ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR FOOD SECURITY STUDIES

HOUSEHOLD FOOD SECURITY, DIETRY DIVERSITY AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN IN ADDIS KETEAM SUB-CITY, ADDIS ABABA

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Addis Ababa

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A Thiesis Submitted to Center for Food Security Studies,College of Development Studies, Addis Ababa University In Partial Fullfilment of the Requirements of the Degree of Master of Science in Food Security and Development Studies

By:

Selamawit Bekele

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Declaration

I, Selamawit Bekele, hereby confirm to the School of Graduate Studies at Addis Ababa University that this thesis is the result of my original research and has not been submitted to any other institution for an academic degree. All materials and information derived from other sources have been properly acknowledged.

Name: Selamawit Bekele

Signature: _____

Date of Submission _____

Dedication

This thesis is dedicated to my mother, Nigatwa Gudeta, and my brother, Meshu Bekele, with heartfelt gratitude for their unwavering love, support, and the sacrifices they have made for me.

Approval Sheet

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As the supervisor/co-advisor of this thesis, I confirm that I have reviewed and evaluated the work prepared by Selamawit Bekele titled *"***Household Food Security, Dietary Diversity, and Associated Factors Among Pregnant Women in Addis Ketema Sub-City, Addis Ababa"** I recommend it for open defense as it meets the requirements for the Master of Science in Food Security and Development Studies.

_____ _____

Name, Major Advisor Signature & Date

As members of the board of examiners for the MSc Thesis Open Defense, we confirm that we have reviewed and evaluated the thesis submitted by Selamawit Bekele titled "Household Food Security, Dietary Diversity, and Associated Factors Among Pregnant Women in Addis Ketema Sub-city, Addis Ababa." We find it acceptable to fulfill the requirements for the Master of Science degree in Food Security and Development Studies.

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The final approval and acceptance of this thesis are conditional upon the candidate's submission of the final version, incorporating all feedback from the Examining Board to the Council of Graduate Studies (CGS) via the Center Academic Committee (CAC).

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Acronyms and Abbreviation

ANC:	Antenatal care
AU:	African Union
CARE:	Cooperative for Assistance and Relief Everywhere
CFS:	Committee on World Food Security
CSA:	Central Statistics Agency
EDHS:	Ethiopian Demographic Health Survey
ESS:	Ethiopian Statistics Service
FANTA:	Food and Nutrition Technical Assistance
FAO:	Food and Agriculture Organization
FI:	Food insecurity
FIES:	Food Insecurity Experience Scale
FSIN:	Food Security Information Network
GRFC:	Global Report on Food Crises
HLPE:	High-Level Panel of Experts on Food Security and Nutrition
IFPRI:	International Food Policy Research Institute
MDI:	Multiple Deprivation Index
MOE:	Ministry of Education
MOFED:	Ministry of Finance and Economic Development
SES:	Socio-Economic Status
SPSS:	Statistical Package for Social Sciences
SDG:	Sustainable Development Goals
UN:	United Nations
UNICEF:	United Nations International Children's Emergency Fund
UNDP:	United Nations Development Programme
USAID:	U.S. Agency for International Development
USDA:	United States Department of Agriculture
WFP:	United Nations World Food Programme
WRA:	Women of reproductive age
WHO:	World Health Organization
GNAFC	Global Network Against Food Crises
UNSCN	United Nations Standing Committee on Nutrition

Abstract

Food insecurity and undernutrition among pregnant women are pressing challenges in Ethiopia today, yet they remain underexplored, especially in urban areas like Addis Ababa, Addis Ketema sub-city. This research assessed the household food security status, dietary diversity, and associated factors among 389 pregnant women attending antenatal care at four purposefully selected public health centers in Addis Ketema sub-city. The geographical location and the case load of the health centers were considered for the selection of the health centers. Household food security was measured using the USAID FANTA's Household Food Insecurity Access Scale (HFIAS), while dietary diversity was assessed using the FAO's Minimum Dietary Diversity for Women (MDD-W). Data analysis was performed using SPSS version 26, applying both descriptive and inferential statistics. The ordered logistic regression model assessed factors influencing household food security levels, while binary logistic regression evaluated factors affecting dietary diversity among pregnant women. The results showed that 81.0% of the households were food secure, while 14.1% were food insecure, 4.1% moderately food insecure, and 0.8% severely food insecure. Ordinal logistic regression identified monthly income ($p < 0.001$), housing type ($B = 1.71$, $p = 0.006$), access to credit services ($B = 1.154$, $p = 0.034$), and social security ($B = 0.368$, $p = 0.037$) as significant predictors of household food security. Regarding dietary diversity, 63.2% of pregnant women consumed a diverse diet, while 36.8% did not. Binary logistic regression indicated that the husband's education ($Exp(B) = 1.522$, $p = 0.039$), the husband's involvement in private business ($Exp(B) = 2.243$, $p = 0.007$), and pregnant women's occupations ($Exp(B) = 2.015$, $p = 0.045$) were significant factors influencing dietary diversity. The study revealed a significant association between household food insecurity and lower dietary diversity. Although most households were food secure, the presence of food insecurity in some indicates the need to improve education, employment opportunities, income generation activities, housing, and social security services.

***Keywords**: Household, Food Security, Pregnant Women, MDD-W, HIFAS,*

CHAPTER ONE: INTRODUCTION

1.1 Background

Ensuring all citizens have consistent access to safe, nutritious, and high-quality food is crucial for developing a productive workforce, extending life expectancy, improving livelihoods, and fostering innovation. These factors collectively drive economic growth, social progress, and sustainable development. Achieving this requires individuals of all ages to adopt healthy lifestyles, gain a deeper understanding of nutrient-rich foods, practice efficient food utilization, and maintain food safety and quality throughout the value chain. Additionally, reducing food and nutrient losses, strengthening emergency preparedness, and enhancing resilience are essential for sustaining these efforts (FDRE, 2018).

Nutritional security stresses the usage dimension, which focuses on eating a wide variety of foods. As a result, nutrition is a critical component of food security (Lee et al., 2013). Nutrition security is attained when reliable access to sufficient, safe, and nutritious food is complemented by appropriate care and feeding practices, a hygienic environment, and access to adequate healthcare services, ensuring the well-being of all household members (FDRE, 2021). Therefore, the issue of food security must be addressed in order to improve the nutritional status of a household (Tunçalp et al., 2017).

Food insecurity occurs when people do not have sufficient, safe, and nutritious food to support normal growth and development, as well as an active and healthy lifestyle (World Food Summit, 1996). Food insecurity not only affects nutritional status of a person but also reduces total calorie consumption and the quality of the diet, increasing the risk of health problems such as malnutrition and obesity-related chronic conditions. Women, particularly those who are pregnant, may face additional difficulties due increase need nutrient intake, gender inequalities and household roles, which can result in complications like underweight babies and other adverse health effects (Achenef et al., 2016).

In 2023, around 28.9 percent of the world's population, or 2.33 billion people, were moderately or severely food insecure, which means they did not have consistent access to sufficient food. In comparison to other regions of the world in 2023, Africa has the highest number of people who are food insecure. The prevalence of moderate or severe food insecurity in Africa (58%) is nearly double the global norm, while Asia (24.8%), Latin America and the Caribbean (28.2%), and Oceania (26.8%) are closer to or somewhat lower than the global prevalence. Middle Africa is the most food insecure subregion in the world, with the highest proportion of moderate to severe food insecurity (77.7 percent, or 157 million people). Following it are Western Africa (61.4%, or 270 million people) and Eastern Africa (64.5%, or 313 million people) (FAO, IFAD, WHO, UNICEF, 2024). More than 282 million people experienced severe acute food insecurity in the 59 food-crisis countries and territories analyzed in 2023, with Ethiopia, Nigeria, Sudan, Afghanistan, and the Democratic Republic of the Congo having the highest rates of severe food insecurity, according to 2024 Global Report on Food Crises (FSIN & GNAFC, 2024).

