COLLEGE OF DEVELOPMENT STUDIES CENTER FOR FOOD SECURITY STUDIES

COMPARATIVE ANALYSIS OF HOUSEHOLD'S FOOD SECURITY STATUS IN DIRE DAWA: RURAL-URBAN DICHOTOMY

BY

YOSEPH DEMELASH ALEMU

NOVEMBER, 2023ADDIS ABABA, ETHIOPIA

Addis Ababa University
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ADVISOR: AMARE BANTIDER (PHD)

MSC THESIS SUBMITTED TO CENTER FOR FOOD SECURITY STUDIES, COLLEGE OF DEVELOPMENT STUDIES, ADDIS ABABA UNIVERSITY FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR DEGREE OF MASTER OF SCIENCE IN FOOD SECURITY AND DEVELOPMENT

NOVEMBER, 2023ADDIS ABABA, ETHIOPIA

DECLARATION

I declare this thesis is my original work, has not been presented for degrees in any other University and all sources of materials used for the thesis have been duly acknowledged. The assistance received during the course these investigations has been duly acknowledged. Therefore, we recommended it to be accepted as fulfilling the thesis requirements.

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

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As supervisor of the thesis, I certify that I have read and evaluated the of the thesis document prepared by Yoseph Demelash Alemu entitled "Comparative analysis of household's food security status in Dire Dawa: Rural-Urban dichotomy" and recommend for open defense as fulfilling the requirement for the degree of Master of Science in Food Security and Development studies.

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As member of the Examining Board of the Thesis Open Defense, we certify that we have read and Evaluated the thesis prepared by Yoseph Demelash Alemu entitled "Comparative analysis of household's food security status in Dire Dawa: Rural-Urban dichotomy' and recommend that it is acceptable thesis required for the degree of Master of Science in Food Security and Development studies.

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Acronyms and Abbreviations

ACAPS	Assessment Capacity project
AE	Adult Equivalent
ANOVA	Analysis of Variance
CFS	Committee on World Food Security
CSA	Central Statistics Agency
FANTA	Food and Nutrition Technical Assistance Project
FAO	Food and Agricultural organization
FEWS NET	Famine Early Warning Systems Network
FGT	Foster, Greer and Thornback Model
FSIN	Food Security Information Network
IFRC	International Federation of Red Cross, and Red Crescent Societies
LIFT	Livelihood and Food Security Technical Assistance
NMI	National Metrology Institute
PHCU	Public Health Care Unit
SNNPR	Southern Nations, Nationalities peoples regional state
SPSS	Statistical Packages for the Social Sciences
TLU	Tropical Livestock Unit
USAID	United States Agency for international development
WPF	World Food Program
WWDSE	Water Works Design and Supervision Enterprise

Abstract

Food security is the ability to access sufficient and nutritious food to live a healthy and active life. The primary goal of this study was to assess the level of food security and its determinants across urban and rural households in Dire Dawa. Both primaryand secondary data have been gathered for the study. Using a multistage sampling technique, primary data were obtained from 356 randomly chosen rural families and 395 randomly selectedurban households, respectively, and secondary data were gathered from various sources. Descriptive statistics, the Foster-Greer-Thorbecke (FGT) and probit logit models were used to examine the data. The survey's findings showed that 35.67% of the selected rural households had access to enough food, while the remaining 64.33% did not. Furthermore, a 65.6% food security rate and a 34.4% food insecurity rate were discovered in the sample of urban households. The results of the Probit regression analysis showed that factors such as the sex of the household head,educational level, household size, donkey ownership (unlike Oxen ownership in the highlands for plough agriculture, and camel and livestock ownership as major income source in the lowlands, donkey in Dire Dawa and its environs is important pack animal and used as source of income in the area by hiring it), cash crop production, off-farm income, income, access to irrigation, and access to better seed all significantly increased the likelihood ofa rural household being able to provide for its members' nutritional needs. Moreover, sex of household head, educational level, household size, remittance, saving, and urban agriculture determines the food security status of urban household at 5% level of significance. Therefore, thestudy advises that in order to improve the status of food security for households in the study area,rural households should be encouraged to promote off-farm income, work on household size through sustainable awareness creation, promote cash crop productivity, access to irrigation, increasing income, owning donkeys, and improve the household heads' educational level.

Keywords*:* Food security, rural households, urban households, probit logit regression, Determinants of food security and Dire Dawa

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

In numerous contexts, one of the top global issues in the present decade is food security. A food security issue affected 124 million people worldwide in 51 countries in 2017. (FSIN, 2018). In eighteen countries violence and insecurity are the main causes of food insecurity, according to FSIN (2018), and the number of people who experience food insecurity globally has been rising overtime. Similar to this, Ethiopia's food security situation deteriorated drastically in 2017. In Ethiopia, there were 8.5 million people who are food insecure, up from 5.6 million in December 2016. (ACAPS, 2018). In 2017, there were 3.6 million critically malnourished children and women in Ethiopia (IFRC, 2018).

Prolonged drought, violence, insecurity, crop disease, etc. are the main contributors to food insecurity in Ethiopia. In the southern and south-eastern pastoral and agricultural areas of SNNPR, southern Oromia, and south-eastern Somali Regions, where total seasonal rainfall wasup to 60% below average, extended drought conditions are severely hurting livelihoods,according to FAO (2018). These regions now have extremely poor pasture and water availability, which has a significant impact on agricultural productivity and livestock conditionsand causes widespread animal mortality. More than a million people have been forced from their homes in Ethiopia as a result of war since September 2017; many of these people have been displaced along the regional boundary between Oromia and Somalia (FEWS NET and WFP, 2018).

The autumn 2018 armyworm outbreak, which affects wide portions of Ethiopia, mainly maize-producing regions in SNNPR, Western Oromia, Amhara, Gambela, and Benshangul Gumuz, is another element contributing to the country's food security crisis (ACAPS, 2018; FEWS NETand WFP, 2018). According to ACAPS (2018), the reduced output of the 2017 harvests, decreased food access due to low purchasing power, and the fatigue of coping mechanisms all contribute to Ethiopia's critical food security situation in 2018. Dire Daw area is one of the areas in the country affected by this hazard. Coupled with frequent drought, this pest infestation affected the food security situation of households both rural and urban areas of Dire Dawa.

Poor institutional structures and reliance on rain-fed agriculture, which is extremely sensitive to drought and results in the loss of lives and livelihoods for rural households every three years, are linked to Ethiopia's low household food security performance (Abduselam, 2017), which is also valid in Dire Dawa.

Most of previous studies have focused on wider level. For instance, study conducted by (Bogale et al. 2009) reviewed literature to seek an answer for the question "why does food insecurity persist in rural areas of Dire Dawa?" The researchers discovered that among the factors taken into account, family size, annual income, the amount of credit received, access to irrigation, the age of the household head, the size of the farm, and the number of livestock owned demonstrated theoretically consistent and statistically significant effects. Though conceptually inconsistent and statistically negligible, the predicted coefficients of the number of owned oxen and dependency ratio did have an impact on the likelihood that a household may experience food insecurity. Calculated household food insecurity coefficients for the study area's head of household's sex, total off-farm income, head of household's educational attainment, and amount of food help received were not found to be statistically significant.

Dire Dawa has been noted for its industrial sector and commerce activity for many years. Many residents in the city were affected by the crackdown on illegal commerce that followed the suspension of rail service. Slow economic growth in several economic sectors and a lack of significant private investments in the city were the main causes of the city's high unemployment rate of 6.9%, which is close to 7.8% nationally (Dire Dawa city Adm., 2017).

Furthermore, the City's Administration has weak performance on natural resource management had hence ecological depletion has had a substantial influence on people's food security in rural areas, and it is gradually spreading to urbanareas (Dire Dawa city Adm., 2017). Due to the aforementioned issues Dire Dawa is one of the cities in Ethiopia where urban poverty is expected to be prominent; roughly,6.9% of the population lives in poverty (Dire Dawa city Adm., 2017).

During the reconnaissance survey, this researcher appraised/identified several problems affecting food insecurity in Dire Dawa and its environs, which include the increase in the price of fertilizer, water logging, crop disease, pest infestations and lack of improved seed. This study is therefor, initiated to prove these findings quantitatively. Furthermore, this study has focused on comparing rural and urban household's food security status and its determinants in Dire Dawa.

1.2 Statement of the problem

Food insecurity is a concern in many poor countries across the world. Ethiopia is one of the most food-insecure and famine-stricken countries in Africa and the developing world, with food insecurity affecting a large proportion of the population. Ethiopia's economy is mostly focused on agriculture, which is vulnerable to a range of shocks, seasonality, and trends (Bedemo et al., 2014). Bezu (2018) estimates that 33 million Ethiopians are food insecure and suffer from chronic malnutrition, with dry land areas housing the majority of the food insecure people.

Many studies have been conducted in the research area of Dire Dewa city administration. Bogale et al. (2009) investigated household-level factors that determine food insecurity in rural Dire Dewa. They concluded that family size, annual income, credit obtained, access to irrigation, the age of the household head, farm size, and livestock ownership all had statistically significant effects. The projected correlations between the number of oxen possessed and the dependency ratio, on the other hand, indicated a theoretically contradictory and statistically insignificant influence on the likelihood of food insecurity in a household. Furthermore, Shimelis et al. (2007) showed that 76 percent of households in Dire Dewa's rural areas were food insecure, with the severity of food insecurity being 15% greater than the national average and a 31 percent food-insecurity gap. Several rural household livelihood strategies were revealed to be a composite of numerous activities to enable individuals to make a living throughout their inquiry. These efforts included growing a variety of crops and livestock, diversifying crop and livestock production, and increasing crop and livestock production through non-farm activities.

The situation of households' food security in rural and urban areas is indicated by Lerner et al. (2011). In their article, they argued about the newly forming areas that combine elements of the urban and rural worlds and examined how these spaces may affect people's ability to support themselves and access to food. Food security for rural and urban households could not yet be divided according to Dire Dewa, the study region. In order to evaluate the contexts in which food production persists within more general processes of landscape and livelihood transformation in peri-urban locations, a modified livelihoods framework was proposed in this research work. The results of this study show the importance of policy and planning in balancing food production with urban growth and may offer paths for further research.

As was already mentioned, there are distinct variations in the degree, causes, and effects of food insecurity depending on the level of analysis. Food insecurity is still an issue in Ethiopia in general and for the administration of Dire Dawa city in particular, despite the efforts of the Ethiopian government, the WFP, and other development partners. In keeping with this, the government chose Dire Dawa, one of the food-insecure districts, as a pilot district for the implementation of PSNP beginning in 2005 and continuing to the present. Agro-ecologically based coping mechanisms, household food security status, and its causes have all been the subject of very few empirical investigations in this district. Therefore, this study was designed to contribute to the body of knowledge specifically on the comparative study of food security situation between rural and urban areas of Dire Dawa City Administration.

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1.3 Objective of the study

1.3.1 General objective

The general objective of the study was to compare the current rural-urban household food security status in Dire Dewa.

1.3.2 Specific objective

To attain the general objective of the study the following specific objectives were set to:

- Measure the current status of food security among rural households in the study area
- Quantify the current status of food security among urban household in the study area.
- Estimate the severity of household food insecurity in the study area
- Determine factors that influence household food security status in the study area.

1.4 Research question

The researcher has tried to answer the following research questions in this study:

- What is the current status of food security among rural households in the Dire Dawa?
- What is the current status of food security among urban households in the Dire Dawa?

- What is the status, gap and severity of food insecurity among rural households in the study area?
- What are the major determinants of households‟ food security in rural households of Dire Dawa?

1.5 Significance of the study

This study is aimed at contributing to the body of knowledge in food security situations of rural and urban areas in Dire Dewa. The data generated is believed to contribute to the planners on the one hand and to the researchers on the other by initiating similar studies elsewhere.

1.6 Scope and limitation of the study

This study examined the level of family food security, the disparity and severity of food insecurity between rural and urban households, and the causes of food insecurity under the Dire Dawa government in Ethiopia in 2022.The four urban and rural Kebeles of Dire Dawa city administration were the focus of this investigation. For this study, household caloric acquisition was utilized to assess food security. Counting assets and household members is considered unacceptable by local customs. However, this study aimed to reduce respondents' hesitation in matters such as asset holding and family size by employing local enumerators who were knowledgeable with the cultural milieu of the social system.

1.7 Organization of the thesis

There are five chapters in this thesis. The background material, problem description, aims, significance, and scope and constraints of the study are all covered in chapter one. In chapter two, a review of the literature on core concepts and definitions, aspects of food security, measures and indicators of food security, empirical research on factors affecting food security, and the theoretical framework for the study were presented. The study area, data type, source, and methods of data collecting, sampling strategy and sample size, data analysis method, and specification of variables and hypotheses are all covered in chapter three. Results and discussions of the research findings are offered in chapter four, and the study's summary, conclusions, and suggestions are presented in chapter five.

CHAPTER TWO
REVIEW OF LITERATURE

This chapter reviews relevant literature on the subject of the study. The fundamental principles and definitions of food security, as well as agropastoral and sedentary farming livelihoods in connection to food security and factors that may influence food security, are thoroughly examined. Furthermore, alternative perspectives on food security are briefly examined, and difficulties confronting people in developing nations are underlined. Finally, a discussion of the concept of coping mechanisms and empirical evaluations on food security factors are offered.

2.1 The concept of food security

2.1.1 Food security

Different writers and organizations have defined food security differently. Since its inception in the early 1940s, the notion and definition of food security have evolved (CFS, 2012). In preparation for the World Food Summit in November 1996, an international forum was held to establish the most careful redefinition of food security. As a result, food security exists ‘‘when all people have physical and economic access to enough, safe, and nutritious food to suit their dietary needs and food preferences for an active and healthy life at all times’’. Furthermore, the World Food Summit in 1996 identified three elements of food security: food availability, accessibility, and use (FAO, 1996). It has just included supply stability as a fourth food security criterion (FAO, 2008). As a result, in this study, food security was defined as sufficient food consumed by the household or adequate calorie availability at the household level.

