43	14.4

The majority, namely 85.6% of the houses had ceilings.

#### **4.3.4.4 Animals sharing the house**

Question 203 investigated if animals are sharing the house with the people living in it. Animals in this case are cattle, sheep and goats but not dogs or cats. Table 4.33 reflects the results.

**Table 4.33: ANIMALS COHABITING WITH HUMANS IN HOUSE (N=299)**

<b>ANIMALS SHARING THE HOUSE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	62	20.7
No	237	79.3

A majority of 79.3% of the households were not sharing their rooms with their animals.

#### **4.3.4.5 Access to toilet facility**

Access to a toilet facility or latrine is determined in question 205. The toilet could be inside or outside of the home - in both cases it was marked that a toilet was available. Three types of toilets are found in the study context, namely a private toilet where only a single family uses the toilet, or communal latrines where a community of neighbours are using a particular toilet or public toilets with an unspecified number of users and it is

mostly not known who all the users are. The result of the availability of toilets is presented in table 4.34.

**Table 4.34: TOILET ACCESS (N=299)**

ACCESS TO TOILETS	FREQUENCY	PERCENTAGE
Yes	279	93.3
No	20	6.7

By far the majority, namely 93.3% of the households have access to a toilet facility.

#### **4.3.4.6 Type of toilet facility**

Respondents could indicate (question 206) that they have any of four types of toilets as specified in table 4.35 or other (unspecified). In this case N=279, because 20 respondents don't have toilet access (see previous paragraph). Types of toilets are indicated in table 4.35.

**Table 4.35: TYPES OF TOILETS (N=279)**

TYPES OF TOILETS	FREQUENCY	PERCENTAGE
Improved pit latrine	75	26.9
Unimproved pit latrine	151	54.1
Ventilated pit latrine	16	5.7
Water flush or water pour	32	11.4
Others	5	1.8

The majority, namely 54.1% of the toilets were unimproved pit latrines and 26.9% of the respondents had improved pit latrines.

#### **4.3.4.7 Toilet ownership**

In 4.3.4.5 different scenarios of toilet access are described. In this case N=279 as well, because 20 respondents don't have access to toilet facilities. Toilet ownership is reflected in table 4.36 in line with the access described in 4.3.4.5.

**Table 4.36: TOILET OWNERSHIP (N=279)**

<b>TOILETS OWNERSHIP</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Private	139	49.8
Communal	112	40.2
Public	28	10

It is indicated above that the majority, namely 49.8% of the households have a private toilet and that 40.2% have to use a communal toilet facility.

#### **4.3.4.8 Observation of faeces around the hole of the toilet**

Whether a faeces was observed by the research assistant around the hole of the toilet is reflected in table 4.37. N=279 for the same reason as that is mentioned above.

**Table 4.37: FAECES SEEN AROUND THE TOILET (N=279)**

<b>FAECES OBSERVED AROUND THE PIT HOLE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	85	31.0
No	194	69.0

In 31 % of the toilets, faeces were seen around the hole of the toilet.

#### **4.3.4.9 Cover for toilets**

The result of the question (209) related to a cover over for the toilet is reflected in table 4.38. N=279 in this case as well.

**Table 4.38: COVER FOR HOLE OF THE TOILET (N=279)**

<b>COVER FOR HOLE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	87	31.2
No	192	68.8

Only 31.2 % of the toilets are covered. Question 210 is not dealt with, because research assistants did not have sufficient time to walk around and inspect for faeces around the house.

**4.3.4.10 Flies observed in the toilet**

Observation of flies around the toilet had to be recorded by the research assistants (question 211). N=279 because of the reason mentioned before.

**Table 4.39: FLIES OBSERVED IN THE TOILET (N=279)**

<b>FLIES OBSERVED IN THE TOILETS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	105	37.7
No	174	62.3

In the majority of the toilets namely, 62.3%, flies were not seen around the toilets.

**4.3.4.11 Households without latrine: what is used for defecation in these cases**

People from households without latrines have to use other options for defecation. In question 212 four options were provided to choose from. N=20, because that was the number of respondents that did not have access to latrines. Results are presented in table 4.40.

**Table 4.40: DEFECATION OPTIONS FOR THOSE WHO HAVE NO TOILET (N=20)**

<b>WHERE AND WHAT IS USED FOR DEFECATION</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Open field	12	60
Ditch	7	35
Potty	0	0
Others	1	5

Sixty percent (60%) of the households with no latrine access were using the open field.

#### **4.3.4.12 Households' disposal of children's faeces**

In table 4.41 places where children's faeces are disposed of are depicted. There were four options to choose from in question 213.

**Table 4.41: PLACE OF FAECES DISPOSAL (N=299)**

<b>PLACE OF DISPOSING CHILDREN'S FAECES</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Open field	12	4
In the ground	40	13.4
In the toilet	239	80
Others	8	2.7

In the above cases 80% of mothers or caretakers were disposing their children's faeces in the toilet.

#### **4.3.4.13 Availability of hand washing facility**

The availability of hand washing facilities close to toilets was the issue at stake that had to be observed for question 214. Results are reflected in table 4.43 and N=279.

**Table 4.42: AVAILABILITY OF HAND WASHING FACILITIES (N=279)**

<b>HAND WASHING FACILITY</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	108	38.7
No	171	61.3

The majority of the toilets, namely 61.3% had no hand washing facility close by.

#### **4.3.4.14 Availability of water in the hand washing facility**

The next observation that had to be made (question 215) is if water is available or not in the hand washing facilities. Only 108 households had hand washing facilities at the toilet and therefore N=108 in this case. The availability of water is reflected in table 4.43.

**Table 4.43: WATER AVAILABILITY IN THE HAND WASHING FACILITY (N=108)**

<b>AVAILABILITY OF WATER AT HAND WASHING FACILITY</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	42	38.9
No	66	61.1

The majority, namely 61.1% of the hand washing facilities had no water supply.

#### ***4.3.4.15. Availability of soap at the hand washing site***

Following the observation above, the next observation was related to soap availability at the hand washing facilities. The 108 households that had hand washing facilities at the toilet were observed and therefore N=108. Results are reflected in table 4.44.