Ethiopia, which is among the second most populous countries in Africa, has been dealing with a food security challenge for many years. About 58% of Ethiopians experienced moderate to severe food insecurity between 2018 and 2020, primarily because of droughts and inadequate harvests (FAO, 2021). Food insecurity in the country is further worsened by conflicts and recurring natural disasters, such as droughts and floods, affecting different regions (Antonaci et al., 2022; Darge et al., 2017). National nutrition surveys in Ethiopia have consistently indicated insufficient intake and deficiencies in vitamin A, zinc, iodine, calcium, vitamin B12, and folate (EPHI, 2016; Tibebu Moges, 2013). Likewise, deficiencies in many of these nutrients have been identified as public health concerns across all population groups, with women of reproductive age and children under five being particularly affected (EPHI, 2016; Tibebu Moges, 2013). According to study findings, this is attributed to a high reliance on cereals such as teff, maize, and sorghum, which have relatively low micronutrient density. Additionally, there is insufficient consumption of nutrient-rich foods from other groups, including animal-source foods (ASFs), pulses, fruits, vegetables, and nuts and seeds.

For example, additionally, there is insufficient consumption of nutrient-rich foods from other groups, including animal-source foods (ASFs), pulses, fruits, vegetables, and nuts and seeds (Beal et al., 2017). For example, fruit and vegetable consumption in Ethiopia is notably low, with 85% of the population consuming no servings at all. Fewer than 2% of individuals consume 3–4 servings, and only 1.5% meet the World Health Organization's (WHO) recommended five servings per day. A similar pattern is observed for animal-source foods ,except in pastoralist areas where milk-based diets are common (Hirvonen et al., 2018; Kassahun et al., 2015).

Women are vital to ensuring food security and must be provided with equal access to productive resources and opportunities to develop and utilize their skills (World Food Summit, 1996). However, research has indicated that food insecurity significantly impacts women due to persisting gender stereotypes and limited access to resources (FAO, 2024). Despite women being responsible for 90% of preparing and purchasing food, they are eating last and least after all family members have been fed (CARE, 2022).

UNICEF's 2021 Child Nutrition Report highlights that, while the importance of women's nutrition is recognized, a concerning number of women worldwide suffer from various forms of malnutrition. This includes being underweight, having short stature, anemia, and being overweight. These nutritional challenges are particularly significant during the demanding periods of pregnancy and lactation. Around 170 million women globally (9.1 percent) are underweight, while three times that number (610 million, or 32.5 percent) face other malnutrition issues. Women's nutritional status is closely linked to, growth, health, development and the nutritional status of their children (UNICEF, 2021). In many developing countries, people often do not have the necessary resources to afford micronutrient-rich foods such as milk, dairy products, poultry, meat, fish and eggs. As a result, their diets rely heavily on staple foods like maize and rice, which are low in essential nutrients (Cuesta, 2014).

Food insecurity reduces vegetable and fruit consumption, leading to deficiencies in micro- and macronutrients, which in turn negatively affect both physical and mental health (Mohamadpour et al., 2012). Globally, more than two billion individuals experience hidden hunger, sometimes referred to as micronutrient insufficiency. Deficiency of important micronutrients for example vitamin A, vitamin D, folate, iodine, iron and zinc, can have detrimental effects on adolescent girls, expectant mothers, breastfeeding mothers and infants (Corinna & Jessica, 2017). In developing countries including Africa, Caribbean, Asia and Latin America, pregnant women and lactating mothers who consumed primarily plant-based diets had low dietary diversity and inadequate intakes of micronutrients (Kavle & Landry, 2018).

A diverse diet is one that includes a variety of foods from various food categories over a given timeframe. It highlights the availability and consumption of diverse foods within these categories to ensure sufficient intake of vital nutrients for maintaining good health (Arimond et al., 2010). Measuring dietary diversity usually involves measuring the number of various food types ingested or, more frequently, adding up the type of food items that was consumed (Martin-Prevel et al., 2017; Vakili et al., 2013). MDD-W stands for minimum dietary diversity for women, which is the percentage of women between the ages of 15 and 49 who eat at least five of the 10 food groups. Indicating the quality of women's diets with an emphasis on micronutrient adequacy, it also estimates household access to a diet rich in micronutrients (FAO & FHI 360, 2016).

Pregnant women need a balanced diet to satisfy increased nutrient needs, ensuring optimal maternal and infant nutrition to reduce pregnancy complications and have healthy baby (Darnton-Hill & Mkparu, 2015). Research from 28 nations revealed a connection between low dietary diversity and food insecurity among women between the ages of 15 and 49. Over 77% of women who were food secure or slightly food insecure satisfied the minimal dietary diversity for women (MDD-W), whereas less than 50% of women who were severely food insecure did not (FAO, IFAD, WHO, UNICEF, 2024).

In low-income households and developing nations such as Ethiopia, food security is significantly compromised by a substantial percentage of income allocated to starchy staples and the limited diversity of food options available (Matz et al., 2015). Chronic food insecurity has a significant impact on the health of all household members, but studies indicated that women and girls are particularly affected. A recent study on food security in southwest Ethiopia found that food-insecure girls are twice as likely experiencing illness compared to boys (Tefera et al., 2011).

Nutrition is critical to both individual and national development. The evidence presented by Lutter demonstrated that a healthy diet has a fundamental impact on numerous developmental goals (Lutter et al., 2013). In addition, Sustainable Development Goals prioritize addressing malnutrition. Dietary diversification is the key strategy for addressing micro and macronutrient scarcity during pregnancy (Tunçalp et al., 2017). Proper diet during pregnancy promotes healthy fetal growth and normal birth weight, which can have long-lasting effects on growth development (Victora et al., 2008). Proper diet also plays a vital role in the prevention of intergenerational effect of malnutrition (UNSCN, 2010).

The World Health Organization's (WHO) recommendations for nutrient consumption are not met by the majority of pregnant women in underdeveloped nations (Darnton-Hill & Mkparu, 2015; Lee et al., 2013) because their diets are usually repetitive, mostly consist of cereals, and usually don't include many nutrient-dense fruits, vegetables, or animal products (Lee et al., 2013).

In underdeveloped nations, anemia caused by malnutrition affects two-thirds of expectant mothers (McLean et al., 2009). The nutrient intake of pregnant women is inadequate to meet their nutritional demands, according to a small number of Ethiopian researches (Taddese et al., 2016; Tamene et al., 2017). The 2016 Ethiopian Demographic Health Survey (EDHS) revealed that lack of nutritional diversity, poor dietary intake, and changing lifestyles are the main causes of the 22% underweight, 24% anemic, and 8%

obese women (Chung et al., 2016). The Ethiopian government has shown a strong dedication to address nutritional issues by creating policies, plans, and initiatives related to food and nutrition. Additionally, the government introduced the "Seqota Declaration" with the objective of eradicating stunting by 2030 (MOE, 2016). Although Ethiopia's government is working hard to improve nutrition, few research on maternal nutrition in the nation showed that pregnant women's nutritional intakes were below the WHO-recommended norm (Taddese et al., 2016; Tamene et al., 2017).

Research carried out in Addis Ketama sub-city revealed that 51.6% of pregnant women had insufficient dietary diversification. Most of the participants (90%) reported consuming staple crops such as maize, sorghum, millet, wheat, barley, and teff. In contrast, animal-sourced foods like eggs (29.4%) and meat, poultry, and fish (31.9%) were the least consumed (Aynshet et al., 2022).

The current study not only examined the dietary diversity of pregnant women but also their household food security status, exploring the relationship between food security and dietary diversity. The result of this research will provide insights for stakeholders working on urban food security and maternal nutrition, encourage them to conduct further research, and initiate nutrition programs to benefit both pregnant women and the broader population of the Addis Ketema sub-city.

1.2 Statement of the Problem

Although various efforts have been made in Ethiopia to address food insecurity, it has persisted as a significant challenge for a long time (Moroda et al., 2018). The Ethiopian diet primarily relies on a limited range of staple foods, and annual increases in food prices significantly reduce both the quality and amount of food consumed. This impact is particularly severe for women who are expecting, as they receive a smaller share of household food despite requiring additional nutrients to support the healthy growth of the fetus and positive birth outcomes (Fanzo&Andres, 2012). In recent decades, rural poverty has decreased in developing countries, while urban poverty has remained stable. With the rapid growth of urban populations, poverty and food insecurity are rising sharply and

becoming a significant issue in cities. However, the problem of food insecurity in urban areas has not been given adequate attention, even though urban residents rely heavily on the market for their food, making stable income and affordable food prices crucial to ensuring their food security (Ruel et al., 2018).

