NUTRITIONAL STATUS OF CHILDREN AND FOOD SAFETY KNOWLEDGE, ATTITUDE AND PRACTICES AMONG HOUSEHOLD FOOD HANDLER MOTHERS IN ADIGRAT, EASTERN TIGRAY ZONE, ETHIOPIA

BY: SELAMAWIT NEGASH

ATHESIS SUMMITED TO CENTER FOR FOOD SECURITY STUDIES

JUNE, 2020

ADDIS ABABA, ETHIOPIA

ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

CENTRE F OR FOOD SECURITY STUDIES

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A MASTER THESIS SUMMITED TO CENTER FOR FOOD SECURITY STUDIES, COLLEGE OF DEVELOPMENT STUDIES, ADDIS ABABA UNIVERSITYIN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN FOODSECURITY AND DEVELOPMENT

JUNE, 2020

ADDIS ABABA, ETHIOPIA

DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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APPROVAL SHEET

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As supervisor of the thesis we certify that we have read and evaluate the thesis prepared by Selamawit Negash entitled **"**nutritional status of children and food safety knowledge, attitude and practices among household food handlers mothers Adigrat, eastern Tigray zone in northern Ethiopia" and recommended for open Defense as fulfilling the requirement for the degree of Master of Science Degree in Food Security and Development Studies

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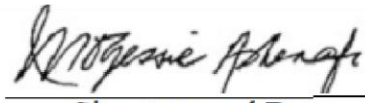 10 June, 2020

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As members of the examining board of the thesis open defense, we certify that we have read and evaluate the thesis prepared by Selamawit Negash entitled **"**nutritional status of children and food safety knowledge, attitude and practices among household food handlers mothers Adigrat, eastern Tigray zone in northern Ethiopia" and recommended that it is acceptable as a proposal for the thesis required for the degree of Master of Science Degree in Food Security and Development Studies.

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DEDICATION

I have dedicated this thesis to my late sister **Meharit Negash Gebremichael,** who heartbreakingly passed away during my stay in Adigrat for data collection. Love you my sister.

ACKNOWLEDGMENTS

My heartfelt gratitude goes to my advisor Professor Mogessie Ashenafi for his time and the all-rounded support in guiding me during the preparation of this thesis work and for his patiency from title amendment to writing the thesis report.

My special gratitude goes to Mr. Ahmed Endris and Habtom Kiros Bitsue for their support and comments during this thesis research work.

Heartfelt thanks go to my sister Letebrhan Negash and her family. Thank you for being a good sister. I would like to extend my special thanks to those who involved directly or indirectly in this research.

Last, but not least I want to thank my husband Tadesse Gashu and my daughter Melonia Tadesse for your day after day encouragement. I would once more like to thank you for being there for me with your unconditional support during my study period.

Finally, to the one to whom I owe my life and through whom I had the strength to go from day to day, the Almighty God I raise my hands in deep and sincere thanks.

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Acronyms (ABBREVIATIONS)

AAU	Addis Ababa University
CFFC	Center for Food Security Studies
CM	Centimeter
CSA	Central Statistical Agency
DALYS	Disablity Adjusted Life Year
EDHS	Ethiopia Demographic and Health Survey
ENA	Emergency Nutrition Assessment
FAO	Food and Agriculture Organization
HAZ	Height for Age
HFIAS	Household Food Insecurity Access Scale
HFS	Household Food Security
HHS	Household Hunger Scale
KAP	Knowledge, Attitude and Practice
KG	Kilo Gram
MM	Millimeter
MOH	Minster of Health
MSC	Master of Science
MUAC	Mid Upper Arm Circumference
OECO	Organization for Economic Co-operation and Development
SD	Standard Deviation
SNNP	South Nation Nationality Peoples
UFSS	Urban Food Security Strategy
UJCFSP	Urban Job Creation and Food Security Program
UNICF	United Nations Children's Fund
WAZ	Weight for Age
WFP	World Food Program
WHO	World Health Organization

Abstract

Foodborne diseases is the major public health problem all over the world, particularly in poor resource settings including the study area .The problem is more noticeable in the study area due to lack of knowledge, inappropriate attitude and unacceptable practice of food safety at household leve.l Thus, the main objective of this present study was to assess the food safety knowledge, attitude and practices of food handler mothers and nutritional status of under five children in the households in Adigrat town, Tigray region, Ethiopia. A total of 342 household food handler mothers were selected randomly from the six kebeles. To perform this study, a cross-sectional survey was carried out among food handlers' households in the study area, between Januarys and March. Moreover, Households food insecurity access scale (HFIAS) was used to assess food security status of households, household food safety KAP were assessed with regards to food handling, personal hygiene and water & sanitation and nutritional measurements were used to assess children under five nutritional status. Data was analyzed by using SPSS version 25. Nutrition status of children Weight and height was used to calculate weight-for-age, weight-for-height and height-for-age by using Emergency Nutritional Assessment (ENA for SMART 2011) in the scale of WHO standards 2006. Results were presented using descriptive statistics and cross tabulation. Chi-square was used to test differences among categorical variables .The result of the present study showed that, low knowledge and poor practice in food handling, personal hygiene and water sanitation. The level of food security was 2.2 % food secure 27 % mild food insecurity 26.7% moderate food insecurity and 44.3% severely food insecurity. The findings also showed that nutritional status of under five children 28.8% wasting ,65% underweight , 51.4 stunted 48.3% MUAC chronic energy deficiency. To cope with this problems governmental or non-governmental stake holders, health extension workers should give education or trading on food safety and nutrition .Temporary solution should join them in to productive safety net programs

Key words: Adigrat, Attitude, Food Safety, Food Security Knowledge, Practices,

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Access to quality food for all groups of people across the globe is considered to be vital for the proper functioning of society. The breakdown of this food safety rewards to nutritional and food security in crisis of restoring access to good quality of food safety is critical for construction of food security. According to FAO (2002), food and nutrition security is achieved, when adequate food in terms of quantity, quality (nutrition and safety), and socio-cultural acceptability is available and accessible for and satisfactorily used and utilized by all individuals at all times to live a healthy and active life. Household food security is the application of this concept at family level, with individuals within households as the focus of concern. Food insecurity is a lack of consistent access to enough food for an active and healthy life. Households with insufficient access to food often face other challenges related to food insecurity including poor health and a decline in productivity (Abduselam, 2017).

Focusing at individual level, food security takes biological utilization of food into consideration. Utilization refers to the ability of the human body to take food and convert it into energy and other nutrient substances, which are used for body metabolism and other daily activities or to be stored. Utilization also considers water and adequate sanitary facilities and understanding of proper health care, food preparation, and storage processes (Clay *et at*., 2002). The report by World Health Organization indicates that unsafe food which is contaminated with harmful bacteria, viruses, parasites and chemical substances is implicated as causes for more than 200 diseases ranging from diarrhea to cancers (WHO, 2019).

Under situations of household food shortage, hygiene, safety and nutrition are ignored and people shift to less nutritious diet and unsafe food that leads to different health hazards. Malnutrition and foodborne illnesses may also be aggravated even in the presence of required amount of food due to poor quality preparations and storage conditions at the household level. These can negatively influence food security situation (Cleaver *et al*., 2006). According to WHO (2002), the term food safety indicates the assurance when food

is consumed in the usual manner that does not affect human health and well-being. However, WHO (2015) indicates that 600 million people fall ill and 420,000 die at global level following the consumption of unsafe food each years. Because of this, currently food safety is a critical concern (Pattron, 2004).

Food can become contaminated at any point of production and distribution, and the primary responsibility lies on food producers. Currently a large proportion of foodborne disease (FBD) incidents are caused by lack of knowledge, attitude and practice of food which is improperly prepared or mishandled at home, in food service establishments or markets. Not all food handlers and consumers understand the roles they must play, such as implementing basic hygienic practices when buying, selling and preparing food to protect their health and that of the wider community (Fukuda, 2014).

In developing countries, diarrheal burden due to foodborne illness accounts for 10 % of the global total - around 9 million (DALYs) each year (Grace, 2015). Ethiopia is one of the developing countries where annual incidence of foodborne illnesses ranged from 3.4 % to 9.3 %, the median being 5.8 %, for the years 1985/86 to 1989/90 (Wendafrash, 2010). The proportion of deaths associated with diarrhea alone in different regions ranged from 22.6 % to 62 % with a median of 45 %. Even in the presence of more advanced technology, the occurrence of food related disease is not controlled and the problem affects both developing and developed nations (Kinfe and Abera, 2007; Jarmila *et al*., 2010). Availability and accessibility of adequate quality of food should correspond to utilization of safe food in order to achieve food security (Hahn, 2000).

In addition, in Ethiopia, many rural and sub urban regions lack essential services and adequate education on importance of knowledge, attitude and practice of food safety. Practices identified as contributing to foodborne outbreaks include improper refrigeration, prolonged handling and inadequate reheating of cooked food and contamination of food by commercial or household food handlers who worked while ill or had poor personal hygiene (Aujoulat, 2019). Sanitary measures, principles and procedures need to be put in place to ensure that food is free from agents of contamination in order to promote a healthy living practice. Sanitation issues in food production comprises of components which include quality of the raw food, personal hygiene of the personnel handling the food, the sanitation of the environment where the food is being stored, prepared and served, as well as of the equipment being used (Aujoulat, 2019).

Safe food contributes to economic prosperity, boosting agriculture, market access, tourism and sustainable development (WHO, 2018). Food safety, nutrition and food security are

inextricably linked. Unsafe food creates a vicious cycle of disease and malnutrition, particularly affecting infants, young children, elderly and the sick (WHO, 2018). There is no food security without food safety (FAO, 2019). Ending hunger is about all people having access to safe, nutritious and sufficient food all year round. Food safety has a direct impact on people‘s health and nutritional intake (FAO, 2019).

1.2 Statement of the Problem

Foodborne diseases remain the major problem worldwide. Particularly in developing countries, there is a higher risk of the occurrence of foodborne diseases, which directly impacts society‘s health and economic development. Foodborne diseases are the major cause of morbidity and mortality in sub-Saharan Africa. A large proportion of foodborne disease incidents are caused by food that is improperly prepared or mishandled at home (WHO, 2018). These aspects of food contamination are mostly related to lack of knowledge, inappropriate attitude and unacceptable practice of food safety at household level among food handlers. Food handlers can be vectors for food contamination directly, leading to the transmissions of pathogens to food, and indirectly, by favoring cross-contamination. According to FAO (2007), approximately 10 to 20 % of foodborne diseases outbreaks are because of contamination by food handlers. According to central statistical agency of Ethiopia (CSA, 2010), 13 % of children experienced diarrheal disease in Tigray region. Poor sanitation, lack of access to clean water supply and inadequate personal hygiene are responsible for 90 % of diarrheal disease occurrence, and these can be easily improved by health promotion and education (UNICEF, 2004).

The government of Ethiopia developed the Urban Food Security Strategy (UFSS) through Urban Job Creation and Food Security Program (UJCFSP) to alleviate urban food insecurity and tackle the increasing levels of vulnerability by supporting the urban poor. However, this program is not implemented in Adigrat so far. According to the Ethiopian Catholic Church (ECC, 2019), 35 % of food utilization in the study area was affected by poor basic infrastructure and deterioration of basic services such as safe drinking water, sanitation, housing and health facilities. This may be due to lack of sufficient knowledge; attitude and practice of keeping food clean by appropriate food handling methods. Available literature does not show any study on the nutritional status and food safety KAP of food insecure food handlers in Adigrat town, northern Ethiopia. Therefore, this study was aimed at assessing the nutritional status and knowledge, attitude and practice of food safety among food handler mothers in the selected area.

1.3. Objective of the Study

1.3.1 General objective

The general objective of this study was to assess the food safety knowledge, attitude and practices of food handler mothers and nutritional status of under five children in food insecure households in Adigrat town, Tigray region, Ethiopia. 2020

1.3.2 Specific objectives

The specific objectives of this study were to:

- Assess food safety knowledge, attitude and practices of food handler mothers in Adigrat town.
- Determine the nutritional status of children under five children in the study households through anthropometric measurement
- Evaluate level of food insecurity using household food insecurity access scale.

1.4. Research Questions

Based on the above specific objectives, the research attempted to answer the following question:

- What is the current nutritional status of children under five years in the households in the distinct?
- What is the current level of food safety KAP of food handler mothers?
- What is the current food security status of the study household?
- What can be done to improve food safety and nutritional issues in the study area?

1.5 Significance of the Study

Since this research work is an academic exercise it will have both academic/ and policy significances. The research demonstrates to local peoples the status of current nutritional status of the childrenand the deficiencies in food safety KAP of food insecure households Since the results of this study provide information on the dire need of livelihood support to these and similar households in the area through safety net programs, it may be useful for policy makers, and development actors in both the governmental and nongovernmental organizations working in the Adigrat area as well as elsewhere in the country. It also helpful guide to plan suitable nutritional and health programs for the community based on the facts and figures generated by this study.

1.6 Scope and Limitation of the Study

The study was conducted in Adigrat town on food insecure household from January up to march on food safety KAPs. This study was based on sample household registered as food insecure households. The non-registered food insecure households are beyond the scope of the study because of time and budget constraints.

Operational terms

Attitudes:- Attitudes are emotional, motivational, perceptive and cognitive beliefs that positively or negatively influence the behavior or practice of an individual. An individual's feeding or eating behavior is influenced by his/her emotions, motivations, perceptions and thoughts. Attitudes influence future behavior no matter the individual's knowledge and help explain why an individual adopts one practice and no other alternatives (Macías and Glasauer, 2014).

Food safety:-Food safety refers to the conditions and practices that preserve the quality of food to prevent contamination and foodborne illnesses. It includes the production, processing, preparation and handling of food to ensure it is safe to eat (Griffith, 2000).

Food security:-When all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2001).

Knowledge:- Refers to an individual's understanding of nutrition, including the intellectual ability to remember and recall food- and nutrition-related terminology, specific pieces of information and facts (Macías and Glasauer, 2014).

Practices:- Is defined as the observable actions of an individual that could affect his/her or others' nutrition, such as eating, feeding, washing hands, cooking and selecting foods (Macías and Glasauer, 2014).

Stunting:- being short for age measured as height for age were defined by Z-score less than two standard deviation (SD) below the median of reference population and a sign of chronic under nutrition that reflects failure to receive adequate nutrition over a long period (EDHS, 2016).

Wasting:-Refers to thinness and it is measured as weight-for-height at least 2SD below the median of a reference population. A measure of acute under nutrition that represents the failure to receive adequate nutrition (EDHS, 2016).

Underweight:-having low weight for age, defined by Z-score defined by Z-score less than -2 standard deviation (SD) below median of the population. It may indicate wasting or stunting (EDHS, 2016).

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Food Security Definition and Concept

Food security as a concept has been reformulated many times since the mid-1970s (Messay, 2016).In the year 1983, the Food and Agricultural Organization (FAO), expanded the concept as access to the basic food that they need. It develops progressively with famine, malnutrition and poverty in 1986. Then in 1996 the world food summit adopted the complex definition and it advanced in 2001 as: "Food security is a situation that exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2002). Food is here defined as any substance that people eat and drink to maintain life and growth. As a result, safe and clean water is an essential part of food commodities. The nutrition focus adds the aspects of caring practices and health services and healthy environments to this definition and concept. Since then, food security has come to include food safety and nutrition as well (Weingartener, 2004).

Food security has four pillars: Availability refers to the amount of food of appropriate quality provided by domestic production or imports, food stocks and food aid. Access refers to the importance of ensuring access to adequate resources to acquire appropriate foods for a nutritious diet which include economical, physical and social access. Food utilization implies the need of an adequate diet achieved through an adequate access to safe and clean water, sanitation and health care system. Stability recognizes that the availability, access and utilization dimensions of food security should be guaranteed at all times. Food insecurity exists when people do not have adequate physical, social or economic access to food (Messay, 2016).