**Table 4.44: SOAP AVAILABILITY IN THE HAND WASHING SITE (N=108)**

<b>SOAP AVAILABILITY IN THE HAND WASHING FACILITY</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	25	23.1
No	83	76.9

The majority (76.9 %) of the hand washing facilities had no soap.

#### ***4.3.4.16 Hand washing habits of child's mother or caretaker***

Mothers or caretakers were asked when they wash their hands and there were four options to choose from plus a final option where multiple options could be marked. Fourteen responses were missing and therefore N=285. Results are presented in table 4.45.



**Table 4.45: HAND WASHING HABITS OF MOTHER OR CARETAKER (N=285)**

HAND WASHING OCCASIONS	FREQUENCY	PERCENTAGE
Before meal	65	22,8
Before breast feeding	43	15.1
After cleaning child's bottom or potty	61	21.4
After using toilet	43	15.1
Multiple occasions	73	25.6

Mothers or caretakers who wash hands on multiple occasions account for 25.6% of the respondents and the rest (74.4%) do it for specific occasions only.

#### **4.3.4.17 Solid waste disposal methods**

Solid refuse disposal was the next question (218) that was dealt with. There were six options to choose from. Five responses were missing, so N=294 and the result is reflected in table 4.46.

**Table 4.46: SOLID WASTE DISPOSAL METHODS (N=294)**

SOLID WASTE DISPOSAL METHODS	FREQUENCY	PERCENTAGE
Pit	5	1.7
Open field	0	0
Burning	14	4.8
Sack	270	91.8
Barrel/garbage can	5	1.7
Other	0	0

As the above table indicates, the majority (91.8%) of the households were collecting solid waste using sacks and followed by burning (4.8%).

#### **4.3.4.18 Liquid waste disposal methods**

It was investigated in question 219 where liquid waste was disposed of. Waste water from the kitchen was the main focus of this question. Four options were provided to choose from. Two responses were not recorded and therefore N=297. Data is presented in table 4.47.

**Table 4.47: LIQUID WASTE DISPOSAL METHODS (N=297)**

<b>LIQUID WASTE DISPOSAL METHODS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Pit	133	44.8
Open space in backyard	113	38.0
Open ditch	27	9.1
Others	24	8.1

The majority (44.8%) of the households were disposing their liquid (kitchen) waste water in the pit followed by open spaces (38%) in the backyard where water is thrown away.

#### **4.3.4.19 Domestic drinking water supply**

Respondents were asked about the source of their drinking water and research assistants could also make observations in this regard (question 220). Eight options were given to choose from. One questionnaire did not have a response to this question and therefore N=298. The result of the source of domestic water supply of the household is presented in table 4.48.

**Table 4.48: SOURCES OF DOMESTIC WATER SUPPLY (N=298)**

<b>SOURCES OF DOMESTIC DRINKING WATER SUPPLY</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Pipe in the compound (connection)	233	78.2
Public distribution	62	20.8
Private vendor	3	1
Protected well / spring	0	0
Unprotected well / spring	0	0
River	0	0
Rain water	0	0

The major source (78.2%) of domestic water supply for the households were piped, connected water supply. Water was supplied at public distribution points for 20.8% of the respondents.

#### **4.3.4.20 Monthly expenditure for water**

The cost of water consumption per month (question 221) is presented in table 4.49. N=293, because six questionnaires did not have this amount filled in.

**Table 4.49: MONTHLY EXPENDITURE FOR WATER (N=293)**

<b>MONTHLY EXPENDITURE FOR WATER</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
<10 birr	194	66.2
11-20 birr	87	29.7
21-30 birr	5	1.7
31+ birr	7	2.4

The majority of the households, namely 66.2% were spending less than 10 birr per month.

#### **4.3.4.21 Distance of water source from the house**

Only 250 responses were recorded for this question. The reason is that for some households the water connection is in the house and those respondents don't need to walk a distance to fetch water. In other cases water is supplied for a group of households communally and then water needs to be fetched some distance away from the dwelling at a central tap. The result is presented in table 4.50.

**Table 4.50: DISTANCE OF WATER SOURCE FROM THE HOUSE (N=250)**

<b>DISTANCE OF WATER SOURCE IN METER</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Less than 500 meters	150	60
Greater than 500 meters	100	40

Sixty percent (60%) of the households, who needed to fetch water, got it at a distance of less than 500 metres from their home.

#### **4.3.4.22 Water consumption per day**

The respondents had to indicate the amount of water that is used or fetched per day. The result is presented in table 4.51.

**Table 4.51: WATER CONSUMPTION (N=295)**

<b>WATER CONSUMPTION</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
< 20 litres	212	71.9
>20 litres	83	28.1

The majority (71.9%) of the households' water consumption was less than 20 litres per day.

#### **4.3.4.23 Type of water containers**

Water can be stored in containers with a wide or narrow mouth. The type used in the household had to be indicated in question 224 and the result is presented in table 4.52. Three respondents did not answer this question, so N=296.

**Table 4.52: TYPE OF WATER CONTAINER (N=296)**

<b>TYPE OF WATER CONTAINERS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Narrow mouthed	200	66.9
Wide mouthed	96	32.1

The majority of the households (66.9%) were using narrow mouthed water containers.

#### **4.3.4.24 Cover for water container**

Whether the water containers have a cover or not had to be indicated in question 225. This question was answered by 296 respondents and the result is presented in table 4.53.

**Table 4.53: AVAILABILITY OF COVER FOR WATER CONTAINER (N=296)**

<b>WATER CONTAINER COVER</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	210	70.2
No	86	28.8

The majority (70.2%) of the water containers had a cover.

#### **4.3.4.25 Water storage in the household**

Respondents had to indicate (question 226) if water is stored in the household and only one response was missing in this case, so N=298. This data is presented in table 4.54.

**Table 4.54: WATER STORAGE IN HOUSE (N=298)**

<b>WATER STORAGE IN HOME</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	86	28.9
No	212	71.1

The majority of the households were not storing water at home and these accounts for 71.1% of the total.

