2016-10-05

Prevalence and Associated Risk Factors of Diarrhea in under Five Children Attending Emdiber Health Centre in Cheha Woreda, Gurage Zone, Southern Ethiopia.

Bediru, Jemal Mirco

Prevalence and Associated Risk Factors of Diarrhea in under Five Children Attending Emdiber Health Centre in Cheha Woreda, Gurage Zone, Southern Ethiopia.

BY

Bediru Jemal Mirco

A Thesis Submitted to Department of Biology Presented in Partial Fulfillment of the Requirement for the Degree of Masters in Biology.

Bahir Dar University

Bahir Dar, Ethiopia

January, 2016

BAHIR DAR UNIVERSITY
SCHOOL OF GRADUATE STUDIES
COLLAGE OF SCIENCE, PROGRAM OF BIOLOGY

Prevalence and Associated Risk Factors of Diarrhea in under Five Children Attending Emdiber Health Centre in Cheha Woreda, Gurage Zone, Southern Ethiopia.

A Thesis Submitted to Department of Biology presented in Partial Fulfillment of the Requirement for the Degree of Masters in Biology.

Advisor

Wassie Anteneh (PhD)

Bahir Dar University
Bahir Dar, Ethiopia
January, 2016

Bahir Dar University
School of Graduate Studies

As a thesis research advisor, I hereby certify that I have read and evaluated this thesis prepared under my guidance by Bediru Jemal Mirco entitled ‘‘Prevalence and Associated Risk Factors of Diarrhea in under Five Children Attending Emdiber Health Centre in Cheha Woreda, Gurage Zone, Southern Ethiopia’’. I recommend this thesis be submitted as fulfilling the requirement for the degree of MSc in Biology.

---------- ---------- ----------

Advisor Signature Date

As members of the examining board of the final MSc thesis open defense, we certify that we have read and evaluated the thesis prepared by Bediru Jemal Mirco and examined the candidate. We recommend that the thesis be accepted as fulfilling the requirement for the degree of MSc in Biology.

---------- ---------- ----------

Chair person Signature Date

---------- ---------- ----------

External examiner Signature Date

---------- ---------- ----------

Internal examiner Signature Date

Declaration

I declare that this MSs thesis is my original work that has not been presented in any university for fulfillment of degree, and all the sources of material in this thesis have been fully acknowledged**.**

---------- ---------- ----------

Name Signature Date

As a thesis research advisor, I hereby certify that I have read and evaluated this thesis prepared under my guidance by Bediru Jemal Mirco entitled ‘‘Prevalence and Associated Risk Factors of Diarrhea in under Five Children Attending Emdiber Health Centre in Cheha Woreda, Gurage Zone, Southern Ethiopia’’. I recommend this thesis be submitted as fulfilling the requirement for the degree of MSc in Biology.

---------- ---------- ----------

Advisor Signature Date

ACKNOWLEDGEMENT

I am deeply indebted to several people without whom the completion of this research would have been impossible. First and for most I would like to express my dearest sense of appreciation and sincere thanks to my advisor Dr. Wassie Anteneh who from the very beginning supported me in all stages of the study with full interest, for his encouragement in my time of difficulties. Meanwhile conducting the study and for his patience to read the thesis and provide valuable comment and suggestion in doing the thesis. I would like to thank Department of Biology, College of science, Bahir-Dar University, for its coordination and support for the successful completion of my study. I am deeply indebted to my employer, Cheha Woreda educational office, particularly Ashenafi Beshir, the head of the office, who ensured that I was granted time off when I requested during my study. A lot of appreciation to health office of the Woreda for its cooperation during the study and mothers/caregivers and their children for their participation in the study. Lastly, I wish to thank my parents, my brothers and sisters for their encouragement and support at the course of the thesis.

ACRONYMS AND ABBREVIATIONS

AIDS ---------- Acquired immune deficiency syndrome

APW----------Alkaline peptone water

CDD ----------Control of diarrheal diseases

CI----------Confidence interval

DHS ----------Demographic and Health Survey

EAggEC ----------Entero aggregative *Escherichia coli*

EPEC----------Entero pathogenic *Escherichia coli*

ETEC----------Entero toxigenic *Escherichia Coli*

HIV----------Human immune deficiency virus

MMT----------Morbidity-Mortality and Treatment

MOH----------Ministry of Health

NHPs----------National health programs

NIHE----------National Institute of Hygiene and Epidemiology

OR----------Odds ratio

ORS----------Oral rehydration salts

ORT ---------- Oral rehydration therapy

SNNPRS ----------South Nations Nationalities and Peoples Regional State

UNICEF----------United Nations International Children's Emergency Fund

USAID----------United States Agency for International Development

WHO----------World Health Organization

WWD----------World water day

Operational Definitions

Condition of Latrine households with functional latrines and whether the family disposes the faces of their under five children in the latrine, no observable feces in the compound, observable fresh or old feces through the squat hole or on the slab.

Diarrhea is defined as more than three loose watery stools passed in a twenty-four hour period.

Distance of latrine from the house the location of latrine from the house.

Hand washing technique at critical time defined as the habit of washing hands mainly after visiting a larine, before eating, before handling food/cooking, and after cleaning a baby's bottom.

Index child refers to a child that will be included in the study from a household to have information on the demographic and health characteristics, and also to calculate the prevalence of diarrheal morbidity.

Sanitation facility is defined as a functioning excreta disposal facility, a toilet or latrine.

Table of content

Contents page

List of tables

List of Figures

List of annexes

ABSTRACT

Diarrheal disease due to inadequate quantities and quality drinking water, lack of sanitation facilities and poor hygiene remain a leading cause of preventable death among millions of the world's poorest people each year, especially among children under-five years of age in developing countries. Each year, an estimated 2.5 billion cases of diarrhea occur among children under-five years of age.

The main objective of this study was to see prevalence and associated risk factors of diarrhea in under five children attending Emdiber Health Centre in Cheha Woreda, Gurage Zone, Southern Ethiopia. This study was done using a cross-sectional design. By using convenient sampling technique, children less than five years attended to Emdiber Health Centre from September 12th to November 28th, 2015 were selected for the study. Mothers were interviewed. This study showed that the prevalence of diarrhea at the Cheha Wereda was 24.7%. The multivariate analysis identified index child sex, unsafe drinking water source, unclean water container, absence of cover for water container, unavailability of latrine, not washing hands at all critical moments and reusing stored food without heating had a significant association with the risk of childhood diarrhea. The results showed that male (AOR = 3.01 (1.1-8.24)) were about 3 times more likely to be infected with childhood diarrhea compared to females. Households who had used rive or stream water sources (AOR=9.75 (3.18-29.88)) were more likely to have an increased risk of childhood diarrhea than households who used piped water. The risk of diarrhea were significantly two times higher for those children whose households have been using a water storage container without a cover (AOR = 2.95(1.1-7.79)) in contrast to those family using the same instrument but with a cover. The result showed that cleaning water container only sometimes (AOR =6.56 (2.02-21.3)) and those mothers who do not clean at all had higher risk causing the episode compared to those households cleaning daily or always. Unavailability of latrine had about 6.96 times increased rate of causing this health problem on children under-five years of age. This study revealed that washing hand only before preparing food (AOR=3.35 (1.05-10.73) showed significant association with childhood diarrhea. Mothers washing their hand after serving a child only (AOR=9.71) were found to have a significant risk on their children's diarrhea status. Finally, the likelihood of developing diarrhea among children who are fed stored food without heating was 3.71 times higher in contrast to those served after heating it. Among the total 288 participants recruited into the study, the number of diarrhea-infected boys was higher than girls. This indicates male children had higher prevalence of diarrhea disease compared to females. It is strongly recommended

that local government, NGOs, and other stakeholders to support the local community with facilities that can improve sanitary or hygienic practices and educate the society about health-related issues.

Key words: under-five children, prevalence, sanitations, hygiene, childhood diarrheal morbidity, risk factor, Gurage Zone and Cheha Woreda.

CHAPTER ONE: INTRODUCTION

1.1Background

Inadequate quantity and quality of drinking water, lack of sanitation facilities, and poor hygiene cause deaths of millions of people especially children. With improvement in the quality of drinking water, there is evidence of increased health benefits. Increasing the quantity of water allows for better hygiene practices. Raising the quality of drinking water reduces the ingestion of pathogens. Health authorities generally accept that microbiologically safe water plays an important role in preventing outbreaks of water borne diseases (WHO, 2002). With less disease, children can eat and absorb more food, thereby improving their nutritional status. Also, a healthier adult population is a more productive population, and improvements in water and sanitation can improve income and the capacity to acquire food. Other benefits associated with better water delivery include time savings for primary caregivers, which can result in the preparation of more or better food for children (Bergeron & Esrey, 1993).

However, an estimated 2.6 billion people or 39% of the world's population lack access to improved facilities for the disposal of human excreta, such as a basic pit latrine, a toilet connected to a septic tank or piped sewer system, or a composting toilet. In low-income regions, where people are most vulnerable to infection and disease, only one in two people is covered by improved sanitation. More than one billion people still practice open defecation. In sub-Saharan Africa and Southern Asia coverage is just 31% and 33%, respectively. While the global population in 2006 is about equally divided between urban and rural dwellers, more than seven out of 10 people living without improved sanitation are rural inhabitants (WHO & UNICEF, 2010 a).

In developing world, almost half lacks access to sanitation. Coverage rates are shockingly low in many of the world's very poorest countries: only about one person in three in sub-Saharan Africa and South Asia has access, in Ethiopia the figure falls to about one in seven (Human Development Report, 2006).

Additionally, in the WHO Africa Region, a total of 44% of the631 million people of the region had no access to adequate sanitation in 1999 (WHO, 2000). In Ethiopia access to water supply and sanitation is the lowest in sub-Saharan Africa and the entire world. According to data from the Joint Monitoring Program for Water Supply and Sanitation of WHO and UNICEF, which are in turn based on data from various national surveys including

the 2005 Ethiopia Demographic and Health Survey (DHS), access to an improved water source and improved sanitation was estimated as follows in 2008: 38% for improved water supply (98% for urban areas and 2% for rural areas) and 12% for improved sanitation (29% in urban areas, 8% in rural areas) (WHO/UN1CEF, 2008). According to a report by WHO/UNICEF, 2008) on global statistics on children, water and hygiene, water supply, sanitation and diarrhea are closely related. Poor hygiene, inadequate quantities and quality of drinking water and lack of sanitation facilities cause millions of the world's poorest people to die from preventable diseases each year. Women and children are the main victims. The link between water, sanitation and diarrhea include: contaminated water that is consumed and may result in waterborne diseases including viral hepatitis, typhoid, cholera, dysentery and other diseases that cause diarrhea. In some areas like Turkana, the prevalence rate is 42% (WHO/UNICEF, 2008). Inadequate water, sanitation and hygiene account for a large part of the burden of illness and health in developing countries. Approximately 4 billion cases of diarrhea per year cause 2.2 million deaths, most of them children under the age of five with about 15% of deaths in developing countries. Diarrheal diseases account for 4.3% of the total global burden. An estimated 88% of this burden is attributable to unsafe drinking water supply, inadequate sanitation and poor hygiene. These risk factors are second after malnutrition in contributing to burden of diarrhea (WHO/UNICEF, 2008).