The third dimension of food security refers to nutritional status and food safety of individuals. Nutrition is the vital pillars of human life and development, from childhood to old age. Appropriate food and good nutrition are important for cognitive development and wholesome (WHO, 2000). Nutritional status can be defined as the level of intake of balanced diet. It depends on the excess or limited use of food. According to FAO (2007), the double burden of malnutrition refers to the co-existence of under nutrition or overweight/obesity. The cause of this disease is linked to food security, health and care. Particularly children under five are affected by dietary intake. Indicators of malnutrition,

stunting, or extreme shortness (very low height-for-age), is the result of a combination of long-term (chronic) poor dietary intake in terms of quality as well as quantity of food and repeated infectious disease episodes. Both wasting (extreme thinness or low weight-for-age) and stunting are associated with increased mortality as well as poor health and longer-term development outcomes (FAO, 2007).

2.2 Concept of Food Safety and Definition

Food safety is defined as the conditions and measures that are necessary during production, processing, storage, distribution and preparation of food to ensure that it is safe, sound, wholesome, and fit for human consumption (WHO, 1984). Food safety has also been defined as "a reasonable certainty that no harm will result from intended uses under the anticipated conditions of consumption" (OECD 1993). Additional definition of food safety in the year 1997 is, the assurance that food will not cause any harm to the consumer when it is prepared and/or consumed according to its intended use (FAO/WHO, 1997). Food safety is a growing global concern for its continuing importance to public health (WHO, 2014).

Thus, food safety remains a critical issue nowadays among professionals in the food service sector as well as consumers. This is basically due to outbreaks of foodborne diseases resulting in substantial costs to individuals and the economy (Badrie *et al*., 2006).

Foodborne disease is as "a disease commonly transmitted through ingested food. Foodborne diseases comprise a broad group of illnesses and may be caused by microbial pathogens, parasites, chemical contaminants and biotoxins" (WHO, 2015). A food safety hazard is anything in food that can harm consumers' health. Hazards are divided into three categories such as biological, chemical, and physical. Biological hazards are living organisms, including viruses, bacteria, protozoa, moulds, and parasites, which have the ability to infect people or produce toxins, which are injurious to health. Chemical hazards can be artificial chemicals produced by industry or natural chemicals including those produced by heating food or toxic metals, which are injurious to health. Physical hazards include stones and fragments of metal or**.** According to Grace (2015**),** foodborne disease can arise in every place within short period of time by different hazards. Foodborne disease may take place in the kitchen by food handlers. Because food handlers are persons who are in close contact with food and perform any activities that involve the preparation, storage or service of food facility.

2.3 Review of Empirical Literature

Globally, several studies have been conducted and conclude that foodborne disease (FBD) is a disease comparable with major infections such as malaria, HIV/AIDS, and tuberculosis. The overall burden of FBD was estimated at 33 million DALYs) with the highest burden in developing countries. Although children under 5 years make just 9 % of the total population, they harbored 40 % of the FBDs. Microbial pathogens were responsible for most (79 %) of the burden with 584 million cases annually (Grace, 2015). In the year 2014, 171 million children under the age of five had stunted growth, meaning that they were excessively short for their age. In Africa, specifically, the scale of under nutrition is staggering with 58 million children under the age of five being too short for their age (stunted) and 13.9 million weighing too little for their height (wasted). Global Nutrition Report (GNR, 2016), indicated that poor diets in terms of diversity, quality, and quantity, together with illness, are linked with micronutrient deficiencies and contribute to stunting, as well as poor health and development outcomes. Food safety is a growing global concern for its continuing importance to public health (WHO, 2014).

The WHO (2014), estimated that in developed countries up to 30 % of the population suffer from foodborne diseases each year, whereas, in developing countries up to an estimated 70 % of cases of diarrheal diseases are associated with the consumption of contaminated food .

In Ethiopia, different studies were carried out in rural as well as urban part of the country and these studies concluded that the nutritional status of the households is different from region to region, from district to district as well as from household to household. According to the United States Agency for International Development (USAID, 2017), prevalence of stunting is highest in Amhara region (46 %), Benishangul-Gumuz (43 %), Afar (41 %), and Dire Dawa (41 %), whereas wasting is highest in Somali (22 %), Afar (18 %), and Gambela (14 %). A study from Tigrai regional state by Gebremedhin *et al*. (2016), indicated that the prevalence of stunting was 57 %. Stunting variation aligns with the introduction of complementary foods, which, if not combined with proper water, sanitation, and hygiene practices, can have detrimental effects on the nutritional status of children (Gebremedhin *et al*., 2016)

The transmission of FBDs is aggravated by unsafe food handling practices of food handlers. Approximately 10 to 20 % of foodborne diseases outbreaks are because of

contamination by food handlers (Henok *et al*., 2019). A number of studies in food safety KAP have been conducted by Asrat et *al*., (2017) and Mulugeta *et al*., (2012), in Bahir Dar; by Legesse. *et al*., (2015), Tessema *et al*., (2014), Gebrehiwet ., and Teka et al., (2014) in Dangila, which reported that lack of knowledge, attitude and practice in household food handlers in food and water safety. On the other hand, studies in Gonder, by Henok *et al*., (2019), In Malaysia by Dora-Liyana *et al*., (2018), and in Nigeria by Fasoro *et al.,* (2016) reported about respondents with good knowledge, attitude and practice in household food handling.

2.4 Household Food Insecurity

A household is considered food insecure if it has limited or uncertain physical and economic access to secure sufficient quantities of nutritionally adequate and safe foods in socially acceptable ways to allow household members to sustain active and healthy living. Household food insecurity has two broad components: (i) insufficient access to a nutritionally adequate and safe food supply at the household level, and (ii) inadequate utilization of these foods by household members. The access component is also believed to comprise three core domains such as (i) anxiety and uncertainty about household food supply, (ii) insufficient quality of food, and (iii) insufficient food intake by household members. The utilization component is influenced most immediately by nutrition knowledge and beliefs, but also by access to healthcare, water, and sanitation services and practices relating to the management of childhood illness and hygiene (Aosei *et al*., 2010).

2.5 Households Food Insecurity Access Scale (HFIAS)

The food and nutrition techniques assistance project developed this technique to be used in developing country (FANTA, 2006). HFIAS is a tool which contains nine occurrences questions with nine frequencies of occurrences questions. HFIAS measures household food insecurity during the previous four weeks (Messay et al.,2016).

2.6 Household knowledge, Attitude and Practice (KAP) of Food Safety

Food containing harmful bacteria, viruses, parasites or chemical substances is responsible for more than 200 diseases ranging from diarrhea to cancer. In addition to this, various epidemiological data indicate that a substantial proportion of foodborne disease is attributable to improper food preparation practices at consumers' homes. Solid waste disposal, sanitary condition and hand washing facilities, lack of knowledge of food safety,

traditional beliefs, inadequate food safety laws, weak health extension services and a lack of health education about food safety and hygiene affect the four food security dimensions. Most of the foodborne diseases are preventable with proper food handling following the WHO‘s five keys to safer food such as keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperatures, and use safe water and raw materials (WHO, 2006).

Food and waterborne infections are risks of chronic diseases or death (Unnevehr, 2003). Conversely, unsafe food would be food unfit for human consumption due to environmental contaminants and pathogens. The food safety health risk ranges from short-term food-borne infections to long-term ill-health conditions (cancer, hypertension or coronary heart disease) (Dodd and Bayerl, 2012). Household food safety, therefore, were refer to protective measures such as food handling practices from acquisition until consumption by the households, which guard against contaminants and pathogens. A report by WHO (2007), indicated that 1.8 million people died from diarrheal diseases caused by various pathogens in the year 2005.

According to the report by Environmental Health Department, MoH, (2003/4), foodborne illnesses which consist of 12,568 cases of Ascariases, 3,167 of typhoid fever and 3,106 of tapeworm, among others were recorded in Addis Ababa Administrative Region in the year 1995 (MoH, 2003/4).

Unsafe food in a household occurs as a result of consuming food contaminated with microorganisms or their toxins. The contamination could arise from inadequate preservation methods, unhygienic handling practices, cross-contamination from food contact surfaces or from persons harboring the microorganisms in their nares and on the skin. Unhygienic practices during food preparation, handling and storage creates the conditions that allows the proliferation and transmission of disease causing organisms such as bacteria, viruses, parasites and other food-borne pathogens (Ahmed *et al*., 2018).

Hand hygiene is the most basic critical criterion for ensuring safe food handling. Hand washing in the kitchen prevents the spread of infectious disease through human to human or human to food contact. The foods most frequently involved in disease outbreaks are those of animal origin, particularly beef, poultry, pork, milk, fish, and eggs owing to their abundant ingredients that could favor the growth of microorganisms. Storage of those foods at room temperature results in multiplication of microbial food contaminants.

According to WHO (2010), of the more than 900 million foodborne deaths and 960 million foodborne diarrheal disease, food handlers were causes for 10-20 % of the disease.

Different studies on food safety KAP indicated that household food handlers had good knowledge, attitude and practice of food handling, personal hygiene and water sanitation (Henok *et al*., 2019; Abera *et al*., 2016). Contemporarily, most study reported that food handlers were with good knowledge and attitude in food handling but there were gaps in food hygiene and handling practice (Adadow and Akawani,et al., 2018; Mulugeta *et al*., 2012).

2.7 Malnutrition in Children

Malnutrition is one of the most serious health problems affecting infants, children and women of reproductive age in developing countries. According to UNICEF (2008) malnutrition is a disorder resulting from an inadequate (under nutrition) or excessive diet (over nutrition) or from failure to absorb or assimilate nutrients. Malnutrition in all its forms is closely linked, either directly or indirectly, to major causes of death and disability worldwide. The causes of malnutrition, as documented by WHO (2013), are directly related to inadequate dietary intake as well as disease but, indirectly, too many factors such as household food security, maternal and child care, health services and the environment. Malnutrition occurs during the first two years of life as, among many, children have high demand for nutrients to support rapid growth and development. So, the first two years of life are considered as a critical window of opportunity to address malnutrition. Ethiopia is one of the developing countries where malnutrition remains a major public health problem.Infants malnutrition continues to be a major public health problem in developing countries. Nutritional status is primarily determined by a child's growth in height and weight and is directly influenced by food intake and the occurrence of infections. Stunting (chronic malnutrition), wasting (acute malnutrition), and underweight (a general measure of health and nutritional status are the major manifestations of malnutrition (EDHS, 2011).

Optimal nutritional status results when children have access to affordable, diverse, nutrient-rich food; appropriate maternal and child-care practices; adequate health services; and a healthy environment including safe water, sanitation and good hygiene practices (UNICEF, 2013). These factors directly influence nutrient intake and the presence of

disease. The interaction between under nutrition and infection creates a potentially lethal cycle of worsening illness and deteriorating nutritional status (UNICEF, 2013).

Child malnutrition impacts cognitive function and contributes to poverty through impending individual's ability to lead productive life. In addition, it is estimated that more than one-third of under-five deaths are attributable to under nutrition (UNICEF, 2012).

2.8 Anthropometric Measurement

Anthropometry is the science of obtaining systematic measurements of the human body**.** Anthropometry is defined as the measurement of size, weight, body proportions and ultimately the composition of the human body. Anthropometric indicators measure the impact of both food insecurity and health status on the nutritional status of individuals. The anthropometric indicators most commonly used in national surveys are based on weight and height (or length) of infants, young children, youth and adults. The interpretation of the adequacy of the anthropometric indicators is based on well-established cut-off points (Rafael and Maria 2008). Several indexes and ratios can be derived from anthropometric measurements. Anthropometric measuring techniques include MUAC, Weight for age, Weight-for-height and Height-for-age.

2.8.1 Mid-upper arm circumference (MUAC)

The MUAC is a simple measurement used to identify children between six months and five years old who have malnutrition (wasting or thinness) and are at risk of dying. According to WHO (2016), standards for mid-upper arm circumference (MUAC)-for-age show that in a well-nourished population, there are very few children aged 6–60 months with a MUAC less than 115 mm**.** Children with a MUAC less than 115 mm have a highly elevated risk of death compared to those who are above. Weight-for-age reflects body mass relative to chronological age.

2.8.2 Length/Height

The length of each child aged 6-59 months is measured lying flat and centrally on measuring boards placed on a hard flat surface on the ground. The length is read to the nearest 0.1 cm (head and feet against the base of the board and foot piece respectively). The height of children aged above 24 months is measured standing straight on measuring board placed on hard flat surface against a wall with line of sight perpendicular to the

horizontal surface. The child's height is measured to the nearest one decimal place (WHO, 2006).

2.8.3 Weight

The child is put in the weighing pants and is gently lowered on the standardized Salter scale with the strap of the pant in front. The scale is hanged from a secure position; the child's weight is read to the nearest one decimal place after the scale needle stabilizes. Weight-for-age reflects body mass relative to chronological age. Low W/A relative to a child of the same sex and age in the reference population is referred to as "*lightness*", while the term "*underweight*" is commonly used to refer to severe or pathological deficits in W/A. W/A is commonly used for monitoring growth and to assess changes in the magnitude of malnutrition over time. However, W/A can show the effects of short- and long-term health and nutrition problems (WHO, 2006).

2.9 Conceptual Frame Work

2.9.1 Conceptual Framework of Food Safety in Food Insecure Households

Conceptualization of household food safety is that food safety refers to all measures taken to ensure that food is safe for human consumption (FAO/WHO, 2004). Unhygienic environment and handling of food in and around the homes have been shown to be a risk factor for the spread of infectious diseases (Takanashi *et al*., 2009; De Jong *et al*., 2008).

The framework is practical and feasible to be implemented at different stages of the food safety management system. Lack of knowledge, attitude and practice has a negative impact on nutritional security which leads to food insecure household. Lack of safe food is one of the world's most urgent food insecurity issues. So it is imperative to conceptualize the problem in hand with respect to knowledge, attitude and practice in food insecure household aspects. The conceptual frame work of food safety in relation to household food insecure integration of different activities is shown as follows.

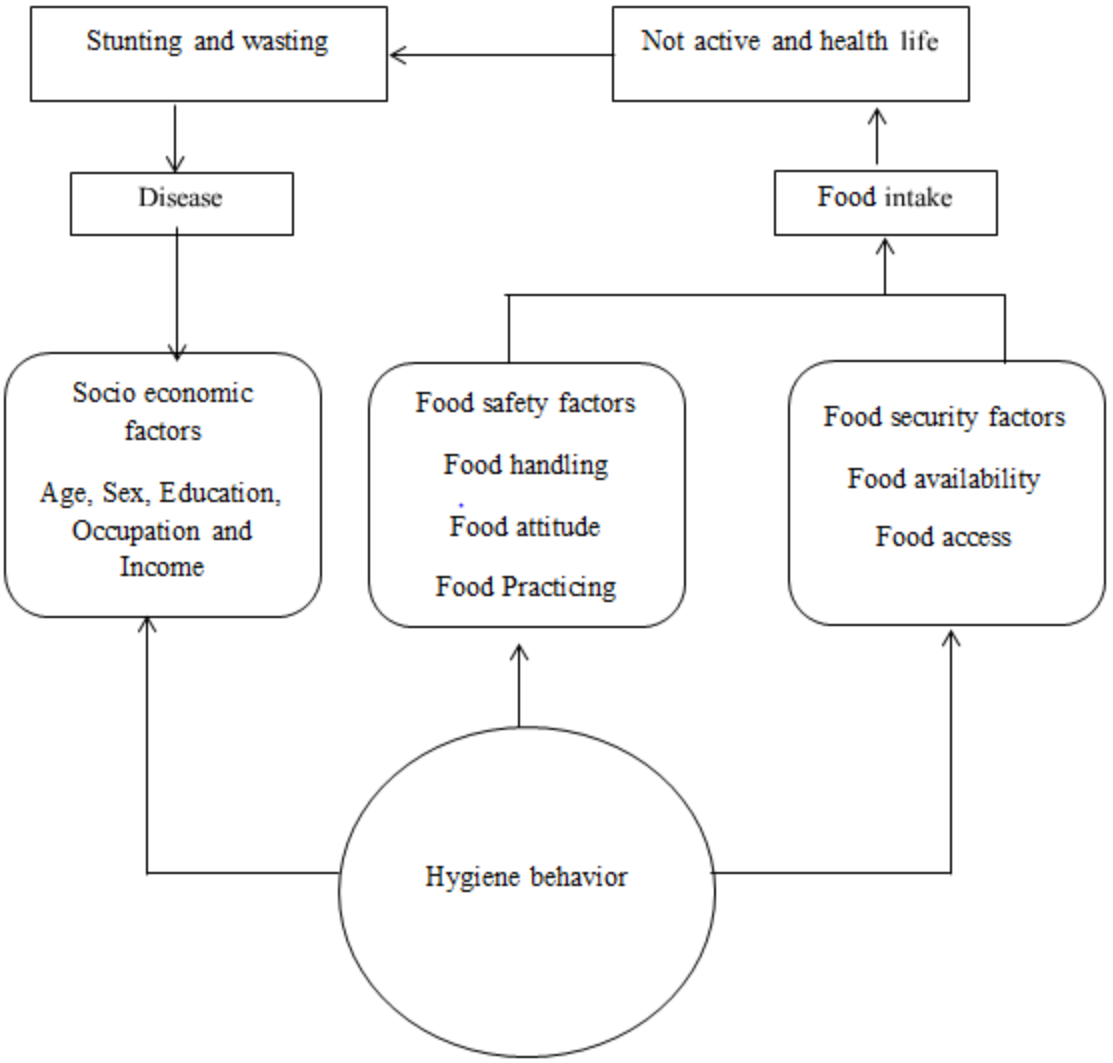

Figure 1: Conceptual Framework of Food Safety in Food Insecure Households

(**Source:** Modified from Gross *et al*., 200

FNS conceptual framework indicates four hierarchical key dimensions of FS including food availability, food access, food utilization (all stable) and the nutritional status required to live an active and healthy life. In addition to this, figure, 1also shows that lack of food safety might block utilization and consequently FNS. When unsafe food is consumed, the utilization stage becomes jeopardized because nutrients get lost through foodborne illnesses. The implication is that even though food is available and accessible, the body may still not obtain enough nutrients for good nutritional and healthy status due to ingestion of unsafe foods. As a result, poor nutrient intake causes stunting and wasting. In addition, foodborne illnesses can be debilitating and even fatal to susceptible groups of the population.