#### **4.3.4.26 Places where water containers are kept**

It is not clear why only 162 respondents answered question 227. This question investigated places where water containers are kept, namely on a high place or on the ground. The result is presented in table 4.55.

**Table 4.55: PLACE WHERE WATER CONTAINERS IS KEPT (N=162)**

<b>PLACE OF WATER CONTAINER</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Above the ground/raised place	50	30.9
On the ground	112	69.1

The majority of the respondents, who answered this question, namely 69.1%, put their water containers on the ground.

#### **4.3.4.27 Household drinking water treatment**

Respondents had to indicate if households are treating drinking water to make it safe (question 228). Five responses were missing and therefore N=294. The result is reflected in table 4.56.

**Table 4.56: TREATMENT OF WATER (N=294)**

<b>TREATMENT OF WATER</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	45	15.3
No	249	84.7

The majority (84.7%) of the households did not treat their drinking water.

#### **4.3.4.28 Methods of water treatment**

The 45 respondents who treated their water were asked what method of treatment they used (question 229) and they were given three options to choose from. The result is depicted in table 4.57.

**Table 4.57: METHODS OF WATER TREATMENT (N=45)**

<b>WATER TREATMENT METHOD</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Boiling	24	53.3
Chemicals	21	46.7
Other	0	0

A slight majority of 53.3% of the households were boiling their water.

#### **4.3.5 Information about the index child**

The introductory section dealt with the demographic data in Part I of the questionnaire, namely items 001 to 004. The table in Part II of the questionnaire was also discussed (see 5.3.1 and 5.3.2). Some questions of Part V of the questionnaire were also discussed in the mentioned sections and that discussion will not be repeated here.

#### **4.3.5.1 Age of index child**

The first question of Part V (question 301) asked the age of the index child in months. The results are reflected in table 4.58.

**Table 4.58: AGE OF THE INDEX CHILD (N=299)**

<b>AGE OF CHILD IN MONTHS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
0-4	6	2.0
5-9	78	26.1
10-14	62	20.7
15-19	41	13.7
20-24	49	16.4
25-29	16	5.4
30-34	12	4.0
35-39	19	6.4
40-44	13	4.4
45-49	2	0.6
50-54	1	0.3
55-59	0	0

The age group with the highest percentage of children was the group of 5-9 months old (26.1%) followed by the 10-14 month old group (20.7%).

The mean age of the index children was 24.9 months with SD  $\pm$ 10.6.

Gender was discussed in 5.3.1.

#### **4.3.5.2 Birth place of the child**

The respondents had to indicate if the child was born at home or in an institution (question 303). Three respondents were not sure where they were born. Therefore N=296. The result is reflected in table 4.59.

**Table 4.59: BIRTH PLACE OF THE CHILD (N=296)**

BIRTH PLACE OF THE CHILD	FREQUENCY	PERCENTAGE
Health institution	252	85.1
Home delivery	44	14.9

By far the majority (85.1%) of children were born in health institutions.

#### **4.3.5.3 Birth order of the child**

The respondents had to indicate if the index child was first born, second born and so on. Results of the birth order of the index child are presented in table 4.60.

**Table 4.60: BIRTH ORDER OF THE INDEX CHILD (N=299)**

BIRTH ORDER OF THE CHILD	FREQUENCY	PERCENTAGE
1 <sup>st</sup> child	119	39.8
2 <sup>nd</sup> child	108	36.1
3 <sup>rd</sup> child	38	12.7
4 <sup>th</sup> and above	34	11.4

The majority of the index children were born first (39.8%) or second (36.1%).

#### **4.3.5.4 History of diarrhoea in mothers or caregivers diarrhoea during the past two weeks**

Respondents had to indicate (question 305) if they had had diarrhoea in the last two weeks. Data is presented in table 4.61.

**Table 4.61: DIARRHOEAL STATUS OF THE MOTHER OR CARETAKER (N=299)**

MOTHER OR CAREGIVER HAD DIARRHOEA DURING PAST TWO WEEKS	FREQUENCY	PERCENTAGE
Yes	120	40.1
No	179	59.9



The majority of the mothers or caretakers (59.9 %) did not have diarrhoea during the last two weeks.

#### **4.3.5.5 Breast feeding of index child**

Question 306 was aimed at investigating if children in this study were breast fed. Twenty seven cases were missed. The result is reflected in table 4.62.

**Table 4.62: BREAST FEEDING STATUS (N=282)**

<b>BREAST FEEDING STATUS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	255	91
No	27	9

Ninety one percent (91%) of the children received breast feeding.

#### **4.3.5.6 Duration of breast feeding**

The question that followed (question 307) investigated the duration of breast feeding in the index child is presented in table 4.64. In this case N=255 (see table 4.62).

**Table 4.63: DURATION OF BREAST FEEDING (N=255)**

<b>DURATION OF BREAST FEEDING</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
< 2 years	168	65.9
>2 years	87	34.1

The majority (65.9%) of the children were breast feed for duration of less than two years.

#### **4.3.5.7 Age at which additional food was started**

The age at which additional food was started for the index child (question 309) is presented in table 4.64. Many of the cases were missed because respondents were unable to remember exactly the age at which the child started supplementary foods.

**Table 4.64: AGE AT WHICH ADDITIONAL FOOD STARTED (N=79)**

<b>AGE OF SUPPLEMENTATION STARTED</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Less than 4 months	29	36.7
4 months and above	50	63.3

As the table shows that 63.3% of the children started supplementary feeding at the age of four months and above.

#### **4.4 BIVARIATE ANALYSIS**

In the Bivariate analysis, a number of risk factors emerged as significant predictors of under five childhood diarrhoea in the study context.