Generally, water supply, sanitation, and hygiene and health are closely related. Inadequate quantities and quality of drinking water, lack of sanitation facilities, and poor hygiene cause millions of the world's poorest people to die from preventable (primarily diarrheal) diseases each year. Women and the main victims (World Bank, 2003).

1.2 Statement of the Problem

Each year, an estimated 2.5 billion cases of diarrhea occur among children under five years of age. More than half of these cases are in Africa and South Asia (Boschi *et al.*, 2009). World Health Organization (WHO) estimated that for every 100 children of 0-5 years of age, there are 1.4 deaths from diarrhea every year (Lemma & Sileshi, 1997).

In Africa and especially sub-Saharan Africa, diarrheal diseases account for over 90% of deaths in children below five years old (WHO, 2000). This has been attributed to lack of safe drinking water, sanitation and hygiene as well as poor nutrition (WHO, 2000). In the continent, a child experiences five episodes of diarrhea per year, and 800,000 children die each year from

diarrhea related dehydration (Woldemiehael, 2001). In Ethiopia, morbidity reports and community-based studies have shown that diarrheal disease is a major public health problem that causes excess morbidity and mortality in children (WH0, 2002). Morbidity-Mortality-and Treatment (MMT) surveys conducted in Ethiopia at different time's revealed five diarrheal episodes per child/year; and the two-week incidence rate to be 26%. The diarrhea associated mortality rate is about 10/1000 under-five population (WHO, 2000).

A comparative study on difference of child health in urban areas of Brazil, Egypt, Ghana and Thailand showed that environmental factors such as drinking water sources, availability and quality of water, availability of toilet facility and housing condition are strongly associated with childhood diarrhea (Timaeus & Lush, 1995).

In Ethiopia, diarrheal diseases are also important child health problems. The age and cause-specific mortality rate was found to be 9.7 per thousand under-five population. The recent demographic and health survey reported that a two-week period prevalence of diarrhea in under-five children was 24 percent (DHS, 2000). However, the prevalence of diarrhea varied in different regions. Children living in the SNNP Region are more susceptible to episodes of diarrhea (25 %) than children living in the other region (EDHS, 2005).

The effect of improved water supply, sanitation , hygienic behavioral and socio-economic factors on the under-five diarrheal morbidity prevalence has been addressed in a number of studies in most of the developing countries and very limited number of studies conducted in rural community of our country, Ethiopia and not studied in Cheha Woreda, particularly. Arising from the observed serious public health problem and limited studies in the country, this research intended to study the effect of demographic, socio-economic, water, sanitation, and hygiene factors on under-five diarrheal morbidity prevalence in the rural community of Cheha Woreda, Southern Ethiopia.

CHAPTER TWO: LITRATUTE REVIEW

2.1 Diarrheal Morbidity Prevalence in Under Five Children

Globally, diarrhea is the second highest cause of mortality in children under five years of age (WHO/UNICEF, 2010 a). According to WHO Global Burden of disease 2004 estimates, diarrhea accounts for nearly 1.8 million deaths or 17% of under-five mortality each year in developing countries.

In Africa, a child experiences five episodes of diarrhea per year, and 800,000 children die each year from diarrhea related dehydration (Woldemichael, 2001) and diarrheal prevalence has been estimated to account for 25-75% of all childhood illnesses (WHO, 2003). WHO estimates that 85%to 90% of diarrhea illnesses in developing countries can be attributed to unsafe water, inadequate, sanitation and hygiene practices (Pruess *et al*., 2004).

A comprehensive analysis of 73 studies from 23 Sub-Saharan African countries showed that children under five years of age experience about five episodes of diarrhea each year. The analysis also showed that prevalence of childhood diarrhea ranged from 10.5 to 19 percent (Child Health Research Project, 1998).

In Ethiopia, diarrheal diseases are also important child health problems. The age and cause-specific mortality rate was found to be 9.7 per thousand under-five population (Ketsela, 1991). The recent demographic and health survey reported that a two-week period prevalence of diarrhea in under-five children was 24 percent (DHS, 2000). However, the prevalence of diarrhea varied in different regions. Children living in the SNNP Region are more susceptible to episodes of diarrhea (25 %) than children living in the other region (EDHS, 2005).

Other studies done in different parts of Ethiopia have also shown that diarrhea incidence and prevalence is very high among under-live children. According to a follow-up study in Butajira, the incidence of diarrhea was about two episodes /person/year (Muhe *et al.,* 1997). A community based study conducted in Keffa-Sheka Zone, Southern Ethiopia found a two-week childhood diarrhea prevalence of 15 percent (Teklemariam *et al*., 2000). The study from Jimma town, South West Ethiopia, showed a prevalence of 36.5 percent (Getaneh *el al.,* 1997). Another a community based study conducted in Nekemte town, western Ethiopia, found a two-week period prevalence of childhood diarrhea morbidity was 28.9% (Girma *et al*., 2008).

2.2. WHO DEFINITION OF DIARRHEA IN ETHIOPIA

Diarrhea is the second cause for clinical presentation in under five children next to pneumonia. It is more common in rural than urban areas. Diarrhea is defined as a child with loose or watery stool for three or more times during a 24 hours period (WHO, 2002).

2.3 THE MAIN CAUSATIVE AGENTS OF DIARRHEA

There are many causes of infectious diarrhea, which include viruses, bacteria and parasites. Norovirus is the most common cause of viral diarrhea in adults but Rotavirus is the most common cause of death in children under five years old. Adenovirus types 40 and 41 and Astroviruses cause a significant number of infections. The bacterium Campylobacter is a common cause of bacterial diarrhea but infections by genus of *Salmonella, Shigellae* and some strains of *Escherichia Coli (E.Coli)* are frequent. The organisms in the total coliform groups are called indicator organisms. Its presence in water requires an analysis of all water systems facilities and their operations to determine how these organisms entered the water system (Curtis *et al*., 2000).

2.4TRANSMISSION ROUTES

The infectious agents associated with diarrhea disease are transmitted chiefly through the fecal oral route (WHO, 2008). The wide variety of bacteria, viral and protozoa pathogens excreted in the feces of humans and animal are known to cause diarrhea. Among the most important of these are *Escherichia coli (E. coli), Salmonella spp*., *Shigella spp.*, *Campylobacter jejuni*, *Vibrio cholera*, *Rotavirus*, *Norovirus*, *Giandia lamblia*, Cryptosporidium sp; and *Entamoeba histolytica* (WHO/UNICEF, 2009). Bacteria agents as a group are believed to cause a majority of diarrheal diseases in developing countries, while viral and protozoa agents tend to cause more cases in developed countries (Huttl *et al*., 1997).

2.5 TYPES OF DIARRHEA

According to Banerjee *et al.*, 2003, based on clinical syndromes, diarrhea could be classified into four types, each reflecting a different pathogenesis, including acute watery diarrhea, dysentery, persistent or prolonged diarrhea and chronic diarrhea.

2.5.1 Acute watery diarrhea

This term refers to diarrhea characterized by abrupt onset of frequent, watery, loose stools without visible blood, lasting less than two weeks. Usually acute, watery diarrhea episodes

subside within 72 hours of onset. It may be accompanied by flatulence, malaise and abdominal pain. Nausea, vomiting may occur and also fever may be present. The common causes of acute watery diarrhea are viral, bacterial, and parasitic infections. Bacteria also can cause acute food poisoning. The enteric pathogens causing this diarrhea in developing countries are largely the same that are encountered in developed countries, but their proportions are different. In general, bacterial pathogens are more important in countries with poor hygienic conditions. The most important causes of this diarrhea in developing countries are Rotavirus, *Shigellae, entero toxigenic E. coli* (ETEC), *Vibrio cholerae*, *Campylobacter jejuni*, *entero pathogenic E. coli (EPEC), And Cryptosporidium* (Vasikari & Tourn, 1994).

The most dangerous complication is dehydration that occurs when there is excessive loss of fluids and minerals (electrolytes) from the body. With vomiting, dehydration becomes more severe. Dehydration is especially dangerous in infants and young children due to rapid body water turnover, high body water content and relatively larger body surface (Molbak, 2000). Patients with mild dehydration may experience only thirst and dry mouth. Moderate to severe dehydration may cause orthostatic hypotension with syncope (fainting upon standing due to a reduced volume of blood, which causes a drop in blood pressure upon standing), a diminished urine out put, severe weakness, shock, kidney failure, confusion, acidosis (too much acid in the blood), and coma.

2.5.2 Dysentery

May simply be defined as diarrhea containing blood and mucus in feces. The illness also includes abdominal cramps, fever and rectal pain. The most important cause of bloody diarrhea is *Shigella. Shigella* is a genus of bacteria with four species: *S. dysenteriae, S. flexneri, S. boydii and S. sonnei.* In developing countries, the main causative agents of dysentery are *S. flexneri, S. boydii and S. dysenteriae*, whereas *S. sonnei* is the main cause in developed countries (Abaram, 1995). *S. dysenteriae* typel (Sdl) is responsible for epidemic shigellosis. *S. dysenteriae* typel can result in severe complications including persistent diarrhea, septicemia (blood poisoning), rectal prolapse and haemolytic-uraemic syndrome (HUS). HUS is a serious condition affecting the kidneys and blood clotting system. *S. flexneri, S. boydii* and *S. sonnei* are usually less dangerous than *S. dysenteriae* type1 and they do not cause large epidemics (Waldman *et al.*, 1994).

Evidences showed that around 10 percent of diarrheal episodes in children under five years of age have visible blood in the stool. This 10 percent of episodes causes about 15 percent of

diarrhea-associated deaths in this age group (WHO, 1999). Disease caused by *S. dysenteriae* type1 tends to be more common in infants, and elderly and malnourished people. Mortality is also highest in these groups.

Other pathogens causing endemic dysentery in children include: *Campylobacter jejuni*, invasive strains of *E. coli* (EIEC), non-typhoid Salmonellastrains and *Entamoeba histolytica (Waldman et* al., *1994). Entamoeba histolytica* usuallycauses less than two percent of episodes of bloody diarrhea in children less than five years old (WHO, 1999).

2.5.3Persistent diarrhea

Is defined as diarrheal episodes of presumed infectious etiology that have an unusually long duration and last at least 14 days (vesikari & Torun, 1994). About 10 percent of diarrheas in children from developing countries become persistent, especially among those less than three years and more so among infants. The episode may begin acutely either as watery diarrhea or dysentery. This diarrhea causes substantial weight loss in most patients. It may be the responsible for about one-third to half of all diarrhea-related deaths. Since persistent diarrhea is a major cause of malnutrition in the developing countries, even the milder, non-fatal episodes contribute to the overall high mortality rates that are frequently associated with malnutrition in these countries.