CHAPTER THREE

3. METHODS AND MATERIALS

3.1 Description of the Study Area

Adigrat is the capital town of the Eastern Zone of Tigray located 900 Km north of Addis Ababa. According to the CSA (2009), the population of Adigrat is estimated at 63,549. Females constitute 50.2 % of the total population. Adigrat is located in the Eastern Zone of Tigray regional state at longitude and latitude 14°16′N 39°27′E Coordinates, with an elevation of 2,457 meters above sea level and below a high ridge to the west. Adigrat was part of Ganta Afeshum woreda before a separate woreda was created for the town. Over 94 % of the inhabitants practiced Ethiopian Orthodox Christianity, while 3.02 % of the population was Catholic, and 2.68 % were Muslims.

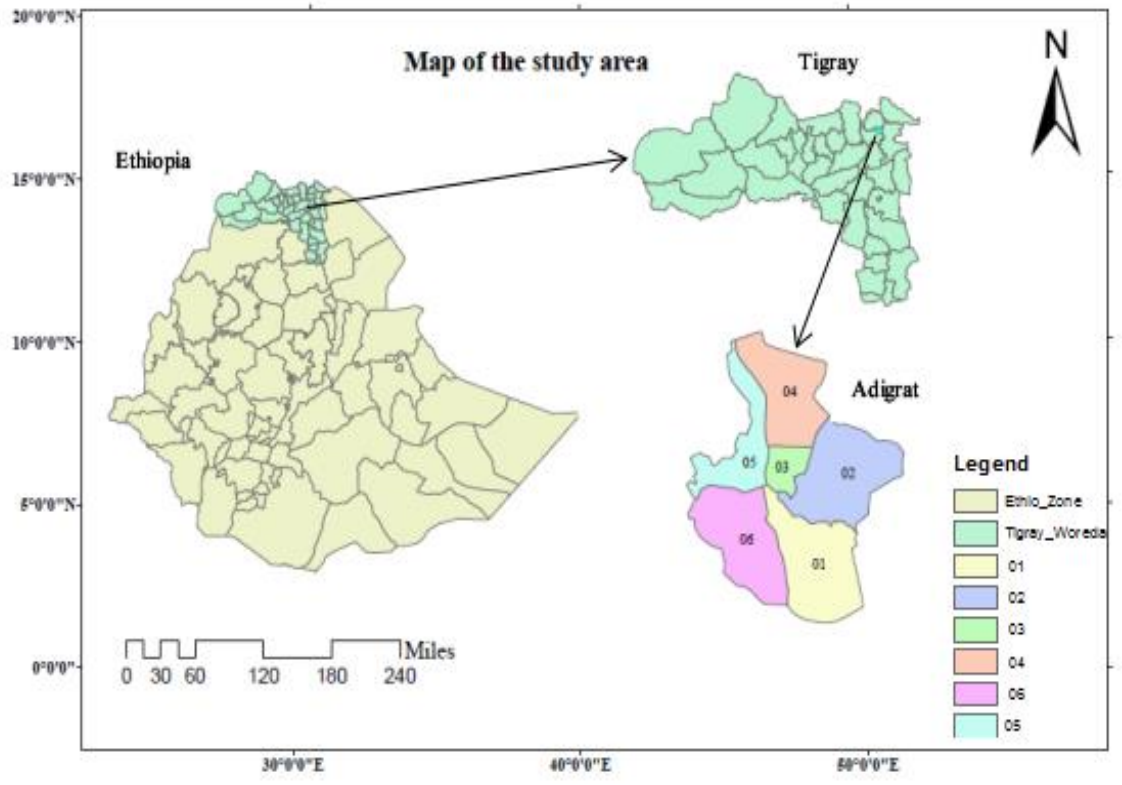

Figure 2: Map of the study area (Adigrat town).

(**Source:** Eastern zone administrative office annual report (2016/17)

3.2 Study Design

A retrospective-cross-sectional study design was used by taking in to account the nutritional status and determinants at one time data. The data source were a cross-sectional questionnaire survey where nutritional status and food safety KAP of household food handler (sampled household heads), kebele administration, wereda office of health and cooperative office).

3.3 Source and Target Population

Population of the study participants were all registered food insecure households who have been living in Adigrat town. The target population of food handler mothers was randomly selected from the registered food insecure households of the six kebeles by simple random selection techniques. Anthropometric measurements were taken from under five children in the selected food insecure households.

3.4 Sampling and Sample Size Determination Techniques

The food insecure households in Adigrat town that were registered as being under the poverty lines, when compared to other towns of Tigray region, were considered in the study. In the town, 342 were selected from each kebele by random sampling. For the purpose of this research, random sampling techniques were applied to select the samples to be considered from the study area and population.

According to the information obtained from social and labor affairs, Adigrat Administratin Office, the total number of registered food insecure households in the six kebeles was 2380. Then the number of sample households was determined by Yamane‘s sample size determination (Yamane, 1967), total sample size is 342. The total sample size has been distributed to all six kebeles based on the proportion of total number of food insecure household in each kebele. Table 1 shows proportionality of sample taken from study kebeles, Adigrat town.

Yamane's sample size determination (Yemane, 1967)

$$n = \frac{N}{\left(1 + N\ (e2)\right)}$$

Where, n = the desired sample size
; N = total number of population and
e = the level of precision or the quality of being care full and accurate which is equal to 0.05

n= 2380 = 342

(1+2380 (0.05)

Table 1: Sample size and address of the study participants

Sample kebele	Number of registered food insecure households	Sample food handler mothers
01	396	57
02	394	57
03	385	55
04	398	57
05	393	57
06	414	59
Total	2380	342

=342

3.5 Data Collection Approaches

3.5.1 Questionnaire survey

A questionnaire survey was developed based on Yvette and Glasauer (2014) for the purpose of data collection. A structured questionnaire was developed by the principal investigator after reviewing different related literatures with required modification based on outcome variables and their predictors.

The questionnaire was prepared first in English then translated to the local language (Tigrigna). To check the consistency of the translation; retranslation to English was done by another translator. The questionnaire included socio-demographic characteristics of care giver/family and child, food safety KAP, household food insecurity access scale measurements, environmental hygiene and anthropometric measurements. The questionnaire was pre-tested on 5 % of the same source population other than sampled population. Based on the pre-test, questions were revised, and edited. Finally, Tigrigna version questionnaire was used for data collection. HFIAS was measured to food access using questionnaires (Coates, 2007). Additionally field observation was carried out by the researcher to check the primary and secondary data.

3.5.2 Secondery data

Secondary data such as published and unpublished documents, journals, articles, reports and e-resources review of the health sectors at district and kebeles and regional health levels were considered as source of information.

3.5.3 Anthropometry Equipment and Procedures

Height/length- Measurement was based on horizontal length (for those who could not stand erect) or standing height (for all above 13 months of age). Measurement was reported to the nearest 0.1 cm. A health extension worker used height board to measure height/length of children.

Weight- Weight was taken to the nearest 0.1 Kg with child wearing just a layer of undergarment. It was measured using hanging plastic pants and a Salter scale recommended for measuring weight of infants.

MUAC- The left arm of a child was used to measure the mid-upper arm circumference (MUAC. To determine the point of measurement, the arm was bent at the elbow to make a right angle. The tape was placed at zero on the tip of the shoulder and the tape was pulled to the tip of the elbow. The midpoint of the arm was marked with a pen. The arm was then straightened; the tape placed around the marked area and the reading was taken twice to get an average.

Age determination- Information on age was obtained from verbal information on date of birth from the mother and age was calculated in months.

Child's nutritional status was assessed using child's weight, height, and age. Using this measurement three indices were used in the evaluation of nutritional status; height-for-age (HAZ below -2SD) which measures stunting; weight-for-height (WHZ below -2SD) which reflects wasting; and weight-for-age (WAZ below -2SD) that reflects underweight

3.6 Data Quality Managements

During data collection, data quality was managed by using pre-testing and the questionnaires were translated from English into Tigrgna for easy communication with the respondents. Pretesting was done on five percent of the sample before the actual data collection. Completed questionnaire and the corresponding food in secured household was collected on daily basis and checked for completeness and consistency on daily basis.

3.7 Eligibility Criteria

3.7.1 Inclusion criteria

All food insecure mothers, in the six selected kebele who have been registered in labor and social affairs of the kebele

3.7.2 Exclusion criteria

Those food insecure mothers who do noy yet registered at the labor and social affairs office in each of the six selected kebeles.

3.8 Study Variables

Dependent variables

Food access in sampled households
Nutritional status in children under the age five years in households
Food security and food safety knowledge, attitude and practice of mothers in households

Independent variables

Age of household headed, Gender of HHs, Educational level and health extension program training status of household headed. Availability of facility such as toilet facility, food handling, equipment cleanliness, hand washing, waste disposal mechanism and income status. Age of household: is also assumed to be a determinant of food safety KAP in food insecure households that older are assumed to have gained knowledge and

experience over time and are better able to evaluate information than younger household headed.

3.9 Method of Data Analyses

The food safety knowledge, attitude and practice results were analyzed through descriptive and inferential statistic. The SPSS – version 25 software was employed to calculate those statistics. Data processing and analysis of anthropometric data was measure based on the WHO Child Growth Standards (WHO, 2006) or ENA smart were used to convert weight, height and age data into Z-scores. Stunting proportion of children with height for-age below –2 standard deviations (SD); underweight, proportion of children with weight-for-age below–2 SD; wasting proportion of children with weight for-height below–2 SD; and overweight proportion of children with weight-for-height above +2 SD were determined. Wasting were defined as WHZ < −2 SD or MUAC < 125 mm.

Mildly food insecure, moderate food insecure, and severely food insecure were evaluated through Household food security assess scale. Mildly food insecure, moderate food insecure, and severely food insecure were evaluated through Household food security assess scale. The Household Food Insecurity Access was measured using a set nine questions related to three different domains of food insecurity access: (i) anxiety and uncertainty about the household food supply; (ii) insufficient quality in terms of variety and preferences of the type of food and (iii) insufficient food intake in terms of reducing quantity of food. Food security status of households as food secure, mildly food insecure and moderately food insecure was determined according to (Coates, 2007) using the formula:

$$\frac{\text{Number of households with HFIA category}}{\text{Total number of households with a HFIA category}} \times 100$$

Qualitative data such as knowledge, attitude and practices on food handling, personal hygiene and water and sanitation assessment were converted to percentages and used as indicators for knowledge, attitude and practice on safe food handling. The assessment was based on the FAOs guidelines on food safety and nutrition related KAP assessments (Macías and Glasauer, 2014) .A three point Likert's scale with a positive, negative and

neutral response was used to measure the knowledge, attitude and practices of food handling. The knowledge, attitude or practice of the population is calculated for each question by dividing the total number of correct responses by the number of respondents who answered the particular question (Macías and Glasauer, 2014). Respondents who did not answer the question, or for whom information is incomplete were excluded

3.10 Ethical Consideration

As measurement was taken from human subjects, research ethical issues were duly addressed. I was taken ethical clearance from Addis Ababa University College of development studies, department of food security. Adigrat town administration and the health office were informed about the purpose of the research and permission to conduct the study in kebeles six was granted. The following were explained to each respondent: purpose of the study and its objectives, confidentiality of information obtained from respondent, right not to answer any question that a respondent would not be comfortable with, and the importance of answering all the questions. Participants were also informed that the study did not offer any incentives to them. In the presentation of the study results, name of respondent was not used. Finally informed oral consent was obtained from respondents.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1 Socio-Demographic Results

All respondents were female food handler and the majorities (54 %) were older than 45 years and 91 % of them were Ethiopian Orthodox Christians. About 81 % were single, divorced or widowed. Only 15 % of the respondents were with educational level of diploma or above. And almost all respondents (97 %) did not have a paid occupation and only 3 % of the respondents work in governmental or non-governmental organizations. Table 2: **Socio-demographic characteristics of respondents** Adigrat, Ethiopian=342, 2020

Characteristic	Meda Agame	Mewtsa'e Worki	Hadish Adi	Total
	No (%)	No (%)	No (%)	N (%)
All female	114 (33.3%)	114 (33.3%)	114 (33.3%)	342 (100%)
Age				
18-29	38 (33.3%)	26 (22.8%)	20 (17.5%)	84 (24.6%)
30-45	24 21%)	26 (22.8%)	24 (21%)	74 (21.6%)
>45	52 (45.6%)	62 (54.4%)	70 (61.4%)	184 (53.8%)
Religion				
Orthodox	96 (84.2%)	108 (94.7%)	110 (96.5%)	314 (91.8%)
Muslim	8 (7%)	4 (3.5%)		12 (3.5%)
Catholic	10 (8.7%)	2 (1.7%)	4 (3.5%)	16 (4.7%)
Marital status				
Married	24 (21%)	16 (14%)	24 (21%)	64 (18.7%)
Single	70 (61.4%)	60 (52.6%)	62 (54.4%)	192 (56.1%)
Divorced	10 (8.7%)	22 (19.3%)	24 (21%)	56 (16.5%)
Windowed	10 (8.7%)	16 (14%)	4 (3.5%)	30 (8.7%)
Occupation				
Governmental	6 (5.3%)		2 (1.7%)	8 (2.3%)
Non-governmental	2 (1.7%)			2 (0.6%)
Others	106 (92.9%)	114 (100%)	112 (98.2%)	332 (97%)
Educational status				
Illiterate	42 (36.8%)	47 (41.2%)	54 (47.4%)	143 (41.8%)
1-8 grade	14 (12.3%)	26 (22.8%)	22 (19.3%)	62 (18.1%)
9-12 grade	38 (33.3%)	27 (23.7%)	24 (21%)	89 (26%)
Diploma	16 (14%)	12 (10.5%)	14 (12.3%)	42 (12.3%)
>diploma	4 (3.5%)	2 (1.7%)		6 (1.8%)
Monthly income				
<800	94 (84.5%)	90 (98.9%)	95 (83.3%)	279 (81.6%)
801-1500	20 (17.5%)	22 (19.3%)	19 (16.7%)	61 (17.8%)
1501-2800		2 (1.7%)		2 (0.6%)
Number of household				
One	28 (24.6%)	22 (19.3%)	18 (15.7%)	68 (19.8%)
Two	13 (11.4%)	16 (14%)	33 (28.9%)	62 (18.1%)
Three	21 (18.4%)	22 (19.3%)	18 (15.7%)	61 (17.8%)
Four	27 (7.9%)	24 (21%)	21 (18.4%)	72 (21%)
≥Five	25 (21.9%)	30 (26.3%)	24 (21%)	79 (23%)

Most respondents said that they earned their daily bread through house-to-house begging, working in flour mills (for a handful of flour per round of milling they helped), selling home-made traditional alcoholic beverage (*Tella*), manually washing clothes for others, cooking food for others, selling vegetables in village sheds or working as sex workers. About 42 % of them cannot read or write and an equal proportion had elementary or secondary education. Only 15 % had diploma or above diploma level education. About 82 % of the respondents had a monthly income of less than ETB 800.00. About 46 % of respondents had households consisting of four or more than four members.