In Ethiopia, while numerous studies have focused on rural populations, the challenges urban people face in terms of food security have been less studied (Tibebu & Sisay, 2017; Wali & Janekarnkij, 2013; Yehuala et al., 2018). Urban food security is becoming a key focus because of its essential contribution to Ethiopia's long-term economic growth and poverty reduction (UNDP, 2018). However, food security studies in urban settings are scarce. Addis-Ketema sub-city has the highest unemployment rate (27.2%) per the 2007 Population and Household Census while Bole sub-city had the lowest rate (17.7%). Additionally, Addis-Ketema sub-city showed the highest Multiple Deprivation Index (MDI) scores in both 2007 and 2016, indicating higher levels of deprivation and greater challenges for its residents including food insecurity due to poverty (Gizachew et al., 2023). However, there are only a few studies in the areas of food insecurity and dietary diversity in Addis Ketama sub-city.

In Addis Ketema sub-city, previous researchers has focused on either dietary diversity (Aynshet et al., 2022) or food insecurity (Bezuayehu, 2021; Harun, 2022; Yeabsira, 2020) separately, but there is no study that comprehensively examines how household food security interacts with dietary diversity of pregnant women in the Addis Ketama sub-city. Additionally, most previous studies focused on the general population and used broad food security metrics, such as HIFAS, without exploring dietary diversity indicators like MDD-W, which assess diet quality. The current study explored the interplay between household food security, dietary diversity, and associated factors specifically among pregnant women in Addis Ketema Sub-City. Pregnant women face unique nutritional needs that are crucial for maternal and fetal health. The current research will therefore fill the literature gap by investigating how household food security impacts the dietary diversity of pregnant women in a socioeconomically disadvantaged urban area, Addis Ketema sub-city. This will contribute valuable insights into designing interventions to improve maternal nutrition in urban low-income settings.

1.3 Objective of The Study

1.3.1 General Objective

The general objective of this study was to investigate the level of household food insecurity, dietary diversity and its associated factors among pregnant women in Addis Ketema Sub city.

1.3.2. Specific Objective

The specific objectives of this study were to**:**

- Examine the level of household food security of pregnant women who attend their ANC at public health centers of Addis Ketema sub-city,
- Assess the diet diversity of pregnant women who attend their ANC at public health centers of Addis Ketema sub-city,
- Identify factors that influence household food security and dietary diversity among pregnant women at public health centers of Addis Ketema sub-city and
- Assess the relationship between household Food Security and diet diversity of pregnant women who attend their ANC at the Public health centers of Addis Ketema sub-city.

1.3.3. Research Question

- What is the household food security status of pregnant women in Addis Ketema sub city?
- What is the proportion of pregnant women achieving a minimum dietary diversity in Addis Ketema sub city?
- What are the factors that contribute to household food security and dietary diversity among pregnant women in Addis Ketema sub city?
- Is there any relationship between household food security and diet diversity of pregnant women?

1.4 Significance of The Study

Africa's development agenda prioritizes food and nutrition security, aiming to end hunger and improve nutrition for all Africans. This highlights the need for more research on food security, a crucial factor in development. This academic research aims to provide insights into the food security status of pregnant women attending ANC at public health centers in Addis Ketema sub-city. Pregnant women are particularly vulnerable, as their nutrient stores are vital for their developing babies. Access to a healthy diet is a fundamental right, especially for pregnant women and infants, even during economic challenges like inflation.

The findings of this study may prompt policymakers to strengthen food security policies and improve food availability and accessibility. Additionally, the research could offer valuable insights for healthcare professionals and government sectors such as agriculture, health, and education, as well as community and non-governmental organizations, encouraging collaborative efforts to enhance the dietary diversity and nutritional well-being of pregnant women in Addis Ketema sub-city.

1.5 Scope of the Study

This cross-sectional study focused on household food security and dietary diversity among pregnant women who attended their ANC service at public health centers of Addis Ketema sub-city.

1.6 Limitation of the Study

The study was only conducted over one season, which would limit the way the findings can be applied to other seasons. The research depended on the participant's memory regarding their household food security in the past one month and the kinds of food they ate in the previous 24 hours, which could have caused recall bias. The Household Food Insecurity Access Scale (HFIAS) is a useful tool for measuring food insecurity in households, but it has limitations. Due to the sensitive nature of the inquiry, participants may be underreporting or overreporting on some of the questions that were answered.

Responses can be subjective and influenced by social desirability bias. MDD-W focuses only on the number of food categories consumed, not the amount of food within each group. Consequently, it may neglect the importance of portion sizes in ensuring adequate nutrition. Additionally, this study did not examine if cooking meals resulted in any significant nutrient loss. Furthermore, the exclusion of pregnant women attending ANC follow-ups in private clinics may make it difficult to apply the results to a larger population.

Additionally, this study did not examine if nutrition sensitive urban agriculture practices, food safety issues including water hygiene and sanitation practices, environmental assessment issues, the Ethiopian food based dietary guidelines.

1.7 Organization of The Thesis

This research thesis is organized into five chapters. The first chapter presents an introduction to the thesis, including the background, problem statement, objectives, significance, scope, and limitations. Chapter two presents a literature review, encompassing food security theory and empirical or practical studies conducted both within the country and globally. Chapter three outlines the methodology of the research, including the research area's description, data sources and types, approach and design of the research, sample size determination, sampling procedures, data collection methods, and analysis techniques of quantitative data. Chapter four discusses the results, including descriptive and model-based findings. Finally, chapter five concludes the thesis with a summary of the results and related recommendation.

CHAPTER 2: REVIEW OF RELATED LITERATURE

2.1 The Concept of Food Security

Food security is a concept that is highly context-dependent, as demonstrated by the variety of definitions that have emerged in research and policy over time. Initially developed around Fifty years ago, in response to the global food crisis of the early 1970s, the idea of food security has evolved to reflect different contexts and challenges. As a result, there were approximately 200 distinct definitions of food security in scholarly works just two decades ago, highlighting the flexibility of the concept and how it adapts to the specific circumstances in which it is applied (S. Maxwell & Frankernberger, 1992).

During the time of worldwide food crises in the early 1970s, the idea of food security was first focused on guaranteeing food supply and the stability of prices for necessities. This focus was driven by the significant volatility and instability in the oil and currency markets at the time, as well as in the prices of agricultural commodities (Berry et al., 2015).

The prevalence of famine, hunger, and food crises necessitated defining food security in a way that took into account the essential needs and behaviors of those who would be affected or at risk (Sinha, 1976). At the World Food Conference in 1974, the concept of food security was defined as "the constant availability of sufficient global food supplies of essential food items to support steady growth in food consumption and to buffer against production and price fluctuations."(Sinha, 1976). This definition highlighted the critical need for increased food production, as it was believed that more than 25% of the global population suffered from protein-energy deficiencies in 1970.

Over time, a more nuanced understanding of food security crises shifted the focus from mere food availability to a broader, more comprehensive approach. A deeper understanding of how agricultural markets function under stress and how vulnerable populations struggle

to access food led to an expanded FAO definition of food security, which now includes ensuring that at-risk groups can access available food supplies. As a result, economic access to food became a key component of the food security concept (Berry et al., 2015). A revised definition of food security was later established, emphasizing "ensuring that all people, at all times, have both physical and economic access to the essential food they need (FAO, 1983). The next milestone occurred in 1986, when the World Bank released its semiannual report, Poverty and Hunger (World Bank, 1986). This established a time scale for food security by distinguishing between chronic food insecurity, which is linked to poverty, and acute, temporary food insecurity, which is triggered by natural or man-made disasters. These were reflected in a further extension of the notion of food security to include “access by all people at all times to enough food for an active, healthy life" (Berry et al., 2015).

The next evolution of the concept took place in 1994, following the release of the UN Development Program’s Human Development Report UNDP, (1994),which incorporated the broader requirements of human security. During this period, food security, as part of the broader framework of social security, became a key topic in the discussion of human rights.

Given that food security studies are often context-specific and influenced by various technical perspectives and policy concerns, it lacked a unified definition at the time. To address this complexity, a redefinition of food security was carried out through international consultations in preparation for the 1996 World Food Summit Sinha, (1976), reflecting the complex interaction among, and between, individuals, households, and even the global level . Food security is achieved at all levels “when everyone, at all times, has both physical and economic access to enough safe and nutritious food that satisfies their dietary requirements and food preferences for an active and healthy life” (FAO, 1996).