2.5.4 Chronic diarrhea

This term refers to diarrhea which is recurrent or long lasting due to mainly non-infectious causes. Chronic diarrhea may be caused by gastrointestinal disease, may be secondary to systemic disease, and may be psychogenic in nature (Vesikari & Torun, 1994). Pathophysiologically, chronic diarrhea may be categorized as inflammatory diarrhea (caused by regional enteritis, ulcerative colitis), osmotic or malabsorptive diarrhea (resulted from lactose intolerance, tropical spruce, celiac disease, Whipple's disease, chronic pancreatitis, bile duct obstruction), secretary diarrhea (caused by medications, bowel resection, mucosal disease), dysmotility diarrhea (caused by conditions such as diabetic neuropathy or irritable bowel syndrome) and factitious (self-induced, e.g., from laxative abuse) diarrhea (Armon et al., 2001).

2.6Determinants of diarrheal morbidity

2.6.1 Socio-economic factors

Childhood mortality and morbidity from different causes are significantly related to socioeconomic status of the child's parent, which forms conducive environment to the

child (Kinfu, 1992). However, Socio-economic factors do not directly affect the risk of diarrhea, but rather, influence family behaviors that alters the child's exposure to pathogens or susceptibility to infection (Daniels *et al*., 1990; Van Deslice *et al*., 1994). The impact of latrines on diarrhea was greater where the mothers had a higher level of education or worked outside the home (Daniels *et al.*, 1990).

The distributions of diarrhea cases were most in areas where the living standard is poor, unhygienic, with no latrine and inadequate water supply (Pelly,1985). In a cross-sectional survey conducted in the Republic of Congo, high educated mothers reported fewer diarrheas (Mock *et al*., 1993). A follow-up study from Zaire also indicated that both mother's and father's education were significantly associated with diarrhea incidence (Manun'ebo *et al*., 1994).

Family income or wealth is an important determinant of diarrhea through which factors like parental education and occupation exert their major effect. A study on determinants of diarrhea among under-five children revealed that the probability of having diarrhea was 33-38% lower for children from the medium-and high-socioeconomic groups than the children from the low-socioeconomic group (Woldemichael, 2001). Another study revealed that mothers and fathers occupation was also significantly associated with diarrheal morbidity. mothers who are housewives are more likely to had diarrhea compared to children of mothers who are government employees, and engaged in other private work, (Teklu, 2003).

2.6.2 Environmental and Behavioral factors

Diarrhea is caused primarily by infectious pathogens (including viruses, bacteria, protozoa, and parasites) that are excreted in the feces of infected humans (Curtis *et al.*, 2000). If human feces are left uncontained, disease may spread by direct contact or by animal contact with the feces. Hence, the proper disposal of children's stools is extremely important in preventing the spread of disease (EDHS, 2005). It seems clear therefore, that human excreta should be managed as a potentially dangerous material (Mc Cornville, 2003).

Various studies conducted in Bangladesh, Burma, Philippines, and Papa New Guinea were consistent with an association between a particular hygiene behavior and an increased risk of diarrhea, such behaviors include hand washing before food preparation, open defecation of children, inattention to proper disposal of feces, the method used by mothers to clean

children after defecation, the manner of disposing of the feces of children and compound hygiene (Balthazar *et al.*, 1997).

The study from Hulet Bjju Enessie District, Amhara region, showed only 12.4% households responded that there were under-five children who used latrines. About one third of them began to use the latrine by the age of three-years and two-third by the age of four years. One hundred and eight (38.9%) households disposed their children's feces improperly by throwing out of houses somewhere either in the garden or in the bush (Andualem, 2007).

Young children are frequently infected with enteric pathogens and their stools are actually an important source of infection for others. Studies have shown that hygienic disposal of children's feces is associated with 30-40% less risk of diarrhea (WHO, 2000). Therefore, proper disposal of the feces of all young children is an important aspect of diarrhea pretention (Pelto, 1991).

Water and sanitation improvements affect health primarily by interrupting or reducing the transmission of disease agents. It is commonly believed that the main health benefit from improved water supply occurs through better water quality, which reduces the ingestion of pathogens. However, the improvements in health associated with better water quality are smaller than those obtained through increases in the quantity of water, which allow for better personal and domestic hygiene practices (e.g. hand washing, food washing, and household cleaning) (Esrey *et al.*, 1991; Huttly *et al.*, 1997).

The World's Water recommended, clean water need in a day is approximately 50 liters per person. It is divided into following categories: drinking water 5 liters, sanitation 201itres, washing up purposes 15 liters and preparation of food 10 Liters (World Water, 2000 & 2001). Studies have shown that population groups that consistently use more water have better health than groups that use less water (Esrey *et al.*, 1991).

Children from homes with Water supplies over 500 meters from the house had incidence rates of diarrhea 34% higher than those of children from houses with their own water supply (Goiter *et al.*, 1991). The study in Accra, Ghana, showed that the presence of drinking water at a household level had a negative association with the incidence of childhood diarrhea ($r = -0.34$. $p<0.0001$). Reports from Gondar, Northwest Ethiopia, indicated that the use of unprotected water sources was significantly associated with diarrheal morbidity (Mitike, 2001). Another report from Kefa-Sheka Zone, Southwest Ethiopia also showed the mean per

capita water consumption was lower in households where children had diarrhea. Therefore, the lack of adequate water of any kind and access to potable water reduces the opportunity to wash people, food, dishes, and clothes and thus contributes to the spread of disease and associated with high incidence of diarrhea (Teklemariam *et al*., 2000).

Improvements in water and sanitation do not automatically result in improvements in health. The addition of hygiene education is often required to see health impacts materialize. The most important hygiene messages to impart concern the basic issues of hand washing, proper disposal of feces, and protection of drinking water (Daane *et al*., 1997). Several studies in different parts of the world, in daycare centers, and in community settings, have indicated that frequent hand washing, with and without soap (local substitutes (like ash, leaves, soil) results in less diarrhea. Collectively, these studies report a 33 percent reduction in diarrhea from hand washing alone (Esrey *et al*., 1991; Huttly *et al*., 1997). A review of other available evidence suggests that hand washing with soap could reduce diarrhea incidence by 47% and save at least one million lives per year (World Bank, 2002; WWD, 2001).

Improved feeding practice has positive influence on under-five diarrheal disease. Therefore, mothers should be aware of feeding the baby with a clean spoon, from a cup, or with a special feeding spoon to minimize the risk of bacterial contamination. Bottle-feeding is discouraged at any age. It is usually associated with increased risk of illness, and especially diarrheal disease. This is because of the difficulty in sterilizing the nipples properly. Bottle-feeding also shortens the period of postpartum amenorrhea and increases the risk of pregnancy (HDHS, 2005).

2.7 THE GLOBAL BURDEN OFDIARHEAL DISEASE IN CHILDREN

With continued high attack rates, diarrheal disease is also an enormous economic burden resulting in significant direct costs to the health sector and patients for treatment as well as in cost time at school, work and productive activities (Mulligan, 2005). An estimated 94% of the diarrhea burden of disease is attributable to the environment and associated with risk factor such as unsafe drinking water, lack of sanitation and poor hygiene (Pruss *et al*, 2004).

2.8 IMPACT OF DIARRHEAL DISEASE ON CHILDREN

The number of deaths caused by diarrhea, 2.5 million yearly is a large burden. In addition, many time this number have long-term, lasting effects on nutritional status, growth, fitness, cognition, and school performance (Kosek *et al.*, 2003). Some studies have revealed the

impact of diarrhea on growth (Molbak, 2000). Molbak, 2000 found that infants who spent more than 20 % of their time with diarrhea had a weight deficit of approximately 370 grams at follow-up after one year of age. There was also an impact on height and that impact varied by age and sex. For example, during infancy, boys who spent from 20% to less than 40% of their time with diarrhea were 5.1 mm shorter than who had no diarrhea, whereas the deficit in girls was negligible. At age of 1-4 years, with the same time spent with diarrhea, the deficit on height was 2.1 mm and 3.0 mm in boys and girls respectively (Molbak, 2000). According to Checkley *et al.,* 2003, children ill with diarrhea 10% of the time during the first 24 months were 1.5 cm shorter than children who never had diarrhea. In addition, the adverse effects of diarrhea on height varied by age. Diarrhea during the first 6 months of life resulted in long-term height deficits that were likely to be permanent.

According to Gracey, 1996, the greatest impact of diarrhea on children's growth occurred in the first 3 years of life and, particularly, during the second half of infancy (6-12months) and in the second year of life.

2.9 TREATMENT OF DIARRHEA

Oral rehydration therapy (ORT) was introduced in 1979 and rapidly became the cornerstone of the CDD programme (Control of Diarrheal Diseases). Consisting of the oral administration of sodium, a carbohydrate and water, ORT was potentially the most significant medical advance of the 20th century (Victora *et al.*, 2000). It has contributed substantially to reducing childhood deaths from diarrheal disease because it is extremely effective in treating acute watery diarrhea (EHP, 1997). ORT, using the WHO formula, is suitable for the management of all types of dehydration (Vesikari & Torun, 1994).

ORS-WHO (oral rehydration salts) can be regarded as a universal, all-purpose, solution; but does not mean that is the optimal solution. However, it is important to have a single acceptable formula that can be recommended and promoted worldwide.

ORS-WHO is an extremely safe therapeutic tool. More than two billion units of ORS have been administered without serious complications (Vesikari & Torun, 1994).

Symptomatic anti-diarrheal drugs are usually not recommended for the treatment of acute diarrhea in children (Vesicar & Torun, 1994); antimicrobials are not effective in uncomplicated acute diarrhea and their use should be discouraged.

One general principle of case management in acute diarrhea is dietary. It recommends that breast feeding must not be interrupted; feeding according to age should be restarted as soon as

clinical signs of dehydration disappear, and be continued even if severe diarrhea persists. Adequate dietary management during and after diarrheal disease is very important in order to reduce or prevent the damage of intestinal functions induced by withholding foods; to prevent or decrease the nutritional damage caused by the disease; to shorten the duration of the disease; and to allow catch-up growth and a return to good nutritional condition during convalescence (Vesikari & Torun, 1994).

2.10 MANAGEMENT CONTRO ANDPREVENTION OF DIARRHEA

A number of measures can prevent diarrhea diseases from manifesting. They include breast feeding, which provides infants the antibodies to protect against infections. Improved weaning practices, proper use of improved weaning practices, and proper use of water for hygiene and drinking, hand washing, disposal of feces properly, vaccinations and proper nutrition (Jailson *et al.*, 2010). To implement these strategies, the people must be educated about proper practices and utilize the community health workers and village health workers. For case management, oral rehydration therapy (ORT) is the oral administration of water and electrolytes to replace existing losses, primarily accomplished by giving oral rehydration salt (ORS solutions). According to WHO/UNICEF, 1999, there is evidence that ORT was an ancient traditional practice. Research in 1990s demonstrated that the addition of glucose to salt solution resulted in absorption of salt and water across the intestines (WHO, 2003). In the absence of glucose no absorption of salt or water was observed. The same research observed a dramatic decrease in mortality rates from diarrhea (30% to less that 3%) with the administration of ORT in refugee camps in Bangladeshi war for independence. In addition to ORT, appropriate feeding during episodes of diarrhea is recommended. Clinical and laboratory studies show that continued feeding during episodes of diarrhea leads to improved outcomes in diarrheal diseases. They include decrease in stool output, shortened duration of illness, significant weight gain and improved nutritional status ((WHO, UNICEF, 2008). Nutritional therapy depends on the age and diet of the child (Bell *et al*., 2010). For infants, the importance of breastfeeding is stressed. WHO recommends exclusive breast feeding for the first few months.