4.2 Households Food Insecurity Access

The food security status of the study households was 2.2 % food secure, 27 % mildly food insecure, 26.7 % moderately food insecure and 44.3 % severely food insecure. In most severe condition, the respondent went a whole day without eating or went to bed hungry because they ran out of food. In general, over 70 % of the households considered in this study were either mildly or severely food insecure. This implies that there is high rate of undernourishment and hunger in the study area. The result of 2.2 % food security happened, perhaps, as a result of vague registration of food insecure households in the town.

The extent of hunger among poor households in the three neighborhoods of the town was also considerable. Of the 237 respondents who reported that there were times in the past four weeks when there was no food of any kind to eat, 29.5 % and 64.1 % faced this sometimes (three to ten times) or often (more than ten times), respectively. Similarly, of the 265 households who had to go to sleep at night hungry, 29.1 % experienced this sometimes, and 50.6 % often. A total of 225 households had a member who, at times, did not eat a whole day and night in the last four weeks because there was no food. This happened sometimes to 30.7 % and often to 56 % of the households.

Table 3a: **Household food insecurity status of respondents** Adigrat, Ethiopia

n=342, 2020

HFIAS	Occurrence		Frequency		
	Yes	No	Rarely (1)	Some times (2)	Often (3)
1. In the past four weeks, did you worry that your household would not have enough food?	303 (89%)	39 (11%)	18 (5.3%)	76 (22.2%)	212 (62%)
2. In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	328 (96%)	14 (4%)	36 (10.5%)	32 (9.4%)	260 (76%)
3. In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	332 (97.1%)	10 (2.9%)	36 (10.5%)	16 (4.7%)	280 (81.9%)
4. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	276 (80.7)	66 (19.3%)	30 (8.7%)	31 (9%)	215 (62.9%)
5. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	288 (84.2%)	54 15.8%)	22 (6.4%)	40 (11.7%)	226 (66%)
6. In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	256 (74.9%)	86 (25.1%)	26 (7.6%)	38 (11.1%)	192 (56.1%)
7. In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	237 (62.3%)	115 (33.6%)	36 (10.5%)	50 (14.6%)	141 (41.25%)
8. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	265 (77.5%)	77 (22.5)%	28 (8.9%)	77 (22.5%)	160 (46.8%)
9. In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	225 (65.8%)	117 (34.2%)	12 (3.5%)	69 (20.2%)	126 (36.8%)

Rarely (1 or 2 times), sometimes (3 to 10 times), Often (more than 10 times)

Based on the measure of household food insecurity access scale- HFIAS (Coates et al., 2006), the food security status of the study households was 2.2 % food secure, 27 % mildly food insecure, 26.7 % moderately food insecure and 44.3 % severely food insecure. In general, about 98 % of the households considered in this study were mildly to severely food insecure (Table 3b).

Table 3b: Food security status of respondents

HFIAS category	Percent
Food secure	2.2 %
Mild food insecure	27 %
Moderately food insecure	26.7 %
Severely food insecure	44.3 %

The extent of food insecurity among the study population in Adigrat town was much worse than the 72 % observed in Damot Gale Woreda, Wolaita zone (Adimasu *et al*., 2019), 90.6 % in Boset district (Getachew *et al*., 2018), 69 % from Jimma zone (Kalkidan *et al*., 2016), 69 % in urban and peri urban Nekemte (Wondu et al.,2020). Similarly, studies from outside Ethiopia, such as the 70 % in Accra, Ghana (Tuholske *et al*., 2020), 39 % in Tongaat, South Africa (Khumalo and Sibanda et ., 2019), and 50 % in slums in North India (Agarwal *et al.*, 2009) and over 54 % in Nepal (Singh and Ghimire, 2020), showed a relative lower prevalence of food insecurity.

4.3 Households Food Handling KAP Assessments

4.3.1 Households food handling Knowledge

Proper food handling, storage and heating is the mainstay in prevention of foodborne diseases. Household food handling knowledge, as related to separation of raw and cooked food and storage of perishable foods is present in (Table 4). In the present study, knowledge of food handling among the respondents is very low with only 12 %. The result from this current finding is in line with similar studies reported by Legesse *et al*., (2015) in Arba Minch, and Tessma *et al*., (2014) in Dangila. However, study in Malaysia by Dora-Liyana *et al*., (2018), showed that food handler food handling knowledge were

excellent (90.3 %). Hence, further food safety awareness creation campaigns are needed in the study area where food handling knowledge of respondents is poor.

Table 4: Household food handling knowledge of respondents Adigrat, Ethiopia

n=342, 2020

Food handling knowledge	Meda-Agame	Mewtsa'e Worki	Hadish Adi
1. Reason for separation of raw and cooked food			
Raw animal foods often contain germs	58 (50.9%)	34 (29.8%)	41 (36%)
Others	24 (21%)	14 (12.3%)	24 (21%)
Don't know	32 (28%)	66 (57.9%)	49 (43%)
2. Signs of through cooking of soup and stews for safety and redness to be served			
They are boiling /well cooked	98 (86%)	83 (72.8%)	96 (84.2%)
Others	2 (1.8%)		
Don't know	14 (12.3%)	31 (27%)	18 (5.2%)
3. Kind of perishable foods to be stored In refrigerator on a cool place			
Meat			
Poultry			
Fish			
Milk /dairy products			
All of the above	84(73.7%)	62(54.4%)	80(70%)
Don't know	30(26.3%)	52(45.6%)	34(29.8%)
4. Reason for avoiding eating left over that were not kept in a cool place			
Because food is not safe any more		6(5.3%0	2(1.8%)
Germs multiply very quickly can cause illness	6(5.3%)	2(1.8%)	16(14%)
Higher temperature make germs grow faster	2(1.8%)	2(1.8%)	
All of the above	68(59.6%)	48(42.1%)	59(51.8%)
Don't know	38(33.3%)	56(49.1%)	37(32.5%)
5. Washing raw fruits and vegetables before eating			
Washing with clean water	108(94.7%)	98(86%)	106(93%)
Don't know	6(5.3%)	14(12.3%)	7(6.1%)
Others		2(1.8%)[3]	

4.3.2 Households food handling attitude

With Regard to household attitude, a high proportion (83.5 %) of respondents from all neighborhoods showed positive attitude (range, 76.8 % to 87.7 %) (Table 5). The observation in this study was higher than the 50.4 % seen in Debark (Henok *et al*., 2019) but almost similar to the positive altitude (80 %) noted from Malaysia (Dora-Liyana *et al*., 2018). Those who had negative attitude had different explanations of their own, some stemming from perception, and others from inability. Some said the following:

> *"Sickness from contaminated food is not serious; God protects us from every disease; keeping food in cold places changes the test; we eat whatever we get from house-to-house begging; we don't have money to buy charcoal for reheating leftovers and we are too old and lack strength to do it".*

However, according to WHO (2006), dangerous microorganisms in foods can make people sick and can even kill them, therefore it is important to reheat cooked food thoroughly because microorganisms can multiply very quickly in them if food are kept at room temperature.

Table 5: Household of food handling attitude of respondents Adigrat, Ethiopia

n=342, 2020

Personal hygiene attitude	Kebeli	It is	It is not	Not sure
Perceived susceptibility				
Likelihood of one self or child having stomach ace or diarrhea from not washing your hand	Meda Agame	110(96.5%)	2(1.8%)	2(1.8%)
	Mewtsa'e Worki	107(93.8%)	2(1.8%	5(4.4%)
	Hadish Adi	102(89.5%)	4(3.5%)	8 (7%)
Perceived severity				
Seriousness if one or child gets diarrhea from one self not washing one's hand	Meda Agame	114(100%)		
	Mewtsa'e Worki	104(93.8%)	4(3.5%)	6(5.3%)
	Hadish Adi	100(87.7%)		4(3.5%)
Perceived benefits				
Goodness of washing ones hand before preparing food or before feeding a child or eating	Meda Agame	114(100%)		
	Mewtsa'e Worki	106(93%)		8 (7%)
	Hadish Adi	110(96.5%)		4(3.5%)
Perceived barriers				
Difficulty to wash one's hand before preparing food before feeding a child or eating	Meda Agame		112(98.2%)	2(1.8%)
	Mewtsa'e Worki	2(1.8%)	102(89.5%)	10(8.8%)
	Hadish Adi	2(1.8%)	108(94.7%)	4(3.5%)
Perceived self-efficacy				
Confidence in washing one's hand properly	Meda Agame	82(71.9%)	10(8.8%)	24 (21%)
	Mewtsa'e Worki	77(67.5%)	24(21%)	13 (11.4%)
	Hadish Adi	82(71.9%)	16(14%)	16 (14%)
Total positive attitude	Meda Agame 523/570=93.3% Mewtsa'e Worki 496/570=87% Hadish Adi 502/570=88.1%			
Over all positive attiude	1521/1710=88.9%			

4.3.3 Households food handling practice

Food handling practices are actions that minimize risk of food contamination. Food handling practice is very important than any other issues in food safety. Overall appropriate food handling practice was 30 %, ranging between 29 % and 32 % among the different neighborhoods (Table 6). It is, however, worth noticing that over 80 % or respondents cleaned utensils with detergents and about 60 % covered perishable fresh foods to protect from insects, rodents, pests and dust The findings in this study was

similar with that observed by Tessema *et al*., (2014) in Dangla, but lower than the observation of Fasoro *et al*., (2016) in Nigeria. The good level of positive attitude of respondents in this study was, unfortunately, not translated into appropriate practice.

Table 6: Household of food handling practices of respondents Adigrat, Ethiopia

n=342, 2020

Food handling practice	Meda-Agame	Mewtsa'e Worki	Hadish Adi	Total
1. Usual cleaning of kitchen surfaces and utensils after preparing dinner				
Scrape excess food in to rubbish bin				
Wash with hot wate	8 (7%)	4 (3.5%)	6 (5.3%)	18 (5.3%)
Wash with detergent	102 (89.5%)	92 (80.7%)	96 (84.2%)	290 (84.8%)
Don't know	4 (3.5%)	18 (15.5%)	12 (10.5%)	34 (9.9%)
2. Storing perishable fresh foods such as raw meat and poultry[1]				
In the refrigerator (below 5 degree cent greed)	10 (8.8%)	14 (12.3%)	23(20.2%)	47(13.7%)
Covered protected from insects rodents pests and dust	74(64.9%)	65(57%)	63 (55.3%)	202(59%)
Separated from cooked or ready to eat foods	22(19.3%)	23 (20.1%)	20(17.5%)	65(19%)
Others	2(1.8%)	2 (1.8%)		4(1.1%)
Don't know	6(5.3%)	10 (8.8%)	8 (7%)	24(7%)
Total appropriate practice	**208/684 30.4%**	**174/684 25.4%**	**202/684 29.5%**	

4.4 Households Personal Hygiene KAP Assessments

4.4.1 Households personal hygiene knowledge

Personal hygiene refers to maintaining of cleanliness of one's body. In this study, personal hygiene knowledge was assessed in terms of identifying action for preventing food poisoning from germs that come from faces and pointing the key moments for hand washing (Table 7). Over 90 % of respondents know the importance of hand washing in preventing harmful foodborne germs. However basic knowledge about the right moments to wash hands was poor. Total knowledge in the three neighborhoods revolved around

30.9 %. Overall proper knowledge about personal hygiene among all respondents was 12.6 % and this was much lower than that observed in Nepal (Sah *et al*., 2015).

Table 7: Household personal hygiene knowledge of respondents Adigrat, Ethiopia

n=342, 2020

Personal hygiene knowledge	**Meda-Agame**	**Mewtsa'e Worki**	**Hadish Adi**
1. Action for preventing food poisoning from germs from faces			
Wash hand (after going to the toilet and cleaning the baby's bottom)	4(3.5%)	8(7%)	12(10.5%)
Remove feces from the home and surrounding	2(1.8%)		
Others		4(3.5%)	
One and two are answers	108(94.7%)	102(89.5%)	102(89.5%)
2. Key movements for hand washing			
After going to the toilet or latrine	16(14%)	20(17.5%)	16(14%)
After cleaning the baby 's bottom or changing the babies nappy	19(16.6%)	14(12.3%)	19(16.6%)
Before preparing handling food	17(14.9%)	15(13%)	17(14.9%)
Before feeding a child or eating	18(15.8%)	19(16.6%)	18(15.8%)
After handling row food	16(14%)	15(13%)	20(17.5%)
After handling garbage	18(15.8%)	15(13%)	18(15.8%)
Others		2(1.8%)	
No answer	10(10.5%)	14(12.3%)	6(5.3%)
Total knowledge	218/684= 31.9%	202/684 29.5%	215/684 31.4%
Total knowledge for all	**30.9%**		

4.4.2 Households personal hygiene attitude

Assessment of attitude towards proper personal hygiene showed that most respondents thought unwashed hands could lead to a serious illness to children or parents (Table 8). Overall total positive attitude among all respondents was 89 % with a range of 89 % to 93 % for the three neighborhoods. The finding is this study was similar with the 82.8 % positive attitude reported from Malaysia (Abdul et *al*., 2012). Those very few respondents who showed negative attitude towards handwashing said the following:

"*Diarrhea is not caused by not washing hands; if we have not been sick from unwashed hands until now, we will never be sick hereafter; it is God who keeps us safe, not Science*."

Table 8: Household personal hygiene attitude of respondents Adigrat, Ethiopia n=342, 2020

Personal hygiene attitude	**Kebeli**	**It is**	**It is not**	**Not sure**
Perceived susceptibility				
Likelihood of one self or child having stomach ace or diarrhea from not washing your hand	Meda Agame	110(96.5%)	2(1.8%)	2(1.8%)
	Mewtsa'e Worki	107(93.8%)	2(1.8%	5(4.4%)
	Hadish Adi	102(89.5%)	4(3.5%)	8 (7%)
Perceived severity				
Seriousness if one or child gets diarrhea from one self not washing one's hand	Meda Agame	114(100%)		
	Mewtsa'e Worki	104(93.8%)	4(3.5%)	6(5.3%)
	Hadish Adi	100(87.7%)		4(3.5%)
Perceived benefits				
Goodness of washing ones hand before preparing food or before feeding a child or eating	Meda Agame	114(100%)		
	Mewtsa'e Worki	106(93%)		8 (7%)
	Hadish Adi	110(96.5%)		4(3.5%)
Perceived barriers				
Difficulty to wash one's hand before preparing food before feeding a child or eating	Meda Agame		112(98.2%)	2(1.8%)
	Mewtsa'e Worki	2(1.8%)	102(89.5%)	10(8.8%)
	Hadish Adi	2(1.8%)	108(94.7%)	4(3.5%)
Perceived self-efficacy				
Confidence in washing one's hand properly	Meda Agame	82(71.9%)	10(8.8%)	24 (21%)
	Mewtsa'e Worki	77(67.5%)	24(21%)	13 (11.4%)
	Hadish Adi	82(71.9%)	16(14%)	16 (14%)
Total positive attitude	**=1530/1710=89.8%**			

4.4.3 Households personal hygiene practice

Handwashing practice was assessed in terms of step by step description of handwashing. Between 35 % and 42 % of respondents did not follow appropriate handwashing sufficient to avoid illness. Total appropriate handwashing was 55 %. A similar observation was also made by (Dagne et al., 2019) where more than 50% food handlers had good practice food hygiene.