In the mid-1990s, alongside the evolution of the term "food security," the concepts of "nutrition security" and "food and nutrition security" also emerged. Food security is now seen as a component of "food security and nutrition." While the terms "food security" and "nutrition security" are sometimes used interchangeably, their definitions differ

significantly. Food security is essential for nutrition security, but it is not sufficient on its own. In addition to food, nutrition security also focuses on care, health, and hygiene practices. According to the FAO, nutrition security is defined as when all members of a household have reliable access to a healthy, balanced diet, a clean environment, and adequate health services and care, ensuring that everyone remains healthy and able to lead a fulfilling life (Mohamadpour et al., 2012).

The FAO's annual flagship report, *The State of Food Insecurity in the World*, first published in 1998, serves as a key tool for evaluating the overall monitoring process of food security. In 2001, the report refined the definition of food security, emphasizing that it ensures all individuals in a given location have equal access to sufficient, safe, nutritious, and adequate food to meet their dietary needs and preferences. This access must be both physical and economic, supporting a healthy and active life. While addressing poverty is essential for tackling food insecurity, this alone is not sufficient to solve the problem (FAO, 2003; Mohamadpour et al., 2012).

2.2 Dimensions of Food Security

According to the definition of FAO, (2008), there are four dimensions to food security. 1) The availability of both domestically produced and imported food. 2) Accessibility. The food can reach the consumer (transportation infrastructure), and the latter has sufficient funds to make a purchase. In addition to physical and economic accessibility, socio-cultural access ensures that food is culturally acceptable and that social protection nets are in place to assist the less fortunate. 3) Utilization. To live a healthy and fulfilling life and reach his or her full potential, the individual must be able to eat enough amounts of both quantity and quality of food. Food and water must be safe and clean; therefore, proper water and sanitation are also required at this level. An individual must also be in good physical health to properly digest and make use of the food consumed. 4) Stability refers to the capacity of a nation, community, household, or individual to cope with disruptions to the food system, whether caused by natural disasters such as climate events or earthquakes or by human-made crises like wars and economic downturns.

Food security operates at multiple levels: availability at the national level, accessibility at the household level, utilization at the individual level, and stability as a time dimension affecting all levels. For complete food security, all four dimensions must be present and functional. Recent developments have highlighted the importance of sustainability, which can be viewed as a fifth, long-term dimension of food security. Sustainability includes indicators at the supra-national or regional level, such as ecology, biodiversity, climate change, and socio-cultural and economic factors (Berry et al., 2015). These will affect the food security of future generations.

Food availability: Food availability refers to the physical presence of food, either produced locally on farms or purchased from external sources such as markets. However, food availability by itself does not guarantee food security, as it only reflects the potential supply of food within society. Individual households may not have the means to access or properly utilize this food (Riely et al., 1999).

Food accessibility: When the resources and means to get food for a healthy, balanced diet are readily available, this is referred to as accessibility (Saint Ville et al., 2019). Access to food involves two main components: physical and financial accessibility. Important resources include financial resources (to purchase food), mobility (to access food sources), and knowledge (to make informed decisions about food acquisition), which are crucial in determining accessibility. This demonstrates that having the capacity to grow food is only one component of ensuring adequate access; people also need to be able to access markets and afford the food that is offered. Thus, even before they can cultivate their own food, a family's ability to pay is essential to their access to food and nourishment (Simelane & Worth, 2020).

Food utilization: Food utilization refers to the mechanism by which the body takes in and utilizes the nutrients that it takes in from its diet (Simelane & Worth, 2020).

Stability/ Sustainability: Food stability refers to a population's ability to consistently access food, even during periods of crisis or stress (Savary et al., 2022). This includes having access to a wide variety of meals that satisfy dietary requirements and preferences.

The protection of individuals from the negative consequences of food insecurity is made possible by food stability (Saint Ville et al., 2019).

2.3 Social Exclusion Theory

The primary claim of the social exclusion theory is that those who are socially excluded experience discrimination and marginalization in addition to poverty. This suggests they are unable to participate completely in society and are often denied access to the opportunities and resources available to others.

A framework for analyzing food security issues from the perspectives of social and economic considerations is provided by the idea of social exclusion (Bernaschi et al., 2023). Food insecurity goes beyond merely having enough food; it also involves having access to affordable, nutritious, and safe food. The social exclusion theory emphasizes how social and economic factors can hinder food production, distribution, and access.

It acknowledges that problems like poverty (e.g., unemployed individuals in urban areas), marginalization (such as those living in urban slums), discrimination, and limited opportunities significantly affect food security, particularly within the context of urban environments (Bernaschi et al., 2023).

2.4 Socio-Economic Status (SES) Theory.

The Socio-Economic Status (SES) Theory highlights the effect of income, education, and employment on food security. In urban areas, low-income households often struggle to access nutritious foods due to financial limitations, resulting in reduced dietary diversity and inadequate nutrition for pregnant women (Darmon & Drewnowski, 2008). Income provides access to essential services, material goods, and opportunities for enriching experiences. It directly influences one's ability to obtain quality healthcare, education, nutrition, and secure housing, while also enabling participation in cultural and recreational activities that contribute to overall well-being (Kraus & Stephens, 2012). Education, like income, is a key measure of socio-economic status (SES). Additionally, higher levels of

education are associated with better economic outcomes, such as less financial difficulty (Snibbe & Markus, 2005).

Occupation is often viewed as a key indicator of socio-economic status (SES) because it is closely related to both income and education. Different jobs tend to offer varying levels of financial compensation, which directly impacts an individual's economic standing. Additionally, the type of occupation typically reflects the level of education required, with higher-paying jobs often requiring higher educational qualifications. As a result, a person's occupation can provide valuable insights into their overall socio-economic position, including their access to resources and opportunities (Duncan & Magnuson, 2012).

2.5 Food Insecurity in Urban Context

Agriculture serves as a primary food source, sustaining the diets of over 7 billion people worldwide Clark & Tilman, (2017) and 109 million people in Ethiopia (Assefa & Kassa, 2020). Despite its critical role in feeding the world, the agricultural sector is under growing pressure from rapid urbanization. As cities expand, agricultural land is often repurposed for urban development, reducing the space available for food production.

This shift not only disrupts rural livelihoods but also pushes many people to move to cities to get work, often without adequate economic opportunities. As a result, poverty, once concentrated in rural regions, is increasingly spreading into cities, leading to urban poverty characterized by unemployment, inadequate housing, and limited access to basic services (Amsalu, 2020; Cohen & Garrett, 2010). Consequently, urban areas' food security is progressively declining (Arega, 2023). According to World Bank data, approximately 821 million people lack sufficient food, with the majority living in urban areas. Poverty is a key contributing factor, particularly in low-income nations where high unemployment rates and rapid population growth drive up demand for already limited food supplies (Kemmerling et al., 2022; Tesfaye & Amene, 2020). A significant challenge to urban food safety is the scarcity of water and land resources. Many cities lack sufficient agricultural land, and water sources are frequently contaminated or polluted. Industrial expansion and development of urban areas have encroached on fertile lands once designated for farming, further limiting

food production (Orsini et al., 2013). As a result, agricultural production declines, while food demand continues to surge due to rapid population growth.

The review by the United Nations also highlighted that rising industrialization, population growth, and the use of motor vehicles have caused higher emissions of harmful gases, which have a substantial impact on climate change. As a global driver of food insecurity, climate change is particularly influenced by urban areas, which are major sources of factors like CO2 emissions from industries and transportation (UN, 2018). Poor infrastructure poses another significant challenge to urban areas' food security. A significant number of cities don't have the necessary facilities to transport, distribute, and store food effectively, resulting in inefficient food supply systems. These issues are compounded by a range of complex factors, including mismatched political priorities, inadequate government policies, and poor implementation. As a result, policies to address food security gaps in urban areas are often insufficient or poorly executed.

The World Food Program states that food availability, the movement of food supply into markets, food access, purchasing power, market access, food usage, and health and morbidity conditions are the main variables affecting food insecurity in urban areas (WFP, 2009). Differences in the availability of food at the local, national, or regional level can contribute to food insecurity. According to Garrett and Ruel, a household's ability to obtain food is determined by whether it has enough money to purchase food at the present price or enough land and resources to cultivate its own food (Garrett & Ruel, 1999). A study by Bonnard found that the capacity of urban households to achieve food security depends on institutional, material, and human resources, often referred to in the literature as "food security factors." The household's level of education and work, demography, participation in urban farming, assets, savings, access to direct transfers or formal social assistance, informal social networks, availability of clean water and sanitation, and the general cost of living are some of these food security factors (Bonnard, 2000).