2.2.2 Food insecurity

Food insecurity is a notion that emerged in the mid-1970s during debates about international food difficulties during a global food crisis. Food insecurity was largely concerned with national and global food supplies at the time (Frankenberger, 1992). Concerning its (food insecurity) source, the food crisis in Africa in the early 1970s sparked great alarm among the international donor community about supply shortfalls caused by drought and desert encroachment as the primary cause. At the 1974 World Food Conference, food supply shortages were identified as a primary cause of food insecurity. The definition offered at the 1974 World Food Conference reflected this view of the idea of food insecurity. At the 1974 World Food Conference, the term "food insecurity"

was used to describe the "absence of an adequate global food supply of basic commodities to maintain an ongoing increase in food consumption and to counteract swings in production and pricing" (Clay, 2002). Food insecurity, according to FAO (2000), ‘‘arises when people lack secure access to sufficient quantities of food that is safe, nutritious, and necessary for both active and healthy living and appropriate growth and development. It could result from a scarcity of food, restricted purchasing power, inadequate food distribution, or inefficient food consumption at the family level’’. The main reasons of poor nutritional status include food instability, poor health and sanitation conditions, and inappropriate care and feeding habits.

2.2 Measuring dimensions of food security

To determine whether a movement from one status to another affect’s food security, it is critical to look at food security aspects. In accordance with the FAO (2000) definition, Gross et al. (2000), LIFT and USAID (2011), Upton et al. (2015), and Tawodzera (2010) recognized four elements of food security: availability, access, usage, and stability.

2.2.1 Food availability

According to FAO (2013), food availability is an important aspect of food security. A sufficient supply of food to a population is a required but not sufficient condition for food access. This is true when the national food supply or availability cannot ensure the individual home's access to that supply unless and until that specific household has the means, resources, and purchasing power to do so. Thus, this is based on the assertion that a household's access to resources leads to that household's food availability or supply by allowing that household to create his own food or buy and consume his food requirement.

Food availability denotes the availability of food in sufficient quantities and on a consistent basis. It focuses on the supply side of food security and is decided by food production, stock levels, and net trade. It is all about having enough food from household production, other domestic output, commercial imports, or food assistance (WFP, 2012). However, global food availability does not guarantee food security in a specific country because what is available in the global market may not be accessible to poor people in other developing countries whose economies do not generate the foreign currency required to purchase food from the competing global market (Sisay, 2012).

2.2.2 Food accessibility

Food access implies that people must be able to obtain adequate quantities of food on a regular basis through purchase, home production, barter, gifts, borrowing, or food aid, as well as having adequate resources to obtain appropriate foods for a nutritious diet, which depends on available income, income distribution in the household, and food prices (WFP, 2012). Sens (1981) entitlement approach, which asserts that "starvation is the feature of some people not having enough food to eat," is at the forefront of the focus given to the concept of access in the 1980s food security definition and literature. It is not a trait of not having enough food to consume. Food entitlements determine access to food. Asset stocks, physical and human capital, access to common property resources, and a range of governmental, community, and household level contracts are all avenues to entitlements.

2.2.3 Food utilization

Diet utilization is sometimes thought of as the method by which the body absorbs different nutrients from diet. The results of appropriate care and feeding practices, food preparation, a variety of diets, and intra-household food distribution are sufficient energy and nutrient intake. It includes cooking, storage, and hygiene behaviors, individual health, water and sanitation practices, and feeding and sharing practices within the home. This determines household members' food insecurity (WFP, 2012).

Food utilization, according to Klennert (2009), is the proper biological use of food, which necessitates a diet rich in energy and necessary nutrients, drinkable water, and suitable sanitation, as well as knowledge of food storage, processing, basic nutrition, child care, and sickness management. This refers to the human body's ability to digest and metabolize food. This acquired energy is critical for daily physical activity, such as working in agriculture. Aside from a healthy physical environment and suitable sanitary facilities, use necessitates an understanding and awareness of correct health care, food preparation, and storage practices.

2.2.4 Stability

The final one is long-term stability of the other three dimensions, even if current food intake is appropriate. Stability refers to the temporal dimension of food and nutrition security, or the time

span in which food and nutrition security are examined (the ability to obtain food over time). Stability is achieved when the supply at the home level remains constant over the course of the year and over the long term. This includes food, income, and financial resources.

Furthermore, it is critical to reduce external risks such as natural disasters and climate change, price volatility, conflicts, and diseases through activities and implementations that improve household resilience. This includes insurance against drought and crop failure, as well as environmental protection and the sustainable use of natural resources such as land, soil, and water (Klennert, 2009).

Food insecurity has spatial and temporal dimensions as well. The geographical dimension denotes the degree of aggregation at which food insecurity is taken into account. Food insecurity can be studied at the global, continental, national, subnational, village, family, or individual levels (Hoddinott, 1999). The temporal dimension relates to the time period under consideration for food insecurity. Much of the food insecurity literature divides the time component into two categories: chronic and transient (Hoddinott, 1999; Tweeten, 1997).

Food insecurity can be temporary, seasonal, or long-term. Food may be unavailable during specific instances of transient food insecurity. Natural catastrophes and drought cause crop failure and reduced food availability at the food production level. Civil wars can also reduce availability to food. Instability in markets, which results in food price increases, can cause temporary food insecurity. Other temporary causes of food insecurity include loss of employment or productivity, which might be caused by illness. The regular sequence of growing seasons in food production might result in seasonal food insecurity.

Chronic (or permanent) food insecurity is described as a long-term, ongoing scarcity of sufficient food. In this circumstance, households are continuously in danger of not being able to obtain enough food to meet the needs of all members. The recurrence of transitory food distress can render households more prone to chronic food insecurity (Ecker and Breisinger, 2012). Contrarily, transitory food insecurity refers to a temporary reduction in a household's access to enough food. Crop failure, animal diseases, seasonal scarcity, momentary illness or unemployment, fluctuations in food prices, output, household income, or a combination of these factors can all result in a short decline in a household's access to food. However, conflict and drought are the main causes of temporary food insecurity in Ethiopia (Devereux, 2010).

Furthermore, seasonality contributes to cyclical food insecurity (Osmani, 2001). Because cyclical food insecurity often follows a recognized sequence of events, it is easier to predict than transient food insecurity. As a result, it is classified as "recurrent transitory food insecurity" (Maxwell et al., 2008a).

2.3 Food security indicators and measurements

There are several methods for evaluating household food security levels. However, no single approach is commonly recognized as a standard measure of food security. High food prices, high levels of malnutrition, high levels of maternal mortality, high levels of vulnerability, and high levels of poverty characterize global household food insecurity. For individuals concerned about food security, vulnerability is defined as the possibility of an abrupt decrease in food access or consumption owing to dangers in the physical or social environment. Weather disturbances, such as drought, or man-made disturbances, such as civil war or dramatic price changes, are examples of typical dangers (Clay, 2002).

Indicators are built from a collection of observations or measurements of food security-related circumstances that are categorized using a predefined set of criteria (Riely et al., 1999). A good indicator should be relevant, low-cost, timely, and flexible across places (Frongillo, 2004). It provides as a foundation for monitoring food security and mapping vulnerability in a given context, which aids in the creation of suitable solutions. However, no single indicator has been found to capture all dimensions of food security.

Indicators vary according to the types and intensity of investigations, techniques, and aggregate level. According to Frankenberger (1992), indicators are divided into two major categories: process indicators and outcome indicators. The process indicators assess food availability and access, whereas the outcome indicators serve as proxies for food consumption. After distinguishing between process indicators and outcome indicators, each was explained in detail, with process indicators grouped into indicators that reflect food supply, such as meteorological data, natural resource information, agricultural production data, food balance sheet, and those that reflect food access.

On the other hand, outcome indicators can be grouped in to direct indicators, which are closest to actual food consumption, rather than indirect indicators focusing on storage estimates, subsistence

potential ratio and nutritional status assessment. At different levels of aggregation and for different purposes, food security is measured. In a particular country, measurements at the national, household, and individual levels are frequently used. The measurement is somewhat more aggregated at the national level and primarily concentrates on the availability of food. The measurement can take many various forms at the home level, including indices of nutrition and food access. Some of these markers reveal historical food stressors that cannot be used as a tool for present-day interventions. For instance, nutritional outcomes are a result of inadequate dietary intake and poor nutrient absorption brought on by environmental factors including illnesses and a lack of access to healthcare (Frankenberger, 1992).

Measuring the required food for an active and healthy life and the degree of food security attained is a question to be addressed in a food security study. However, there is no single indicator for measuring it. Measurement is necessary at the outset of any development projects to identify food security, to assess the severity of food shortfall, and to characterize the nature of food security (Hoddinott, 2001).

According to Maxwell et al. (2008b), the most widely used and accessible indicators that could be used to assess food security include coping strategies index, actual food consumption at the household level as determined by a 24-hour recall, nutritional status, and food shortage. Proxy indicators include calorie intake, household income, productive assets, food shortage, under-5s nutritional status, dietary diversity, and access scale to household food insecurity. Despite the fact that these indicators correctly capture and identify a portion of the issue, they do not give a full picture. Individual intakes, household caloric acquisition, dietary diversity, and coping indices are four indicators of family and individual food security (Hoddinott, 1999; 2002). These four popular methodologies are shown below:

Household caloric purchase*:* It is a measurement of the number of calories or nutrients that members of the family can access throughout a certain time frame. How much food was prepared for consumption over the course of a 7 or 14-day period from purchases, stocks, gifts, loans, and/or wages is inquired of the primary person in charge of meal preparation (Bouis, 1993).

Individual consumption: This entails completing 24-hour recalls of food consumption for specific family members and determining the caloric value of each food item mentioned (and sometimes a

more complete nutrient analysis). Even though this approach generates more accurate consumption data and captures intra-household distributional differences, it has a number of disadvantages, such as memory lapses, observer bias, respondent fatigue, a brief and potentially unrepresentative recall period, and such high data collection costs that resources are frequently restricted to relatively small samples (Bouis, 1993).

Coping method index*:* This is an easy method that takes little effort and time. It can be handled utilizing rapid appraisal techniques and does not require specialized manpower. The score, which is based on household coping strategies, enables researchers to gauge how sensitive a population is to food insecurity. To arrange and synthesize the data into a comparable figure is the primary tactic. It enables the distinction between secure and insecure households by allowing the employment of a single coping strategy or a mix of numerous coping strategies. The method can be applied in a variety of ways depending on the required level of accuracy and the type of data (Hoddinott, 1999). According to Maxwell et al. (2002), some limitations of this measure include: because it is a subjective measure, different people have varied opinions about what it means to eat smaller portions; and comparing across households or an area is difficult.

Dietary diversity*:* One or more members of the family are asked about various items they have ingested throughout a specific time period. Where there is a suspicion of disparities in food intake among household members. The drawback of this measure is that it does not record quantities in its most basic form. If it is not possible to inquire about the frequency with which specific quantities are consumed, it is impossible to evaluate the extent to which diets are deficient in terms of caloric availability (Migotto et al., 2006). For this study, calorie consumption was utilized to assess household food security and establish the cutoff point (food insecurity line) beyond which a home is or is not food secure. This measure was chosen because it provides a rough approximation of the number of calories available for consumption in the family. Furthermore, according to Hoddinott (2001), respondents do not always understand how their responses can be influenced. Since the inquiries are retrospective rather than prospective, there is less probability that people or households will alter their behavior as a result of being watched.

Most food security studies use one of two methods to assess food security (Shiferaw, Kilmer, & Gladwin, 2003). One way is to compute gross household output and purchases over time, as well as the growth or depletion of food stockpiles kept over that time period, and then assume that all food that entered and left the family was consumed. Another method is to undertake a 24-hour recall of food consumption by individual family members and estimate the calorie content of each item of food.

In order to distinguish between households that are food secure and those that are food insecure across cultural contexts, FANTA (Food and Nutrition Technical Assistance Project) and its collaborators have identified a set of questions (see Annex part, Household Food Insecurity Access Scale Generic Questions).

These questions appear to be common aspects of household food insecurity (access), and they can be used to classify households and communities on a severity scale ranging from food secure to very food insecure.

The HFIAS data can be used to determine the prevalence of household food insecurity (access) (for example, for geographic targeting) and to track changes in household food insecurity (access) in a population over time (e.g., for monitoring and evaluation). A normal baseline and final evaluation survey can include the questions. Food secure households can produce enough food for all members of the household to live a productive and healthy life. Food can be manufactured, purchased, borrowed, or given as a gift. Food security was measured in this study by taking into account both actual home food production from purchased, farm, and other sources. The analytical model section delves into the individual steps.

2.4 Empirical review

Numerous empirical findings in eastern Ethiopia supported the idea that the majority of households there had these elements of food security. For instance, Lemma and Wondimagegn (2014) examined the susceptibility of smallholders to food insecurity and their coping mechanisms in east Hararghe. Their research showed that 62.7 percent of households had access to enough food, whereas 37.3 percent did not. Furthermore, according to Hussein and Janekarnkij (2013), 63% of

Somali households had access to enough food, whereas 37% did not. In contrast, a different poll revealed that about 56.5% of local households experienced food insecurity (Abdirahman, 2015).

Bogale et al. (2009) looked at household-level variables that affect food insecurity in Dire Dewa's rural districts. They found statistically significant effects for variables such family size, annual income, credit obtained, access to irrigation, age of the household head, farm size, and ownership of livestock. Though conceptually contradictory and statistically insignificant, the projected correlations between the dependency ratio and the number of oxen owned showed an impact on the risk that a household will go without food. Furthermore, according to Shimelis et al. (2007), food insecurity affected 76 percent of households in Dire Dewa's rural districts, with a food-insecurity gap of 31% and a severity of food insecurity that was 15% greater than the national average.

According to Misgana (2014), a study on rural household food security status and its determinants in the case of Laeleymaichew district, Tigray's central zone, revealed that 31.2 percent and 68.8 percent of sample families were food secure, respectively. Furthermore, the model result demonstrated that total cultivated land holding size, total livestock holding, total yearly revenue per AE, and usage of chemical fertilizer were all positively connected to food security status and statistically significant. In contrast, family size in rural homes is adversely associated and statistically significant to food security status.