Table 9: Household personal hygiene practice of respondents Adigrat, Ethiopia

n=342, 2020

Personal hygiene practices	Meda-Agame	Mewtsa'e Worki	Hadish Adi
Could you please describe step by step how you wash your hand			
a) wash hands in a bowl of water sharing with others (poor practice)	42 (36.8%)	32 (28%)	29 (21%)
b) With someone pouring a little clean water from a jug in to one's hand	8(7%)	14(12.3%)	16(14%)
c) under running water (appropriate practice)	6(5.3%)	10 (8.8%)	14(12.3%)
d) washes hand with soap or ashes (appropriate practice	58(49.1%)	48(36.8%)	51(44.7%)
e) don't know		10 (8.8%)	4 (3.5%)
Total appropriate practice	64/114= 56.1%	58/114= 50.9%	65/114= 57%
Overall appropriate practice	**54.7%**		

4.5 Households Water Sanitation KAP Assessment

4.5.1 Households water sanitation knowledge

Water sanitation refers to having clean drinking water by using treatments. Boiling or adding disinfectants in the right concentration are the methods of choice to make water safe for drinking (CDC, 2020). Accordingly, 44.2 % of all respondents knew either to boil or discard unsafe water (range, 34 % to 50 % among neighborhoods). None in the three neighborhoods knew about using bleach to disinfect water. Generally respondents had poor knowledge of treating unsafe water (Table 10). This is similar to the study of Mattal *et al*. (2016) from India where 78 % of the respondents did not treat water.

Table 10: Household water sanitation knowledge of respondents Adigrat, Ethiopia

n=342, 2020

Water sanitation	Meda-Agame	Mewtsa'e Worki	Hadish Adi	Total
Boil it	4(3.5%)		4(3.5%)	8(2.3%)
Add bleach or choline				
Strain it through a cloth			2(1.8%)	2(0.58%)
Use awater filter ,ceramic ,sand composite etc				
Use solar destination				
Let it stand and settle	15 (13.2%)	18 (15.8%)	16 (14%)	49 (13.4%)
Discard it and get water from safe source	54 (47.5%)	35 (30.7%)	50 (44.7%)	139(40.6%)
Others				
Do not know	46 (40.4%)	57 (50%)	41 (36%)	144 (42.1%)

4.5.2 Households water sanitation attitude

Positive attitude of respondents in the three neighborhoods (86 % - 99 %) was observed towards susceptibility to illness coming from unsafe water, seriousness of the illness, benefits of boiling unsafe water before drinking, and confidence in boiling water to avoid illness. In addition, most (77 % - 88 %) did not think that boiling water was difficult. Overall positive attitude of all respondents was 91.3 % (Table 10). Negative attitude by few respondents was expressed as:

> *"We are still safe without boiling water; God is keeping us safe; we do not give attention to boiling water, we cannot afford charcoal for boiling water; we believe that water is clean and safe".*

Similarly, 94 % of respondents in the study of Mattal *et al*. (2016) from India felt that water was clean.

Table 11: Household water sanitation attitude of respondents Adigrat, Ethiopia

n=342, 2020

Water sanitation practice	**Kebele**	**It is**	**It is not**	**Not sure**
Perceived susceptibility				
Likelihood of one self or ones child to get diarrhea from using unsafe water	Meda Agame	110(96.5%)	3(2.6%)	1(0.8%)
	Mewtsa'e Worki	105(92.1%)	6(5.3%)	3(2.6%)
	Hadish Adi	109(95.6%)	6(5.3%)	0
Seriousness of getting sick from using unsafe water	Meda Agame	110(96.5%)	0	4(3.5%)
	Mewtsa'e Worki	110(96.5%)	4(3.5%)	0
	Hadish Adi	114(100%)	0	0
Perceived benefits				
Goodness of boiling water before drinking or using it?	Meda Agame	113(99.1%)	0	2(1.8%)
	Mewtsa'e Worki	100(87.7%)	0	14(12.3%)
	Hadish Adi	110(96.5%)	0	4(3.5%)
Perceived barriers				
Difficulty of boiling water before drinking or using it?	Meda Agame	12 (8.3%)	100(87.7%)	2 (1.8%)
	Mewtsa'e Worki	22 (12.3%)	88(77.1%)	4 (3.5%)
	Hadish Adi	18 (15.8%)	94(82.5%)	2(1.8%)
Perceived self-efficacy				
Confidence in boiling water before drinking or using it?	Meda Agame	102(89.5%)	7(6.1%)	5(4.4%)
	Mewtsa'e Worki	96(84.2%)	17(14.9%)	1(0.8%)
	Hadish Adi	100(87.7%)	10(8.8%)	4(3.5%)
Total positive attitude	Meda Agame	535/570 = 93.9%		
	Mewtsa'e Worki	499/570 = 87.5%		
	Hadish Adi	527/570 = 92.5%		
Overall positive attitude	**1561/1710 = 91.3%**			

4.5.3 Households water sanitation practice

All households collected water for domestic use and they obtained the water from a public tap (stand pipe) using Jerry cans or buckets (Table 12). All treated collection item to make it clean and about 97 % of them used water and soap to clean the items. Only about 45 % of respondents stored water in clean and covered jar. About 89% of respondents believed that they treated the water to make it safe. However, only about 3 % of them boiled water or added bleach to make it safe. According to CDC (2020), boiling or adding disinfectants in the right concentration are the methods of choice to make water safe for drinking. Such appropriate practices can be achieved through occasional training given to low income households by health extension workers. Unfortunately, over 87 % of respondents said that they did not get training on water sanitation this month.

Table 12: Household water sanitation practice of respondents Adigrat, Ethiopia

n=342, 2020

	Meda-Agame	Mewtsa'e Worki	Hadish Adi	Total
1.Main source of water for drinking ,cooking and hand washing				
Piped water				
Public in to dwelling				
Public tap/standpipe	114 (100%)	114 (100%)	114 (100%)	342 (100%)
Piped into yard or plot				
2.Collection of water for domestic use				
Yes	114 (100%)	114 (100%)	114 (100%)	342 (100%)
3.Collection item				
Bucket				
Jeri can				
Barrel				
All Bucket ,Jeri can and Barrel	114 (100%)	114 (100%)	114 (100%)	342 (100%)
4 .Treating collection item to make it clean				
Yes	114 (100%)	114 (100%)	114 (100%)	342 (100%)
Yes (How)				
5. How you make it clean				
Use of water and soap to clean the container	112 (98.2%)	111 (97.4%)	110 (96.5%)	334 (97.7%)
Others	2 (1.8)%	3 (2.6%)	4 (3.5%)	8 (2.6%)
6.Description of how the water store				
Clean container or jar	32 (28%)	20 (17.5%)	28 (24.6%)	80 (23.4%)
Covered container and jar	28 (25.6%)	32 (28%)	29 (25.4%)	89 (26%)
Clean and covered jar	52 (45.6%)	50 (43.8%)	49 (43%)	151 (44.2%)
Don't know	2 (1.8%)	12 (10.5%)	8 (7%)	22 (6.4%)
7.Treatment of water to make safe to drink				
Yes	10 (8.8%)	8 (7%)	20 (17.5%)	8 (11.1%)
No	104 (91.2%)	106 (92.9%)	94 (82.5%)	304 (88.9%)
8.Practice usually done to the water to make safer to drink				
Boil it	2 (1.8%)	4 (3.5%)	4 (3.5%)	10 (2.9%)
Add bleach or chlorine				
Stain it through a cloth	2 (1.8%)	2 (1.8%)		4 (1.1%)
Use water filtrate (ceramics, sand composite etc	10 (8.8%)	16 (14%)	18 (15.9%)	44 (12.9%)
Let it stand and settle	53 (46.5%)	51 (1.8%)	35 (30.7%)	139 (40.7%)
Don't know /no answer	47 (41.2%)	41 (44.7%)	57 (50%)	145(42.4%)
9.Training of food safety from healthy extensions				
None in this month	100 (87.7%)	105 (92.1%)	102 (89.5%)	307 (89.8%)
1-2 times in this month	14 (12.3%)	9 (7.9%)	12 (10.5%)	35 (10.2%)
Above three times	0	0	0	0
Total appropriate practice	**634/1938 32.7%**	**629/1938 32.5%**	**639/1938 32.9%**	**1881/5814 32.4%**

4.6 Anthropometric Assessments

The prevalence of total, moderate and severe wasting, as measured by weight-for-height in all under-five children was about 30%, 13.6 % and 15.3 %, respectively (Table 13a). Boys had higher total prevalence (36.7 %) than girls (23.3 %). The degree of wasting was moderate in 20 % of the boys and 10 % of the girls. Similarly 20 % and 13.3 % of the boys and girls, respectively, were severely wasted.

Table 13a: Prevalence of wasting based on weight-for-height z-scores by sex Adigrat, Ethiopia. n=60, 2020

Category	All n = 60	Boys n = 30	Girls n = 30
Prevalence of total wasting (<-2 z-score)	(18) 30 %	(11) 36.7%	(7) 23.3 %
Prevalence of moderate wasting (<-2 z-score and >=-3 z-score	(8) 13.3 %	(6) 20 %	(3) 10 %
Prevalence of severe wasting (<-3 z-score	(10) 16.6%	(6) 20 %	(4) 13.3 %

Although moderately or seriously wasted children were encountered in the age groups 6 to 41 months, most of the moderately or seriously wasted children were found in the age groups 6-17 months and 18-29 months, respectively (Table 13b).

Wasting in the under-five children considered in this study was much higher than that of the national average prevalence in Ethiopia was 10.1 % Abay Kassa *et al*.,2019 or the 9 % reported by Mulugeta et al., 2015: (EMDHS, 2014). It was also much higher than the 5 % reported from Uganda (Ratib, 2018).

Table 13b: Prevalence of wasting based on weight-for-height z-scores by sex Adigrat, Ethiopia n=60, 2020

Age (mo)	Total no.	Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
		No.	%	No.	%	No.	%
6-17	21	3	14.3	5	23.8	13	61.9
18-29	25	5	20.0	2	8.0	18	72.0
30-41	9	2	22.2	1	11.1	6	75.0
42-53	5	0	0.0	0	0.0	5	100.0
54-59							
Total	60	10	16.6	8	13.3	42	71.2

MUAC measurements showed a high prevalence of total malnutrition (48.3 %) among all children of which 21.7 % were moderately and 26.7 % were severely malnourished. Higher proportion of boys suffered from total malnutrition (Table 14a), Moderate malnutrtion was more conspicuous in boys (30 %) than in girls (13.3 %). However, more girls (33.3 %) were severly malnourished when compared with boys (20 %).

Table 14a: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex Adigrat, Ethiopia. n=60, 2020

Category	MUAC		
	All n = 60	Boys n = 30	Girls n = 30
Prevalence of total malnutrition (< 125 mm and/or oedema)	29 (48.3%)	15 (50%)	14 (46.7%)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	13 (21.7%)	9 (50%)	4 (13.3%)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	16 (26.7%)	(6 (20%)	10 (33.3)

The highest proportion of moderate wasting was observed in the children within the age group 6-17 months and severe wasting within the age group 18-29 months. Although a very small proportion (4 %) of children in the age group 42-53 months were moderately wasted, none were severely wasted (Table 14b).

Table 14b: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema sex Adigrat, Ethiopia. n=60, 2020

Age (mo)	Total no.	MUAC					
		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)	
		No.	%	No.	%	No.	%
6-17	21	5	23.8	6	28.6	10	47.6
18-29	25	9	36.0	5	20.0	11	44.0
30-41	9	2	22.2	1	11.1	6	66.7
42-53	5	0	0.0	1	20.0	4	80.0
54-59							
Total	60	16	26.7	13	21.7	31	51.7

According to MCHET (2020), children with MUAC values of <125 mm are considered to suffer from moderate acute malnutrition and should be immediately referred for supplementation. Of the children who had MUAC values of <125 mm, 27 % had MUAC measurements of 115 mm or less, thus showing severe acute malnutrition which requires immediate referral for treatment. In households who lived under such abject poverty and severe food insecurity, child malnutrition was unavoidable.

Prevalence of total level of underweight as assessed by weight-for-age measurements was 65 % among all children (Table 15a). Prevalence of moderate and severe underweight was 43.3 % and 21.7 %, respectively. Half of the boys were moderately underweight, but a higher proportion of girls were severely underweight (23.3 %). National average of stunting in Ethiopia was reported to be at 25 % (Mulugeta , 2015) and (EMDHS,2014)

Table 15a: Prevalence of underweight based on weight-for-age z-scores by sex Adigrat, Ethiopia. n=60, 2020

Category	All n = 60 (%)	Boys n = 30 (%)	Girls n = 30 (%)
Prevalence of underweight (<-2 z-score)	39 (65%)	21 (70%)	18 (60%)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	26 (43.3%)	15 (50%)	11 (36.7%)
Prevalence of severe underweight (<-3 z-score)	13 (21.7 %)	6 (20%)	7 (7%)

Most of the children (66.7 %) who were moderately underweight belonged to the age group 30-41 months and most of those (40 %) who were severely underweight belonged to the age group 42-53 months (Table 15b). It is, however, worthnoting that 11% of the children of ages 6 to 53 months were overweight (data not shown).

Table 15b: Prevalence of underweight by age, based on weight-for-age z-scores Adigrat, Ethiopia. n=60, 2020

Age (mo)	Total no.	Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
		No.	%	No.	%	No.	%
6-17	21	3	14.3	9	42.9	9	42.9
18-29	25	7	28.0	8	32.0	10	40.0
30-41	9	1	11.1	6	66.7	2	22.2
42-53	5	2	40.0	3	60.0	0	0.0
54-59	-	-	-	-	-	-	-
Total	60	13	21.7	26	43.3	21	35.0

Prevalence of general stunting was high (51.6 %) among the study children, with a much higher prevalence of severe stunting (43.3 %) than moderate stunting (Table 16a).

Table 16a: Prevalence of stunting based on height-for-age z-scores and by sex scores Adigrat, Ethiopia. n=60, 2020

Category	All n = 60 (%)	Boys n = 30 (%)	Girls n = 30 (%)
Prevalence of stunting (<-2 z-score)	31 (51.6 %)	16 (53.3 %)	15 (50 %)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	5 (8.3 %)	3 (10%)	2 (6.7 %)
Prevalence of severe stunting (<-3 z-score)	26 (43.3 %)	13 (50 %)	13 (50 %)

Moderate and severe stunting was distributed through children of ages 6 months to 53 months at varying rates among age groups. The most notable was, however, that none of the children within the age group 42-53 months were normal. Most among them (80 %) were severely stunted (Table 16b). The prevalence of stunting among the children in this study was much higher than that observed in Uganda (Ratib, 2018). National prevalence

of stunting in Ethiopia is reported at 38.3 % (Abay *et al*., 2019). Ethiopian demographic health survey also reported, high prevalance of stunting 49% in Tigray. (EMDHS, 2019).

Table 16b: Prevalence of stunting by age based on height-for-age z-scores

Age (mo)	Total no.	Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
		No.	%	No.	%	No.	%
6-17	21	4	19.0	2	9.5	15	71.4
18-29	25	15	60.0	2	8	8	32
30-41	9	3	33.3	0	0	6	66.6
42-53	5	4	80.0	1	20	0	0.0
54-59							
Total	60	26	43.3	5	8.3	29	48.3

Total prevalence of stunting among <five children (n=60) in this study was notably higher than that observed in Nigeria (Oguizu *et al*., 2019) but comparable with the reports from Wukro, Eastern Tigray by Gebru *et al*., 2019; and Gebrehiwot *et al*.,2016 who reported prevalence of stunting with 57 % and 49.2 %, respectively. In the Democratic Republic of Congo, stunting ranged from 44.9 % to 76.9 % in under five children (Kandala *et al*., 2011).