In Ethiopia, urban food insecurity is primarily driven by low- and irregular-income levels. Many urban dwellers struggle with unstable income sources, often due to seasonal employment, informal work, or underemployment, which prevents them from consistently affording sufficient food. This financial instability makes it difficult for families to meet their basic dietary requirements, particularly as prices of food fluctuate. As a result, even when food is available, access to it becomes a significant challenge for households with limited income, exacerbating the issue of food insecurity in cities (Besfat & Melaku, 2019).

The number of unemployed individuals in Ethiopia is steadily rising, further exacerbating the difficulties associated with food insecurity (Amsalu, 2020). In Addis Ababa, 79.9% of the population has experienced food insecurity as a result of rising food costs (Maru & Juliet, 2016). The increase in food prices is indirectly linked to crop yields. In other words, when crop yields decrease, food prices tend to rise Amsalu, (2020), or it results from the disparity between the availability and demand for food in cities (Miccoli et al., 2016). In central Ethiopia, it has been observed that urbanization has led to a reduction in agricultural land, leading to a sharp increase in the prices of major crops like teff and wheat (Dadi et al., 2016). Consequently, the cost of 100 kg of teff rose from about USD 21.6 in 2005 to just over USD 92 in 2012, and the cost of wheat rose to more than USD 54 in 2012 over its 2005 figure. Furthermore, Amsalu, (2020) also stated that Addis Ababa's food price index has more than doubled. In this situation, the size of household farms, crop production, and global food price trends have made it difficult for households to maintain food security (Dadi et al., 2016).

The high cost of food pushes many into poverty Deng et al., (2021) and increases hunger (Besfat & Melaku, 2019). Ethiopia is primarily a rain-fed agricultural nation; therefore, changes in the seasons have a significant impact on food prices, particularly in urban areas. These prices fluctuate between seasons within the year, with food costs typically rising during the wet season (Amare et al., 2023). During this period, the poor individuals in urban areas can't always afford to buy their families healthy food, which negatively impacts the stability of food availability over the course of the entire year (Khan et al., 2020).

As a result, there are inconsistencies in the supply and consumption of food for urban dwellers throughout Ethiopia. It is clear that supplying very low-income urban dwellers with constant access to nutritious food is a major challenge by (Wurwarg, 2014).

In February 2022, domestic food price inflation remained high (over 5 percent) in six of the ten Eastern African countries, which make up 60% of the region, according to the World Food Program's Regional Food Security & Nutrition Update (2022) report. Four of these nations face double-digit food inflation: Burundi (16 percent), Ethiopia (42 percent), Sudan (258 percent), and Somalia (13 percent). More than 80% of Ethiopian urban households rely on food markets, and access to food is mostly influenced by household income and market pricing, which together determine purchasing power. Ethiopia's food price index has continuously surpassed the world food price index since August 2004. (Ulimwengu et al., 2014).

As highlighted in studies, less than 25% of the produce grown by rural households goes towards urban markets, which significantly compromises urban food security, especially during times of crisis in rural areas. This shows that the food stability of poor urban populations is largely dependent on external factors. If rural communities face production losses, they may be unable to supply even a quarter of their produce to urban areas, putting the sustainability of food in these urban regions at risk (Berhanu et al., 2019).

Studies conducted in Ethiopia reveal that between 2006 and 2011, land use for agriculture in Addis Ababa city experienced a significant change, with a reduction rate of 24%. Remarkably, this decline took place over a span of just five years (Tekle et al., 2017). Moreover, a study analyzing the temporal dynamics of the factors driving urban landscape changes in Addis Ababa between 1984 and 2014 confirms that the city's urban area expanded by 50%. During the same period, arable land decreased by 34%, while forested areas experienced a significant reduction of 75% (Meskerem et al., 2018). As a result of the rapid conversion of farmland into urban centers, there has been a significant increase in food prices, exacerbating the already high levels of food insecurity (Farrell, 2017; Harris

et al., 2020).Uncontrolled urbanization results in slums to expanding, posing a serious threat to all aspects of nutrition and food security (Abu Hatab et al., 2019; Besfat & Melaku, 2019; Eigenbrod & Gruda, 2015).

According to a study on urban livelihoods, food and nutrition security in Greater Accra, Ghana, food prices, household demographics, and household preferences and tastes all affect how readily available food is in households (Maxwell et al., 2000). The situation in Ethiopia closely mirrors the circumstances found in other developing countries. For instance, the World Food Program identified several common variables contributing to the nation's urban areas' household food insecurity. These factors include household size, the head of the household's age and sex, marital status, education level, dependency ratio, credit availability, savings account ownership, total income per adult equivalent, food and non-food expenditure levels, asset ownership, social service accessibility, home garden presence, supply of food, food sources, and subsidized food (WFP, 2009).

2.6 Dietary Diversity

Dietary diversity is eating a range of foods from different food groups within a specific time frame. Nutrition experts have long acknowledged it as a crucial component of a nutritious diet. Most dietary guidelines in the United States emphasize the importance of broadening the range of food options both between and within food groups (Dupont, 1992) as well as internationally (FAO & WHO, 1998). It is considered vital for ensuring adequate nutrient intake, which in turn supports optimal health. Growing evidence linking diet to the risk of chronic diseases has led to dietary recommendations that emphasize both greater dietary diversity and the reduction of certain nutrients like fat, refined sugars, and salt.

In developing countries, the focus on dietary diversity primarily stems from concerns about nutrient deficiencies. Increasing the range of food types and categories is essential to achieving nutrient adequacy, especially among poorer populations whose diets often rely heavily on starchy staples. These diets typically lack animal products, fresh fruits, and vegetables, leading to low levels of key micronutrients. While excessive consumption of processed sugar, fat, and salt has not traditionally been a concern in these regions, rising

incomes and urbanization are driving dietary and lifestyle changes (FAO & WHO, 1998; Patterson et al., 1994).

The Ethiopian Public Health Institute (EPHI) led the development of Food-Based Dietary Guidelines (FBDGs) in collaboration with various stakeholders. These partners include implementing sectors, international nutrition development organizations, academic institutions, faith-based groups, media, and civil society organizations. The creation of these FBDGs aligns with Ethiopia's Food and Nutrition Policy and its strategic framework. The guidelines are intended to assist a wide range of groups, such as consumers, nutritionists, educators, healthcare professionals, and agricultural extension workers, in promoting better nutrition. The FBDGs present eleven key messages designed to help individuals adopt healthier dietary habits and lifestyles. Among these, eight messages promote positive dietary behaviors, while the remaining three advise limiting the intake of specific food groups for improved health. Successfully implementing these guidelines relies on the coordinated efforts of multiple sectors (EPHI, 2022).

Dietary diversity is typically determined by counting the number of foods or food groups that were consumed. The MDD-W, or Minimum Dietary Diversity for Women, developed by the FAO in 2016, is a widely used measure of women's dietary quality. A binary indicator called MDD-W assesses whether women between the ages of 15 and 49 have eaten at least five of the ten specified food groups in the previous 24 hours. The proportion of women meeting this threshold within a population serves as a proxy for improved micronutrient adequacy, a key aspect of the quality of diet. Inadequate nutrient intake prior to and throughout pregnancy and lactation can negatively impact both mothers and their infants. However, in many resource-limited settings, the diet quality of women of reproductive age (WRA) is often poor, with significant gaps between micronutrient intake and recommended requirements (Arimond, et al., 2010).

2.7 Empirical Review of Food Insecurity

According to the Global Report on Food Crises, approximately 193 million people in 53 countries and territories, including Ethiopia, faced acute food insecurity in 2022 and required urgent assistance (GRFC, 2022).The COVID-19 pandemic, along with severe climate-related events and widespread conflicts, is believed to have significantly worsened the situation (GRFC, 2022; Savary et al., 2022). In Ethiopia, 57% of people in Addis Ababa and over 40% of the country's total population make less than the US$1.25 per day (WFP, 2009). The average daily energy intake is thought to be 16–20% below the globally accepted minimum requirement, and diseases brought on by dietary deficiencies in vital elements like vitamin A, iron, and iodine are common and widespread (Naylor & Falcon, 2010). Food insecurity in Ethiopia has further strained the nation’s already fragile economy, particularly by intensifying rural-to-urban migration and contributing to the rise in unemployed or underemployed individuals in many urban areas. The World Bank has compiled development indicators from officially recognized sources, and according to it, Ethiopia's urban population growth rate was recorded at 4.6% in 2021 (UN, 2018).