Diarrhea prevalence is influenced by the interplay of many risk factors. Among them are:

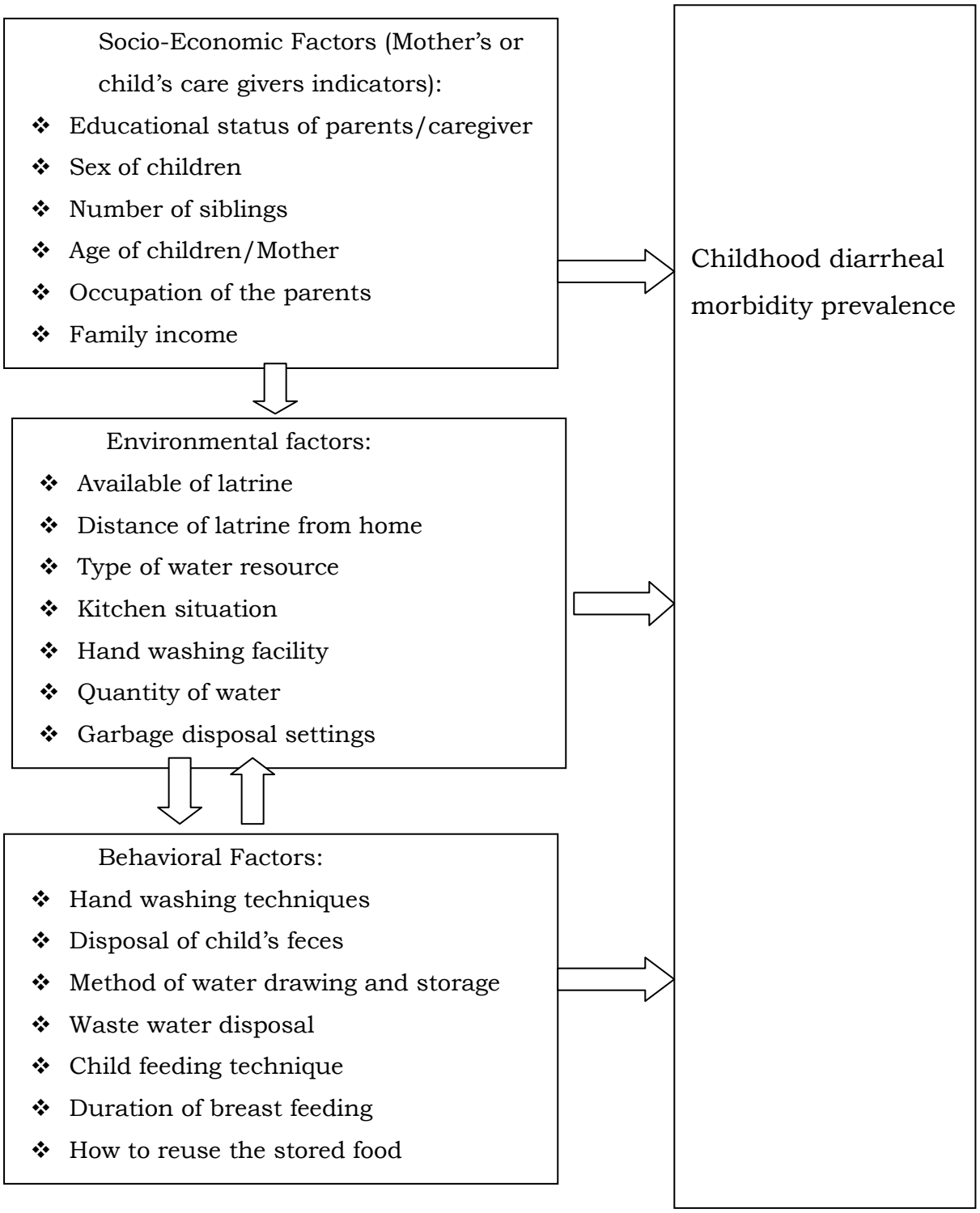

Fig. 1: Concept framework of determinants of childhood diarrheal morbidity

Source: Genser. Int. J. Epidemiol. 2008; 37: 831-840

CHAPTER THREE: OBJECTIVES OF STUDY

3.1 General Objective

The main objective of the study was to assess prevalence and factors associated with diarrhea episodes among under five children attending Emdiber Health Centre in Cheha Woreda, Gurage Zone, Ethiopia.

3.3 Specific objectives

- To determine the prevalence of diarrheal in under-five children in the Cheha Woreda.
- To see possible association between risk factors and diarrhea among under five children attending Emdiber Health Centre in the Cheha Woreda.

CHAPTER FOUR: METHODOLOGY AND MATERIALS

4.1 Study Design: cross-sectional study

This study was a cross-sectional design. The design was chosen since it was meant to determine prevalence and risk factors associated with diarrhea among children under five in Cheha Woreda.

4.2 Study Area

The study was conducted in Cheha Woreda, Gurage Zone, Southern Nations Nationalities Peoples Region. The Woreda is one of the thirteen Woreda in the Zone. It is located 27km from Wolkite Town and 182km from the capital city of Addis Abeba. The astronomical locations of the Woreda are $8^{o}4\square\mathbf{3}\square\mathbf{-}8^{o}7'2\square$latitude and $37^{o}55\square00\square$-$38^{o}8\square4\square$East longitude. It also lies at an altitude of about 1710-2650 meters above sea level. The Woreda has 41 kebeles of which two kebeles from urban area and the rest 39kebeles are rural village. In the Woreda there are five health health centres and three clinics. The relative location of the Woreda is surrounded by Kebena and Abeshiga Woreda in North, Izsha in the North East, Enemor Woreda in the South, and Geta and Gummer Woreda in the South East. Climatically, Cheha Woreda falls in Dega (20%), Woinadega (9%). It means annual temperature is approximately 18 degree centigrade. Whereas the annual total amount of rain fall is 1200-1300mm (Cheha Woreda Metrology station, 2012-2014)..

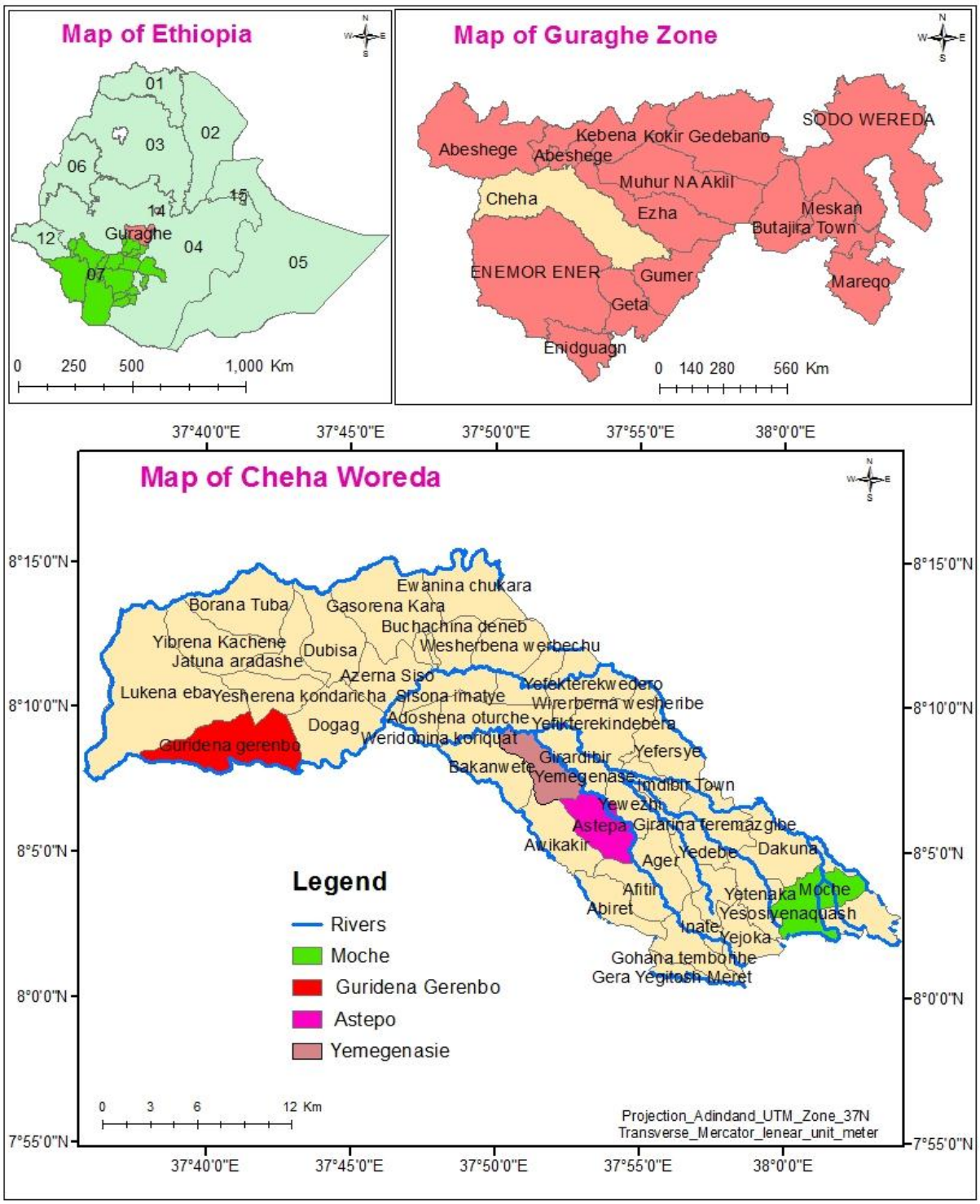

Fig. 2: Map of Cheha Woreda

Source: Cheha Woreda land use and resource management office

4.3 Source population

The source population for the study was all mothers/caregivers with under-five children in the rural communities of Cheha Woreda.

4.4. STUDY POPULATION

Study population included children less than five years of age admitted to Emdiber Health Centre from September 12th to November 28th, 2015.

4.5 Inclusion criteria

- Permanent rural resident mothers/care-givers who have visited the health center with their under-five children.

4.6 Exclusion criteria

- Mothers /caregivers of the index child who did not live in the study area were excluded.
- Mothers/care-givers of the index child who had urban residence.

4.8 Sample size determination

The sample size was calculated using a single population proportion formula. The two-week period prevalence of diarrhea among under-five children of the study area was not previously studied. Hence, the regional two-week period prevalence of diarrhea (25%) Among under-five children was taken from the report of the Ethiopian Demographic and Health Survey (EDHS) to calculate the sample size (EDHS, 2005). Hence the formula (WHO, 2010) used to calculate the sample size was:

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

$$= \frac{(1.96)^2 \times 0.25(0.75)}{(0.05)^2} = 288$$

Where by:

Z=the standard normal variable at 95% confidence level (1.96).