The following emerged:

*Household's access to toilet facility:* children from the households having no toilet facilities have a 1.37 times relative risk (95% Confidence interval (CI, 1.085 to 1.72) to have diarrhoea (compared to children from households where there is a toilet). In this study, there is an association ( $p < 0.05$ ) between under five diarrhoea morbidity and access to toilet facilities. Children from households having toilet facilities are 77% less likely to have diarrhoea compared to children from households having no toilet facility (OR 0.23, 95% CI (0.11, 0.49). This finding is in agreement with another study that was done in Ethiopia (Muluken 2009). However, in the logistic regression when other variables are controlled availability of a toilet did not come up as a significant predictor of under five diarrhoea. But variables related to toilet use and management are strongly associated with under five diarrhoea.

*Use of narrow mouthed drinking water container:* children from households where these containers are used for transport and storage of water are 80% less likely to have diarrhoea than children from households who use wide mouthed drinking water containers, [OR: 0.2, 95%CI (0.02, 0.39)].

Children from those households where *faeces were observed around the pit-hole/on the slab* are about eight times more likely to have diarrhoea compared to those children

from houses in which faeces was not observed around the pit-hole [OR : 8.13, 95%CI (3.4,19.09)].

Children from households in which *flies were observed around the pit* are about seven times more likely to have diarrhoea compared to households in which flies were not observed in their toilet pit-hole [OR: 7.89, 95%CI (3.28, 18.97)].

Children from the households *having a hand washing facility* are 80% less likely to have diarrhoea than children from the households who have no hand washing facility [OR: 0.092, 95%CI (0.022, 0.3)].

#### **4.5 DISCUSSION**

Diarrheal disease is a leading cause of child morbidity and mortality on the world, and mostly results from contaminated food and water sources (WHO 2007).

An estimated 94% of the diarrhoea burden is attributed to environment and associated risk factors such as unsafe drinking water, poor sanitation and hygiene (WHO 2007). Worldwide around 1.1 billion people lack access to improved water and 2.4 billion have no access to basic sanitation (WHO/UNICEF 2012).

A number of studies revealed that environmental factors including access to toilet facilities and hygienic management of the toilets, safe and adequate water supply and water handling practices and hand washing practices contributes to the prevention of under five diarrhoea disease (Christa et al 2010, Choyon 2012, Mutunga 2007 and Cynta et al 2008). Interventions to improve environmental factors and related behaviour such as cleaning the toilets, hand washing and safe drinking water management were reported to reduce diarrhoea morbidity (WHO / UNICEF 2012).

This study was designed to assess whether these facts are holding true in Addis Ababa, (capital city) Akakikality sub city districts, 5 and 8. The study used a representative sample of households with at least one under five child in the study context in Addis Ababa. The study presented findings from community based analytical cross-sectional survey of the study area, Akakikality sub city.

The two-week period prevalence of childhood diarrhoea morbidity in this study was 12.7%. The finding is almost similar to the EDHS survey which demonstrated a prevalence of 13% over a two-week period of diarrhoeal morbidity (EDHS 2011).

Ownership of consumer durables such as television and refrigerators are used as an indicator of better wealth level. Moreover, TV can be considered as a means of getting health information as to how diarrhoea can be prevented and refrigerator may contribute to food preservation which helps to prevent food related diarrhoea.

In this study availability of television had an association with the occurrence of childhood diarrhoea in under five year olds ( $P < 0.001$ ). Children from the households having television sets are 63% less likely to have diarrhoea when compared to children from households having no television [OR: 0.37, 95%CI 0.24, 0.19.]. These variables disappeared when further regression were employed and did not show an association when other socioeconomic and environmental factors are controlled in the logistic regression. This was almost the same case for refrigerator ownership. Children from the households having refrigerators are 57% less likely to have diarrhoea when compared to those children from the households having no refrigerator [OR : 0.43, 95%CI 0.22, 0.83]. This is in agreement with another study which reported that, children from households owning consumer durables are less likely to have diarrhoea (Muluken 2009).

Like that of the faeces, In this study children from households in which flies were observed around the toilets' pit-holes have a significant association ( $P < 0.001$ ) with under five childhood diarrhoea. Children from households in which flies were observed in their toilet's pit hole/slab were five times more likely to have diarrhoea compared to children from households in which flies were not observed in their toilet pit-hole [OR: 5.551, 95%CI (2.62, 11.77)]. The mere presence of a toilet does not suffice the effort to prevent disease occurrence and transmissions but the proper and hygienic utilisation and management of toilets is vital to disease prevention including childhood diarrhoea.

In this study a strong association was also observed between under five childhood diarrhoea and hand washing ( $p < 0.001$ ). Children from the households having designated hand washing facilities (proxy indicator) were 89% less likely to have diarrhoea compared to children from households who had no separate hand washing

facilities [OR: 0.11, 95%CI (0.027,0.45)]. This is in agreement with the study done in Dhaka where washing hands after cleansing of children's faeces was studied (Girma et.al 2007).

In this study a significant association was not observed between the sources of drinking water and under five childhood diarrhoea. This finding is in an agreement with the study done in Nekemt (Girma et al 2007). In contrary to this finding, the study reported that drinking water source was an important environmental determinant of diarrheal morbidity and children from households who claim to use water from improved sources had less likelihood of diarrhoea compared to those children from the households who obtain water from unimproved sources (Muluken 2009). The difference between the findings of these two studies might be due to the difference in respect to the water supply access and coverage in the two study areas. Recent study was done in urban area where there was no much difference between the households with respect to the water supply sources and almost all the households were getting water from improved water sources.

In this study the amount of water consumption per day (Water per capita) did not show significant association with the under five child hood diarrhoea which was in agreement with the study done in Nekmte (Girma et al 2009) but it was not in agreement with other studies which showed high diarrhoea morbidity in the households using less water consumption per day (Muluken 2009). The difference might be due to the difference in the socioeconomic and environmental background of the study populations.

In this study there was no significant association between household water treatment and under five childhood diarrhoea which is in contrast with a study done in urban Dhaka which showed that children who drank un-boiled water had a higher risk of contracting diarrhoea as compared to those who drank boiled water (Jahangiralam 2008).