The 2022 report The State of Food Security and Nutrition in the World highlights that women consistently have less access to food than men in every region globally. Alarmingly, the disparity in food security between men and women continues to widen (Borghi et al., 2022). Even when both men and women face food insecurity, women often shoulder a heavier burden. In Somalia, for instance, men may eat smaller portions, but women often go without meals entirely (Busingye, 2021). At the start of the COVID-19 pandemic in Lebanon, 85% of people reduced their number of daily meals. However, 85% of women also began eating smaller portions, compared to only 57% of men. Additionally, 66% of women switched to lower-quality food, while only 43% of men did the same (Dellen, 2020).Food insecurity is a significant public health issue in both developing and developed countries. However, the highest proportion of undernourished individuals is still found in sub-Saharan Africa (FMH, 2005; Vozoris & Tarasuk, 2003).

2.8 Empirical Review of Pregnant Women's Dietary Diversity

Diverse diet helps to meet the mineral and vitamin needs of both the pregnant woman and her growing fetus. However, the lack of adequate dietary diversity among pregnant women doubles the risks, leading to poor fetal development and an increased likelihood of pregnancy-related complications (Gina et al., 2009). Although dietary diversification plays a crucial role in promoting the health of both mothers and fetus in Ethiopia, a significant portion of women face nutritional challenges. Around 22% of women are underweight, while 8% are obese. These issues arise from a combination of insufficient food consumption, limited access to diverse foods such as fruits, vegetables and shifts in lifestyle patterns. These factors contribute to an overall imbalance in the diet, affecting women's health and increasing the risk of poor maternal and fetal outcomes (Chung et al., 2016).

Research has shown that global mortality and morbidity rates related to malnutrition have remained largely unchanged over the past three decades (IFPRI, 2015; Lartey, 2008). Ethiopia is among the developing nations with a high maternal mortality rate, attributed to complications during pregnancy. Achieving optimal consumption of a diverse range of foods is crucial in developing countries like Ethiopia, as it plays a key role in efforts to eliminate all forms of malnutrition.

A well-balanced and varied diet can significantly improve health outcomes, enhance maternal and child nutrition, and contribute to the overall development of the population. Promoting dietary diversity is an essential step toward ensuring better nutrition, improving public health, and addressing the widespread challenges of malnutrition in such countries (Cucó et al., 2006; Tunçalp et al., 2017). The study by Lee et al., (2013) emphasized that dietary diversity is linked to a household's per capita food consumption, suggesting that households with a more varied diet also have better access to food. Additionally, a household's dietary diversity serves as an indicator of its economic access to food. A higher dietary score reflects the utilization of a greater number of food categories (Arimond, et al., 2010). Furthermore, evidence indicates dietary diversity at the household level is strongly correlated with per capita income and energy availability, indicating that it can be

a useful indicator of the access component of food security (Henjum et al., 2015). Proper dietary diversity among pregnant women varies by location, according to studies done in Ethiopia; rates range from 12.8% in the Oromia region to 61.2% in the Tigray region (Abdulhalik et al., 2019; Alebachew et al., 2024; Kemal & Mukemil, 2019; Seid et al., 2019; Sintayehu & Bedasa, 2019; Walelgn et al., 2020). Pregnant women's dietary diversity is influenced by a number of factors, such as the mother's educational attainment, monthly household income, ownership of livestock, emotional support from their husbands, wealth index, purchasing habits, and availability of nutrition information (Abdulhalik et al., 2019; Alebachew et al., 2024; Seid et al., 2019; Sintayehu & Bedasa, 2019; Walelgn et al., 2020).

2.9 Conceptual Framework

According to the World Food Program (2009), several factors contribute to household food insecurity and dietary diversity in urban areas of the country. These factors include household size, the age and gender of the household head, marital status, education level, dependency ratio, access to credit, ownership of a savings account, total income per adult equivalent, asset ownership, access to social services, home garden ownership, and access to food banks.

It is hypothesized that household food security status directly influences dietary diversity among pregnant women. Food-insecure households may have limited access to a variety of foods, resulting in lower dietary diversity among pregnant women. Socioeconomic factors such as income level, education, and occupation, and residence may influence household food security and dietary diversity indirectly through their effects on food accessibility. Income enables households to access diverse and nutritious foods and thereby ensures household food security and dietary diversity. Higher educational attainment may help individuals to either create their own business or work for companies; this could help them to generate income. Therefore, higher educational attainment reduces food insecurity and enhances dietary diversity. Educated individuals are more likely to understand the importance of a diverse diet and could make informed food choices. The sector of employment influences access to food and the purchasing power of the household. For example, husbands engaged in private business increase the likelihood of their wives

meeting the minimum dietary diversity. Housing types that individuals live in often reflect a higher socioeconomic status and better access to resources that contribute to food security and dietary diversity. Pregnant women who have access to training and credit services have better access to diversified diets and reduced food insecurity. The training and credit service may have enhanced their skill, and the credit facility may have helped them to engage in a better livelihood and increase their source of income. Being married may be associated with lower food insecurity. This could be due to shared resources and support.

Food Insecurity among Women

I developed the following conceptual framework from food security and diet diversity studies and theories.

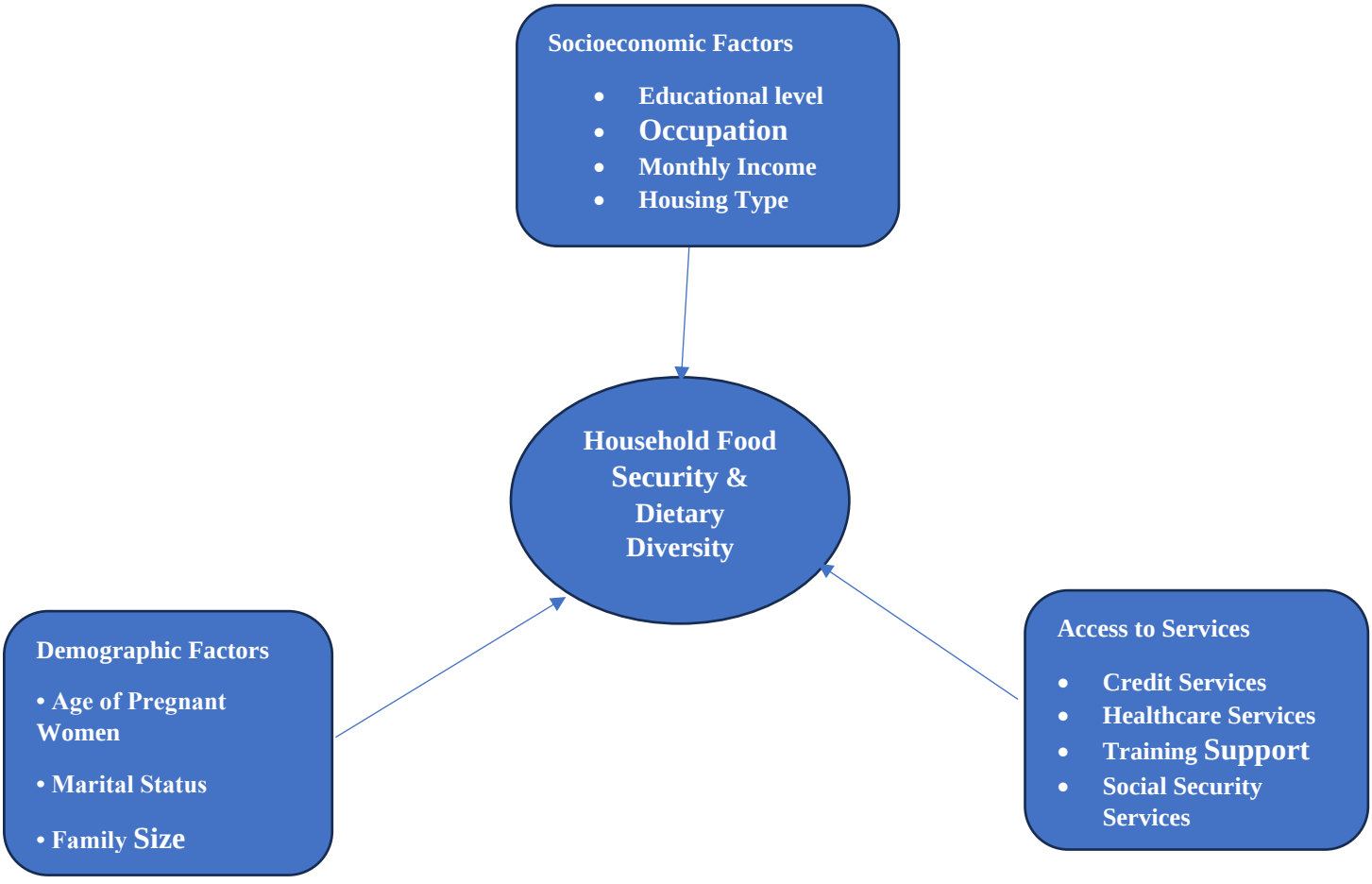

Figure 1 Conceptual Framework of Household Food Security, Dietary Diversity and Associated Factors Among Pregnant Women in Addis Ketema Sub City, Addis Ababa