Furthermore, Furgasa and Degefa (2016) employed the home food balance model to measure household food security in central Oromia, Ethiopia. High fertilizer prices, a scarcity of farm land, erratic rainfall patterns, water logging, poor soil fertility, a scarcity of oxen, a scarcity of grazing land, crop disease and insect pests, a scarcity of improved seed supply, and a scarcity of farm machinery were identified as major constraints to food production among the study households.

According to Beyene and Muche (2010), the majority of households in the country's central region are food insecure (about 36 percent were food secure and the rest 64 percent of the households were food insecure). The average amount of energy available for homes with and without access to food was 2,908 Kcal/AE/day for the former and 1,822 Kcal/AE/day for the latter, according to the study. Households with food insecurity had a minimum and highest energy supply of 1,043 Kcal and 2,098

Kcal, respectively. The minimum and highest energy intakes in homes with access to food were 2,203 and 3,492 calories, respectively. Additionally, according to another survey, the area's total number of households was 58.16% of which 20% and 9.4% of them were food insecure, respectively (Girma, 2012).

Family size, livestock ownership, proximity to the market center, availability of nonfarm employment, and cash crop output were found by Fekede et al. (2016) to be major factors that positively influence household food security. The econometric results revealed that high livestock ownership, access to nonfarm activities, and producing cash crops improve the probability of a household being food secure, whereas large family size and distance from market center diminish the probability of a household being food secure.

Amsalu et al. (2012) investigated the status and determinants of rural household food security in Ethiopia's Shashemene district of Oromia regional state. Using the FGT index, the headcount ratio, gap, and severity of food insecurity were calculated, yielding 36, 12.38, and 7.35 percent, respectively. The logit model also revealed that parameters such as household family size, cultivated land size, total farm revenue, off-farm income, and animal ownership had a positive and significant relationship on household food security status.

Ehebhamen et al. (2017) found that an increase in yearly income, education, the amount of cultivated land, land ownership, and livestock ownership by the head of the family positively and significantly boosted food security. On the other hand, age and household size increases have a negative and significant effect on the state of food security. Numerous studies in Ethiopia's northern area found that food insecurity occurs quite frequently.

According to Welderufael (2014), 48 percent of households in the Amhara Region were exposed to food insecurity. According to him, food insecurity was far worse in rural households than in urban households. The majority (74 percent) of households in a poll in the north of the country, which is prone to drought, reported food insecurity (Arega, 2013). In contrast to other drought- prone regions, where 58 percent of rural households reported being food secure, Tsegay (2009) found that the frequency of food security in rural households in the Tigray region was 42 percent.

Numerous studies have also shown that food insecurity is less common in southern Ethiopia than it is in other parts of the country. In the Shashemene district, about 64% of households had access to enough food, whereas 36% did not, according to Mitiku et al. (2012).

Furthermore, Mequanent et al. (2014) found that whereas 57.1 percent of households were food secure, 42.9 percent of households experienced food insecurity. Despite this, over 54% of households in some southern Ethiopian regions report having moderate to severe food insecurity, according to Nigatu (2011). In support of this, Ahmed (2015) calculated that roughly 77 percent of Bule Hora households experience food insecurity. Additionally, 84.91 percent of rural households in the Guraghe zone reported food insecurity (Zelalem, 2014). (Buom, 2013) found that 19.2 percent of tested rural households were food secure compared to 80.8 percent of rural households that reported food insecurity in the Gambella region.

The logistic model result in rural Ethiopia suggested that enhanced food security is achieved along with an increase in the size of cultivated land and animal holdings. Off-farm and nonfarm revenues have an impact on farm households' food security. Their relevance is enormous in supplementing total agricultural income and improving household food security. Improved food security is observed as the intensity of fertilizer use increases (Fekadu and Mequanint, 2010).

2.5 Conceptual framework

The following variables were identified in literature reviews to determine the state of foodinsecurity in rural and urban settings. Factors to consider include family size, number of dependents(under the age of 18), remittance amount, amount of assistance, type of income source (daily or salaried), gender, asset background, amount of savings, living conditions, education level, pregnancy/lactating status, and status of social connection with host communities. As a result, as shown in the model below, the following statistical model was used to investigate factors influencing the target groups.

The combination of environmental, social, and policy settings determines a country's food security position. The interaction of these elements also influences household income and food security (Ejigayehu and Edriss, 2012). Food security is comprised of four basic components. They are, as previously stated in the conceptual definition, food availability, food access, food use, and not losing such access. Availability, access, and utilization are all hierarchical. Food availability is

required but insufficient for food accessibility, while access is required but insufficient for consumption (Webb et al., 2006). Food security is determined by two broad groupings of elements.

These are supply and demand side factors, respectively. The supply-side factors influence physical availability to food at the home level. Demand side considerations influence economic access to food goods. Similarly, food availability in marketplaces influences current prices (assuming prices are not controlled) since urban and pre-urban households rely heavily on the market. A household with sufficient purchasing power has access to food and can go to the next higher stage, utilization, and therefore become food secure. However, households with insufficient purchasing power as a result of low income and high market prices may experience food insecurity (Ejigayehu and Edriss, 2012).

Aside from food consumption, the final usage of food by households is influenced by availability to safe water, health care, and meal preparation. Food use includes both physical and biological utilization. The physical utilization is concerned with the physical means that can be consumed, whereas the biological utilization is concerned with the body's ability to properly absorb nutrients from the food eaten (WFP, 2009b).

Finally, as seen in the left portion of figure 1, high availability, sufficient purchasing power, good access, and good usage all contribute to household food security. On the other hand, as shown in the right part of Figure 1, insufficient availability of food items from own production, stocks, and aid, as well as low purchasing power of households due to low income and high prices, less access to food items, and inappropriate food utilization, ultimately lead to food insecurity. Then, food-insecure households may be pushed to employ a variety of coping techniques, which contributes to household food security. Furthermore, the arrows pointing towards food security indicate a good position in terms of food availability, purchasing power, food access, and food utilization, whereas the arrows pointing towards food insecurity indicate a poor position in terms of food availability, low purchasing power, insufficient food access, and inefficient food utilization. Figure 2.1 depicts the aforementioned conceptual explanation.

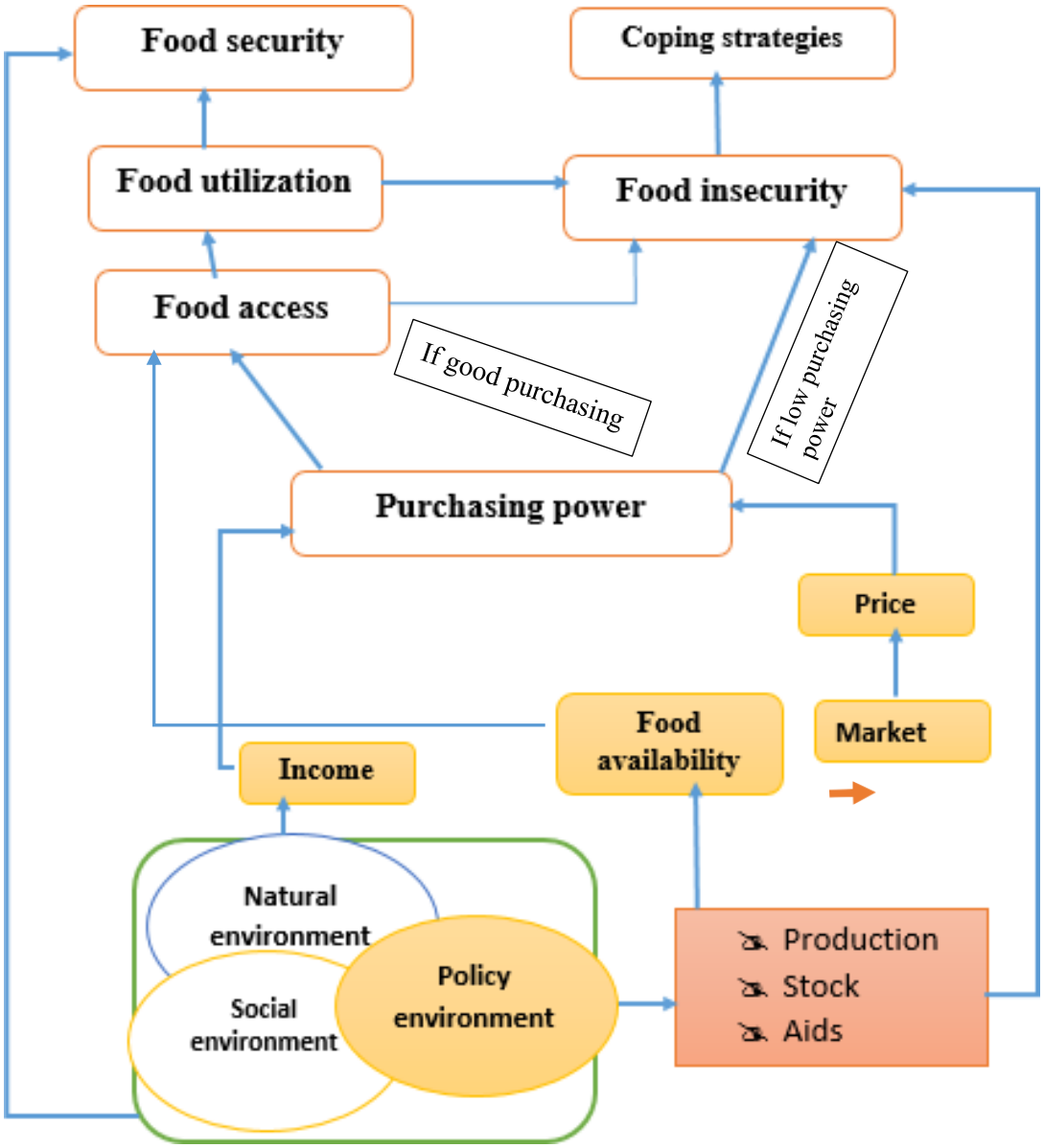

Figure 2.1: Conceptual framework of the research

Source: Adopted and modified from (WFP, 2009b)

CHAPTER THREE

RESEARCH METHODOLOGY

In this chapter, brief description of the study area, data types, sources and methods of data collection, sampling technique and sample size, methods of data analysis and definition of variables and hypothesis are presented.

3.1 Description of the study area

3.1.1 Location

The city lies between latitudes 9^0 27' N and 9^0 49' N, and longitudes 41^0 38' E and 42^0 19' E. The Oromia region's Eastern Hararghe administrative zone borders it on the south and southeast, and the Somali region's Shinilie zone borders it on the north, east, and west (Abdu, 2000).

Dire Dawa is the country's administrative capital as well as one of its largest cities. It is located between Addis Ababa and Djibouti, 515 kilometers east of Addis Ababa. It has built a comparative advantage as a transit and terminal for much of the country's import and export trade. Furthermore, as a result of the project, rural farmers in the research region have been encouraged to diversify and intensify their agricultural production. According to the Woody Biomass Inventory and Strategic Planning Project, Dire Dawa is located in the heart of the eastern Hararghe highlands group, with much of its land area being in semi-arid lowlands (2000). The highest point on the escarpment is around 2500 meters above sea level. Underneath the escarpment are large cultivated valleys ranging in elevation from 1320 to 1900 meters above sea level.

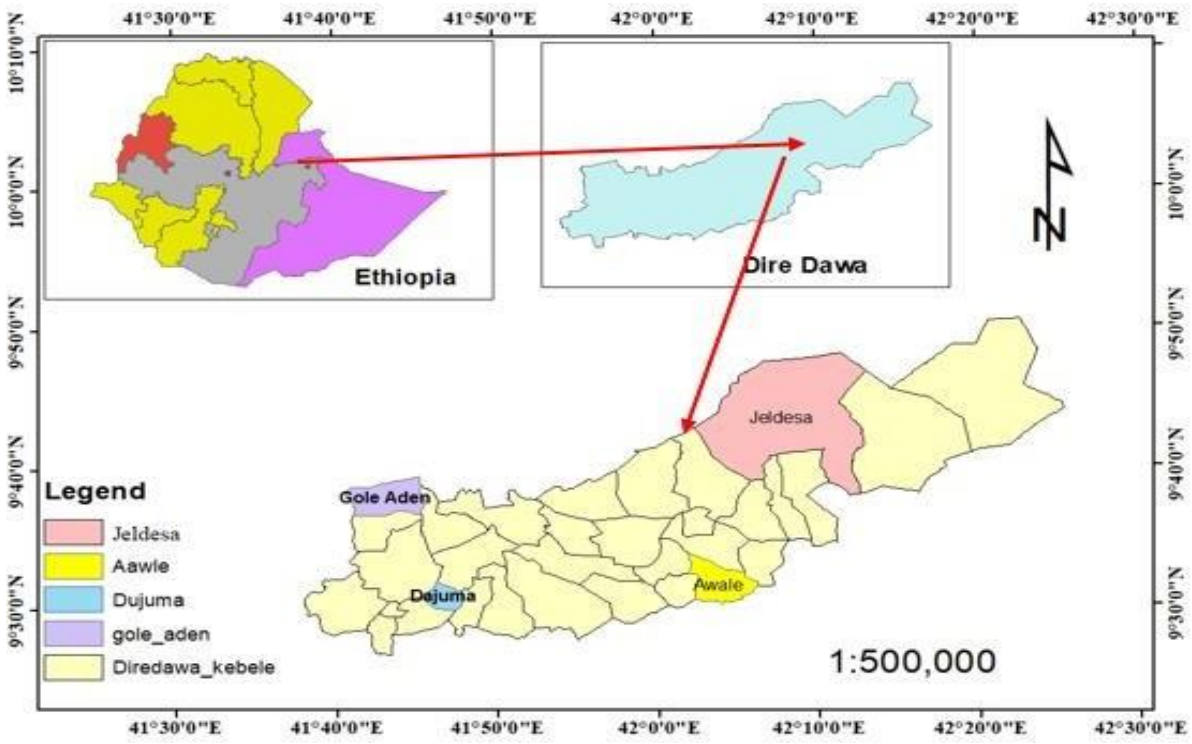

Figure 3.1: Location map of the study area

3.1.1. Population

According to 2015 census result the total population of Dire Dawa city administration is estimated to be 440000 out of which 62.95% (2770074) live in urban while the rest 31.05% (108610) live in rural areas. Currently based on Dire Dawa administration RHB 2013 EFY (Ethiopian physical year) facility information result the total population of Dire Dawa city administration is estimated to be 521000 out of which 67.79% (353226) live in urban while the rest 32.21% (167774) live in rural areas.