#### **4.6 CONCLUSIONS**

Therefore by employing the logistic regression, it was found that the type of drinking water container (Narrow mouth versus wide mouthed), the presence of faeces and flies around the pit-hole and access of the households to separate hand washing facilities

remained the independent risk factors or predictors of under five childhood diarrhoea in Addis Ababa Akakikality sub city districts,5 and 8.

## **CHAPTER 5**

### **CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS**

#### **5.1 INTRODUCTION**

The researcher observed that there was a constant flow of sick children with diarrhoea to the clinics in Addis Ababa. The purpose of this study then was to investigate the environmental factors that impact on under five childhood diarrhoea in Akakikality sub city of Addis Ababa, Ethiopia. Objectives of the study were to determine the prevalence of diarrhoea in children under five years old in Akakikality sub city and to determine the environmental factors that impact on diarrhoea in children under five years old in Akakikality sub city. These objectives were reached (refer back to chapter 4).

#### **5.2 RESEARCH DESIGN AND METHODOLOGY**

A non-experimental approach was used in this descriptive and analytical quantitative study using a cross sectional study design. A self-designed questionnaire was used as research instrument. The study was conducted in Akakikality sub city, districts 4, 5 and 8 in Addis Ababa. The target population for this study was comprised of mothers and caregivers of all under five children found in Addis Ababa.

The sample size was determined based on the prevalence of diarrhoeal disease for Ethiopian children under five years old which is 13% (EDHS 2011:168). The sample size for this study was 299 mothers or caregivers of children under five years old.

#### **5.3 CONCLUSIONS AND INTERPRETATION OF THE RESEARCH FINDINGS**

In this study children from households who claimed to use narrow mouthed drinking water containers for water storage had an 80% less chance to contract diarrhoea than children from households who use wide mouthed drinking water containers. Children from households in which faeces were observed around the hole of the latrine as well as on the slab around the toilet, had a bigger chance to contract diarrhoea as compared to those children from houses where the hole and slab were clean. Children from

households in which flies were observed around the latrine, have a bigger chance to contract diarrhoea as compared to households where flies were not observed around the latrine. Children from households with hand washing facilities were less likely to contract diarrhoea than children from the households who have no hand washing facility. The two-week period prevalence of childhood diarrhoea morbidity in this study is 12.7%.

#### **5.4 RECOMMENDATIONS**

- As this study reveals many toilets were not hygienically managed and they were not clean which was evidenced by the faeces and flies observed around the latrine hole and slab. Therefore health promotion regarding the hygienic management of the toilets and improving cleanliness of toilets is recommended to reduce childhood diarrhoea.
- The study aimed to contribute to the achievement of the national targets set by the government of Ethiopia in the Universal Access Plan (UAP) in order to reach 100% coverage of safe water supply and hygienic sanitation by 2015. It is recommended to strongly promote the improvement of sanitation facilities.
- Health promotion should also be focused on safe water handling and it should include proper and safe collection, transportation and storage of water using narrow mouthed containers.
- It is recommended that hand washing facilities with water and soap availability near by the toilet should be promoted. People should be educated to always wash hands after using toilets and also before handling foods and drinks.
- Akakikality sub city is congested with many factories, in which case there is a possibility of leakage of industrial waste to the environment resulting in pollution. It is recommended to conduct a study to investigate possible environmental factors related to industrial waste that may contribute to childhood diarrhoea.
- Research studies related to the topic of this study but in other research contexts could be undertaken.



## **5.5 CONTRIBUTION OF THE STUDY**

The results of this study will be of help to policy makers, researchers and local implementers to serve as a baseline to do further research in order to plan and design child survival strategies locally, nationally and regionally.

It was shown that to promote and establish clean toilet facilities will be an important means of preventing diarrhoeal diseases – especially in young children.

## **5.6 LIMITATIONS OF THE STUDY**

- All diarrhoea cases were based on self-reporting from respondents without confirmation from a health practitioner, laboratory or any health record. Therefore there might be a reporting bias.
- The risk of childhood diarrhoea varies by season. It is high in summer and low in winter. The data were collected at one point in time namely during winter. The generalisability of findings are limited to the dry season.
- The cross-sectional research design means that the ability to make casual inferences from the results is limited.
- This study tried to investigate the environmental factors associated with childhood diarrhoea, but the study didn't investigate the association of industrial wastes with childhood diarrhoea, as the Akakikality sub city is well known for the presence of a large number of factories that may pollute the environment.

## **5.7 CONCLUSION**

The researcher tried to make a contribution to the promotion of the health of children under five years old by identifying factors that impact on diarrhoea in children under five years old. If recommendations of this study could be implemented, a real difference could be made in this regard.