Source: Researcher's Own Drawing (2024)

CHAPTER 3: DESCRIPTION OF STUDY AREA AND RESEARCH METHODS

3.1 Description of The Study Area

The research was carried out at Addis Ketema Sub-City, which is under the administration of Addis Ababa, the capital of Ethiopia. There are eleven sub-cities under Addis Ababa city administration. Ledet to the southeast, Kolfe Keranyo to the west, and Arada and Gulale sub-cities to the northeast encircle this central Addis Ababa location, Addis Ketema sub-city. Presently, the sub-city is separated into 10 woredas and 28 sub-woredas, which include 302 blocks and 84 Sefers (neighborhoods). This central location and its diverse demographic structure make Addis Ketema an important area for studying health and social-related issues, such as food security and pregnant women's dietary variety (Worreta, 2015).

The area of the sub-city covers 7.41 square kilometers. According to the 2016 census, there are 218,187 people living in the sub-city, 99,641 of whom are men and 118,546 are women. This demographic information is crucial for understanding the population structure and potential factors influencing diet diversity and food security in the area (Chung et al., 2016). The study area, Addis Ketema Sub-City, is a densely populated and packed area of Addis Ababa, with a population density of 37,488 people per square kilometer. There are about 4.2 people living in each housing unit. The vast majority of the sub-city's residents work as daily laborers, civil servants, or entrepreneurs, including both businesswomen and businessmen. Additionally, due to the influx of individuals from various regions of the country for different reasons, commercial sex workers are also prevalent in the area. As far as schooling is concerned, Addis Ketema Sub-City hosts 44 kindergartens, 16 of which are government-owned, while 28 are run by private or other institutions. This demographic and socio-economic context highlights the diverse challenges and opportunities present in the sub-city, which are important considerations for research on food security and dietary diversity among pregnant women (Worreta, 2015).

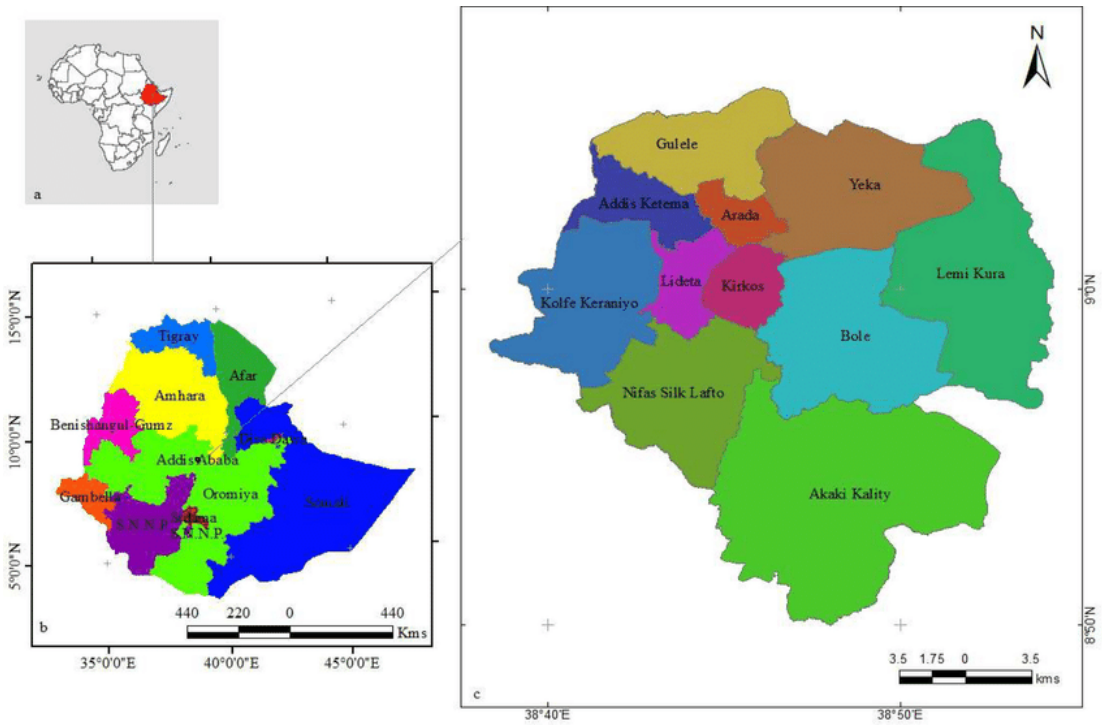

Figure 2 Addis Ababa City Administration Map

Source: Ethio-GIS- 2022

3.2 Study Design and Period

An institutional based cross-sectional research design was applied for the collection of data. In contrast to a longitudinal study, a cross-sectional research strategy simply gathers data from participants once, rather than following them over time. One advantage of using a cross-sectional study design is that it enables researchers to compare multiple variables simultaneously (IWH, 2015). A previously tested questionnaire was used to gather quantitative data.

3.3 Study Population

The study specifically targeted pregnant women who attended antenatal care at the four selected public health centers during the data collection period and who are willing to for an interview and provide necessary information.

3.4 Source of Population

All pregnant women who attended ANC at public health centers in Addis- ketema sub-city.

3.5 Eligibility Criteria

3.5.1 Inclusion Criteria

The study included all healthy pregnant women who visited the selected health centers for antenatal care follow-up during the data collection period and were willing to participate in the interview.

3.5.2 Exclusion Criteria

Pregnant women who were not willing to participate in the interview or those who were unwell during the data collection period were excluded from the study to ensure the accuracy and relevance of the data.

3.6 Data Types and Sources

The study utilized primary data collected from expectant mothers receiving antenatal care (ANC) at selected public health facilities in Addis Ketema Sub-City, using structured questionnaires to gather relevant information.

3.7 Sample Size Determination, Sampling Technique and Procedure

3.7.1 Sampling Technique and Procedure

In this study, the non-probability sampling method was used as the sampling strategy. Out of Addis Ababa's eleven sub-cities, Addis Ketema was specifically chosen for this study. This is because Addis Ketema sub-city, one of the most impoverished areas in Addis Ababa (Khwairakpam et al., 2016). Addis Ketama sub-city had also a limited research on pregnant women's dietary diversity and household food security (Aynshet et al., 2022).

The researcher aims to contribute to the understanding of food security and dietary diversity in the study area. According to the Addis Ababa Health Office, as of February 2024, there were 14 public health centers in Addis Ketema Sub-City, including Kolfe, Addis Ketema, Absiniya, Milkiland, Woreda 03, Addis Raey, Lomi Meda, Felege Meles, Abebe Bikila, Millennium, Woreda 10, Ginbot, Woreda 9 (7), and Kuas Meda. For this study, four health centers were selected based on their high patient load and their representation of different geographical areas within the sub-city.

3.7.2 Sample Size Determination

This study focused on four public health centers: Kolfe Health Center, Addis Ketema Health Center, Milkiland Health Center, and Lomi Meda Health Center. These centers were purposefully selected due to their strategic locations across different areas of Addis Ketema Sub-City and their higher patient loads compared to other centers. By including health centers from diverse geographical locations, the study ensured a more representative sample of the pregnant women population in the area. The varying socioeconomic statuses and living conditions across these locations provided a broader perspective, enhancing the generalizability of the results to a larger population. This approach allowed the study to capture a range of socioeconomic backgrounds, which can significantly influence household food security and dietary diversity. The study population consisted of pregnant women who attended antenatal care (ANC) services at public health centers in Addis Ketema Sub-City. Specifically, it focused on those who visited the four selected health

centers during the data collection period. With a total of 3,075 pregnant women in the entire sub-city, the sample size for this study was 389 pregnant women.