P=the proportion of study population exposed for the risk factors.

d=desired precision of the estimate.

n=the total sample size.

4.9 Sampling technique

Convenient sampling technique was used. By this way, children less than five years admitted to Emdiber Health Centre from September 12th to November 28th, 2015 were selected conveniently until the sample size was reached.

4.10 Data collection tools and Techniques

4.10.1Data collection instrument

Data were collected by using structured questionnaires which was developed after reviewing relevant literatures. The questionnaire was first developed in English language and then translated in to Amharic language, which all the local dwellers communicate with. The questionnaire contained different sections that include demographic and socio-economic, water, hygiene and sanitary factors. All the questionnaires are checked for any ambiguity (Annex-1 & Annex-2).

4.10.2Data collection techniques

Interview

Face-to-face interviews based on the questionnaire were conducted on mothers of the children who were recruited into the study. Interviews were conducted on the day of admission. The Interviewer informed interviewees that participation in the study was voluntary. The Interviewer explained the purpose of the study and asked interviewees for their permission to interview. Interviewees also were informed that the information they provided was handled as confidential and their individual answers would not be known, except by the interviewer.

4.13 Data Analysis

Data was analyzed with a computer software using SPSS version 20. The data entered werechecked for its completeness and consistency. Errors identified were corrected afterrevising the original questionnaire. Bivariate analysis was performed to determine whether there is an association between explanatory and dependent variables. The strength of association between selected variables and for the different risk factors of under five diarrhea morbidity prevalence was determined using odds ratio, with 95% confidence interval by employing logistic regression model. Further analysis was performed using multivariate analysis by selecting only variables that reached p-values of 0.05 lower in the bivariate analysis and considered as the main findings of the study.

4.15 Ethical Consideration

The research activity was commenced up on approval by Bahir Dar University Ethical and Research Committee. The researcher explained purpose and benefits of the study to the subjects and asked them for their permission for the interview. Participation in the study was totally voluntary. Participants were not forced or persuaded to participate in the study. Even those who first accepted to participate were free to withdraw in the course of the interview if they did not wish to continue. The researcher had to guarantee the anonymity of the participants and the confidentiality of the information they provide.

Since the study was conducted by asking mothers/caregivers of children recruited to gather information, the conduction of the study did not pose any health risk to the participants.

4.16 Limitation of the study

- Recall bias by mothers/caregivers during interview of two weeks occurrence of childhood diarrhea.

CHAPTER FIVE: RESULT

5.1Prevalence

A total of 288 (mothers/care-givers) children under-five were included in the study with a response rate of 100%. 217(75.3%) and 71(24.7%) were households who had children without diarrhea and children with diarrhea, respectively (Fig. 3)

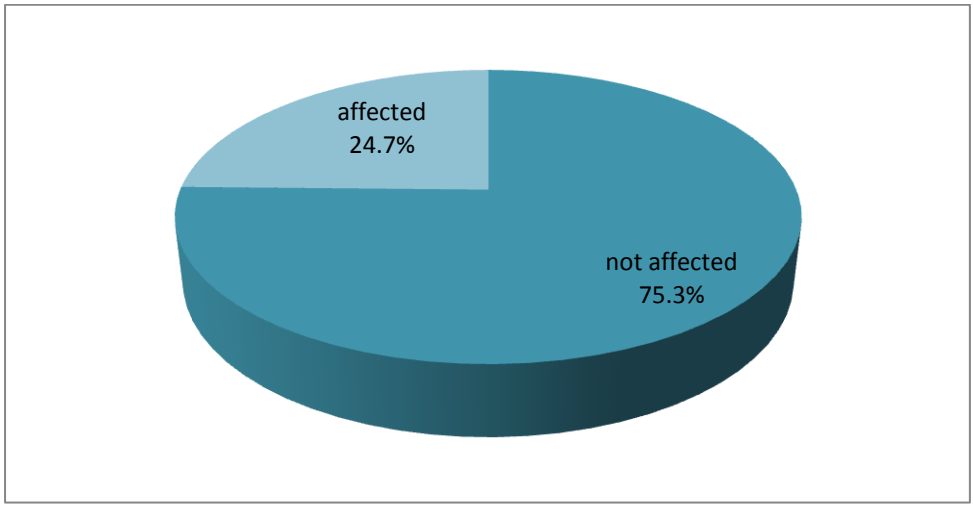

Fig. 3: Prevalence of diarrhea among children under five attending Emdiber Health Centre, 2015.

From 288 index children included in the study, 31.6% of them were aged below one year, 37.5% between the age of two and three years and the remaining 30.9% above the age of three year. About 49.3% of the infected children were found to be from the age category of below one year, 39% between the age of two and three, and only 11.3% from age group of above three years (Table-1).

Regarding the sex of the index children, the majority of them included in the study were females (55.9%). But among the infected children, the higher proportions of them, which account about 78.9%, were males (Table- 1)

The results from the study indicate that the majority of the mothers included in the study, which accounts about 54.2% are illiterate, 34% of them studied only primary education, 4.2% secondary education and the remaining above secondary school. Only 5.6% of the participant mothers who studies above secondary school had a child affected with diarrhea, whereas 81.8% of the mothers at the same educational level saved their children from the episode.

About 73.2% of the mothers or the care-giver who came to our focal health center with their diarrhea infected children was illiterate. When we are going to look at the educational level of fathers of our index children, the majority (45.1%) of them were illiterate, 35.1% of the total only studied primary education while 13.5% of the participants' husbands of secondary education level and the remaining the least percent (6.2) had above secondary educational level. Most of the fathers of infected children which comprises of about 42.3% are with no educational level at all. 24.4% of the total infected children belong to their fathers with primary educational level. Most of female parents (mothers) were housewives, who account 59.7% and most mothers of the diarrhea positive children (66.2%) were, once again, housewives (Table-1).

Most of the households of the index children (40.6%) were found with economic status of less than five hundred birr monthly income and among the households of the infected children, the majority (60.6%) lead their life with less than five hundred birr monthly income (Table-1).

Table-1: Distribution of diarrhea in terms of socio-economic factors in under five children attending Emdiber Health Centre, 2015.

Variables		Under five children	
		Non-diarrheic	Diarrheic
		(N (%)	N (%)
Age (months)	37-59	81 (28.1)	8 (2.8)
	24-36	80 (27.8)	28 (9.7)
	7-23	56 (19.4)	35 (49.3)
Sex	Female	146 (50.7)	15 (5.2)
	Male	71 (24.7)	56 (19.4)
Mother educational level	Above secondary	18 (6.2)	4 (1.4)
	secondary	12 (4.2)	0 (0)
	Primary	83 (28.8)	15 (5.2)
	Illiterate	217 (75.3)	71 (24.7)
Father educational level	Above secondary	6 (2.1)	12 (4.2)
	secondary	28 (9.7)	11 (3.8)
	Primary	83 (28.8)	18 (6.2)
	Illiterate	100 (34.7)	30 (10.4)
Number of siblings	One	76 (26.4)	20 (6.9)
	Two	99 (34.4)	10 (3.5)
	>Three	42 (14.6)	41 (14.2)
Household monthly income	>1000	63 (21.9)	18 (6.2)
	500-1000	80 (27.8)	10 (3.5)
	<500	74 (25.7)	43 (14.9)
Total		217 (75.3)	71 (24.7)

The result indicated that 35.1%of the households collect water from pipe water, 32.3% from spring while the remaining 32.6% from river water. The results revealed that 84.2% of households collected drinking water from piped water sources had not affected children with diarrhea and 95.7% who used spring water as a source of drinking had not affected children with diarrhea. However about most 54.3% of households whose source of drinking water was river or stream had affected children with diarrhea (Table-2).

The study revealed that the majority of the households, which accounts for 81.9%, used utensils with a cover to store water, had no children with diarrhea. It is unforgettable that the

study tried to investigate the cleanness of water storing containers. Accordingly, 89.4% the households who always clean their water storage container as they refill it with water had no childhood diarrhea positive child (Table-2).

Table-2: Distribution of diarrhea in terms of other explanatory factors among under five children attending Emdiber Health Centre, 2015.

Variables		U5 children	
		N (%) Non diarrheic	N (%) diarrheic
Water source	Piped water source	85 (29.5)	16 (5.6)
	Spring water	89 (30.9)	4 (1.4)
	River/stream	43 (14.9)	51 (17.7)
Water storage container	With cover	136 (47.2)	30 (10.4)
	Without cover	81 (28.1)	41 (14.2)
How often water storage container is cleaned	Always	126 (43.1)	15 (5.2)
	Sometimes	63 (21.9)	37 (12.8)
	Never	28 (9.7)	19 (6.6)
Latrine availability	Present	145 (50.3)	21 (7.3)
	Absent	72 (25)	50 (17.4)
At what time you whash hands	All critical time	132 (45.8)	16 (5.6)
	Before preparing food	50 (17.4)	24 (8.3)
	After serving a child	29 (10.1)	21 (7.3)
	Before feeding achild	6 (2.6)	34 (11.8)
With what a child is fed	With spoon	125 (43.4)	34 (11.8)
	Without spoon	12 (31.9)	37 (12.8)
Total		217(75.3)	71 (24.7)

Regarding latrine availability, the majority of the study population (57.6%) possesses latrine. Among those who use latrine to dispose feces, the majority (87.3%) saved children from the episode. while 70.4% of the infected children family possesses no latrine compared to the minority (29.6%) who had latrine and, despite that, infected children (Table-2).

The study reveal that the majority 51.4% of participant mothers or care-givers wash their hands at all critical moments compared to the rest 48.6% of the care givers who did not. From those mothers who clean their hands at all critical moment 89.2% of them, of course, the majority saved their children from childhood diarrhoea while only 10.8.6% of those who clean their hands at all critical periods had infected children. The study indicated that only 25.7% of care-givers wash hands only before preparing food, 17.4% mothers do wash hands only after serving a child and the remaining 5.6% of the participants wash their hands only before feeding their kids. About 43.4% of study participants, who feed their children with spoon, could save their children from the infection while 12.8% the participants those who feed their children without spoon and had infected children. Majority of the households (59.9%) were found to be reusing stored food after heating while the remaining only 44.1% without heating. Among those feed their children after heating the cold over, the majority (88.2%) saved their children from disease compared to only 11.8% of them with affected children while under the same situation (Table -2).

Table-3:Bivariate analysis of Determinants of Childhood Diarrhea in Cheha Woreda, SNNPR, Ethiopia, 2015.