3.1.2. Climate

Dire Dawa Administrative City is situated in Kola agro-climatic region, temperature is hot throughout the year with minor seasonal variations. Temperature progressively increases northward from somewhat Woina-Dega type along the mountain tops of the mountain ranges along the southern border and the low alluvial plains in the northwestern margin experience the lowest and the highest temperature recordings respectively in the region. The seasonal rainfall has a bimodal distribution with peak in April and August. The two seasons are 'Meher' and 'Belg' and they receive about 80% of the annual rainfall separated by a short dry spell in June. The mean annual rainfall is 657mm and mean monthly values varies between 5.7mm (December) and 119mm (April), which

indicate poor temporal distribution of rainfall. The mean annual average air temperature is 25.3 degree centigrade and June is the warmest month of the year while December and January are the coldest. Based on National Metrology Institute (NMI), beginning from 1980 up to 2015 Ethiopian Calander average rain fall was recorded 25.59 millimeter, even the last five years (2011 up to 2015) average rain fall was 26.04 millimeter, which shows rain fall is almost similar throughout thrree decay. Dire Dawa enjoy a sunny climate with mean annual daily value of bright sunshine equal to 8 hours IDP (2006).

3.1.3. Soil

The major soil types of Dire Dawa City exhibit a general relationship with altitude and slopes. Shallow and infertile soils being the characteristics of the mountains and hills whereas the deep and fertile soils are the major properties of valley bottoms, river terraces and flat plains. Generally, the soils of the valley are developed on recent alluvial colluvial sediments derived from the adjacent mountain ranges. Fluvisols and Vertisols are generally dominating the region and particularly lowland flat plains, valley bottoms and river terraces. Texturally these soils are sandy loam and sandy clay respectively. Shallow Leptisols are the dominant type of soils found in the mountain andhills of the region WWDSE (2004).

3.1.4. Geology

Dire Dawa City's geology is made up of a variety of metamorphic, volcanic, and sedimentary rocks. The oldest rock types in the region are those that have undergone metamorphic change, which mostly consist of gneisses and migmatites. The majority of them are crystalline basement complexes or pre-Cambrian in origin. They were primarily exposed in the escarpment zone, with some outcropping occurring near Dire Dawa. In the immediate area of the town, only a very smallnumber of outcrops of volcanic rocks are exposed. However, extensive extrusive lava flow outcrops(mostly basalt) and a few tiny intrusive outcrops may be seen in the surrounding areas of the Dire Dawa watershed. Numerous types of sandstone, limestone, alluvial deposits, and travertine are found in the region's sedimentary rocks. Sands, silt, and clay make up the majority of the alluvial

deposits, with some wadi gravel present. Nearly the entire low-lying, flat alluvial plain is taken upby them. Only a small portion of the travertine is exposed within the town and its environs WWDSE (2004).

3.2 Data type, sources and methods of data collection

3.2.1 Data type and sources

Data of all kinds, both qualitative and quantitative, were gathered from primary and secondary

sources. Both primary and secondary sources were used to produce the necessary data. To complement the primary data, secondary data was also generated from various sources, former conducted researches, official websites, unpublished documents, and publications of government offices such as Dire Dawa agricultural offices.

3.2.2 Methods of data collection

Primary data was collected through the help of EPHI (Ethiopian public Health Institute), Food Science and Nutrition Directorate during ‘‘Food and Nutrition Strategy Baseline Survey’’ throughout the country. I was regional coordinator in Dire Dawa during that time and I benefited collection of the data for this study side by side. For this research data was collected from Jaldesa, Dujuma, Awale and Adada rural kebeles using household survey via using structured questionnaire that was administered by trained enumerators who have knowledge about the area and well acquainted with the culture and language. Moreover, data was also obtained from four urban kebeles of Dire Dewa city namely of kebele 01, kebele 02, kebele 03and kebele 04 with structured questionnaire, interview and focus group discussion.

Household Survey: For the actual survey work, the survey instrument was translated in local language (Afan Oromo and Somligna) because enumerators can communicate easily with the respondents. The data required for analyzing the household’s food insecurity and coping strategies were gathered by incorporating the most important socio-demographic, economic profiles and characteristics of the categories of respondents.

To supplement the primary data in the study, numerous secondary sources were used. This consistsof textual materials, such as reports from sedentary farming and agro-pastoral rural development bureaus, as well as more current research projects that are pertinent to the subject of the study andthe study locations. It contains an analysis of pertinent periodicals, books, conference proceedings, academic theses, and dissertations, as well as reports from the necessary administrative levels and governmental and non-governmental organizations. To obtain more information, many offices and people were approached.

3.3 Sampling techniques and sample size determination

For this research data was collected from rural and urban areas. The data was collected from the two areas because one of the major goals of the study was to compare the food security situation of the two. It is clear that the economic activities of the two areas are different. However, when the food security situation is looked at one of the research questions was to assess which area is more food

insecure and to analyze why. It is also to be noted that biophysically the two areas are similar and the hypothesis for the research is that the difference in food security situation is due to the difference in the economic activities.

The primary data was collected in 4/12/2013EC for the rural and in 9/11/2014 EC urban areas. Though there is a difference of eleven months between the two data collection time, in those two periods climatic situation was not changed. This is to imply that usually the food security situation of rural areas heavily affected by the climatic, however in the two successive data collection type such climatic shocks didn't happen. In addition, major socio-economic changes didn't happen. In general, it is possible therefore, to conclude in the absence of shocks in weather and socio-political situations, the known economic activities were more or less comparable, though not exactly similar. Even, then readers have to take this difference into account when reading the findings.

3.3.1 Sample size determination of rural household

The selection of representative sample respondents was done using a multi-stage sampling technique. The Dire Dawa city administration's rural woredas were purposefully chosen for the firststage because they are more likely than other kebeles to experience food insecurity issues. Four Kebeles from rural areas—Jeldesa, Dujuma, Awale, and Adada Kebeles—were randomly chosen for the second stage. Finally, using simple random sampling with probability proportional to size, 356 households were chosen from a list of all the households in each Kebele. A formula created byYamane was used to determine the desired number of sample households (1967). The formula below was used to calculate the necessary sample size at a 95% confidence level, with a 0.5 degreeof variability and a 5% level of precision.

$$n = \frac{N}{1 + N(e)^2}$$

Where; n=sample size; N=population of the study (Rural households); e=acceptable sampling error, at 95% confidence level, e=0.05

$$n = \frac{3236}{1 + 3236(0.05^2)}$$

n= 356

Therefore, the study had a total of 356 sample size to be participated.

3.3.2 Sample size determination of urban household

Four stages sampling techniques were applied to reach at the respondents who fill questionnaires. In the first stage, out of the existing sub city in Dire Dewa, two of them were considered based on their nature of food insecurity issues. More specifically, Addis Ketema and Ganda Kore were selected as they are generally characterized by food unsecured areas. In order to identify the mentioned sub cities, discussions have been conducted with the officials. In the second stages, four urban kebeles (Kebele 01, 02, 03 and 04) were considered from the two sub cities using the simple random sampling technique thinking that more or less the kebeles have similar pattern of food security issues. According to (CSA, 2007), the total household number of the four kebeles was reached 31,576. Thirdly, the urban households have been stratified into food secured and non-secured groups in consultation with the officials. Fourthly, systematic random sampling was applied to identify the households who was participated in this study by filling questionnaires. In these processes, sample households have been determined using the statistical formula developed by Yemane (1967) described above.

$$n = \frac{31{,}576}{1 + 31{,}576(0.05^2)}$$

n = 395

Therefore, the study had a total of 395 urban house hold sample size to be participated.

3.4 Method of data analysis

Data analysis refers to organizing, summarizing and synthesizing the data to arrive at the results and conclusions of the research, therefore, qualitative research methods has used since descriptive survey design is employed. Thus, in this study, following the data collection, the data was coded and entered into statistical software called Statistical Package for Social Sciences (SPSS)version 26.0 for analysis. The household data was analyzed using both descriptive and econometricmethods of analysis.

To explain the demographic and socioeconomic situations of the households, the descriptive statistics like mean, variance, standard deviation, frequency distributions, ratios, and percentage were employed.

3.4.1 Measuring food security status

The household daily caloric intake per Adult Equivalent (AE) (calorie per AE per day) was calculated to assess the level of food security by dividing the household's daily caloric intake by the number of adults in the household after accounting for adult equivalent using the consumption factor for age-sex categories (Zegeye, 2009). The outcomes were then compared to the Ethiopian government's 2,200 Kcal daily minimum subsistence requirement per AE (FSS, 2002). Therefore, a cutoff point of 2,200 Kcal per adult equivalent (AE) per day was used in this study to distinguish between households with access to enough food and those without it.

Whereas if it falls below, the household is considered to be food insecure. The level of food security for the households was assessed by a direct consumption survey. The number of calories or nutrients that members of a family can consume over a specific time period is measured by the household caloric acquisition. We questioned the primary cook about how much food was prepared for consumption over time through purchases, stock, gifts, loans, and/or wages. The principal person responsible for preparing meals were asked how much food was prepared for consumption from purchase, stock and/or gift/loan/wage over a period of time. In this study, a seven-day recall method was used since such a measure gives more reliable information than the household expenditure method (Bouis, 1993).

The Foster Greer Thornback (FGT) index was used to calculate the prevalence, status, and severity of household food insecurity in the research area. The three most often used indices—head count ratio, food insecurity gap, and severity are provided by this model. These indicators reflect the various

levels of food insecurity. The head count ratio shows how many households consume less than the benchmark, which in this study is 2200 kcal/AE/day. The depth or gap of food insecurity, on the other hand, quantifies how far below the cut-off value food insecure households are. However, the squared food insecurity gap is more directly associated to the degree of food insecurity, providing those who are farther from the subsistence level a bigger weight in aggregate than those who are closer to it (Hoddinott, 2001).

Even though the model was widely used for poverty measurement studies; deferent researchers used the FGT index to determine the incidence and severity of food insecurity (Abebaw, 2003; Aschalew, 2006). Consequently, to estimate head count ratio, food insecurity gap and to assess the severity of household food insecurity the Foster, Greer and Thorbecke (FGT) index was employed which was widely used for poverty measurement studies.

The model is expressed as follows:

$$FGT(\alpha) = \frac{1}{N}\sum_{i=1}^{q}\left[\frac{Z - yi}{Z}\right]^{\alpha} \qquad (2)$$

Where, q = number of food insecure households, Z = minimum caloric intake, yi= is daily calorie intake per AE of i^{th} households, α=weight attached to food insecurity which is α = 0 incidence/head count ratio, α =1 depth/gap and α = 2 severity of food insecurity and N = total sample size.

3.4.2 Econometric model

Econometric modeling the kind of dependent variable under examination largely determines the suitable model and analytical technique to use. When a continuous variable is the dependent variable of interest, use the ordinary least squares approach. However, the dependent variable of interest is frequently not a continuous scale. Only two or more categories of constrained outcomes may be present. The dependent variable Y (home food security) is also a dichotomous variable in this study, taking value 1 if the household is food secure and 0 otherwise. Probability regression models are best suited to examine the relationship between dependent and independent factors when the dependent variable is dichotomous. The probability of the dependent variable given the independent variable is calculated when the response variable is qualitative. The linear probability

model, logit model, and probit model are the three most popular qualitative regression models (Gujarati, 2004). The Probit and Logit models are commonly used models when the dependent variable is binary. The Probit model is associated with the cumulative normal probability function, whereas, Logit model assumes cumulative logistic probability distribution. The advantage of these models over the linear probability model is that the probabilities are bound between 0 and 1. Moreover, they best fit to the non-linear relationship between the probabilities and the independent variables; which is approaches zero at slower and slower rates as an independent variable (Xi) gets smaller and approaches one at slower and slower rates as Xi gets large (Train, 1986).

Similar to a standard linear regression model, a linear probability model works by calculating the conditional expectation of the dependent variable given the independent variable. In addition, the model encounters numerous issues such as the disturbance Ui's heteroscedastic variances and non-normality, as well as the probability's failure to fall between 0 and 1 values. Due to its lack of appeal, the linear probability model has been abandoned in many real-world scenarios. Probit and logit models could be used to handle these issues with ease. The likelihood in these two models ranged from 0 to 1. The majority of the time, these two models work similarly. The key distinction is that the conditional probability Pi approaches zero or one more slowly in the logistic distribution than in the probit distribution because it has slightly thicker tails. As a result, there isn't a strong argument in favor of picking one over the other (Gujarati, 2004).

Probit analysis is a type of regression used to analyze binomial response variables. It transforms the sigmoid dose-response curve to a straight line that can then be analyzed by regression either through least squares or maximum likelihood. Probit analysis can be conducted by one of three techniques: using tables to estimate the probits and fitting the relationship by eye, hand calculatingthe probits, regression coefficient, and confidence intervals, or having a statistical package such asSPSS do it all for you. Probit analysis is a specialized regression model of binomial response variables. Regression is a method of fitting a line to your data to compare the relationship of the response variable or dependent variable (Y) to the independent variable (X).

$$Y_i = x\beta + u_i \qquad (3)$$

Where

Yi = food security status of the i^{th} respondent (household)

$\boldsymbol{x}$ = vector of determinants of food security

β = vector of parameters of interest

u_i = residuals of the ith respondent of the household A binomial response variable refers to a response variable with only two outcomes. The Probit Model assumes that the function F follows a normal (cumulative) distribution, therefore, in this study probit model was used over other alternative models because its interpretation is logical and clear to understand. In this study, variance inflation factor (VIF) was used to detect the multicollinearity among the explanatory variables. In this method, each explanatory variable would be regressed on all other explanatory variables and coefficient of determination would be computed for each subsidiary regression.