CHAPTER FIVE

5. CONCULSION AND RECOMMENDATIONS

5.1 Conclusion

The socio demographic and economic characterictisc of respondents of the present study showed that, all respondents were female with 54 % were older than 45, and only 15 % were educational background above diploma. More than 70 % of the respondents were categorized under mild and severely food insecure, and implied large number of the the respondents were affected with chronic food insecurity. In most severe condition, the respondent went a whole day without eating or went to bed hungry because they ran out of food. To live life they earned their daily bread through house-to-house begging, working in flour mills (for a handful of flour per round of milling they helped), selling home-made traditional alcoholic beverage (*Tella*), manually washing clothes for others, cooking food for others, selling vegetables in village sheds . The present finding indicates that, there were food safety gaps in terms knowledge, attitude and practice of food handling, personal hygiene and water sanitation. Nutrition is one of the most important components of child growth. Similarly, the anthropometric measurement of the study showed that high prevalence of stunting, wasting, and underweight among the study participants was 51.6 %, 28.8 %, and 65 % respectivel; which is higher than the national and regional prevalence of the EDHS 2011. The prevalence of total, moderate and severe wasting, as measured by weight-for-height in all under-five children was about 28.8 %, 13.6 % and 15.3 %, respectively. The degree of wasting was moderate in boys with 16.7 %, and 10.3 % in the girls; and 16.7 % and 13.8 % of the boys and girls, respectively, were severely wasted.

5.2 Recommendations

1. Households should be educated on basic hygiene principles such as critical moments to wash hands, methods of appropriate hand washing, methods to store left over foods, separation of raw and cooked foods, proper personal hygiene during food handling and practice of treating unsafe water.
2. Planning for intervention strategies should consider to the study areas.
3. Continuous awareness creation and health education campaigns should be given to the food insecure households in the study area
4. Further detail study should be conducted on all the possible foodborn disease risk factors (accesses to and quality of water, behavioral and socio-economic factors, and sanitation and hygiene practices

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Appenidices

ANNEX: 1

Chi square evaluation among practice of water treatments and socio demographic of respondents

Variable	Category	p	Boil it	Use water filter	Don't know
Age	18-19		0	0	21 (100%)
	30-45	0.017	1 (7.1%)	3 (21.4%)	10 (71.4%)
	Above 46		1 (4%)	0	24 (96%)
	Total		2 (3.3%)	3 (5%)	55(91%)
Marital status	Married		0	0	10 (100%)
	Single		1 (2.6%)	0	37 (97.4%)
	Divorced	0.001	1 (12.5%)	3 (37.5%)	4 (50%)
	Windowed		0	0	4 (100%)
	Total		2 (3.3%)	3 (5%)	55 (91.7%)
Educational status	Illiterate		1 (3.6%)	0	27 (96.4%)
	1-8	0.012	0	0	20 (100%)
	9-12		1 (9.1%)	3 (23.3%)	7 (63.6%)
	Diploma		0	0	1 (100%)
	Total		2 (3.3%)	3 (5%)	55 (91.7%)
Monthly income	<800		1 (2.9%)	3 (8.6%)	31 (88.6%)
	801-1500	0.319	1 (4.0%)	0	24 (96%)
	Total		2 (3.3%)	3 (5%)	55 (91.7%)
No of house hold	One		1 (9.1%)	0	10 (90.9%)
	Two		0	0	8 (100%)
	Three	0.414	0	0	13 (100%)
	Four		0	0	7 (100%)
	Five and above five		1 (4.8%)	3 (14.3%)	17 (81%)
	Total		2 (3.3%)	3(5%)	55 (91.7%)

ANNEX: 2

Chi square evaluation among social demographic and practice storing perishable food of respondents

Variable	category	P	In the refrigerator or cool box	Cover or protect from insect	Separate from cooked or ready to eat food	Other
Age	18-29		3 (14.3%)	9 (42.9%)	6 (28.6%)	3 (14.3%)
	30-45	0.245	2 (14.3%)	5 (35.7%)	2 (14.3%)	5 (35.7%)
	Above 46		2 (8%)	14 (56%)	4 (14%)	5 (20%)
	Total		7 (12.3%)	28 (46.7%)	12 (20%)	13 (21%)
Marital status	Married		2 (20%)	2 (20%)	3 (30%)	3 (30%)
	Single		3 (7.8%)	22 (57.9%)	8 (21.1%)	5 (13.2%)
	Divorced	0.032	0	3 (37.5%)	1 (12.5%)	4 (50%)
	Windowed		2 (50%)	1 (25%)	0	1 (25%)
	Total		7 (11.6%)	28 (46.7%)	12 (20%)	13 (21.7%)
Educational status	Illiterate		4 (14.3%)	16 (57.1%)	3 (10.7%)	5 (17.9%)
	1-8		1 (5%)	10 (50%)	5 (25%)	4 (20%)
	9-12	0.342	2 (18.2%)	2 (18.2%)	4 (36.4%)	3 (27.3%)
	Diploma		0	0	0	1 (100%)
	Total		7 (14.3%)	28 (46.7%)	12 (20%)	13 (21.7%)
Monthly income	<800		4 (11.5%)	19 (54.3%)	6 (17.1%)	6 (17.1%)
	801-1500	0.367	3 (12%)	9 (36%)	6 (24%)	7 (28%)
	Total		7 (11.6%)	28 (46.7%)	12 (20%)	13 (21.7%)
No of HH	One		2 (18.2%)	1 (9.1%)	3 (27.3%)	5 (45.5%)
	Two		3 (37.5%)	5 (62.5%)	0	0
	Three	0.000	0	8 (61.5%)	5 (38.5%)	0
	Four		2 (28.6%)	3 (42.9%)	0	2 (28.6%)
	Five and above		0	11 (52.4%)	4 (19%)	6 (28.6%)
	Total		7 (11.6%)	28 (46.7%)	12 (20%)	13 (21.7%)

ANNEX: 3

Some home of respondents



Some latrine of respondents



ANNEX: 4

English version Questioner and interviews

Addis Ababa University College of development studies center for food security Studies

The aim of this study will be to investigate the status of knowledge, attitude and practices in food safety in food in secured households in Adigrat city and ass's nutritional status of household members. The information you provide used only for academic purpose. So, please put a thick mark and short answer for the following questionnaires.

I would like to thank you in advance for sharing your time with me!

Socio-demographic data food insecure households

No	Question	Response	Remark
1.1	Sex	0=Female 1=Male	
1.2	Age	1=18-29 2=30-45 3=> 46	
1.3	Religion	1=Orthodox 2= Muslim 3= Catholic 4=Others	
1.4	Marital status	1=Married 2=Single 3=Divorced 4=Windowed 5=widower	
1.5	Occupation	1=Agriculture 2=Governmental 3=Nongovernmental 4=Others	
1.6	Educational status	1=Illiterate 2=1-8 grade 3=9-12 grade 4= Diploma 5= Above diploma	
1.7	Monthly income (birr)	1=>800 2=801-1500 3=1501=2800 4=<2800	
1.8	Number of household	1=One 2=Two 3=Three 4=Four 5=Above five	

II.Anthropometri data

No	Question	Answer	Remark
1.1	Age	1,<one age 2,1-2 age 3,3-4 age 4, 4-5 age	
1.2	Weight (kg)		
1.3	Height (m)		
1.4	MUAC		

III. Household Food Insecurity Access Scale (HFIAS) Measurement Tool

NO	QUESTION	RESPONSEOPTIONS	CODE
3.1	In the past four weeks, did you worry that your	0= No(skipto Q2) 1=Yes	….|___|
3.1.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes in thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	….|___|
3.2	In the past four weeks, were you or any Household member notable to eat the kinds of food syoupreferred because of	0= No(skipto Q3) 1=Yes	….|___|
3.2.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes in thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	….|___|
3.3	In the past four weeks, did you or any household Member have to eat a limited variety of	0= No(skipto Q4) 1= Yes	….|___|
3.3.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes in thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	….|___|
3.4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of	0= No(skipto Q5) 1= Yes	….|___|
3.4.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes in thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	….|___|
3.5	In the past four weeks did you or any household Member have to eat a smaller meal than you felt you needed because there was not enough food?	0= No(skipto Q6) 1= Yes	….|___|
3.5.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes	….|___|

		thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	
3.6	In the past four weeks, did you or any other household Member have to eat fewer meals in a day because there was not enough food?	0=No(skipto Q7) 1= Yes	….|____|
3.6.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes in thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	….|____|
3.7	In the past four weeks, was there ever no food to Eat of any kind in your household because of lack of resources to get food?	0= No(skipto Q8) 1= Yes	….|____|
3.7.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes in thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	….|____|
3.8	In the past four weeks, did you or any household Member go to sleep at night hungry because there was not enough food?	0= No(skipto Q9) 1= Yes	….|____|
3.8.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes in thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	….|____|
3.9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0= No(questionnaireisfinished) 1= Yes	….|____|
3.9.1	How often did this happen?	1=Rarely(onceortwiceinthepast fourweeks) 2 =Sometimes (three totentimes in thepastfourweeks) 3=Often(morethantentimesinthe pastfourweeks)	….|____|

IV. Food safety

(Source: FAO Guidelines for assessing nutrition-related knowledge, attitudes and practices) Explain to the participant:

Iamgoingtoaskyousomequestionsaboutfoodsafety.Pleaseletmeknowifyouneedmeto Clarify any of my questions. Feel free to ask any question you may have.

1. Practices

1.1 Cleaning of dirty surfaces, plates and utensils

4.1. After you have prepared dinner, kitchen surfaces, pots, pans, plates and utensils are dirty. Can you describe how you clean them usually?

A. Scrape excess food in to rubbish bin

B. Wash with hot water

C. Wash with detergent

D. Don't know/no answer

2: Storage of perishable foods

4.2 How do you store perishable fresh foods such as raw meat, poultry and seafood?

A. In their rerefrigrator (below5 °C)/cool box

B. Covered (protected from insects, rodents, pests and dust)

C. Separated from cooked or ready-to-eat foods

D. Other

E. Don't know/no answer

2. Knowledge

2.1 Separation of raw and cooked foods

4.3 Why should you prevent raw meat, offal, poultry and seafood from touching other foods such as those that are cooked or ready to eat?

A. Raw animal foods often contain germs (which may be transferred to cooked and ready-to-eat foods)

B. Other

C. Don't know

2.2 Cooking thoroughly

4.4 When cooking soups and stews, what signs hows that the seare ready and safe to beserved?

A. They are boiling/ well-cooked
B. Other
C. Don‘t know

3: Storage of perishable foods

4.5 What kinds of food should be placed in there rerefrigrator or in a cool place, such as an ice box or cool box? Perishable foods

A. Meat, offal

B. Poultry

C. Fish

D. Foods from the sea or lake

E. Milk/dairy products

F. Cooked foods

G. Other

H. Don‘t know

3: Storage of left overs in a cool/cold place

4.6. Why should someone avoid eating left overs that were not kept in a cool place?

A. Because food is not safe anymore

B. Foods get spoiled (germs multiply very quickly and can cause illness)

C. Higher temperatures make germs grow faster

D. Other

E. Don‘t know (Any of the three first response options is correct)

4 .Washing raw fruits and vegetables

4.7 What should you do before eating raw fruits and vegetables?

B. Wash them with clean water

C. Other

D. Don‘t know

3. Attitudes

3.1. Perceived susceptibility

4.8 How likely do you think you are to get sick from eating spoiled food?

1. Not likely

2. You‘re not sure

3. Likely

If Not likely: Can you tell me the reason why it is not likely? _____

3.2. Perceived severity

4.9. How serious do you think it is to be sick from eating spoiled food?

1. Not serious

2. You‘re not sure

3. Serious

If Not Serious: Can you tell me the reason why it is not serious? _____

3.3 Keeping perishable food in a cool place, for example in a cool box or in the Rerefrigrator.

3.3.1. Perceived benefits

4.10 How good do you think it is to keep meat, poultry, fish, sea food or cooked food in a cool place, for example in a cool box or in there refrigerator?

1. Not good
2. You‘re not sure
3. Good

If Not good: Can you tell me the reasons why it is not good? _____.

3.3.**2. Perceived barriers**

4.11 How difficult is it for you to keep these foods in a cool box or in the rerefrigrator?

1. Not difficult
2. So-so
3. Difficult

If Difficult: Can you tell me the reasons why it is difficult? .....

3.4. Reheating left overs before eating them

3.4.1. Perceived benefits

4.12 How good do you think it is to reheat left overs before eating or serving them?

1. Not good
2. You‘re not sure
3. Good

If Not good: Can you tell me the reasons why it is not good? .....

3.4.2. Perceived barriers

4.13 How difficult is it for you to reheat left overs before eating orserving them?

1. Not difficult
2. So-so
3. Difficult

If Difficult: Can you tell me the reasons why it is difficult? .....

3.5. Washing fruits and vegetables with clean water

3.5.1. Perceived benefits

4.14 How good do you think it is to wash fruits and vegetables with clean water?

1. Not good

2. You‘re not sure

3. Good

If Not good: Can you tell me the reasons why it is not good? .....

3.5.2. Perceived barriers

4.15 How difficult is it for you to wash fruits and vegetables with clean water?

1. Not difficult

2. So-so

3. Difficult

If Difficult: Can you tell me the reasons why it is difficult? .....

3.6. Personalhygiene

Explain to the participant:

3.6.1. I am going to ask you some questions about personal hygiene. Please let me know if you need me to clarify any of my questions. Feel free to ask any question you may have.

3.6.2. Practices

Method of hand washing

5.1 Could you please describe step by step how you wash your hands?

a. Washes hands in a bowl of water (sharing with other people) poor practice

b. With someone pouring a little clean water from a jug onto one‘s hands appropriate practice

c. Under running water appropriate practice

d. Washes hands with soap or ashes

e.Other

f. Don‘t know/no answer

3.6.3. Knowledge

3.6.3.1 Prevention of food poisoning from germs from faeces

5.2 Food poisoning often results from contact with germs from faeces. What can you do to avoid sickness from germs from human or animal faeces?

a. Wash hands (after going to the toilet and cleaning the baby‘s bottom)

b. Remove faeces from the home and surroundings (use alatrine, teach small children to use a potty and put children‘s faeces in the latrine, and clean up

faeces from animal

c. Other

d. Don‘t know

3.6.3.2. Key moments for hand washing

5.3. There are key moments when you need to wash your hands to prevent germs from reaching food.

What are these key moments?

a. After going to the toilet/latrine

b. A fter cleaning the baby‘s bottom/changing a baby‘s nappy

c. Before preparing/ handling food

d. Before feeding a child/eating

e. After handling rawfood

f.. After handling garbage

g. Other

h. Don‘t know

3.6.4. Attitudes

3.6.4.1. Sickness from not washing hands

Perceived susceptibility

5.4. How likely do you think you are to become sick, such as having stomach acheor diarrhoea, from not washing your hands? OR How likely do you think it is that your child will become sick, such as having stomach acheor diarrhoea, from you not washing your hands?

1. Not likely

2. You‘re not sure

3. Likely

If Not likely:

Can you tell me the reason why it is not likely?

Perceivedseverity

5.5. How serious do you think it is if you or your child gets sick from you not washing your hands?

OR How serious do you think diarrhea is for your health?

ORHowseriousdo you think is diarrhoeaforababy‘shealth?

a. Not really serious

b . Neutral/unsure

c. Serious

IfNotSerious: Can you tell me the reason why it is not serious? _____

Washing one‘s hands Perceived benefits

5.6. How good do you think it is to wash your hands before preparing food? Or how good do you think it is to wash your hands before feeding a child/eating?

a. Not good

b. You‘re not sure

c. Good

If Not good: Can you tell me the reasons why it is not good? .....

Perceived barriers

5.7 .How difficult is it for you to wash your hands before preparing food? OR

How difficult is it for you to wash your hands before feeding a child/eating?

a. Not difficult

b. So-so

c. Difficult

If Difficult: Can you tell me the reasons why it is difficult? .....

Self-confidence

5.8 How confident do you feel in washing your hands properly?

1. Not confident

2. Ok/so-so

3. Confident

If Not confident: Can you tell me the reasons why you do not feel confident? .....