Variables		U5 childhood diarrhea N (%)		COR(95%CI)	(P-value)
		Non diarrheic	Diarrheic		
Source of drinking water	Piped water	85 (84.2)	16 (15.8)	1	
	Spring water	89 (95.7)	4 (4.3)	2.39 (0.07-0.74)	0.01
	River or stream	43 (45.7)	51 (54.3)	6.30 (3.22-12.33)	<0.001
Utensils used to store water	Container with lip	136 (81)	30 (18.1)	1	
	Container without lip	81 (66.4)	41 (33.6)	2.29 (1.33-3.96)	0.003
How water storage container cleaned	Always	126 (58)	15 (10.6)	1	
	Sometimes	63 (63.8)	37 (37.2)	4.93 (2.52-9.66)	<0.001
	Never	28 (59.6)	19 (40.4)	5.7 (2.58-12.57)	<0.001
Latrine availability	Yes	145 (87)	21 (12.7)	1	
	No	72 (59)	50 (41)	4.79 (2.67-8.59)	<0.001
Hand washing period	All critical period	132 (89)	16 (10.8)	1	
	Before preparing food only	50 (67.6)	24 (32.4)	3.96 (1.94-8.07)	<0.001
	After serving child only	129 (58)	21 (42)	5.97 (2.78-12.83)	<0.001
	Before feeding a child only	6 (37.5)	10 (62.5)	13.75 (4.41-42.88)	<0.001
How a child is fed	With spoon	125 (78)	34 (21.4)	1	
	Without spoon	92 (71.3)	37 (28.7)	1.47 (0.86-2.53)	0.154
Index child age	Above three year	81 (91)	8 (9)	1	
	Between two & three	27 (48.2)	29 (51.8)	3.34 (1.52-8.24)	0.003
	Below two	56 (61.5)	35 (38.5)	6.32 (2.73-14.66)	0.08
Index child sex	Female	146 (90)	15 (9.3)	1	
	Male	71 (55.9)	56 (44.1)	7.67 (4.06-14.50)	<0.001
Family monthly income	>1000birr	63 (77.8)	18 (22.2)	1	
	500-1000birr	80 (88.9)	10 (11.1)	12.4 (4.65-33.21)	<0.001
	<500birr	74 (63.2)	43 (36.8)		
Number of sibling	One	76 (79.2)	20 (20.8)	1	<0.001
	Two	99 (90.8)	10 (9.2)	0.38 (0.17-0.86)	0.02
	More than two	42 (50.6)	41 (49.4)	3.71 (1.92-7.13)	<0.001
How leftover is reused	After heating			1	
	Without heating			5.18 (2.182-9.39)	<0.001

Key: COR (Crude odds ratio) significant at α=0.05

Multivariate Analysis

The multivariate analysis identified index child sex, unsafe water source, unclean water container, absence of lip for water container, unavailability of latrine, not washing hands at all critical moments and reusing stored food without heating had a significant association with the risk of childhood diarrhea (Table 4). The results showed that male (AOR =3.01(1.1-8.23)) were about three times more likely to be infected with childhood diarrhea compared to females. Households who had used river or stream water (AOR =9.75 (3.181-29.878)) were 9 times more likely to have an increased risk of childhood diarrhea than households who used piped water. The risk of diarrhea were significantly higher for those children whose households have been using a water storage container without a lip (AOR=2.92(1.1-7.8)) in contrast to those family using the same instrument but with a lip. The result showed that cleaning water container only sometimes (AOR =6.56 (2.02-21.34)) and those mothers who do not clean at all (AOR =6.04 (1.5-24.4)) had higher risk causing the episode compared to those households cleaning daily or always. Absence of latrine was another risk factor found to have its own significant effect on childhood diarrhea with a statistical value (AOR = 6.96 (2.41-20.1)). This implies that unavailability of latrine had about 6.96 times increased rate of causing this health problem on children under five years of age. Mothers washing their hand only before preparing food (AOR=3.35(1.04-10.73), mothers washing their hand after serving a child only (AOR= 9.71 (2.8-33.68)) and mothers washing their hand only before feeding their children hand were found to have a significant risk on their children's diarrhea status. Finally, the likelihood of developing diarrhea among children who are fed their any stored food for later use without heating (AOR=3.7 (1.34-10.26) was 3.7 times higher in comparison to those served after heating it (Table-4).

Table-4: Multiple logistic regression analysis of Determinants of Childhood Diarrhea in Cheha Wereda, SNNPR, Ethiopia, 2015

Variables		AOR(95% CI)	P-value
Drinking water source	Piped water	1	
	Spring water	0.37 (0.09-1.48)	0.16
	River or stream	9.75 (3.18-29.88)	<0.001
Water storage container	With lip	1	
	Without lip	2.92 (1.09-7.79)	0.03
How often Water storage container cleaned	always	1	
	Sometimes	6.56 (2.02-21.33)	<0.001
	Never	6.05 (1.5-24.39)	0.01
Latrine availability	Yes	1	
	No	6.96 (2.41-20.10)	<0.001
Hand washed at	All critical period	1	
	Before preparing food only	3.35 (1.05-10.73)	0.04
	After serving a child only	9.71 (2.8-33.68)	<0.001
	Before feeding a child only	21 (2.47-18.12)	<0.001
How food is reused	After heating	1	
	Without heating	3.71 (1.34-10.26)	0.01
Index child sex	Female	1	
	Male	3.01 (1.1-8.25)	0.03
Number of sibling	One	1	
	Two	0.08 (0.02-0.3	<0.001
	More than two	1.26 (0.38-4.15)	0.70

Key: AOR (Adjusted Odds Ratio), CI (Confidence interval), [1] (Reference category).

CHAPTER SIX: DISCUSSION

6.1Discussion

The result of this study indicated that the prevalence of diarrhea at Cheha Woreda was 24.7%. However, the prevalence of diarrhea varied in different regions. Children living in the SSNP Region are more susceptible to episode of diarrhea (25%) than children living in other Regions (EDHS, 2005). A community based study conducted in Keffa-Sheka Zone, Southern Ethiopia found a two-week childhood diarrhea prevalence of 15 percent (Teklemariam *et al*., 2000). The study from Jimma town, southwest Ethiopia, showed a prevalence of 36.5 percent (Getaneh *el al.*, 1997). Another a community based study conducted in Nekemte town, Western Ethiopia, found a two- week period prevalence of childhood diarrhea morbidity was 28.9% (Girma *et al*., 2008). Such differences are attributable to quality water supply, sanitary facilities, seasonal differences and even the geographical location of the study area and many other factors.

Consistent to other studies, this study also showed that male children had higher incidences of diarrhea diseases in two weeks recall period compared to females. The reason for the sex difference concerning diarrhea prevalence is not clear. Among the total 280 participants recruited into the study, the number of diarrhea-infected boys was higher than girls.

Studies conducted at different time indicated that high number of sibling is directly associated with under five diarrhea (Woldemichael, 2001; Sobel *et al.*, 2004). Consistent to this, the present study found out the same result that high number of sibling increased the occurrence of diarrhea significantly. This may be due to the nutritional imbalance as it becomes very difficult to feed more number of children with in a family. In addition to this, it is also very difficult to look after all the children at the same time.

Everyday people are put at risk through drinking contaminated water, eating food prepared in bowls or with utensils washed with contaminated water, through poor personal hygiene, bathing and washing in unhygienic water. Over 3 million people die each year nearly all from developing countries with 80% of the total disease burden coming from the poor countries (WHO, 2007). It is estimated that up to half of all hospital beds in the world are occupied by victims of water contamination. The biggest killer is diarrhea contracted from micro-organisms in water contamination by sewage resulting in 1.8million child deaths per year. The present study revealed that the use of unsafe water source and poor storage of drinking water had a significant association with childhood diarrhea. Similarly various studies and outbreak

incidences have found an association between poor water quality and diarrhea. As diarrhea is acquired via contaminated water and foods, water-related factors are very important determinants of diarrhea occurrence. Poor storage of drinking water (Jensen *et al*., 2004; Jinadu *et al*., 1991; Marijata *et al*., 1994) (e.g. container without a lip, not cleaning water storage before refilling it), and use of unsafe water sources (such as rivers, pools, lakes, streams, wells and other surface water sources) (Karim *et al*.,2001; Molbak *et al*., 1992; Wijewardene *et al*., 1992; Yasin, 2000) had a significant association with diarrhea occurrence among children less than five years of age.

The health consequences of sanitation services include an estimated 4 billion cases of diarrhea and 1.9 million deaths each year, mostly among young children in developing countries (Waterwiki, 2010). Women and children are the main victims. The link between water, sanitation and diarrhea include: Contaminated water that is consumed and may result in waterborne diseases including viral hepatitis, typhoid, cholera, dysentery and other diseases that cause diarrhea. Some sanitation factors, like no existence of latrine (Aulia *et al.,* 1994; Marjata, 1994; Woldemicael, 2001) or unhygienic toilet (Tiler *et al*., 2004; Wijewardene *et al.,* 1992) significantly increased the risk for diarrhea in children. Poor excreta disposal practices are responsible for a significant proportion of the world's infectious disease burden (WWD, 2001; WHO, 2002). Diarrhea is caused primarily by infectious pathogens (including viruses, bacteria, protozoa, and parasites) that are excreted in the feces of infected humans (Curtis *et al*., 2000). If human feces are left uncontained, disease may spread by direct contact or by animal contact with the faces. Hence, the proper disposal of children's stool is extremely important in preventing the spread of disease (EDHs, 2005). It seems clear, therefore, that human excreta should be managed as a potentially dangerous material (Cornville, 2003).
Coherent to the previous studies, the same result was obtained in the present study, that the above mentioned sanitary problems were significantly associated with childhood diarrheal morbidity in this study. To explain more, these above mentioned sanitary problems are said to increase the episode because they become an ideal environment for rapid growth and reproduction of infecting and contaminating agents.

Consistent to the findings of the present study, some studies have revealed that mothers not washing hands before feeding children or preparing foods (Marjata, 1994; Brooks *et al*., 2003; Alam *et al*.,1989) and children eating with their hands rather than with spoons (Aulia *et al*, 1994) were associated with risk of diarrhea morbidity in children. Improved feeding practice

has positive influence on under-five diarrheal disease. Therefore, mothers should be aware of feeding the baby with a clean spoon, from a cup, or with a special feeding spoon to minimize the risk of bacterial contamination. Since children have high risk of contamination, they get many infections if allowed to feed with hands. Feeding with spoons decreases considerable amount of infection. Washing hands of care givers at all critical times needs due attention as our hands get contaminated in all our activities. This is especially common in poor countries like Ethiopia where there are no enough infrastructural facilities.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1 CONCLUSION

The findings of this study showed that the prevalence of diarrhea at the study area is 24.7%. From this study we identified, sex of the child, number of sibling, unsafe source of drinking water, unsafe water storage container, absence of latrine, poor hand washing habit, and not heating food before feeding a child had significantly increased risk of childhood diarrhea in the study area.

Water supply, sanitation, and hygiene and health are closely related. Diseases related to poor excreta disposal facilities and inadequate or contaminated water, especially diarrheal diseases, are still a major health problem in the Cheha Woreda. This prevalence figure indicates that there is poor sanitation facilities, poor hygienic practices and others that expose the under five for the diarrheal infection in the Cheha Woreda.

7.2 Recommendations

- Awareness creation to the local communities.
- Work on attitude and practice of mothers.
- The government should support NGOs that deals with water, sanitation and hygiene program.
- Health policy makers should encourage unified and well-coordinated mechanisms with other relevant stakeholders to incorporate public health education.