3.5 Working variables and research hypothesis

3.5.1 Definition of explanatory variables used in the model for rural food security

It is anticipated that the combined effects of a variety of factors at any given time have an impact on a household's food security. Based on the literature that is currently accessible, the independent variables that are anticipated to have a relationship with family food security were chosen. Any explanatory variable with a negative coefficient was predicted to decrease the food security of the household, whereas explanatory variables that were discovered to have positive coefficients raised that security. Following is an explanation of the key factors anticipated to have an impact on family food security. Therefore, the major variables expected to have influence on the household food security were explained below:

Table 3.1: Description of variables for rural household food security

Variable and code	Expected Relationship	Description
Age	-	Age of the household head in years (AGEHH)
Sex	+/-	Sex of the household head; 1if male and 0 otherwise
Education	+	Literacy of the household head; 1 if literate (able to read and write) and 0 otherwise

Livestock ownership	+	It is a continuous variable measured by the number of Tropical Livestock Unit (TLU).
Number of oxen owned	+	It refers the number of oxen possessed by the household. It is a continuous variable measured by number.
Number of donkey (camel) owned	+	It is a continuous explanatory variable measured in numbers. Donkey (camel) serves as transportation in many developing countries, thereby significantly affecting household's livelihood activities
Access to irrigation	+	It is a dummy variable taking a value of 1 if the farmers have access to irrigation and 0, otherwise.
Credit access	+	Whether a farmer needed credit and was able to get it; 1 if he/she accessed 0 otherwise
Cash crop production	+	It is a dummy variable that takes a value of 1 if the household has produces cash crops and 0 otherwise.
Membership to agricultural cooperatives	+	It is a dummy variable that takes a value 1 if a household is a membership to agricultural cooperatives and 0, otherwise.
Household size	-	It is a continuous variable which refers to the number of family size in a household in terms of adult equivalent
Dependency ratio	-	Household members aged below 15 and above 64 are considered as dependent and dividing it by household members whose age is between 15-64 resulted in dependency ratio (Velasco, 2003).
Improved seed utilization	+	This is dummy variable 1=utilize improved seed, 0=otherwise
Cultivated Farm Size	+	The total size of the cultivated farm, in hectares
Total annual income excluding off/non-farm income	+	It is a continuous variable which represents the total amount of annual income of household per adult equivalent in ETB from different source.
Off-farm income	+	Whether a farmer engaged in off-farm employment, 1 if a farmer has off-farm employment and 0 otherwise

3.5.2 Definition of explanatory variables used in the model for urban food security

Variables that explain food security in urban areas were different from rural area determinants of food security issues. To conduct probit regression analysis, dependent and independent variables were first set. Based on literature, ten (10) predictor variables were selected to dichotomize the urban household food security. Seven (7) predictor variables namely sex, education, marital status,

saving, Access to credit, saving, remittance and urban agriculture were categorical variables. The rest of three (3) predictor variables namely age, household size and household income were continuous variables. Their description and category of each of the predictor variables were depicted in the following table (Table 3.2).

Table 3.2: Description of independent variables used to predict urban household food security

Variable and code	Type	Description
Age	Continues	Age of the household head in years (AGEHH)
Sex	Categorical	Sex of the household head; 1if male and 0 otherwise
Education	Categorical	Literacy of the household head; 1if literate and 0 otherwise
Credit access	Categorical	Whether a farmer needed credit and was able to get it; 1 if he/she accessed 0 otherwise
Owning saving account	Categorical	It is a dummy variable that takes a value of 1 if the household has owing bank account and 0 otherwise.
Remittance	Categorical	It is a dummy variable that takes a value 1 if a household gained money from remittance and 0, otherwise.
Household size	Continues	It is a continuous variable which refers to the number of family size in a household in terms of adult equivalent
Urban agriculture	Categorical	It is a dummy variable that takes a value of 1 if the household has urban agriculture and 0 otherwise.
Household income	Continues	It is a continuous variable which represents the total amount of annual income of household per adult equivalent in ETB.
Marital status	Categorical	Marital status of the household head; 1if Married and 0 otherwise

3.5.3 Dependent variable

Home Food Security Status (HFINS): In the model, this dichotomous dependent variable has a value of 1 if the household has access to enough food, and 0 otherwise. The number of total calories consumed by the home each day per adult equivalent was compared to the daily minimum requirement of 2,200 calories per adult equivalent to assess the household's level of food security. Food security was defined as receiving 2,200 Kcal/AE/day or above, with all other households being classified as food insecure.

CHAPTER FOUR

RESULTS AND DISCUSSION

In this chapter the results of the study are presented and discussed pertaining to previously determined specific objectives. Findings from an in-depth analysis of food security through use of descriptive and inferential statistics and econometrics model analysis are provided and discussed. The food security status of farming households and the extent of calorie intake are addressed. The results of the econometric (logistic) analysis for the determinants of farming household's food security status is provided. This is presented by first discussing the logistic results of the determinants for the study area. A total of 356 respondents in the Dire Dawa city administration living in rural area that fulfilled the interests of the research for this thesis in relation to the variables were examined. Moreover, a total of 395 sample respondents were selected from urban households to determine the food security status over the selected urban kebeles of Dire Dewa city Administration.

4.1 Rural household food security status of Dire Dawa

According to the results of the Foster, Greer and Thorbecke (FGT) food security index analysis sampled 356 respondents, 127 houses (35.67%) and 229 (64.33%) of the research area's households experienced food security and insecurity, respectively. For families that had access to enough food, the maximum and minimum daily kilocalorie intake for one adult was 3318.93 and 2217.045, while these values were 2198.74 and 1578.61 for householdsthat did not. The mean daily caloric intakes for the sampled families with access to food were 2695.7214 kcals and 1901.4512 kcals, respectively. At a 1% threshold of significance, the difference is significant. The expected standard deviations for homes with access to food were to be 323.1888 and 179.26347, respectively (Annex).

The mean daily calorie intake per day per AE was 2184.8004 kcal which is below the national average of daily requirement of 2200 kcal per day per adult equivalent for active and healthy life.

Table 4.1: Mean differences test of daily calorie intake by food security status for rural sampled households

Daily Energy Available per AE in (Kcal)	Food secure (N=127)	Food insecure (N=229)	Total sample (N=356)	t-value
Maximum	3318.93	2198.74	3318.93	23.13
Minimum	2217.93	1578.61	1578.61	
Mean	2695.72	1901.45	2184.80	
Standard deviation	323.18	179.263	450.43	

Source: survey data, 2022.

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4.2 Descriptive statistics of sample households in terms of food security by demographic variables

4.2.1 Descriptive statistics of categorical variables across food security for rural households

This section of the study presents the existence of any systematic relationships or association between socio-demographic characteristics of the households and the status of household food security in terms of per capita kilocalorie available for the households. The different characteristics of sample households were compared to see if there are significant differences between food secure and food insecure groups.

Sex of household head: Women, girls, boys and men each have a special role in ensuring food security. Thus, the male is directly engaged in livestock production and contributes more labour than female. Labour factor plays a great role in rural areas.

Therefore, in this study, from the total sample households 70.79% were males while 29.21% were females headed households. This result implies that in addition male-headed households are more food secured than female-headed household in Dire Dawa. From the total of female-headed households, 23.07 were food secured and 76.92% were food insecure. However, of male-headed households, 40.87% were food secured and 59.12% were food insecure.

The above result clearly implies that Women and men have different and complementary roles and responsibilities in securing nutritional well-being for all members of the household and the community. Women often play a greater role in ensuring nutrition, food safety and quality, and are

also, often responsible for processing and preparing food for their households. Women tend to spend a considerable part of their cash income on household food requirements. After a crisis, livelihood strategies of women and men may change and you should assess the new division of tasks to ensure food security and nutritional well-being for the household to design effective rehabilitation programs.

Educational status of household head: Education is important to increase the quality of living standard among the households. Higher earnings among more educated individuals mean more resources to buy food, better access to nutritious foods, and more options to cope with price shocks and food shortages. In addition, well-nourished children and adults perform better in schools and labor markets (Babatund et al., 2007). Thus, in this study as far as the educational level of households concerned, among sample respondents, having no formal education rate is found to be quite high. More than 68.53% of the surveyed household heads were illiterate or while 31.46% of them are literate. Therefore, 15.44% of illiterate households were found food secure while 53.08% of them were food secure. On the other hand, from the total literate 20.22% households 11.23% where food secure while was food insecure. Respectively. Thus, the chi square result showed that there is significant association between household's food security status and educational level of households at 1% significance level.

Use of improve Seed: This diversity also provides a kind of high productivity for food crops by ensuring that some plants are more likely to survive threats from insects, plant diseases and climate change than others. In this study, concerning the use of improved seeds, it was found out that very few improved varieties are available in the study area. The survey result revealed 69.95 % of the sample households did not utilize improved seeds whereas 30.05% of the sample households have utilized improved seeds. When compared the two groups, 22.19% and 13.48 % of food secure and insecure households used improved seeds, respectively. The chi square result showed a statistically significant association between household food security and use of improved crop varieties at (X^2 =97.06, $p<0.001$).

Access to irrigation: There are different studies that show a positive impact of small-scale irrigation on food security. A study conducted by Frenken (2012) in Malawi shows that more than 70% of all the adopters were food insecure before adoption of the irrigation but their food security

has significantly improved because of irrigation practice. As an agricultural intensification method, irrigation could play a dominant role in increasing agricultural production and productivity to promote food security of households.

The study result revealed that households those have access to irrigation accounted for 29.5 percent while households have not access to irrigation accounted for 70.5 percent. Thus, the households those who have an access to irrigation were 22.85 percent of total sampled food insecure households. In addition to this; irrigation users accounted for about 63.77 percent of the total food secure households. In contrast, the proportion of those who have not access to irrigation out of total sampled food secure and food insecure households were 63.77 and 10.48 percent, respectively (Table 4-2). There was statistically significant proportion difference between food secure and food insecure households in terms of use of irrigation at 1% probability level.

Access to Credit: access to formal credit, by enabling households to reduce their borrowing from informal sources, has marginally beneficial effects on household annual income. Credit service improves food security status of households through purchase of agricultural inputs like improved seed and chemical fertilizers. In rural areas of Dire Dawa, there is credit service for to promote agricultural production and productivity. However, 68.3 percent of the respondents were not participating in the credit service while 31.7% of the respondents utilize credit. 20.78% of food secure households utilize credit while 10.95% of them were not utilizing credit. On the other hand, from the total food insecure households 17.03% were utilize credit while 82.98 % of them were not utilizing credit. Many farmers are reluctant to use credit for fertilizer, as it is very expensive and may lead to indebtedness. The chi-square result showed here is significant association between household food security and credit utilization at 5% significance level.

Table 4.2: Rural Households food security status with respect to household characteristics and other variables

		Food-Secure (127)		**Food-Insecure (229)**		Total sample **(356)**		
Variables	Categories	Freq	%	Freq	%	Freq	%	X^2 value
Sex of households	Male	103	28.93	149	41.85	252	70.79	
	Female	24	6.74	80	22.47	104	29.21	10.76
Educational level	Literate	72	20.22	40	11.23	112	31.46	
	Illiterate	55	15.44	189	53.08	244	68.53	58.29
Use of improve Seed	Yes	79	22.19	28	7.86	107	30.05	97.06
	No	48	13.48	201	56.46	249	69.95	
Access to credit	Yes	74	20.78	39	10.95	113	31.7	64.11
	No	53	14.88	190	53.37	243	68.3	
Extension visits	Yes	69	19.38	51	14.33	120	33.7	37.57
	No	58	16.29	178	50.0	236	66.3	
Access to irrigation	Yes	81	22.75	24	6.74	105	29.5	111.60
	No	46	12.92	205	57.58	251	70.5	
Cash crop production	Yes	95	26.68	21	5.89	116	32.6	160.20
	No	32	8.99	208	58.42	240	67.4	
Membership to agricultural cooperatives	Yes	68	19.10	63	17.69	131	30.8	23.80
	No	59	16.57	166	46.62	225	63.2	

Source: Survey, 2022

Cash crop production: Some authors posit that cash crops displace food crops and undermine food security by rendering households more dependent on market conditions for food. On the contrary, some studies suggest that cash crops rather enhance the food security of farmers by increasing incomes (Abbasi, etal.2016).

In this study, from the total of the sample households 32.6% were cash crop producer and 67.4% were not cash crop producer. As expected, out of food secure households, 74.80% were cash crop

producer and 25.2% were non-producer of cash crop. About 90.82% of the food insecure households were from non-producer of cash crop and the remaining 9.17% were from cash crop producer (Table 4-2). There was statistically significant proportion difference between food secure and food insecure households in terms of cash crop production at 1% probability level.

Membership to agricultural cooperative: According to Musa (2017) has explained that joining agricultural cooperatives has a positive impact on the wellbeing of smallholder farmers. Furthermore, the analysis also indicates that agricultural cooperative membership has a heterogeneous impact on wellbeing among its members. Thus, this study result revealed that out of the sample households 30.8% were membership to agricultural cooperative and 63.2% were not membership to agricultural cooperative. And about 53.36% of the food secure households were membership to agricultural cooperative and the remaining 46.64% were not membership to agricultural cooperative. From the total of food insecure households 72.49% from not membership to agricultural cooperative households and 27.51% were from membership to agricultural cooperative (Table 4-2). Therefore, there was statistically significant proportion difference between food secure and food insecure households in terms of membership to agricultural cooperative at 1% probability level.

4.2.2 Descriptive statistics of continuous and discrete variables across food security for rural households

This section of the study presents the existence of any systematic relationships or association between socio-demographic characteristics of the households and the status of household food security in terms of per capita kilocalorie available for the households. The important household socio-demographic characteristics considered in this section are age of household head, Household size, Cultivated land size, Livestock ownership, Oxen Ownership, Donkey Ownership, Total annual income, Off/nonfarm income, household size, dependency ratio of the of household head in the study area.

Age of household head: The survey revealed that the age of the respondents ranged from 18 to 86 years with the average age of 48.92years. The mean age of food secure (47.63) was less than the mean age of food insecure (50.21). This implies that, the oldest age was participated in this study area and they are most suffering by food insecurity, because the oldest age or the retired age is not

able work more hours as compared to the adult age. Younger households are usually better than older households.