Water and sanitation

Explain to the participant:

6. I am going to ask you some questions about water and sanitation. Please let me know if you need me to clarify anyof my questions. Feel free to ask any question you may have. **Practices**

Main source of water for drinking, cooking and hand washing

6.1 What is the main source of water used by your household for drinking, cooking and hand washing?

a. Piped water

b. Piped into dwelling

c. Piped into yard or plot

d. Public tap/stand pipe

e. Tube well/bore hole

f. Dug well

g. Protected well

h. Unprotected well

i. Water fromspring

j. Protected spring

k. Unprotected spring

l. Rain water collection

m .Tanker-truck

n. Cart with small tank/drum

o. Surface water (river, stream, dam, lake, pond, canal, irrigation channel)

p. Bottled water

q. Other (specify) _____
r.Don‘t know

Collection of water

6.2 Do you collect water for domestic use?

A.Yes.....Go to question2.

B.No..... Go to question 3.

6.2.1 What item do you use to collect water? _____

6.2.2 To know if the item is clean probe: Did you treat this item in any way to make it clean?
A. Yes
B. No
C. Don‘t know

If Yes: How?

A. Use of water and soap (clean container)

B. Others

C. Don‘t know/no answer

Storage of water

6.3 Could you describe how you store water?

A. Clean container or jar

B. Covered container or jar

C. Clean and covered container or jar

D. Other
E. Don‘t know/no answer

Treatment of water to make it safe to drink

6.4 Do you treat your water in any way to make it safe to drink?

1. Yes
2. No
3. Don‘t know/no answer

6.5. If Yes: What do you usually do to the water to make it safer to drink? _____.

a. Boil it

b. Add bleach/chlorine

c. Strain it through a cloth

d. Use a water filter (ceramic, sand, composite, etc.)

e. Use solar disinfection

f. Let it stand and settle

g. Don‘t know/no answer

h. Anything else? Other (Record all items mentioned)

Knowledge

6.6. If you know that the water you are going to use for cooking or drinking is not safe or does not come from a safe source, what should you do?

a. Boil it

b. Add bleach/chlorine

c. Strain it through a cloth

d. Use a water filter (ceramic, sand, composite, etc.)

e. Use solar disinfection f. Let it stand and settle

g. Discard it and get water from a safe source

h. Other

i. Don‘t know

Attitudes

Diarrhea from using unsafe water Perceived susceptibility

6.7. How likely do you think you are to get diarrhea from using unsafe water? Or how likely do you think your child is to get diarrhea from using unsafe water?

1. Not likely

2. You‘re not sure

3. Likely

If Not likely: Can you tell me the reason why it is not likely? _____

Perceived severity

6.8. How serious do you think it is to get sick from using unsafe water?

1. Not really serious
2. Neutral/serious
3. Serious

If Not serious: Can you tell me the reason why it is not serious? _____

Boiling water before drinking or using it Perceived benefits

6.9 How good do you think it is to boil water before drinking or using it?

1. Not good
2. You‘re not sure
3. Good

If Not good: Can you tell me the reasons why it is not good? _____

Perceived barriers

6.10. How difficult is it for you to boil water before drinking or using it?

1. Not difficult
2. So-so
3. Difficult

If Difficult: Can you tell me the reasons why it is difficult? _____

Self-confidence

6.11 How confident do you feel in boiling water before drinking orusing it?

1. Not confident
2. Ok/so-so
3. Confident

If not confident: Can you tell me the reasons why you do not feel confident?

ANNEX: 5

አዲስ አበባ ዩኒቨርስቲ ልምዓት ምርምር ኮሌጅ ናይ ምግቢ ውሕስና ምርምር ማዕከል ናይዚ ምርምር ዋና ዓላማ ኣብ ዓዲግራት ከተማ ብዛዕባ ምግቢ፣ ጥዕናን ውሕስና ስድራ ቤት ዘለዎም ፍልጠት፣ አመለካከታን ትግበራን ኣብ ምግቢ ውሕስና መረጋገፂ ዘለዎም ኣስተዋፅኦ ንምፍላጥ ዘክእል መፅናዕታዊ ምርምር መረዳእታ መጠይቅ።ንትብብሩልና ትሕብብርን ትክክለኛ መልሲ ቅድሚያ የመስግን።

ክፍል ፣ ስነ ሕዝቢና ማሕበራዊ ኩነታት

ተ.ቁ	ሕቶ	መማረፂ መልሲ	ሪእቶ
1.1	ፆታ	0. ተባዕታይ 1. ኣንስታይ	
1.2	ዕድመ	0. 18-29 1. 30-45 2. > 46	
1.3	ሃይማኖት	0. ኦርቶዶስ 1. ሞስሊም 2. ካቶሊክ 3. ካሊእ	
1.4	ኩነታት ሓዳር	0. ሓዳር ዘለዎ/ዋ 1. ሓዳር ዘይብሉ/ላ 2. ሰብዓያ ዝሞታ 3. ሰበይቱ ዝሞተቶ 4. ዝፈትሐ/ት	
1.5	ኩነታት ስራሕ	0. ግብርና 1. ዘይመንግስታዊ ትካል 2. ፅዳት 3. ካሊእ	
1.6	ትምህርቲ ደረጃ	0. ምንባብን ምፅሓፍን ዝኽእል 1. ምንባብን ምፅሓፍን ትኽእል 2. ካብ 1 - 8 ክፍሊ 3. ካብ 9-12 ክፍሊ 4. ዲፕሎማ 5. ልዕሊ ዲፕሎማ	
1.7	ወርሓዊ እቶት	0. 800-1500 1. 1500-2800 2. ልዕሊ 2800	
1.8	ናይ ቤተሰብ በዝሒ	0. ሓደ 1. ክልተ 2. ስለስተ 3. ኣርባዕተ 4. ልዕሊ ሓሙሽተ	

ክፍል 2 ANTHROPOMETRIC DATA

ተ.ቁ	ሕቶ	መማረፂ መልሲ	ሪእቶ
1.1	ዕድመ	0. 0-1 ዓመት 1. 1-2 ዓመት 2. 2-3 ዓመት 3. 3-4 ዓመት 4. 4-5 ዓመት	
1.2	ክብደት (ኪ.ግ)		
1.3	ቁመት (ሜትር)		
1.4	ሃይየክንድ መካከለኛ ክፍል መጠን (MUAC)		

ክፍሊ 3.Household Food Insecurity Access Scale (HFIAS) Measurement Tool ዋሕስ ምግቢ ዘረጋግፁ ናይ ቤተሰብ መለክዒ

ተ.ቁ	ሕቶ	መማረፂ መልሲ	ሪእቶ
3.1	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ውሽጢ ገዛ እኹል ምግቢ ኣይሕልወኒን ዝከውን ኢሎም ዶ ሰጊዖም ይፈልጡ/ጣ?	0 = ኣይፈልጥን 1=እወ (መልሶም እወ እንተኮይኑ ቁፅሪ 3.1 ይመልሱ)	
3.1.ሀ	ሕቶ 3.1 እወ እተኮይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ሻዕ ሰጊዖም?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	
3.2	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ውሽጢ ገዛ እኹል ዝኾነ ምግቢ ወይ ከዓ ገንዘብ ብዘይምህላዎም ኣብኣም ወይ ኣብ ቤተሰቦም ዝፈተኩምዎ ምግቢ ዶ ቀሪኹም?	0 = ኣይፈልጥን 1 = እወ	
3.2.ሀ	ሕቶ 3.2 እወ እተኮይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ሻዕ ኣጋጢምዎም/ወን?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	
3.3	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ውሽጢ ገዛ እኹለል ዝኾነ ምግቢ ወይ ከዓ ገንዘብ ብዘይምህላዎም ኣብኣም ወይ ኣብ ቤተሰቦም ኣባላት ዝተወሰኑ ምግብታት ዶ በሊዕኩም/ኣን?	0 = ኣይፈልጥን 1 = እወ	
3.3.ሀ	ሕቶ 3.3 እወ እተኮይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ሻዕ ኣጋጢምዎም/ወን?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	
3.4	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ውሽጢ ገዛ እኹለል ዝኾነ ምግቢ ወይ ከዓ ገንዘብ ብዘይምህላዎም ምብላዕ ዘይትበልዕዎ ዶ በሊዕኹም?	0 = ኣይፈልጥን 1 = እወ	
3.4.ሀ	ሕቶ 3.4 እወ እተኮይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ሻዕ ኣጋጢምዎም/ወን?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	
3.5	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ገዛ እኹል ዝኾነ ምግቢ ብዘይምሕላው ንሶም ወይ ድማ ናይ ቤተሰቦም ኣባል ዝኾነ ከይፀገብኩም ንምልዓል ዶ ተገዲድኩም/ደን?	0 = ኣይፈልጥን 1 = እወ	
3.5.ሀ	ሕቶ 3.5 እወ እተኮይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ሻዕ ኣጋጢምዎም/ወን?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	
3.6	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ገዛ ውሽጢ እኹል ዝኾነ ምግቢ ብዘይምህላው ንሶም ወይ ኣብ ቤተሰቦም ቁርሲ፣ ምሳሕ ወይ ድማ ድራር ከይበላዕኩም ዶ ቀሪኩም ዶ ትፈልጡ?	0 = ኣይፈልጥን 1 = እወ	
3.6.ሀ	ሕቶ 3.6 እወ እተኮይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ሻዕ ኣጋጢምዎም/ወን?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	
3.7	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ገዛ ውሽጢ እኹል ዝኾነ	0 = ኣይፈልጥን	

	ምግቢ ወይ ከዓ ገንዘብ ብዘይምህላው ኣብ ቤተሰቦም ውሽጢ ዝለሓስ ወይ ዝጠዓም ዘይነበረሉ ጊዜ ዶ ነይሩ?	ነ = እወ	
3.7.ሀ	ሕቶ 3.7 እወ እተኾይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ግዘ ኣጋጢምዎም/ወን?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	
3.8	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ገዛ ውሽጢ እኩል ዝኾነ ምግቢ ወይ ድማ ገንዘብ ብዘይምህላዎም ኣብኣም ወይ ኣብ ቤተሰቦም እናጠመየ ናብ ድቃስ ዝኸድከሙሉ ግዘ ዶ ኣሎ?	ዐ = ኣይፈልጥን ነ = እወ	
3.8.ሀ	ሕቶ 3.8 እወ እተኾይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ግዘ ኣጋጢምዎም/ወን?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	
3.9	ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ኣብ ገዛ ውሽጢ እኩል ዝኾነ ምግቢ ወይ ከዓ ገንዘብ ብዘይምህላዎም ኣብኣም ወይ ኣብ ቤተሰቦም ሙሉእ መዓልቲ ከይበልዐ ውዒሉ ዝሓደረ ዶ ኣሎ?	ዐ = ኣይፈልጥን ነ = እወ	
3.9.ሀ	ሕቶ 3.9 እወ እተኾይኑ እቲ መልሲ ኣብ ዝሓለፉ ኣርባዕተ ሰሙናት ክንደይ ግዘ ኣጋጢምዎም/ወን?	1. ሓሊፉ ሓሊፉ (1-2) 2. ሓደ ሓደ ሻዕ (3-10) 3. ብዙሕ ግዘ (ልዕሊ 10 ግዘ)	

ክፍሊ 4. Food saftey (ብዛዕባ ምግቢ ደሕንነት ኣመለካኽታ)

ተ.ቁ	ሕቶ	መማረፂ መልሲ	ሪእቶ
4.ነ	ምግቢ ድሕሪ ምድላውና ኣብቲ መብሰሊ ክባቢ ድስቲ፣ መጥበሲ፣ ሸሓነታትን ካልኦት ንግልገለሎም ነገራት ብደምቢ ክፀርዩ ይግብኣም። መብዛሕቲኡ ግዘ ከመይ	1. እቲ ተረፍ መረፍ ናብ ጓሓፍ ነእትዎ 2. ብዝሞቀ ማይ ንሓፅቦ	

	ገይሮም ከም ዘፅርይዎም ክነግሩኒ ዶ ይከእሉ/ላ?	3. ብፈሳሽ ሳሙና ወይ ከዓ ኣጃክስ ገይርና ንሓፅቦ 4. መልሲ የለን	
4.2	ቀልጢፎም ክበላሸው ዝክእሉ ምግብታት (ከም ስጋ፣ ዘይተሰርሐ ደርሆ ወይ ድማ ዓሳ) ክሳብ ዝስርሑ ከመይ ይቕመጡ?	1. ኣብ ፍሪጅ ውሽጢ 2. ሓመድ ወይ ከዓ ኣንጭዋ ከይረክቦ ሸፊንና ነቕምጦም 3. ንምግብነት ካብ ዝተዳለው ከይነካክኡ ፈሊካ ምቕማጥ 4. ካሊእ ሜላ ምጥቃም 5. መልሲ የለን	
4.3	ዘይበሰለ ስጋ፣ ናይ ከብዲ ስጋ (ጨጓራ፣ መዓንጣ፣ ፀላም ከብዲ፣ ኩላሊት፣ልቢ) ምስ ዝበሰሉ ወይ ንምግብነት ናብ ዝተዳለው ምግብታት ከይነካካእ ምግባር እንታይ ጥቅሚ አለዎ?	1. ካብ እንስሳት ዝርከቡ ዘይበሰሉ ምግብታት መብዛሕቲኡ ግዘ ተዋህስያን ይርከቡዎም፤ እዞም ጀርምታት ናብ ዝበሰሉ ወይ ከዓ ንምግብነት ናብ ዝተዳለው ምግብታት ክመሓላለፉ ይከእሉ፡፡ 2. ካሊእ ሜላ 3. መልሲ የለን	
4.4	ፀብሒ ወይ ከዓ ሾርባ ኣብ ንሰርሐሉ እዋን (ንምግብነት ንምቅራብ ዝተዳለወ ምኽኑ) ከምኡ እውን ዘየሕምም ዘይምኽኑ ብምንታይ ንፈልጦ?	1. ብደንቢ ተንተከቲኩ ከበስል ከሎ 2. ካሊእ ሜላ 3. መልሲ የለን	
4.5	ኣብ ውሽጢ ፍሪጅ ወይ ዝሕል ዝበለ ቦታ ክቕመጡ ዝግብኦም ዓይነታት ምግቢ እንታይ እንታይ እዮም?	1. ስጋ (ኣብ ውሽጢ ከብዲ ዝርከቡ ናይ እንስሳት ስጋ ከምኒ ጨጓራ፣ መዓንጣ፣ ኩላሊት፣ልብ) 2. ናይ ደርሆ ስጋ 3. ዓሳ 4. ፀባን ውፅኢት ፀባን 5. ዝበሰሉ ምግብታት 6. ኩሎም 7. ካልኦት 8. መልሲ የለን	
4.6	ንምግብነት ተዳልዩ ካብ ዝቀረበ ምግቢ ክይተበልዐ እንድሕር ተሪፉ ኣብ ዝሑል ቦታ እንድሕር ዘይኣቀሚጥናዮ ፀኒሕና ንካልኣይ ግዘ ንምግብነት	1. ሕማም ከስዕብ ስለ ዝክእል 2. ኣብቲ ምግቢ ውሽጢ ጀርምታት ቀልጢፎም ስለ	

	ከቀርብ ዘይብሉ ንምንታይ እዩ?	ዝራብሑ ንሕማም ስለ ዘቓልዕ 3. ኣብ ውዕይ ዝበለ ቦታ ጀርምታት ቀልጢፎም ስለ ዝራብሑ 4. ኩሎም 5. ካሊእ 6. መልሲ የለን	
4.7	ፍረምረ ወይ ከዓ ኣትክልቲ (ከምኒ ጉዕ፣ ሰላጣ፣ ቆስጣ፣ ሓምሊ ኣድሪ፣ ካውሎ፣ ቲማቲም) ቅድሚ ምምጋብና እንታይ ክንገብር ይግብኣና?	1. ብፅሩይ ማይ ምሕፃብ 2. ካሊእ 3. መልሲ የለን	