REFERENCES

Abaram S. (1995). Control of Communicable Diseases Manual. 16th ed. *Am Public Health Assoc*. 250-4.

Alam N., Wojtyniak B., Henry F., Rahaman M. (1989). Mothers' personal and domestic hygiene and diarrhoea incidence in young children in rural Bangladesh. *Int J Epidemiol*. (1):242-7.

Altman D. (1991). Practical statistics for medical research. *Campman and Hall, Great Britain.* pp 93-99.

Andualem A. (2007). Assessment of the impact of latrine utilizationon diarrheal disease in the rural community of Hulet Ejju Enessie district, East Gojjam Zone, Amhara Regional State. Master thesis, Addis Ababa University.

Armon K., Stephenson T., MacFaul R., Eccleston P., Werneke U. (2001). An evidence and consensus based guideline for acute diarrhoea management. *Arch Dis Child.* 85:132-42.

Aulia H., Surapaty S., Bahar E. (1994). Personaland domestic hygiene and its relationship to the incidence of diarrhoea in south Sumatera. *J Diarrhoeal Dis Res*. 12(1):42-8.

Baltazar J., Tiglao T, Tempongko S. (1997). Hygiene behaviour and hospitalized severe childhood diarrhea: a case-control study. Bulletin of WHO; 71(3&4):323-327.

Banerjee B., Hazra S., Bandyopadhyay D. (2003). Diarrhea Management Among Under Fives. Institute of Hygiene and Public Health, India. Available from URhttp://www.indianpediatrics.net/mar 2004.

Bergeron G., Esrey S. (1993). Baseline Survey for the Guatemala Highlands Rural Water and Sanitation Project. WASH Field Report #403.WASH: Washington DC.

Bizatu M., Negga B. (2010). Community based assessment on household management of waste and hygiene practices in Kersa Woreda of Eastern Hararghe, Ethiopia: *Ethiop. J. Health Dev*, 24 (2):106

Boschi (2009). The Global Burden of Childhood Diarrhea, in: Meremikwu (editor), International Boschi Maternal and Child Health (in press)

Brooks J. Epidemiology of sporadic bloody diarrhea in rural western Kenya (2003). *Am J Trop Med Hyg*. 68 (6): 671–7.

Central Statistical Authority (CSA) (2007). StatisticalAbstractof Federal Democratic Republic of Ethiopia.

Checkley W., Epstein L., Gilman R., Cabrera I., Black R. (2003). Effects of acute diarrhea on linear growth in Peruvian children. *Am J Epidemiol*. 157 (2):166- 75.

Child Health Research Project. (1998). Childhood diarrhea in Sub-Saharan Africa. Special report. Apr. 2(1).

Curtis V., Cairncross S., Yonli R. (2000). Review: Domestic hygiene and diarrhea pinpointing the problem. *Trop Med Int Health*; 5 (1): 22–32.

Daane J., Lamb M. and Perez E. (1997). Evaluation of the Jamaica Urban Environmental Program for On-Site Sanitation. Activity Report No.35. Arlington, VA: Environmental Health

Daniels D., Counsens S., Makoae N. & Feachem R. (1990). A case control study of improved sanitation on diarrhea morbidity in Lesotho; Bulletin of WHO, 68(4):455-463.

Demographic and Health Survey. (DHS). (2000).Central Statistics Authority, Addis Ababa, Ethiopia & ORC Marco and Calverton, Maryland, USA.

Environmental Health Project (1999). Diarrhea Prevention. Lessons Learned. Available from URL: http://www.ehproject.org/PDF/Lessons Learned

Esrey S., Potash J., Roberts I., Shiff C. (1991). Effects of improved water supply and sanitationon ascariasis, diarrhea, drancunculiasis, hookworm infection, schistosomiasis and trachoma. Bulletin of the World Health Organization; 60:609-621.

Ethiopia Demographic and Health Survey (EDHS) (2005).Central Statistics Authority. pp. 140-150.

Etiler N., Velipasaoglu S., Aktekin M. (2004). Risk factors for overall and persistent diarrhea in infancy in Antalya, Turkey. Public Health; 118 (1): 62-9

Feachem R., Kolinsky M. (1984). Intervention for the control of diarrhoeal diseases among young children: promotion of breast feeding; Bulletin of WHO: 62 (2):271-291

Genson L. *Int. J. Epidemiol* (2008). 37; 831-840

Getaneh T. (1997). Diarrhea morbidity in urban area of Southwest Ethiopia. *East Africa-Medical Journal; 74 (8*): p 491 -494.

Girma R., Wondwosen B., Bishav D. and Tefera B. (2008). Environmental Determinants of Diarrhea among Under-Five Children in Nekemte town, Western Ethiopia: *Ethiop. J. Health sci*. l8 (2):43-44.

Gorter A., Sandiford P., Davey Smith G., Pauw J. (1991). Water supply, sanitation and diarrheal disease in Nicaragua: Results from a case-control study: *International Journal of Epidemiology.* Htm-20 (2) 527.

Ghosh S., Sengupta P., Mondal S., Banu M., Gupta M, Sircar B. (1997). Risk behavioural practices of rural mothers asdeterminants of childhood diarrhoea. *J Commun Dis*. 29 (1):7-14.

Gracey M. (1996). Diarrhea and Malnutrition: A Challenge for Pediatricians. *J Pediatr Gastroenterol Nutr;* 22(1): 6-16.

Gracey M. (1086). Diarrhoeal disease and malnutrition. *Churchill Livingstone, Edinburgh.*

Grosvenor press international LTD. (1986). Developing world health:Water supply and sanitation in developing countries: pp.31.

Human Development Report (2006). Kevin Published for the United Nations Development Programme (UNDP) beyond scarcity: Power, poverty and the global water crisis, New-York. pp. 12.

Hunnekens C., Buring J. (1987). Epidemiology in medicine. Wolters Kluwer company, USA. PP. 132-49.

Hunter S. (1997). Prevention of diarrhea in young children in developing countries. *Bulletin of WHO,* 75 (2): p163-l74.

Institute of One World Health (2000). Diarrheal disease Fact Sheet. Available from URL: http://www.oneworldhealth.org

Jailson B., Manish M., Osamumu L. and Nakagomi C. (2010). Effectiveness of monovalent rotavirus vaccine against severe diarrhea. UK: Liverpool.

Jane S., SwansonL. Diarrhea. A Jobson Publication. Available from URL: http://www.uspharmacist.com

Jinadu M., Olusi S., Agun J., Fabiyi A. (1991). Childhood diarrhea in rural Nigeria. Studies on prevalence, mortality and socio-environmental factors. J Diarrhoeal Dis Res.; 9(4):323-325.

Joint Monitoring Program for Water Supply and Sanitation (2001). Progress on Drinking Water and Sanitation: Geneva and New York.

Joint Monitoring Program for Water Supply and Sanitation: Ethiopia 2008 estimates, accessed on 18 September 2010.

Karim A., Akhter S., Rahman M., Nazir M. (2001). Risk factors of persistent diarrhea in children below five years of age. Indian J Gastroenterol. 20(2):59-61.

Ketsela T. (1991). Knowledgeand practice of mothers/caretakers towards diarrhoea and its treatment in rural communities in Ethiopia. *Eth. Med. J.* 29 (4).

Kinfu B. (1992). Maternal education and childsurvival in AddisAbaba. *Ethiop. J. Health Dev.* 6(1):11-15.

Kosek L., Bern J., Guerrant (2003). The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000. Bull World Health Organ. 81 (3): 197-204.

Kwasi S. and Markka J. (2005). Childhood diarrheal morbidity in the Accra Metropolitan Area, Ghana: socio-economic, environmental and behavioral risk determinants: Journal of Health & Population in Developing Countries. March / URL:http://www.jhpdc.unc.edu/.

Lemma T., Sileshi R. (1997). Persistent diarrhea: Socio-demographic and clinical profile of 204 children seen at a referral hospital in Addis Ababa; *Ethiopian Medical Journal*, 35(3); 161-16.

Marjatta S. (1994). Water supply and diarrhea in East African community. A case-control study on the quality of water supplies and the occurrence of diarrhea among small children in a rural area of Western Kenya. University of Oulu Printing Center. 37-57.

Mc Cornville (2003). Field engineering in the developing world:How to Promote the Use of Latrines in Developing Countries. www.cee.mtu.edu/peacecorp

Mengistu S., Charles B., Teka C. (1992). Water handling procedures and their association with childhood diarrhea in Gara Muleta district of East Hararghe Region, Ethiopia. *Journal of Health Development,* 6(2)

Mitike B. (2001). Prevalence of acute and persistent diarrhoea in North Gondar Zone, Ethiopia. *East Africa Medical Journal;* 78(8): p 44-48.

Mock L., Sellers D., Abdoh E. (1993).Socioeconomic, environmental, demographic and behavioral factors associated with the occurrence of diarrhea in young children. *Soc. Sci. Med.* 36 (6): 807-816.

Molbak R. (2000). The epidemiology of diarrheal diseases in early childhood: A review of community studies in Guinea-Bissau. University of Copenhagen.

Muhe S., Freij R., Byass L., Sandstrom K., Wall D. (1997).A one-year community study of under-fives in rural Ethiopia: Patterns of morbidity. *Eth.J. Hlth. Dev.* 11(specialissue):361-367,

Parashar I., Bresee E., Glass F. 2003). The global burden of diarrhoeal disease in children. *Bull World Health Organ*. 81 (4): 236.

Pelly C. (1985). Diarrheal disease in shelter populations: Practical aspects of management; *Ethiopian Medical Journal*, 23 (4); 193-196.

Pelto G. (1991). The role of behavioral research in the prevention and management of invasive Diarrhea Rev. *Infent. Dis;* 13 (seppl4): S255 - 8.

Pruss A., Boss R., and Bartram S. (2004). Safe water, better health. Costs and benefits and sustainability of intervention to protect and promote health (1246-1255). Geneva: WHO

Root K. (2001). Sanitation, community environment and childhood diarrhea in rural Zimbabwe. *Journal of Health Population and Nutrition*: 19 (2): P 73-82

Snyder J., Merson M. (1982). The magnitude of the global problem of acute diarrheal disease: a review of active surveillance data. Bulletin of the World Health Organization; 60: 605- 613.

Sobel J., GomesT., Ramos R., Hoekstra M., Rodrigue D., Rassi V., Griffin P. (2004). Pathogen-Specific Risk Factors and Protective Factors for Acute Diarrheal Illness in Children Aged 12–59 Months in Sao Paulo, Brazil. *Clin Infect Dis.* 38 (11): 1545-51.

Teklemariam S., Getaneh T., Bekele F. (2000). Environmental determinants of diarrhea morbidity in under-five children. Keffa-Sheka Zone, Southwest Ethiopia.*Ethiopian Medical Journal: 38(1):* p 27-34.

Teklu M. (2003). Socio-economic, environmental and behavioral factors associated with the occurrence of diarrheal disease among under five children in Meskanena Mareko Woreda, Southern Ethiopia. Master thesis, Addis Ababa University.