Livestock ownership: The livestock ownership per household measured in TLU for the sampled households varies from a minimum of 0.00 to a maximum of 17.35. Average livestock ownership of the sampled households was 4.04 with a standard deviation of 2.63. The average livestock ownership was 4.21 with the standard deviation of 2.63 for food secure and 3.16 with the standard deviation of 2.85 for food insecure households, respectively. Therefore, the mean livestock ownership by food secure households was significantly higher than the food insecure and the difference was significant at 5% significance level (Table 4.3).

Oxen ownership: Draught oxen can contribute to food security and improved livelihoods in the smallholder mixed farming systems of rural households; particularly it plays a very important role in the farm economy of the mixed farming system of rural Ethiopia. This is because of the fact that they provide traction power for different farm activities and they also serve as a store as asset. The mean oxen for the sampled respondents were 1.43 with a standard deviation of 1.14. For food secure and food insecure sample households were 0.83 and 1.07 respectively.

Off farm income: Participation in off-farm income generating activities was measured by whether or not any member of household earned from diversified income sources such as selling firewood, working on farms as daily laborers and running petty or small trade. Households who engaged and earned from off-farm activities are more likely to be food secure. Hence, the surveys found out that the proportion of food secure households have higher off farm income than food insecure households. The mean values of annual households‟ off farm income for food secure and food insecure households were 11330.6 and 5865.27ETB respectively. The average annual households‟ off farm income for the surveyed households was 7947.54 ETB with a standard deviation of 15,731.3.

Total annual income: The mean annual income per adult equivalent of the sampled household heads was 19273.07with a standard deviation of 4763.05. The minimum and maximum annual incomes were 7825 and 34156 birrs. The mean annual income of the household heads was 22493.9 (SD=4568.06) and 15769.43 (SD=4568.06) for food secure and food insecure households respectively. The statistical test of the mean annual income of the household heads shows that there

was statistically significant difference between food secure and food insecure households at 1% probability level (Table 4.3). This showed that food secure households had achieved more annual income than food insecure households which may help them to reduce the risks of food insecurity.

Donkey ownership: The average number of donkeys for the sampled households was 0.57 with the standard deviation of 0.64. For food secure households, the average number of donkeys owned was 0.62 with the standard deviation of 0.69. Whereas for food insecure households the average number of donkeys owned was 0.35 with the standard deviation of 0.56. The average numbers of donkey owned appeared greater for food secure households as compared to food insecure households and this difference was statistically significant at 1% significant level (Table 4.3).

Size of cultivated land: The cultivated land per household for the sampled households varies from a minimum of 0.51 ha to a maximum of 4 ha. Average cultivated land of the sampled households was 0.71ha with a standard deviation of 0.39. The average cultivated land was 0.87 ha with the standard deviation of 0.43 for food secure and 0.74 ha with the standard deviation of 0.43 for food insecure households, respectively. Therefore, the mean cultivated land by food secure households was significantly higher than the food insecure and significant at 10% probability level (Table 4. 3).

Dependency ratio (DR): The mean dependency ratio of the sample households was 90.75 with the standard deviation of 0.42. The minimum and the maximum dependency ratios were 0.00 and 1.9, respectively. The mean dependency ratio for food secure sampled households was 0.79 with the standard deviation of 0.38. For food insecure households, the mean dependency ratio was 0.86 with the standard deviation of 0.39. The mean dependency ratio of food insecure households was significantly higher than food secured households and the difference was significant at 10% significance level (Table 4-3).

Table 4.3: Rural households' food security status with respect to continuous and discrete variables

	Food security status						
Variables	**Mean**	**SD**	**Food secured**	**Food insecured**	**Total households**		**t-value**
Age of households	47.63	6.82	50.21	12.21	48.92	14.3	0.47
Household size	4.69	1.46	4.03	1.96	4.33	2.10	-2.75
Cultivated land size	0.87	0.43	0.74	0.43	0.71	0.39	-1.59*
Livestock ownership	4.21	2.63	3.16	2.85	4.04	2.25	-5.01**
Oxen Ownership	1.43	1.14	0.83	1.07	1.23	0.72	-6.28
Donkey Ownership	0.62	0.69	0.35	0.56	0.57	0.64	-5.18***
Total annual income	22493.9	4568.06	15769.43	2227.31	19273.07	4763.05	-19.14*
Off/nonfarm income	11330.6	487.86	5865.27	14761.02	7947.54	15731.3	-2.52
Dependency ratio	0.79	0.38	0.86	0.46	90.75	0.42	-1.33*

Source: Survey, 2022
Note: *, ** and *** show significance levels at 0.1%, 0.05% and 0.01%, respectively

4.3 Determinants of rural household food security status

Table 4.4 shows the marginal effect and significance level of each explanatory variable. Sixteen explanatory variables were included in the binary logit model to identify the determinants of rural households" food security status in the study area. Among the sixteen explanatory variables included in the model, age of household head showed a significant and negative effect on food security. While sex of household head, education of household head, oxen ownership, off farm income, credit utilization, access to irrigation and use of improved seed have a positive and significant effect on food security.

Age of household head: in this study, the model revealed that age of household head has significantly positive relationship with household food security status at 10% probability level. That is, the households with older age tend to be food insecure than younger household heads. The marginal effect of age of household head indicated that holding other factors constant as the age of household head increase by one year, the probability of being food secure decreases by 0.39%. This is because mostly elder households have less capacity to cultivate larger-farm size and become less productive than young ones, which ultimately affects their food security status through restraining production. Also, older household heads naturally could have more dependents to feed, redistribute their holdings to children and grandchildren, and may face physical incapability to work more and engage in multiple activities to support their household and ensure food security. The result is consistence with the findings of Babatunde et al. (2007); Nugusse et al. (2013); Alemseged G. et al. (2018); Seid Sani and Biruk Kemaw(2019).

The predicted Y hat [Y=Pr (HHFS=1)] was 0.123, suggesting that the success probability of being food secure by the sample households was about 12.3%. The result of Hosmer-Lemeshow test (Prob>chi2 = 1.0000) indicated that the null hypothesis test of goodness of fit of the model was accepted. It suggested that the error term follows standard normal cumulative distribution function, thus the probit model was fitted for the data.

Educational status of household head: The model revealed that education of household head was significant at 10% significance level and positively related with food security status of the households in the study area. The marginal effect 0.18 implies that, holding other regresses‟ constant, a change in household head education level by one unit, say one grade, will increase a probability of being more food secure by a factor of 0.12(`18%). The possible justification for this finding was that literate farming household heads are more willing to implement agricultural extension advice, to accept and use modern agricultural technologies, and to diversify their source of income than the illiterate ones.

Table 4.4: Logistic regression result for rural households

Variables	Marginal Effect	Standard Error	Z–Value	p>z
Age of households	-0.0039789	-0.0019	-1.78	-0.056
Household size	-0.0006532	0.0203	-0.22	0.863
Cultivated land size	0.0547146	0.0799	-0.65	0.497
Livestock ownership	0.0394696	0.02563	1.49	0.131
Oxen Ownership	0.1463218***	0.04071	3.76	0.000
Donkey Ownership	0.2113021	0.11562	2.033	0.003
Total annual income	0.00004345	0.06962	0.15	0.889
Off/nonfarm income	0.057292	0.0000	2.32	0.025
Dependency ratio	0.00006687	0.12888	-0.64	0.520
Sex of households	0.2241333*	0.13517	1.77	0.066
Educational level	0.186452*	0.05392	1.84	0.056
Use of improve Seed	0.1192692*	0.06454	1.65	0.077
Access to credit	0.1493801	0.06545	2.28	0.018
Access to irrigation	0.260222**	0.463	1.149	0.503
Cash crop production	0.5273321***	0.479	2.53	0.234
Membership to agricultural cooperatives	0.9491730	0.417	0.292	0.384
Constant	-68.14	21.53		
Log likelihood				39.43
Number of observations				356
LR chi2 (17)				405.67
Prob > chi2				0.000
Pseudo R2				0.85
Sensitivity1				0.82
Specificity2				0.69

Source: Survey, 2022.

Note: *, ** and *** show significance levels at 10%, 5% and 1%, respectively.

1. Correctly predicted food secure group based on 0.5 cut value
2. Correctly predicted food insecure group based on 0.5 cut value

Furthermore, household head education largely contributed on working efficiency, competency, diversify income and becoming visionary in creating conducive environment to educate dependents with long term target to ensure better living condition than illiterate ones. Consequently, literate households reduce the probability of becoming food insecure in the sample households. This is due to educated household head plays a significant role in shaping household members to participate in to different income generating activities. Thus, his finding is in line with prior research findings of Amsalu et al. (2012); Gezemu (2012); Amsalu and Wendimu (2014) and Belete Debebe (2017); Tsegamariam Dula and Wakjira Berhanu (2019).

In the rural context, education influences food security through access to information on best agricultural production, nutrition and sanitation; increased efficiency, hence increased production and better decision making as well as the pride that comes with education (De Muro and Burchi 2007).

Off farm income: This represents the amount of off-farm income the farmer or any of the household members earned in the year. Since smallholder farmers have inadequate farm income, they often look for external source of income to purchase food and farm inputs. In this regard, households engaged in off-farm activities are better endowed with additional income to purchase food. The success of households and their members in managing food insecurity is largely determined by their ability to get access to off-farm job opportunities in the study area. As expected, the contribution of off farm income is positive and significant at 5% probability level associated with households‟ food security. The marginal effect showed that the probability of the households to be food secure increases by factor of 5.72(57.2%) as the household earned more off-farm income per AE. This is consistent with the findings of Zelalem Fikire (2014) and Zegeye Paulos (2017), the more the off-farm income households earning the lower food insecurity level and are more likely to become better off.

Moreover, while the poverty implications of off-farm income have been analyzed in different developing countries, much less is known about the impact of off-farm income on household food security and nutrition. Here, this research gap is addressed by using farm survey data from Nigeria. Econometric analyses are employed to examine the mechanisms through which off-farm income

affects household calorie and micronutrient supply, dietary quality, and child anthropometry (Raphael, 2009).

Oxen ownership: This variable as hypothesized affects the household's food security in such a way those households who owned oxen have better chance to escape serious food insecurity than those who don't own. Thus, maintaining oxen was found an important livelihood activity for the majority of the sample households. As expected, the relationship between oxen holding and household food security status was positive and statistically highly significant at 1% probability level and highly significant from all independent variables. This result implies that relative to households that have not oxen, the level of being food secure will be high for those who have oxen. Having oxen will easily facilitate the well preparation and ploughing of the land which increases production and productivity per cultivated plot of land.

In addition to the above expression, oxen enabled the farm households to have better chance to earn more income from selling which enables them by increasing purchasing power of stable food during food shortage and could invest in purchasing of farm inputs that increase food production, and able in ensuring household food security. The interpretation of the marginal effect implies that, other factors are held constant, the probability of being food secure increases by a factor of 0.146(14.6%) as the farmer's oxen holding increase by one extra ox. The result is the same with the findings of Mulugeta Tefera (2002); Abebaw Shimels (2003); Ayalew Yimer (2003); Mohammed Abdulahi (2016).

Access to credit: As expected, it was found to have positive and significant effect on households" food security at 5% significance level. The positive relationship indicates that households who have access to credit have a higher probability of being food secure. This implies that those households who had access to credit service have more chance of being food secure than without access ones. The marginal effect 0.16 implies that, at citrus paribus the probability of being food secure increased by 0.149(14.9%) as the household has access to utilize credit services. This is due to the fact that access to credit gives the household an opportunity to be involved in income generating activities so that derived revenue increases financial capacity and purchasing power of the household to escape from risk of food insecurity.

In addition, households with the opportunity to get credit would build their farm production capacity through the purchase of agricultural inputs. This result is in conformity with the findings of Ayantoye et al. (2011); Gezemu (2012); Abimbola O. and Kayode A. (2013); Amsalu and Wendimu (2014); Hiwot Yirgu (2014); Zelalem Fikire (2014); Seid Sani and Biruk Kemaw (2019).

To sum up the above-mentioned results, Credit encourages the farmers to grow more as they reap the benefits of high production in form of high margin of profit which becomes possible because of use of quality inputs (Naqvi et al., 2016). Results of credit can be expanded if condition of collateral may be removed as some farmers hesitate to obtain credit from institutions or banks because of collateral condition (Chandio et al., 2017). It will not only increase the food production but will also enhance the food security (Iftikhar & Mahmood, 2017). Literature concludes that credit is one of the major hurdles faced by the poor farmers. Food production is low which is further causing food security in the country. The definition of food security emphasizes on the availability and affordability of the food which is possible if credit constraints are removed. Hence, it is concluded that ample quantity of food will be available, if production will increase. It will further lead to low prices and increase the purchasing power of the people. Thus, issues of hunger and poverty both can be resolved.

Improved Seed: This variable is found to have positive influence on the food security status at 10% significance level. The positive sign implies that the likelihood of food security increases as the households" use of improved seed increases. This means that those farmers who have access to improved seed are more likely to be food secure than those who have no access to improved seed. The result indicated that, other factors kept constant, on average improved seed users are more likely to be food secure by a factor of 0.119(11.9%) as compared to their counterpart. The likely explanation is that households who used improved seeds have a chance of getting high production which in turn would enable them to become food secure. This finding is also in consonance with the findings of Asfaw and Shiferaw (2010); Belete Debebe (2017). The results of their studies revealed that application to improved seeds augmented agricultural productivity by boosting overall production and this in turn decreases the likelihood of household to become food insecure.

Moreover, Seed is a key input for improving crop production and productivity. When there are different seed sources available and farmers get access to them there is high probability of adoption

of improved varieties. An enhanced seed availability though formal or informal or both sources will improve smallholder farmer's access to seed and enhance improved variety adoption. In practice, whenever a farmer is talking about getting a new seed it implies that she or he is deciding to adopt a new variety. Increasing the quality of seeds can increase the yield potential of the crop by significant folds and thus, is one of the most economical and efficient inputs to agricultural development (FAO, 2006).