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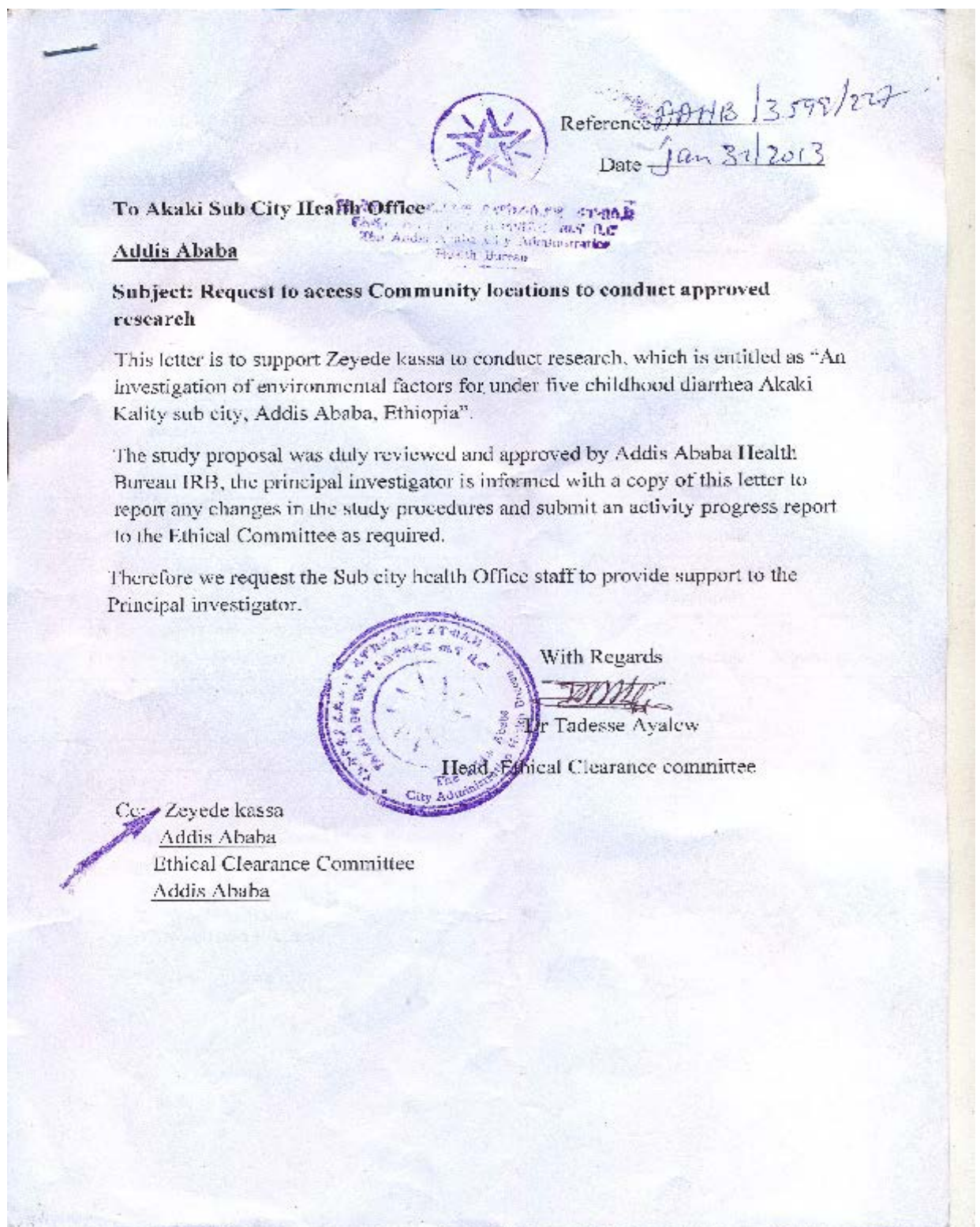
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**Annexure I: Permission from the Health Authority**





## Annexure II: Ethical Clearance Certificate



**UNIVERSITY OF SOUTH AFRICA**  
**Health Studies Higher Degrees Committee**  
**College of Human Sciences**  
**ETHICAL CLEARANCE CERTIFICATE**

HS HDC/109/2012

Date: 29/11/2012

Student No: 46461035

Project Title: **AN INVESTIGATION OF ENVIRONMENTAL FACTORS FOR UNDER FIVE CHILDHOOD DIARRHOEA: AKAKI KALITY SUB CITY, ADDIS ABABA, ETHIOPIA.**

Researcher: MANDEFRO Z.K.

Degree: **Masters in Public Health**

Code: DIS4986

Supervisor: Prof A. Botha  
Qualification: DPhil et Litt  
Joint Supervisor: n/a

**DECISION OF COMMITTEE**

Approved

Conditionally Approved

*P.P. [Signature]*

Prof L. Roats  
CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE

*P.P. [Signature]*

Dr MM Moleka  
ACTING ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

## **Annexure III: Consent form for Respondents**

### **Participant CONSENT Form**

Greetings

My name is \_\_\_\_\_; I am going to collect information for a study on childhood diarrhoea to investigate the environmental factors associated with it. The aim of the study is to investigate the environmental factors and recommend strategies in the reduction of diarrhoea in under five children in Akakikality sub city.

The study has approved by the ethical clearance committee of the University of South Africa (UNISA) and Addis Ababa Health bureau.

I assure you that the information you are going to give will be kept in secret and no names will be attached to the study. Therefore, you are free to respond or not to respond to the questions. Your support and willingness in responding the questions will be very important for the success of this study.

Do you agree to participate in this study?

Yes\_\_\_Signature\_\_\_\_\_No\_\_\_\_\_

THANK YOU FOR YOUR COOPERATION

## Annexure IV: Questionnaire

### QUESTIONNAIRE

*INVESTIGATION OF FACTORS CONTRIBUTING TO IN UNDER FIVE CHILDHOOD DIARRHOEA IN AKAKI KALITY SUB CITY, ADDIS ABABA , ETHIOPIA.*

#### **PART I. IDENTIFICATION**

001. Mother's ID number/code \_\_\_\_\_

002. Address: Woreda/ district \_\_\_\_\_ Kebele: \_\_\_\_\_ House number: -----

003. Number of persons living in the household \_\_\_ Male \_\_\_\_\_ Female \_\_\_\_\_ Total-----

004. Number of under five children in the household \_\_ Male \_\_\_\_\_ Female \_\_\_\_\_ Total \_\_\_\_\_

#### **PART II. LIST ALL UNDER FIVE CHILDREN PRESENT IN THE HOUSEHOLD**

**\*\* Mark " √ "if the child has diarrhoea, and mark "X "if he/she hasn't**

S. No	Name of the child	Age	Sex	Diarrhoea at the time of the survey	Diarrhoea within the last two weeks
1					
2					
3					
4					