The Environmental Health Project. Preventing child diarrheal disease (1999). Available from URL: http://www.ehproject.org

Timaeus I. and Lush L. (1995) .Intra-urban differentials in child health. *Health Trans Rev, 5:163*-129.

Tumwine J., Thompson J., Katua-Katua M., Mujwajuzi M., Johnstone N., Porras I. (2002). Diarrhoea and effects of different water sources, sanitation and hygiene behaviour in East Africa. *Trop Med Int Health*. 7(9):750-6

United Nations Environment Program (2002). United Nations Children's Fund &World Health Organization. Children in the new millennium:Environmental impact on health, pp. 43-102.

United Nations Millennium Development Project (UNMDP) (2006). Available at http://www.unmillenniumprojcct.org/. Accessed March 2, 2010.

Van Deslice J., Popkins B. & Briscoe J. (1994). Drinking water quality, sanitation and breast feeding: their interactive effects on infant health; Bulletin of WHO, 72(4); 587-601

Vesikari T., Tourn B. (1994). Diarrheal Diseases. In: Kari SL, Staffan B, Makela PH, Miikka P, editors. Health and Disease in developing countries. *Macmillan Education Ltd. London and Oxford*. Pp.136-46.

Waldman R., Fontaine O., Richard L. (1994). Epidemic dysentery. A supplement to Dialogue on Diarrhoea. Published by AHRTAG, UK.

Walsh J., Warren K. (1979).Selective primary health care: interim strategy for disease control in developing countries. *New England Journal of Medicine* 301: 967-974.

Warren P. (2003). Diarrhea in Childhood. Department of Pediatrics. The University of Iowa, USA.

Waterwiki (2010). Preventing Diarrhea diseases in developing countries. *Nepal; Kathmandu: Water Aid.*

WHO (1999). Department of Child and Adolescent Health and Development. The evolution of diarrheal and acute respiratory diseases control at WHOM. World Health Organ.

Wijewardene K., Fonseka P., Wijayasiri W. (1992). Risk factors contributing to acute diarrhoeal disease in children below five years. *Ceylon Med J.* 37(4):116-9.

Woldemichael G. (2001). Diarrheal morbidity among young Children in Eritrea: Environmental and socioeconomic determinants. *Journal of Health Population and nutrition;* 19(2): p83-90

World Water Day (WWD) (2001). Water, sanitation and hygiene at a glance. (http:/www.cmhealth.org)

World Bank water supply and sanitation (2002). Hygiene and sanitation promotion: why promote sanitation?

World Bank (2003). Water. Sanitation, and Hygiene at a glance.

World Health Organization and United Nations Children's Fund. (WHO/UNICEF) (2008).

World Health Organization (WHO) (2003). Indicators to improve children's environmental health:Diarrheal diseases.pp.24-26.

World Health Organization (WHO), Integrated Management of Childhood Illness, 2010a

World Health Organization and United Nations Children's Fund (WHO/UNICEF) (2010b).

World Health Organization (WHO) (2000). African Regional water supply and sanitation assessment. Joint Monitoring Program for Water Supply and Sanitation. Progress on Drinking Water and Sanitation: Geneva and New York.

World Health Organization (WHO) (2002). Healthy villages: A guide for communities and communities health workers.Pp.19-70

World Health Organization (1988). Persistent diarrhea in children in developing countries: memorandum from a WHO meeting. Bull World Health Organ. 66 (6): 709-11.

World's Water (2000 &2001).The Biennial Report on Freshwater Resources. Island Press. Washington DC. 2000. ISBN1-55963-792-7

Yassin K. (2000). Morbidity and risk factors of diarrheal disease among under-five children in rural upper Egypt. *J Trop Pediatr*. 46 (5): 28

ANNEX-1

QUESTIONNAIRE-ENGLISH VERSION

General guide line

Questionnaire Prepared to Investigate the Effect of Socio-Economic Factors, Water, Sanitation and Hygiene Practices Associated with under-five Diarrheal Morbidity Prevalence in Rural Community of Cheha Woreda, Gurage Zone, Ethiopia.

The structured interview oriented questionnaire has five parts. The first part contains questionnaires designed to interview the demographic aspects of the under five children, the second part contains sex-related questionnaires, the third part contains water-related questions, the fourth part consists of hygiene-related questionnaires and the last part contains sanitation-related questions.

The information obtained through the questionnaires will be kept confidential and will be used only for the research purpose.

Your response essentially determines the success of this study.Thus your genuine, frank and timely response is kindly requested.

Identification number: .....

Address/kebele: .....

Part-I: Demographic questionnaires

1.What is the index child's age?

A.>3years

B. 2-3years

C. <2year

2. What is the index child's sex?

A.Female

B.Male

3.What is the Educational level of the mother?

A. Above secondary

B. secondary school

C. Primary school

D.Illiterate

4.What is the educational level of the father?

A. Above secondary school

B. secondary school

C. primary school

D. Illiterate

Part-ll: Socio-economic questionnaires

5. What is the amount of monthly income of your family?

A. >1000

B. 500-1000

C. <500

6.What is the occupation of the mother?

A. Government worker

B. private work

C. Merchant

D. Housewife

7. What is the occupation of the father?

A.Government worker

B.privateworker

C.Merchant

D.farmer

8. How many surviving siblings does your child have?

A.one

B.two

C.more than two

Part-lll: Water-Related characteristics

9.What is your source of drinking water?

A. Piped water

B.spring water

C. River or stream water

Part-lv:Hygiene-related questionnaires

10. What kind of utensils used to store/fetch water?

A.Container with a lip

B.container without a lip

11. How often do you clean your water container as you refill it with water?

A. Always .

B. Sometimes

C. never

Part-v:Sanitary questionnaires

12.Do you have latrine?

A. yes

B. no

13 At what critical moments do you wash your hand?

A. At all critical moment

B. Before preparing food ony

C. After serving a child only.

D. Before feeding a child only

14. With what a child is fed?

A. with a spoon

B. without a spoon

15.How do you reuse the stored food?

A. After heating

B. Without heating

16. Does your under five children affected with diarrhea in the last two weeks?

A. NO B. Yes

The multiple choices in each above questionnaireare encodedas: A=1 B=2 C=3D=4

Thank you

ANNEX-2:AMHARIC VERSION OF THE QUESTIONNAIRES

የጹሑፍ መጠይቅ

ቀበሌ----------
መለያ ኮድ--------

መመሪያ:-ከዚህ በታች በማህበራዊና በኢኮኖሚያዊ የመጸዳጃ ቤት አጠቃቀም ፤የየዉሃ ምንጭ የግልና የአካባቢ ንጽህና ከአምስት አመት በታች ህጻናት ላይ በተቅማጥ በሽታ ላይ ያለዉ ተጽኖ የተመለከቱ ጥያቄዎች ቀርበዋል፡፡ እያንዳንዱ ጥያቄ በጥሞና ካነበቡ በኃላ ምርጫ ለተሰጣቸዉ ጥያቄዎች የእርሶን ሀሳብ የሚያንጸባርቀዉን (የሚገልጸዉን) አንድ ምርጫ በመምረጥ ይመልሱ ፡፡ እባኮ ሲመልሱ በተቻለ መጠን እዉነተኛ መልስ ይስጡ ፡፡ የሚሰጡት መልስ ለጥናቱ ወሳኝ ነዉ ፡፡ የሚሰጡት መልስ በሚስጥር ይጠበቃል፡፡

ክፍል አንድ፡- ከማህበራዊና ኢኮኖሚያዊ ጉዳዩችጋር የተያያዙ መጠይቆች

1/ የልጆን እድሜ ምን ያህል ይሆናል?
ሀ/ ከ3 አመት በላይ ለ/ከ2-3 አመት ሐ/ ከ2 አመት በታች
2/ የህጻኑ ጾታ?
ሀ/ ሴት ለ/ ወንድ
3/ የወላጅ እናት የት/ርት ደረጃ?
ሀ/ከሁለተኛ ደረጃ በላይ ለ/ ሁለተኛ ደረጃ ሐ /አንደኛ ደረጃ መ/ ያልተማረ
4/የአባት የትምህርት ደረጃ?
ሀ/ከሁለተኛ ደረጃ በላይ ለ/ ሁለተኛ ደረጃ ሐ /አንደኛ ደረጃ መ/ ያልተማረ
5/የበተሰቡ ወርሀዊ ገቢ ምን ያህል ነዉ?
ሀ/ ከ1000 ብር በላይ ለ/ ከ500-1000 ብር ሐ/ ከ500 ብር በታች
6/ የወላጅ እናት የስራ ሁኔታ?
ሀ/የመንግስት ሰራተኛ ለ/የግል ተቀጣሪ ሐ/ ነጋዴ መ/ የቤት ዕመቤት
7/ የላጅ አባት የስራ ሁኔታ?
ሀ/የመንግስት ሰራተኛ ለ/ የግል ተቀጣሪ ሐ/ ነጋዴ መ/ ዐርሶ አደር
8/እቤት ውስጥ ምን ያህል ልጆች አሎት?
ሀ/አንድ ቢቻ ለ/ ሁለት ቢቻ ሐ/ ሁለት በላይ

ክፍል ሁለት፡- ከመጠጥ ውሀ ምንጭና አያያዝ ጋር የተያያዙ ጥያቄዎች

9/ የቤት ውስጥ መጠቀሚያ ውሃ ከምን አይነት ምንጭ ያገኛሉ?
ሀ/ ከባንቦ ውሃ ለ/ ከምንጭ ሐ/ ከወንዝ እና ሌላ
10/ እቤት ውስጥ ውሀ በምን አይነት እቃ ያጠራቅማሉ?
ሀ/ ክዳን ባለው አቃ ለ/ ክዳን በሌለው አቃ
11/ የውሀ ማጠራቀሚያ እቃ በምን ያህል ጊዜ ውስጥ ይታጠባል?
ሀ/ ሁሌም ለ/ አንዳንዴ ሐ/ ምንም አይታጠብም

ክፍል ሦሥት ፡-በግልና ከአካባቢ ንጽህና ጋር የተያያዙ መጠይቆች

12/ መጸዳጃ ቤት አሎት /ይጠቀማሉ?
ሀ/አዎ ለ/ የለም /አልጠቀምም/
13/ እጆን በምን ወቅት ይታጠባሉ?
ሀ/በሁሉም አስፈላጊ ጊዜ ለ/ ምግብ ከማዘጋጀት በፊት ቢቻ
ሐ/ ህጻን ልጅ ካጸዳዱ በኃላ ቢቻ መ/ ልጅ ከመመገቦ በፊት ቢቻ
14/ ልጆን የሚመግቡት በምንድነው?
ሀ/ በማንኪያ ለ/ ያለ ማንኪያ
15/ ለህጻኑ ለበኃላ ፍጆታ ያቆዩት ምግብ እንዴት ይጠቀማሉ?
ሀ/ በድጋሚ ካሞቅን በኃላ ለ/ ምንም ሳናሞቅ
16/ ልጆን በዚህ ሁለት ሳምንት ውስጥ በተቅማጥ በሽታ ተይዞ ያውቃል?
ሀ/ አልተያዘም ለ/ ተይዘዎል

አመሰግናለሁ!!