Access to irrigation: At a 5% likelihood level, having access to irrigation had a significant positive benefit on household food security. This suggests that having access to irrigation boosts a household's likelihood of being food secure. The marginal effect results indicate that, in comparison to homes without access to irrigation, there was a 26% greater likelihood for households with access to irrigation to achieve food security. One of the technology alternatives accessible is irrigation, which enables smallholder farmers to directly produce consumable food grains and/or vary their cropping, make up for the lack of moisture in agriculture, and thus boost productivity and food consumption (Table 4-4). This discovery agrees with the findings of (Sani et al., 2019).This review analyzes the existing evidence concerning the role of irrigation in improving nutrition and health outcomes. Most of the studies examined showed a positive effect of irrigation interventions on food security.

Cash crop production: At a 1% likelihood level, it had a considerable impact and a favorable link with household food security. This suggests that as cash crop output improves, so does the likelihood that households will have access to food. As a result, households that grow cash crops are in a better position than households that do not. The marginal effect results indicate that the likelihood of a household producing cash crops becoming food secure was 52% higher than it was for those who did not. According to the study's findings, farming households' access to food depends on the output of cash crops (Table 4-4). This discovery is consistent with those made by Fekede et al. (2016) and Nasir (2018). Some authors posit that cash crops displace food crops and undermine food security by rendering households more dependent on market conditions for food. On the contrary, some studies suggest that cash crops rather enhance the food security of farmers by increasing incomes.

4.4 Urban household food security status in Dire Dawa

Table 4.5 presents the food security status of urban households using the recommended daily calorie intake of 2,200kcal. The result shows that 65.6% of the sampled urban households were food secure while 34.4% were found to be food secure.

Table 4.5: Food security status of urban household

Food security status	Frequency	Percent
Food secure	259	65.6%
Food insecure	136	34.4%

Source: Own survey, 2021

4.4.1 Testing urban household, the association between predictor variables and the response variable

The Chi-square test statistics in this section emphasize the elements that affect the food security of urban households. Muzah (2015) and Gebre (2012) contend that a household's access to institutional, material, and human resources determines its capacity to attain food security in an urban setting. According to the chi-square results, there may or may not be a relationship between household food security and various socio-economic factors.

The findings in Table 4-6 demonstrate a significant association between a household head's marital status and the claimed food security of the household ($p<0.29$). If they pool their resources with their wives, married household leaders may feel safe in their ability to eat. According to Berger et al. (2007), marriage and committed relationships offer people social support and other non-financial resources that help them cope with stressful or unpredictable economic times.

According to the chi-square analysis in Table 4.6, there is a statistically significant correlation ($p<0.06$) between household food security and educational attainment. This shows that household heads with various degrees of formal education are probably more likely to feel safe in their access to food than household heads without formal education. The level of education of the household head affects the household's access to and use of knowledge as well as its capacity to improve food security, according to Mango et al. (2014). Ike et al. (2017) agreed that it is expected that households with heads who have completed more years of education will be more likely to have access to food than those with heads who have completed little to no education.

Results of a one-way ANOVA (Analysis of Variance) test for household food security and its determinants are shown in Table 4-6. The findings show a statistically significant relationship between age and household food security ($p<0.06$). According to the mean age disparities, the likelihood that a home will have enough food increases as the age of the head of the household rises.

A strong correlation between household size and food security is also shown in Table 4-6 ($p <0.05$). The difference in the mean household size demonstrates that there are more obligations with larger households, particularly when many members of the home are dependent on the household head for their income. This is consistent with the findings of Tawodzera (2011) and Sishah et al. (2020), which show that households who have access to food have small sizes and low dependency ratios. According to Bradly et al. (2017), there is often a strong correlation between big family sizes and a much higher likelihood of poverty. The Anova test reveals a significant correlation between total land area and household food security ($p<0.09$). The study's average land size difference demonstrates that households with greater land for urban agriculture were able to provide for their needs. Food secure households, according to Tawodzera (2011), have smaller families, lower dependency ratios, larger percentages of irrigated land, and greater overall land and livestock holdings than food insecure households.

According to Muraoka et al. (2014), a 10% increase in operational land size results in an increase in per capita total consumption and home-produced food consumption of 0.8 and 2%, respectively. The findings show a statistically significant relationship between household food security and total household assets ($p<0.04$). Potential cash from selling household possessions can be used to support urban livelihoods. The mean household asset value difference demonstrates that a household's potential income increases with the value of its assets. Physical assets can be sold to finance consumption, but they can also be used as tangible security for a loan or credit, as noted by Oluwasola et al. (2008). According to Maponya (2008), households can also sell some of their possessions to make up for consumption gaps.

According to the chi-square analysis in Table 4.6, there is a statistically significant link between international remittances and urban households' access to food ($p<0.07$). This suggests that household heads who have received money in the form of a remittance from a relative are probably

to feel more comfortable about their access to food than those who do not. According to Mango et al. (2014), the amount of money received through remittances affects how the household may access and use money to improve its food security. According to Munyegera et al. (2016), it is projected that households with heads who receive more money via remittance are more likely to have access to food than their counterparts who do not.

Table 4.6: Urban household Chi-square test statics between predictor variables and response variable

Parameter	B	Std. Error	Exp(B)	Chi-Square	Sig.
Education	-1.292	0.6952	0.275	3.454	0.063
Sex	0.200	0.3475	1.221	0.331	0.565
Saving	2.282	0.7227	9.797	9.970	0.02
Access to credit	2.350	0.3880	10.487	36.695	0.09
Marital status	-0.400	0.3806	0.671	1.103	0.294
Remittance	2.278	0.4118	9.758	30.611	0.07
Urban Agriculture	-2.144	0.4131	0.117	26.945	0.08
Age	0.361	0.0644	1.435	31.401	0.06
Household size	1.082	0.1708	2.949	40.099	0.05
Household income	0.041	0.0001	1.000	11.994	0.01

According to the findings in Table 4.6, there is a strong correlation between a household head's use of urban agriculture and the claimed level of food security in the home ($p<0.29$). If household heads use urban agriculture to increase their income and other services, they might feel secure in their access to food. According to Abu et al. (2016), there is a substantial association between urban agriculture and the food security of household heads. Household heads who have a small agricultural farm in their garden have better food security than those who do not.

Access to formal credit, which enables households to cut back on borrowing from unofficial sources, has moderately positive effects on household yearly income, as shown in Table 4.6. For small business launch in metropolitan regions, credit service increases household food security status. Thus, a significant correlation between urban household food security and access to credit services was found ($p<09$). To that end, household heads who have access to credit are more likely to have food secured than those who do not.

According to Table 4.6's findings, there is a strong correlation between a household head's saving habits and the claimed level of food security in the home ($p<0.02$). Household heads who have saved money in a bank account are more likely to have food secured than those who haven't. The tendency of saving money in bank accounts, according to Davies (2016), has been shown to assist people cope with stressful or uncertain economic times. As a result, there is a strong correlation between bank account savings and the level of food security in the research area.

4.4.2 Determinants of urban household food security

In urban and peri-urban settings, the ordered probit model was used to identify household factors that predict household food security. The ordered probit model's results are shown in Table 4.7. The LR statistic's p-value of less than 1% reveals that all computed coefficients are collectively statistically significant. For cross-sectional data, the pseudo R2 value is around 22%, which is moderate. According to the model, household heads' educational backgrounds influence their ability to access food ($p<0.09$). According to Table 4.7, households with formal education (primary, secondary, and tertiary) have a 9.4% likelihood of continuing to have access to food. If a year is added to the total number of years spent out of school, households without any formal education are 11.5 percent more likely to fall into the food insecure category. The suggestion may be that a person has a greater probability of finding a formal job that pays well the more schooling they have. As a result, there will be more money available to buy food for the family.

Faridi and Wadood (2010) found a strong correlation between education and food security issues, based on the idea that household heads with greater human capital are likely to experience less food insecurity. As the household's level of education rises, there is a general tendency toward lessening food insecurity. Other studies have demonstrated the beneficial impact of higher education on reducing the likelihood of household food insecurity. According to Seligman et al. (2010), he

looked at both the human capital approach and the capacity approach to better understand the mechanisms by which people with higher levels of education are more likely to suffer lower levels of food insecurity. Education is a significant factor in determining a household's ability to feed themselves, as educated households are more likely to employ technology in order to increase the production of their farming operations. This significantly impacted the food security of households (Muche et al., 2014).

Table 4.7: Ordered probit results of determinants of urban household food security for urban sampled households

	Coefficient			**Marginal effect**	
Parameter	Std. Error	Z-value	P-value	Food secure	Food insecure
Educational level of respondents	0.181	0.004	0.09	0.094	0.115
Marital status of the respondents	0.172	0.005	0.06	-0.015	0.088
Access to credit	0.159	0.004	0.07	0.014	0.021
Saving	0.18	0.007	0.04	-0.097	0.213
Remittance and aid income	0.163	0.006	0.05	0.991	0.089
Urban Agriculture	0.171	0.005	0. 6	0.031	0.025
Age of respondents	0.011	3.826	0.8	0.041	0.064
Sex of respondents	0.911	4.826	0.342	-0.541	0.031
Household size	0.052	0.112	0.911	0.006	0.072
Household income	0.002	-5.251	0.07	-0.621	0.051
Intercept	0.417	0.002	0.99	0.001	0.001
Log likelihood = 68.98 Number of observations= 395 Prob > chi2 = 0.711 Pseudo R2 = 0.67					

The model demonstrates that urban agriculture has a favorable impact on the food security of households ($p<0.6$). There is a 3.1 percent likelihood that the home will continue to be food secure and a 2.5 percent risk that it will become food insecure if the head of the household continues to engage in urban agriculture production. According to Maharjan, K. L., and Khatri-Chhetri (2006), a household's food insecurity will be lower the higher the head of the household's occupational position. According to Titus, B., and Adetokunbo, G. (2007), the high income associated with professional employment means that the incidence of food insecurity for this group is quite low.

According to the model, the head of the household's marital status is a highly significant factor of the security of the household's food supply ($p<0.06$). The model for the marital status variable used a 1 for married and a 0 for single. There was a 1.5% likelihood that married heads of households would keep their families fed. If the head of the home becomes single, there is an 8.8% risk that the entire household would experience acute food insecurity.

The model's output demonstrates that the household head's gender is a statistically significant driver of food security ($p<0.03$). According to the findings, male-headed households had a 5.4% likelihood of continuing to be food secure. A female becoming the new head of the household increases the likelihood of the family becoming food insecure by 3.1%. The results of this study suggest that male-headed households had superior access to work, productive resources, and an asset base such credit facilities and access to property than their female counterparts, mostly due to family headship and gender division of labor. The male leader of the household, according to Peters et al. (2007), is the most important key because he typically assumes responsibility for caring for the family and makes use of all available resources, including the current human capital, to survive. The findings are in line with those of Modirwa (2012), who emphasized that since men earn more than women in the same occupation, a household without a man's income simply has a far higher likelihood of being impoverished. Sociocultural barriers may make it difficult for women to enter the workforce. Jost et al., (2016) spine that lack of access to resources, such as land, inputs and support services, limit the capacity of women to contribute significantly to their families' food basket, compared to males. In this regard, male-headed households are expected to be more food secure than female-headed households.

The result shows that the age of household head had a positive relationship with the food security status of household and significant at 5%. This indicates that the older the household head, the higher the probability that the household would be food secure. A unit increase in the age of the household head will increase the probability of the household to be food secured by 4.1%. This could be attributed to the fact that the productivity of old household heads will increase, as they get older and older. Since as age of the household head increase will increase the experience of households in agricultural production. Therefore, older people are more likely to have more farming experience and more output resulting in their families have a better probability of being food secure. This result is consistent with the findings of Sekhampu (2013). Converse to these results older households may face the challenge of declining productivity and efficiency hence result in less probability to be food security (Echebiri et al., 2017; Faustine, 2016; Sani & Kemaw, 2019).

4.5 Comparing food security status among rural and urban households

Table 4.8 compares the level of food security in urban and rural households using the 2,200-kcal daily calorie intake that is advised for each type of dwelling. The findings indicate that whereas 64.3 percent of the studied rural families experienced food insecurity, 35.6% of them were food secured. This represents the biggest percentage of rural residents who do not have enough access to food. Urban residents made up 65.6 percent of the households with food security, which is the highest percentage. On the other hand, a sizable proportion of households also fall under the category of food insecurity. According to the study's findings, 136 (34.4 percent) of all examined households experienced acute food insecurity. According to the findings in Table 4-8, urban households had better food security than rural households. This conclusion is supported by the fact that almost 259 urban households were food secure. This is the highest percentage of rural households with food security out of the 356 sampled rural households; 127 rural households have food secure. This is the reason why there were more job opportunities in urban regions than in rural ones. A person who holds a particular work title may be able to obtain food, which explains why the majority of sample households in metropolitan regions are more likely to have access to food. The results of this study disagreed with those of Mora-Rivera et al. (2021), who asserted that rural populations are suffering greatly from unemployment. Due to this, the rural community was compelled to move into the towns and cities nearby, and as a result, the urban population is steadily growing. The primary cause of a rural household's migration to an urban area for daily food

consumption was a lack of food security. Furthermore, Atimen (2021) articulated that the prevalence of food insecure households was very high in rural areas than the urban area.

Table 4.8: Rural and Urban household food security status comparison in the study area

	Food secure		**Food insecure**	
Residence area	Frequency	Percent	Frequency	Percent
Rural	127	35.6%	229	64.3%
Urban	259	65.6%	136	34.4%

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This study was conducted in rural and urban Kebeles of Dire Dawa city administration in 2022 and 2023.The main purpose of this study was to compare rural and urban households' food security status anddetermine factors that influence household food security level and identify the coping mechanisms adopted by households in Dire Dawa. To achieve these objectives, the study has collected mainly primary data from 356 randomly selected rural households and 395 urban households from four randomly selected kebeles of the study area. Thus, the study has employedquantitative research method.

The data were collected on household demographic, economic, physical and institutional factors hypothesized to affect food security status of the households and were analyzed using descriptive statistics, FGT indexes and econometric method. The descriptive statistics were used to study the demographic, economic, physical and institutional factors in relation to food security status of the households.

Accordingly, the households of the study area were classified into food secure and food insecure groups based on kilocalories (kcal) consumed by the households during the previous seven days of survey data. Total amount of food commodity consumed by each household during the seven days was converted into equivalent daily (kcal) per adult equivalent (AE) and then compared with daily kcal recommended. Accordingly, 64.33% of sample households were living on total daily food energy level per adult equivalent of less than 2200 kcal (the minimum recommended requirement), while remaining 35.67% of sampled households were living on total daily food energy level per adult equivalent of greater than 2200 kcal (the minimum recommended requirement) in the study area (FSS 2002).