አመለካከታ ወይ ድማ አተሓሳስባ (ዝቓልዐሉ፣ ዝግመትን ክብደትን)

4.8	ዝተበከለ ምግቢ ምብላዕ ንሕማም ንምንታት ክቓልዕ ኢሎም ይሓስቡ?	1. ኣይንሓስብን 2. ርግፀኛ ኣይኮንኩን 3. እወ ይሓስብ 4. ኣይንሓስብን እንተኮይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ዶ ይኽእሉ _____	
4.9	ዝተበከለ ምግቢ ብምብላዕ ዘስዕቦ ሕማም ከቢድ እዩ ኢሎም ዶ ይሓስቡ/ባ?	1. ከቢድ ኣይኮነን 2. ርግፀኛ ኣይኮንኩን 3. ከቢድ እዩ 4. ከቢድ ኣይኮነን እንተኮይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ዶ ይኽእሉ _____	
4.10	ስጋ፣ ናይ ስጋ ደርሆ፣ ዓሳ ወይ ድማ ዝበሰለ ምግቢ ኣብ ዝሑል ቦታ ወይ ከዓ ኣብ ፍሪጅ ምቅማጥ ክንደይ ዝኣኽል ፅቡቕ እዩ ይብሉ/ላ?	1. ፅቡቕ ኣይኮነን 2. ርግፀኛ ኣይኮንኩን 3. ፅቡቕ እዩ 4. ፅቡቕ ኣይኮነን እንተኮይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ዶ ይኽእሉ _____	

4.11	ኣብ ቁፅሪ 4.10 ዝተዘርዘሩ ምግብታት ኣብ ፍሪጅ ምቅማጥ ክንደይናይ ከቢድ እዩ?	1. ከቢድ ኣይኮነን 2. ከከም ኩነታቱ 3. ከቢድ እዩ 4. ከቢድ እዩ እንተኾይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ከነግሩኒ ዶ ይኽእሉ _____	
4.12	ከይተበልዐ ዝተረፉ ምግብታት (ከም ፀብሒ) ቅድሚ ምብላዕና ብደምቢ ገይርና ምንትክታክ ፅቡቅ እዩ ኢሎም ዶ ይሓስቡ/ባ?	1. ፅቡቅ ኣይኮነን 2. ርግፀኛ ኣይኮንኩን 3. ፅቡቅ እዩ 4. ፅቡቅ ኣይኮነን እንተኾይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ከነግሩኒ ዶ ይኽእሉ _____	
4.13	ከይተበልዐ ዝተረፉ ምግብታት (ከም ፀብሒ) ዝበሉ ቅድሚ ምብላዕና ብደምቢ ገይርካ ምንትክታክ ክንደይናይ ዝኣኽል ይከብዶም ዶ?	1. ከቢድ ኣይኮነን 2. ከከም ኩነታቱ 3. ከቢድ እዩ 4. ከቢድ እዩ እንተኾይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ከነግሩኒ ዶ ይኽእሉ _____	
4.14	ፍረምረ እና ኣትክልቲ ብፀሩይ ማይ ምሕፃብ ክንደይናይ ዝኣኽል ረብሓ ይሕልዎ?	1. ፅቡቅ ኣይኮነን 2. ርግፀኛ ኣይኮንኩን 3. ፅቡቅ እዩ 4. ፅቡቅ ኣይኮነን እንተኾይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ከነግሩኒ ዶ ይኽእሉ _____	
4.15	ፍረምረ እና ኣትክልቲ ብንፁሕ ማይ ምሕፃብ ክንደይናይ ዝኣክል ይከብዶም/ደን?	ነ. ከቢድ ኣይኮነን 2. ከከም ኩነታቱ 3. ከቢድ እዩ 4. ከቢድ እዩ እንተኾይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ከነግሩኒ ዶ ይኽእሉ _____	

ክፍል 5. Personal hygiene (ውልቀ ፅርየት)

ተ.ቁ	ሕቶ	መማረፂ መልሲ	ሪእቶ
5.1	ኣእዳዎም ከመይ ገይሮም ከም ዝሕፀቡ ብቅደም ሰዓብ ዶ ክነግሩኒ ይክእሉ/ላ?	1. ኣእዳውና ኣብ ውሽጢ ኢድ መሕፀቢ እናኣለከና ምስ ብዙሓት ሰባት ብሓባር ምሕፃብ 2. ካሊእ ሰብ ፅሩይ ማይ እናጠብጠበልና ምሕፃብ 3. ካብ ቡንቢ ምሕፃብ 4. ኢድና ብማይ ብሳሚናን ምሕፃብ 5. ካልኦት 6. መልሲ የለን	

Personal hygiene knowledge (ፍልጠት ውልቀ ፅርየት)

5.2	መብዛሕቲኡ ግዘ ናይ ምግቢ ምብካል (ምምራዝ) ዝፍጠር ካብ ዓይነ ምድሪ ምስ ዝወፁ ጀርምታት (ተህዋስያን) ምንከካእ ዝፍጠር እዩ፤ ካብ ሰብ ወይ ከዓ እንስሳት ዓይነ ምድሪ ዝመፁ ተህዋስያን ንምክልካል እንታይ ክንገብር ይግብአና?	1. ሽቃቅ ምስ ተጠቀምና ወይ ድማ ንህፃውንቲ መቀመጪኡም (ምስ ሓፀብናዮም) ኢድና ምሕፃብ 2. ኣብ ውሽጢ ገዛን ከባቢና ዝርከብ ዓይነ ምድሪ ምውጋድ (ሽቃቕ ክጥቀሙ ምምሃር፣ ቆልዑት ኣብ ባዞ ምስ ሸኑ ብጥንቃቀ ናብ ሽንት ቤት ምድፋእ፣ ኣብ ከባቢና ዝርከቡ እንስሳት ዓይነ ምድሪ ምፅራይ 3. ነ ን 2 መልሲ 4. ካሊእ 5. መልሲ የለን	
5.3	ተህዋስያን ናብ ምግቢ ውሽጢ ንኪይኣትው ንምግባር ኢድና ምሕፃብ ዘድልዩና ወሰንቲ ግዘታት ዝበሃሉ አለው:: እዞም ወሰንቲ ግዘታት መዓዝ መዓዝ እዮም።	1. ድሕሪ ሽንትቤት ምጥቃምና 2. ድሕሪ ናይ ቆልዓ መቀመጫ ምስ ሓፀብና፣ ናይ ቆልዓ ሽንቲ ጨርቂ ምስ ቀየርና 3. ቅድሚ ምግቢ ምድላው ምጅማርና 4. ቅድሚ ቆልዓ ምምጋብና 5. ድሕሪ ዘይበሰለ ምግቢ ምስ ነካካእና 6. ድሕሪ ርስሓት ኣኪብና ምስ ደብረናዮ (ምስ ጓሓፍናዮ) 7. ኩሎም	

		8. ሌሎች 9. መልሲ የለን	

Personal hygiene and Attitudes (ውልቀ ፅርየት አመለካከታን ግንዛበን)

5.4	ንሶም/ሰን ኢዶም ብዘይምሕፃቦም ምክንያት ኣብ ባዕሎም ወይ ድማ ውላዶም እንተትሓሙ ክንደይ ዝኣክል ከቢድ ዝኾውን ይመስሎም? ውፅዓት ንባዕሎም ወይ ድማ ንውላዶም ጥዕና ክንደይናይ ከቢድ እዩ ኢሎም ይሓስቡ/ባ?	1. ከቢድ ኣይኮነን 2. ርግፀኛ ኣይኮንኩን 3. ከቢድ እዩ 4. ከቢድ እዩ እንተኮይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ዶ ይኽእሉ _____	
5.5	ንሶም/ሰን ኢዶም ብዘይምህፃቦም ናይ ከብዲ ሕማም ኣብ ውላዶም ወይ ድማ ውፅዓት ናይምትሓዝ ዓቅሚ ክንደይናይ እዩ ኢሎም ይኣምኑ?	1. ዝሓምም ኣይመስልን 2. ርግፀኛ ኣይኮንኩን 3. ክሓምም ይክእል 4. ዝሓምም ኣይመስልን እንተኮይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ዶ ይኽእሉ _____	
5.6	ቅድሚ ምግቢ ምድላው ምጅማርና፣ ኦዶም ምሕፃቦም ክንደይናይ ዝኣኽል ፅቡቅ እዩ ኢሎም ይሓስቡ? ወይ ቆልዓ ቅድሚ ምምጋቡ ኢድኩም ምሕፃቡኩም ክንደይናይ ፅቡቅ እዩ?	1. ፅቡቅ ኣይኮነን 2. ርግፀኛ ኣይኮንኩን 3. ፅቡቅ እዩ 4. ፅቡቅ ኣይኮነን እንተኮይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ዶ ይኽእሉ _____	
5.7	ምግቢ ምድላው ቅድሚ ምጅማርና፣ ቆልዓ ቅድሚ ምምጋብናን ባዕሎም ቅድሚ ምምጋቦም ኢዶም/ን ምሕፃብ ክንደይናይ ዝኣኽል የፀግሞም/መን?	1. ኣየፀግምን 2. ርግፀኛ ኣይኮንኩን 3. የፀግም 4. የፀግም እዩ እንተኮይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ይኽእሉ _____	
5.8	ኢዶም ብኣግባቡ ብምሕፃቦም ክንደይናይ ዝኣክል ዓርሰ እምነት የሕድረሎም?	1. ኣይተኣማመንን 2. ብመጠኑ/ከም ኩነታቱ	

		3. ይተኣማመን 4. ኣይተኣማመንን እንተኾይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ዶ ይኽእሉ _____	

ክፍሊ 6. Water and sanitation practice (ማይን ፅሬትን ልምዲ)

ተ.ቁ	ሕቶ	መማረፂ መልሲ	ሪእቶ
6.1	ኣብ ገዝኡም ውሽጢ ንመስተ፣ ንመብሰሊን ኢድ መሕፀቢን ዝከውን ማይ ካብ ምንታይ ይረክቡ/ባ?	1. ካብ ቡንቧ (ተሓቋኒ) 2. ኣብ ገዛ ውሽጢ ካብ ዘሎ ቡንቧ 3. ካብ ወሓዚ ማይ 4. ካብ ጉድጓድ ማይ 5. ናይ ዝናብ ማይ ብምዕቋር 6. ካብ መኪና (ቦጥ) ዝፅድል ማይ ምርካብ 1. ዝተዓሸገ ማይ (ሓይላንድ) 2. ካልኦት _____ 3. መልሲ የለን	
6.2	ኣብ ገዛ ውሽጢ ንጥቀመሉ (ንሰርሐሉ) ማይ ይቀድሑ ዶ?	1. መልሱ እወ እንተኾይኑ ናብ ቁፅሪ 6.2.ሀ ይመልሱ 2. መልሱ ኣይቀድሕን እንተኾይኑ ናብ ቁፅሪ 6.2.ለ ይመልሱ	
6.2.ሀ	ማይ ንምቅዳሕ እንታይ ዓይነት መቅድሒ ይጥቀሙ/ማ?	_____	
6.2.ለ	እቲ መቅድሒ ፅሩይ እንተዘይኮይኑ ፅሩይ ንምግባር ዝጥቀሙሉ ነገራት ዶ ኣለው?	1. እወ 2. ምንም ኣይንጥምን 3. መልሲ የብለይን እንተኮይኑ እቲ መልሲ ከመይ ደኣ?_____ 4. እቲ መቅድሒ ብሳሙናን ብማይን ይሓፅቦ 5. ካሊእ 6.መልሲ የለን	
6.3	ማይ ከመይ ገይሮም ከም ዝዓቁርዎ ክገልፁለይ ዶ ይክእሉ?	1. ኣብ ውሽጢ ፅሩይ ማይ መጠራቀሚ	

		2. ኣብ ውሽጢ ዝተኸደነ ማይ መጠራቀሚ 3. ኣብ ውሽጢ ፅሩይ እና ዝተኸደነ ማይ መጠራቀሚ 4. ኩሎም 5. ካሊእ 6. መልሲ የለን	
6.4	ዝቀድሕዎ ማይ ንምስታይ ዘየሕምም ንክከውን ዝሕክምሉ መንገዲ ዶ ኣሎ?	1. ኣሎ 2. የለን 3. መልሲ የለን እንተኾይኑ ናብ ቁፅሪ 6.5 ይኪዱ	
6.5	ዝቀድሕዎ ማይ ንምስታይ ዘየሕምም ምእንቲ ክሽውን መብዛሕቲኡ ግዘ እንታይ ይበግሩ/ራ?	1. ብምፍላሕ 2. በረኪና ብምውሳክ 3. ብጨርቂ ምፅራይ 4. ናይ ማይ መፃረይ ምጥቃም (ሓሸዋ፣ ፀፀር) 5. ብፀሓይ 6. እቲ ርስሓት ክሳብ ዝግ ዝብል ምፅባይ 7. መልሲ የለን	
6.6	ብዛዕባ ምግቢ ደሕንነትን ጥንቃቐን ኣብ ከባቢኩም ዘለው በዓል ሞያ ጥዕና (ጤና ኤክስቴንሽን) ትምህርቲ ተዋሂብዎም ዶ ይፈልጥ/ጣ?	0. ኣብ ወርሒ ውሽጢ የለን 1. 1-2 ግዘ ብወርሒ 2. ልዕሊ 3 ግዘ ብወርሒ	

Water and sanitation knowledge (ፍልጠት ማይን ፅሬትን)

6.7	ምግቢ ንምስራሕን ማይ ንምስታይ ንጥቀመሉን ዝተቀድሐሉ ቦታ ምኳኑ እንድሕር ፈሊጥኩም እንታይ ክገብሩ ይግብኦም?	1. ነፍልሖ 2. በረኪና ምውሳክ 3. ብጨርቂ ምፅራይ 4. መፃረይ ማይ ምጥቃም (ውሃ ኣጋር፣ ሓሸዋ፣ ፀፀር) 5. ናብ ፀሓይ ብምቅላዕ (ብምውፃዕ) ተህዋስያን ክሞቱ ምግባር	

		6. እቲ ርስሓት ክሳብ ዝግ ዝብል ምፅባይ 7. እቲ ዝቀዳሕናዮ ማይ አፍሲሰ ካብ ጥዕንኡ ዝተሓለወ ማ,ይ ምቕዳሕ 8. ካሊእ 9. መልሲ የለን	

Water and sanitation attitudes (ግንዛበ ብዛዕባ ማይን ፅሬትን)

ተ.ቁ	ሕቶ	መማረፂ መልሲ	ሪእቶ
6.8	ጥዕንኡ ዘይተሓለወ ማይ ምስታይ ውልዶም ብውፅዓት ክሓምም ከም ዝክእል ይሓስቡ ዶ?	1. ኣይሓስብን 1. ርግፀኛ ኣይኮንኩን 2. ይሓስብ 3. ኣይሓስብን እንተኮይኑ መልሶም ምክንያቶም እንታይ ከም ዝኾነ ክነግሩኒ ዶ ይኽእሉ _____	
6.9	ጥዕንኡ ዘይተሓለወ ማይ ብምስታይና ከስዕቦ ዝክእል ሳዕቤን ክንደይናይ ከቢድ ክኸውን ኢሎም ይሓስቡ?	1. ከቢድ ኣይኮነን 2. ቅልል ዝበለ 3. ከቢድ እዩ 4. ከቢድ ኣይኮነን እንተኮይኑ መልሶም ምክንያቶም	

		እንታይ ከም ዝኮነ ክነግሩኒ ዶ ይኽእሉ _____	
6.10	ማይ ንምስታይ ይኹን ንካሊእ ነገር ቅድሚ ምጥቃምና ምፍላሕ እንታይ ረብሓ አለዎ ኢሎም ይሓስቡ?	1. ፅቡቅ ኣይኮነን 2. ርግፀኛ ኣይኮንኩን 3. ፅቡቅ እዩ 4. ፅቡቅ ኣይኮነን እንተኾይኑ መልሶም ምክንያቶም እንታይ ከም ዝኮነ ክነግሩኒ ዶ ይኽእሉ _____	