#### **PART III. DEMOGRAPHIC AND ECONOMIC DATA (down)**

<b>NO</b>	<b>QUESTIONS</b>	<b>RESPONSES</b>
101	Relation of the respondent to the index child	<ol style="list-style-type: none"> <li>1. Mother</li> <li>2. Care taker</li> </ol>
102	Age of mother or caretaker	-----years
103	Marital status of the mother or caregiver	<ol style="list-style-type: none"> <li>1. Married</li> <li>2. Divorced</li> <li>3. Single</li> <li>4. Widowed</li> <li>5. Separated</li> </ol>
104	Type of marriage	<ol style="list-style-type: none"> <li>1. Monogamous</li> <li>2. Polygamous</li> </ol>
105	Religion of parents/caretaker	<ol style="list-style-type: none"> <li>1. Christian</li> <li>2. Muslim</li> <li>3. Other (specify)</li> </ol>
106	Ethnic group of parents/caretakers	<ol style="list-style-type: none"> <li>1. Amhara</li> <li>2. Oromo</li> <li>3. Tegrer</li> <li>4. Others (specify)</li> </ol>
107	Educational level of mother/caretaker	<ol style="list-style-type: none"> <li>1. Formal education (last grade completed _____)</li> <li>2. Read and write</li> <li>3. Read only</li> <li>4. Neither</li> </ol>
108	Occupation of the mother/caretaker	<ol style="list-style-type: none"> <li>1. Housewife</li> <li>2. Government or other sector employee</li> <li>3. Own income generating work</li> <li>4. Other (specify)</li> </ol>
109	Age of the child's father	-----years
110	Educational level of the father	<ol style="list-style-type: none"> <li>1. Formal education (last grade completed-----)</li> <li>2. Read and write</li> <li>3. Read only</li> <li>4. Neither</li> </ol>

111	Occupation of the father	1. Government Employee 2. Factory employee 3. Merchant  4. No job  5. Other (specify
112	Monthly income of the family in ETH. Birr	_____Birr
113	Does the family own a television?	1. Yes  2. No
114	Does the family own a refrigerator	1. Yes 2. No
115	Does the family own private house	1. Yes  2. No
116	If no, for Q115 what is the ownership of the house	1. Rental from the kebele/district 2. Rental from landlords 3. Other / specify /
117	If rental to Q 116, do the family afford to pay for the house rent?	1. Yes  2. No
118	Does the house have a kitchen?	1. Yes 2. No
119	Do you send all the children of school age to school?	1. yes 2. No
<b>PART IV. ENVIRONMENTAL FACTORS</b>		
201	Type of floor material of the house? <i>(OBSERVATION)</i>	1. Mud                      3. Cement 2. Wood                    4. Other (specify
202	Does the house have a ceiling? <i>(OBSERVATION)</i>	1. yes 2. No
203	Do domestic animals live in the same house where the members of the family live?	1. Yes

	(OBSERVATION)	2. No
204	Number of rooms in the house	_____
205	Is a latrine available?	1. Yes 2. No (If No, skip to Q212)
206	If yes in Q205, what type of toilet is it?	1. Improved pit latrine 2. Unimproved pit latrine 3. Ventilated pit latrine 4. Water flush or water pour latrine 5. Other/ specify
207	Ownership of the latrine	1. Privately owned 2. Shared with neighbours 3. public latrine
208	Is faeces seen around the pit-hole (or on the floor of the toilet room)?  (OBSERVATION)	1. yes 2. No
209	Does the latrine have hole cover?	1. Yes 2. No
210	Is faeces seen around the house (or in the compound)?  (OBSERVATION)	1. Yes 2. No
211	Do flies seen around the toilet or the house? OBSERVATION	1. Yes 2. No
212	If the family has no latrine, where do they use?	1. In open field 2. In the ditch 3. Potty 4. Other/specify \
213	Where do you dispose of children's faeces?	1. Dispose in open field 2. Burry 3. In the toilet 4. Other( specify)
214	Do you have hand washing facility around the toilet? ( only for those having toilet) OBSERVATION	1. Yes 2. No
215	If yes to Q 214, does the hand washing system have water? OBSERVATION	1. Yes 2. No
216	Is there soap or ash at the sides of the hand washing facility? OBSERVATION	1. Yes 2. No
217	When do you wash your hands mostly?	1. Before feeding the child 2. Before breast feeding

	(Multiple response )	<ol style="list-style-type: none"> <li>3. After cleaning baby bottom</li> <li>4. After cleaning baby potty.</li> <li>5. Multiple response</li> </ol>
218	Where do you dispose of refuse?	<ol style="list-style-type: none"> <li>1. Pit</li> <li>2. Open field</li> <li>3. Burning</li> <li>4. Garbage sack</li> <li>5. Garbage barrel / can</li> <li>6. Other/ specify</li> </ol>
219	Where do you dispose liquid kitchen wastes (waste water)?	<ol style="list-style-type: none"> <li>1. In the pit</li> <li>2. In the backyard</li> <li>3. In open ditch</li> <li>4. Other/specify/</li> </ol>
220	From where do you get water for drinking? (OBSERVATION of the water sources if it is nearby )	<ol style="list-style-type: none"> <li>1. household connection</li> <li>2. public stand</li> <li>3. private vendors</li> <li>4. Protected well/spring</li> <li>5. Unprotected well/spring</li> <li>6. River</li> <li>7. Rain water</li> <li>8. Other (specify)</li> </ol>
221	How much do you pay for domestic water per month ( in birr)	_____Birr
222	Distance of the water sources from the house ( if no connection in the house or yard)	_____minutes or _____ meter
223	How many litres of water do you fetch or use in a day?	_____litter
224	Type of water container	<ol style="list-style-type: none"> <li>1. narrow mouthed container</li> <li>2. wide mouthed container</li> </ol>
225	Cover for water container	<ol style="list-style-type: none"> <li>1. In a covered container</li> <li>2. In an uncovered container</li> <li>3. Other (specify)</li> </ol>
226	Do you store water in the house?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
227	Where do you keep water containers?	<ol style="list-style-type: none"> <li>1. On a table ( raised place)</li> <li>2. On the ground</li> </ol>
228	Do you treat your drinking water in the house?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>

229	If yes to Q228, what do you use to treat the water?	1. Boiling 2. Chemicals 3. Others ( specify)
-----	---	--

**PART V. INFORMATION ABOUT THE INDEX CHILD**

*Ask the mother/caregiver about the child with diarrhoea, or if there is no child with diarrhoea, ask about the child who is younger than the others.*