The chi-square test of association indicated that households' educational level, sex, access to irrigation, credit utilization, income, oxen ownership, cash crop production and use of improved seed had statistically significant association with rural households‟ food security status. This implies that households who were literate, male headed, have access to credit, access to

irrigation, and credit utilizer, produce cash crops and households who have used improved seed are more likely to be food secure households.

Likewise, the t-test result also indicated that household head working labour force, livestock ownership, oxen ownership, annual households‟ off-farm income in AE and donkey ownerships had statistically significant mean difference between the rural households' food security status.

Therefore, in this study, Binary probit model was used to analyze the determinants of households‟ food security status. The model result revealed that out of sixteen (16) variables included in the model ten (10) had significant effect on household food security status. Sex of household head, educational level of household head, donkey holding, household size, income, off/non-farm activities, access to irrigation, access to credit and producing cash crops are found to be positively and significantly determined household's food security status and age of households was negatively related with food security status of the households in the study area.

The comparative analysis indicate that 64.3 percent of the studied rural families experienced food insecurity, whereas 35.6% of them were food secured. This represents the biggest percentage of rural residents who do not have enough access to food. Urban residents made up 65.6 percent of the households with food security, which is the highest percentage. On the other hand, a sizable proportion of households also fall under the category of food insecurity. According to the study's findings, 136 (34.4 percent) of all examined households experienced acute food insecurity. This conclusion is supported by the fact that almost 259 urban households were food secure. This is the highest percentage of rural households with food security out of the 356 sampled rural households; 127 rural households have food secure. This is the reason why there were more job opportunities in urban regions than in rural ones. A person who holds a particular work title may be able to obtain food, which explains why the majority of sample households in metropolitan regions are more likely to have access to food.

5.2 Recommendations

Based on the findings of the study, the researcher forwarded possible recommendations that would improve the food security status of rural and urban households.

1. Food security is high in rural areas compared to Urban areas. In both areas food insecurity is pervasive. So, the policy makers should work in concerted efforts to reduce food insecurity.

2. The determinants of food security in rural areas are sex of household head, educational level of household head, donkey holding, household size, income,off/non-farm activities, access to irrigation, access to credit and producing cash crops are found to be positively and significantly determined household's food security status and age of households was negatively related with food security status of the households in the study area. and while in urban areas are educational level, saving, household income, access to credit, remittance, age, sex and household size. Therefore, improving these determinants might improve the food security situation.

3. Sectors which are working on food security areas should expand financial institutions; provide loan (credit), and creating awareness about the purpose of taking credit and how to optimally utilize it based on the capacity (ability to pay of the farmers with low interest rate).

4. The study therefore, focused on two dimensions of food security namely, food availability and access in analyzing the determinants of food security status in the study. Other food security dimensions such as food utilization as well as nutritional safety were not considered. However, nutritional benefit is an important aspect of food security. Further research is required to re-assess this area to improve human development in the country.

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Questionaries

ADDIS ABABA UNIVERSITY COLLEGE OF DEVELOPMENT STUDIES
CENTER FOR FOOD SECURITY STUDIES

Dear Respondents,

I am graduating class of MSC student at Addis Ababa University. This questionnaire is prepared for research purpose entitled '***Comparative analysis of household's food security status in Dire Dawa***: **Rural-Urban Dichotomy'** your participation in this study will be valuable and greatly appreciated. Information gathered will be treated with utmost confidentiality and will not be used for any other purpose.

INSTRUCTIONS:

The questionnaires contain statements about '***Comparative analysis of household's food security status in Dire Dawa***: **Rural-Urban Dichotomy**' Give your own opinion and feeling about each item. Please circle your response to each statement according to the following five-point scale in terms of your own agreement and disagreement of the statement.

5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree

Example: If you strongly agree with any of the statements given in the questionnaire, you should circle on 5 and if you strongly disagree with any statements, please circle on 1. For the statement, where you cannot make a decision, circle on 3 and rate others categories accordingly.

Part 1. Demographic Information

1. **Age:** 20-30 ☐ 30-40 ☐ 40-50 ☐ above 50 ☐
2. **Sex:** Male ☐ Female ☐
3. Current size of household.....
4. Educational level of the farmer:
   - ☐ Less than elementary level (*Illiterate*)
   - ☐ Elementary to less than high school
   - ☐ High school
   - ☐ Two years college
   - ☐ University or above
5. Marital status of household
   - ☐ Married
   - ☐ Single
   - ☐ Widowed
   - ☐ Divorced
6. Means of Agricultural land ownership and size.
   - ☐ Allocated
   - ☐ Inherited
   - ☐ Borrowed
   - ☐ Rental
   - ☐ Bought

Part II. Extent of Household Food Insecurity

7. Answer the following question in the table by putting 1 or 0

   1 = yes

   0 = No

S. N	Questions	No	Yes

1	You or others in your household worried about not having enough food to eat because of a lack of money or other resources?		
2	Still thinking about the last 12 MONTHS, was there a time when you or others in your household were unable to eat healthy and nutritious food because of a lack of money or other resources?		
3	Was there a time when you or others in your household ate only a few kinds of foods because of a lack of money or other resources?		
4	Was there a time when you or others in your household had to skip a meal because there was not enough money or other resources to get food?		
5	Still thinking about the last 12 MONTHS, was there a time when you or others in your household ate less than you thought you should because of a lack of money or other resources?		
6	Was there a time when your household ran out of food because of a lack of money or other resources?		
7	Was there a time when you or others in your household were hungry but did not eat because there was not enough money or other resources for food?		
8	Was there a time when you or others in your household went without eating for a whole day because of a lack of money or other resources?		
9	In the past 12 months, did you or any household member go a whole day and night without eating anything because there was not enough food?		

Part III. Determinants of rural household food security

Variables	**Yes=0**	**No=1**
Age of households		
Household size		
Cultivated land size		
Livestock ownership		
Oxen Ownership		
Donkey Ownership		
Total annual income		
Off/nonfarm income		
Dependency ratio		
Sex of households		
Educational level		
Use of improve Seed		
Access to credit		
Extension visits		
Access to irrigation		
Cash crop production		

Part IV. Determinants of urban household food security

Parameter	**0=yes**	**1=no**
Educational level of respondents		
Marital status of the respondents		
Access to credit		
Saving		
Remittance and aid income		

Urban Agriculture		
Age of respondents		
Sex of respondents		
Household size		
House hold income		

Appendix

Module 1: Household identifier, characteristics and sociodemographic status

Household identifier and characteristics			
101	Unique Household Code	EA Code and Household Code	☐☐☐☐
102	Residence	1 = Urban 2 = Rural	☐
103	Do you own this house?	1 = Yes 0 = No	☐
104	What is the main material of the walls? Observe	1 = No walls 2 = Natural materials (cane, wood, mud, straw) 3 = Stone with mud 4 = Stone/bricks with cement 99 = Other	☐
105	What is the main floor material? Observe	1 = Natural floor (earth/sand/dung) 2 = Rudimentary floor (wood/palm/bamboo) 3=Finished floor (polished wood/ vinyl/	☐

		tiles/cement/carpet) 99 = Other	
106	What is the main material of the roof? Observe	1 = Thatch/grass or leaves 2 = Iron sheets or tiles 99 = Other	
107	What type of fuel does your household mostly use for cooking? Do not read list	1 = Dung 2 = Firewood/straw 3 = Charcoal 4 = Kerosene 5 = Gas (methane/biogas) 6 = Electricity 99 = Other	
108	Is the house connected to electricity?	1 = Yes 0 = No	
109	In total, how many of the following items are owned by residents of this household? Add the household total for each item	Kerosene lamp/pressure lamp Mobile phone Cart Bicycle /Motorcycle Radio/ Television bajaje tractor	
110	Does this household own any livestock, herds, other farm animals, or poultry?	1= Yes 0 = No (Go to112)	
111	In total, how many of the following animals are owned by residents of this	Milk cows, oxen or bulls? Other cattle?	

	household? Add the household total for each item	Horses, donkeys, or mules?	
		Camels	
		Goats?	
		Sheep?	
		Chickens or other poultry?	
		Beehives?	
112	Does any member of this household own any agricultural land?	1 = Yes 0 = No	
113	Hoe many hectares of agricultural land do you own?		
114	How often does anyone smoke inside your house? Would you say daily, weekly, monthly, less often than once a month, or never?	1 = Daily 2 = Weekly 3 = Monthly 4 = Less once monthly 5 = Never	
Household head sociodemographic status			
115	Age in years		
116	Marital status	1. Single 2. Married 3. Divorced 4. Separated 5. Widowed	
117	What is the highest level of school the head of the	1. None 2. Primary	

	household completed?	3. Secondary 4.Technical/vocational certificate 5. Higher / university/ college 98.Don ‘t knows 99. Other (specify)_____	
118	What is the religion of the head of the HH?	1. Orthodox 2. Protestant 3. Catholic/ other Christian 4. Muslim 5. No religion 98.Don ‘t knows 99. Other religion (specify)_____	

Now I would like to ask you some questions about food. During the last 12 MONTHS, was there a time when:

SN	Questions	Answers	
301	You or others in your household worried about not having enough food to eat because of a lack of money or other resources?	1=Yes 0= No 98=Don’t know 97 =Refused	
302	Still thinking about the last 12 MONTHS, was there a time when you or others in your household were unable to eathealthy and nutritious food because of a lack of money or other resources?	1=Yes 0= No 98=Don’t know 97 =Refused	

303	Was there a time when you or others in your household ate only a few kinds of foods because of a lack of money or other resources?	1=Yes 0= No 98=Don't know 97 =Refused	☐☐
304	Was there a time when you or others in your household had to skip a meal because there was not enough money or other resources to get food?	1=Yes 0= No 98=Don't know 97 =Refused	☐☐
305	Still thinking about the last 12 MONTHS, was there a time when you or others in your household ate less than you thought you should because of a lack of money or other resources?	1=Yes 0= No 98=Don't know 97 =Refused	☐☐
306	Was there a time when your household ran out of food because of a lack of money or other resources?	1=Yes 0= No 98=Don't know 97 =Refused	☐☐
307	Was there a time when you or others in your household were hungry but did not eat because there was not enough money or other resources for food?	1=Yes 0= No 98=Don't know 97 =Refused	☐☐

308	Was there a time when you or others in your household went without eating for a whole day because of a lack of money or other resources?	1=Yes 0= No 98=Don't know 97 =Refused	☐ ☐

Module 2 Dietary assessment

My name is . I came from Addis Ababa University. The institution is working to improve food security of the community by providing solutions for different problems based on tangible researches. At this time, we came here to conduct research on comparative analysis of household's food security status in Dire Dawa: rural urban dichotomy. It enables to provides understanding for the community to protect the spreading of food insecurity. Your household is chosen for the study participant. I would like to express my good feeling for that. We are going to conduct 24 hr. dietary recall assessment. We will give you important materials like soap for your cooperation. So, are you volunteer to continue with us?

Please give your permission.

1. yes
2. No

If you don't want to participate, please give your reason_____

_____

Data collector: Name_____, Signature_____, Date_____.

Form for Recording the Interactive 24-hour Recall, with a Sample Recall

Subject category: ☐ 1. Household members			
1. Participant's code: ☐☐☐☐	2. Date of interview ☐☐ ☐☐ ☐☐ Day Month Year	3. Location ☐☐☐☐	4.Field worker code: ☐☐
5. Subject's name: _____ First name _____ Middle name _____ Last name			
6. Birth day ☐☐ ☐☐ ☐☐ Day Month Year		7. Income ___	
8. Religion ___	9. Educational status _	10. Where did you born? ___	
11. Age in year ☐☐	12. Sex (1= M, 2 = F) ☐	13. Is the water source the same over dwelled years in the area? _	
14. Marital Status ___	15. How many years the subject live in the study area?__	**NOTE:** if the study participants are on health defects, do not apply the survey ☐	
16. Yesterday, was it a holiday in the community? (0 = No, 1 = Yes) ☐		17. Yesterday, was there a celebration in the family (0 = No, 1 = Yes)	
18. Is there any heath defects yesterday? ☐ (0 = No, 1 = Yes)		19. Last two week, was the participant sick? ☐ (0 = No, 1 = yes)	

Second Stage

Interviewer: Scale no.: Day food eaten:			Location: Subject ID: Subject name:				Sex: Age:	
Time	Place eaten	Food or drink	Description and cooking method	Raw (1) Cooked. (2)	Amount served (g)	Amount left (g)	Amount eaten (g)	Food code

Probe for alcohol: Yes ☐ No ☐				Probe for sickness Yes ☐ No ☐ If yes, did sickness affect appetite? If yes, how? Increase ☐ Decrease ☐			
Was food intake unusual? Yes ☐ No ☐ If yes, how was it unusual?				Probe for tablets Yes ☐ No ☐ Iron ☐ Vitamins ☐ Other supplements ☐ Anti-malaria ☐			
Was it a feast day? Yes ☐ No ☐ Was it a market day? Yes ☐ No ☐ Was it a fasting day? Yes ☐ No ☐				Name of supplement (Record this from the label, if available)			

Calculation

Based on the 15 food groups, Cereals and their products, Starchy Roots & tubers, Pulses and their products, Vegetables and their products, Fruits, Meat poultry and their products, Eggs and their products, Fish, shellfish and their products, Milk and milk products, Fats and oils, Nuts and seeds, Sugar and sweetened products. Beverages, Spices and condiments, Miscellaneous. Information collected from the 24-hr recall was converted into quantitative data of nutrients using Ethiopian Food Composition Tables (volume III and volume IV) and Software. The recommended nutrient intakes (RNI) were used to assess the nutritional adequacy of the diets consumed. Data from the food frequency questionnaire were used to describe the food consumption patterns of the household.

A household mean daily calorie intake per day per AE should be 2200 kcal and above considered as a food secured household which is above the national average of daily requirement of 2200 kcal per day per adult equivalent for active and healthy life if not considered to be a food secured household.