301	Age of the index child	_____ months
302	Sex of the index child	1. Male    2. Female
303	Where was your child born?	1. Health institution    2. Home
304	Birth order of the index child	1. First                    3. Third 2. Second                4. Fourth & above
305	Do you (the mother/caregiver) have a history of diarrhoea in the past two weeks?	1. Yes    2. No
306	Have you ever breast-fed your child?	1. Yes    2. No (If no, go to Q 408)
307	For how long did you breastfed your child?	_____ months
308	What is his/her current breastfeeding status?	1. Exclusive breastfeeding 2. Partial breastfeeding 3. Not breastfeeding
309	At what age the child started supplementary /weaning food?	_____ months
310	Did the child receive measles, Rota and H1N1 vaccination?  <i>(Ask for children of age greater than nine months, look the vaccination card)</i>	1. Yes, <i>(by the response of the respondent)</i> 2. Yes, <i>(by checking the card)</i> 3. No
311	Does your child have diarrhoea today?	1. Yes    2. No , <i>if yes go to question</i>



		<i>312-314 , If no skip to q.315</i>
312	For how long does the child have the diarrhoea?	1. Less than 14 days 2. Greater than 14 days
313	If the child has diarrhoea today, how many times a day he/she passes stool?	1. Three times 2. More than three times 3. Don't know
314	The type of diarrhoea that the child had	1. Watery    2. Blood and mucus
315	Does your child have diarrhoea within the past two weeks?	1. Yes, 2. No
316	What actions did you take to treat/stop the diarrhoea?	1. Take him/her to health institution 2. Take him/her to traditional healer 3. Increase feeding 4. Give him/her ORS 5. Give him/her cereal based fluids 6. Stop/decrease feeding 7. Homemade treatment 8. Other (specify)
317	What do you think is the causes for your child's diarrhoea?	
318	How many of your children have diarrhoea within the last two weeks?	_____

Date of interview: \_\_\_\_\_

Name of Interviewer: \_\_\_\_\_

Signature: \_\_\_\_\_

## ANNEXURE V: DATA ANALYSIS

### BIVARIATE ANALYSIS

VARIABLES	CHILD HOOD DIARRHOEA		ODDS RATIO (95% CI)	P-VALUE
	YES (%)	NO (%)		
TOILET				
Yes	31(12.5%)	248(87.5)	0.232( 0.110,0.441)	0.02
No	7 (35)	13(65)	1.368(1.085 -1.723)	
TOILET COVER				
Yes	5 (5.7%)	82(94.3)	0.429(0.17, 1.079)	
No	26(13.5)	166(86.5)	1.09(1.01, 1.174)	
FAECES SEEN INSIDE THE TOILET				
Yes	23 ( 26. 2 )	62(73.8)	6.202(2.89 , 13.31)	0.00
No	8 (4.3)	186( 95 .7 )	0.774( 0.68, 0.87)	
FLIES SEEN AROUND THE TOILET HOLE				
Yes	26 (24.7)	79 ( 75.3)	5.551(2.62,11.77)	0.00
No	7(4)	167(96)	0.783(0.698,0.88)	
HAND WASHING				
Yes	2 (1.85 )	106 (98.2 )	0.110 ( 0.027, 0.451	0.001
No	29 ( 16.95 )	142(83.1 )	1.181(1.098, 1.27)	
TYPE OF WATER CONTAINER				
Narrow mouthed	13 ( 34.3)	187( 72.4)	0.25( 0.140, 0.445)	
Wide mouthed	25( 65.7)	71( 27.6)	1.264(1.154-1.4)	
WATER CONTAINERS COVER				
Have cover	16 (42.2)	194 (75.2)	0.298(0.174,0.509)	0.000

Do not have cover	22(57.8)	64 (24.8)	1.241( 1.188, 1.37)	
ASSET OWNERSHIP				
OWN TELEVISION				
Yes	22(9.3)	213(90.7)	0.377(0.240, 0.59)	0.01
No	16(25)	48(75)	1.27(1.10,1.46)	
REFRIGERATOR				
Yes	6 (6.1)	91(93.9)	0.437(0.23,0.83)	0.024
No	32(15.8)	170(84.2)	1.133(1.05,1.23)	
ANIMAL LIVING WITH HUMAN IN THE HOUSE				
Yes	16 ( 25.8)	46(74.2)	2.76(1.76,4.32)	0.001
No	22(8.4)	237(91.6)	0.782(0.679, 0.9)	

Where faeces was observed around the toilet pit-hole Odds Ratio (OR) 6. 202 (2.89 to 13.31), flies observed around the toilet pit-hole OR: 5.55,( 2.62 to 11.77), absence of separate hand washing facility OR 1.18 (1.098 to 1.269), type of water collection material, wide mouthed OR 1.264 (1.154 to 1.384), presence of cover for the water collection/storage container, monthly income, and cohabitation of animals with human in the households OR 2.76 (1.76 to 4.32) (  $p < 0.01$ ), sources of domestic water supply and ownership of refrigerator were found to be significantly associated with under five childhood diarrheal morbidity at a  $P < 0.05$  ) (Table 4). Further logistic regression model was employed to evaluate associations between independent variables and dichotomous variables designed to measure environmental factors including availability of toilet, faeces and flies observed in the toilet pit- hole cover, which is indicative of the hygienic use and keeping clean of the toilet, availability of hand washing facility which is a proxy indicator to assess the level of hand washing, type of water collection material and water container cover which is indicative of the safe storage of water ( safe storage of water at household), existence of household items like television which is again a proxy indicator to measure the households / mother or care takers access to health information and availability of refrigerator which ideally helps to preserve food and reduce the likelihood of food poisoning related diarrhoea and the cohabitation of

pet animals with people as an indicator of environmental hygiene(housing) in relation to under five childhood two weeks diarrhoea morbidity during the survey.

In the logistic regression model, variables which were found to be associated significantly in a bivariate analysis were re-evaluated independently by controlling for other potential confounders. Hence, most of the variables which were significantly associated with diarrhoea disappear and only few variables such as type of drinking water container, the presence of faeces and flies around the pit-hole and ownership of hand washing facility remained to be independent risk factors/predictors of under five childhood diarrhoea morbidity.