The sample size was determined using the following formula, which follows the Taro Yamane method:

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

n= 3,075/1+3,075(0.05)2=354.

For a population of 3,075, the sample size calculated using the formula, with a 5% margin of error, is 354. However, it is recommended that researchers oversample by 10% to 20% of the calculated sample size to account for potential discrepancies. This is because survey studies often experience non-sampling errors, such as non-response, biases in respondent selection, mis definitions of key variables, and errors in coverage and data compilation by the researcher (Naing et al., 2006). Accordingly, considering the 10% non-response rate, the final sample size was 389.

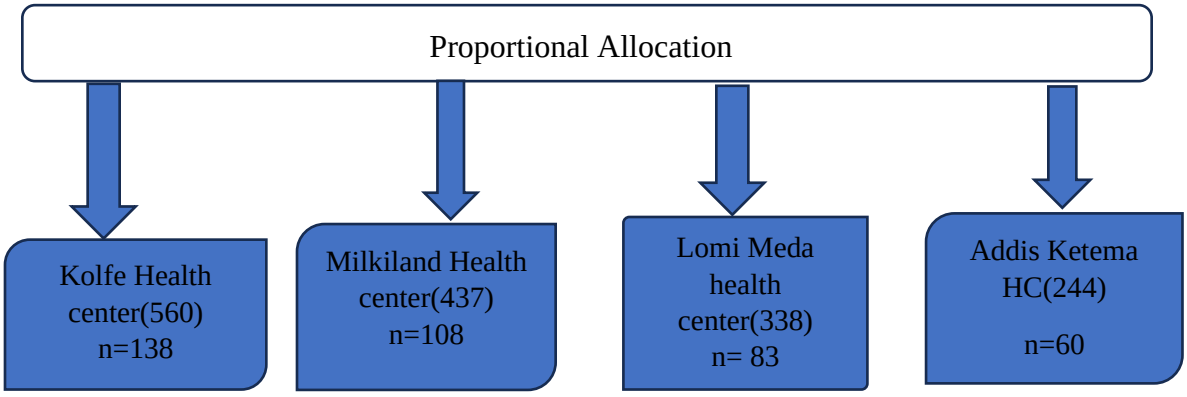

Figure 3 Follow up in The Selected Health Centers (1,579) and the 389 Study Participants Allocations

Source: Researcher's Own Drawing (2024)

3.8 Data Collection Instrument and Procedure

3.8.1 Household Food Insecurity Access Scale (HFIAS)

The study participants were interviewed by data collectors who got training concerning collecting data in relation to the status of household food security and dietary diversity. Information was gathered on demographic and socio-economic factors, pregnant women's household food security status, and their respective dietary diversity. The status of household food security was assessed using a standardized set of questions from version 3 of the Household Food Insecurity Access Scale (HFIAS) measurement guide developed by USAID's FANTA.

This guide includes nine occurrence questions that reflect increasing levels of food insecurity severity, along with nine corresponding "frequency-of-occurrence" questions to find out how frequently each conditions occurred (Coates et al., 2007).

The Food and Nutrition Technical Assistance II (FANTA) project, which was supported by USAID and collaborated with Tufts and Cornell Universities as well as other partners, created the HFIAS score between 2001 and 2006(Guerra et al., 2009). It offers an easy-to-use technique for calculating the access component of food insecurity in households (Coates et al., 2007). A quick survey is used to determine the HFIAS indicator, which measures behavioral and psychological indicators of food insecurity in a home, such as cutting back on meals or food quality because of a lack of resources. Researchers can use the survey results to categorize households according to the degree of food access insecurity (Guerra et al., 2009).

The HFIAS score has nine "occurrence" and nine "frequency-of-occurrence" items, and it employs a 30-day recall period. First, respondents were asked whether they had ever experienced a particular condition (yes or no), and if so, how frequently (rarely, occasionally, or often). The responses obtained were then converted into a continuous or categorical food security indicator. Each question was given a score between 0 and 3, with

0 denoting the least frequency of occurrence and 3 the greatest, when calculating HFIAS using a continuous indicator. The sum of the scores for every question was then calculated. Thus, the total HFIAS scores would be between 0 and 27, which would indicate the degree of food insecurity in the household. The households were then classified as either food secure, mildly food insecure, moderately food insecure, or severely food insecure. (Coates et al., 2007).

Household Food Insecurity Access category for each household is calculated by adding the results of frequency-of-occurrence questions.

HFIA category = 1 if [Q1a=0 or Q1a=1) and Q2=0 and Q3=0 and Q4=0 and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0]. Households with no or minimal food insecurity where HFIAS score range: 0-1 Which are food Secure

HFIA category = 2 if [(Q1a=2 or Q1a=3 or Q2a=1 or Q2a=2 or Q2a=3 or Q3a=1 or Q4a=1) and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0] , households experiencing worry about food, but without significant reductions in food quantity or quality, HFIAS score range: 2-7 who are mildly Food Insecure

HFIA category = 3 if [Q3a=2 or Q3a=3 or Q4a=2 or Q4a=3 or Q5a=1 or Q5a=2 or Q6a=1 or Q6a=2) and Q7=0 and Q8=0 and Q9=0], households reducing the quality of food and sometimes reducing food quantity, HFIAS score range: 8-14 who are moderately food insecure

HFIA category = 4 if [Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3] 4=Severely Food Insecure Access Households experiencing severe reductions in food quantity and possibly going without food for days, HFIAS score range: 15-27 who are severely food insecure

3.8.2 Minimum Dietary Diversity for Women (MDD-W)

The dietary diversity of pregnant women was evaluated using the Minimum Dietary Diversity for Women (MDD-W), a binary indicator that identifies whether a pregnant woman consumed five out of ten at minimum designated food groups in the past 24 hours (FAO & FHI 360, 2016). The data were collected from May 5 to 15, 2024 and all pregnant women who came to the selected four health centers during the data collection period were included in the study. The Minimum Dietary Diversity for Women (MDD-W) is a validated population-level indicator used to assess dietary diversity among women aged 15-49 years. It measures the proportion of women within this age group who have consumed at least five out of the ten pre-defined food groups in the previous 24 hours (the day or night before). This indicator is a key measure of the micronutrient adequacy of a diet, reflecting an important aspect of its overall quality. As a dichotomous indicator, MDD-W categorizes women into two groups: those who meet the minimum dietary diversity (consuming five or more of the ten food groups) and those who do not. It is widely regarded as the standard for evaluating population-level dietary diversity among women of reproductive age. To gather the necessary data for MDD-W, a questionnaire is administered to female respondents aged 15-49 years. Respondents were asked to recall the food groups they consumed over the past 24 hours. This can be done using an open-recall method, where respondents freely recall all foods they ate, and the enumerator classifies them into the corresponding food groups (FAO & FHI 360, 2016). The MDD-W indicator consists of 10 food groups; participants receive a score of 1 for a given food group if they consume at least one item in that food group; otherwise, the participant receives a score of 0 for that food group. The ten food groups required include a variety of food categories such as cereals, vegetables, fruits, dairy, and protein sources, among others

The assessment was conducted by asking participants to recall foods and drinks that they had consumed in the previous day (the last 24 hours), The total dietary diversity score was calculated and dichotomized as adequate dietary diversity (consumption of five or more food groups) or inadequate dietary diversity (consumption of less than five food groups).

3.9 Study Variables

3.10.1 Dependent Variables

The dependent variables in this study were the level of pregnant women's household food security (food secure, mildly food insecure, moderately insecure, severely insecure) and the dietary diversity of pregnant women (diversified and non-diversified).

Household Food Security: This variable assesses how easily households can access adequate, secure, and nutritious food that supports a healthy and active lifestyle. It can be measured using various indices, including food availability, accessibility, utilization, and stability.

Dietary Diversity: This variable measures the range of foods consumed by expectant mothers. It can be calculated by assessing the number of food categories consumed over a specific period, such as 24 hours.

3.10.2 Independent Variables

Independent variables influencing the dependent variables include socio-demographic and economic factors such as age, marital status, family size, education, occupation, and monthly income, as well as institutional factors like access to social protection and savings programs.

Age of pregnant women: age of pregnant women was measured in years. The age of pregnant women did not show any influence on food security.

Marital status of Pregnant women: Marital status is categorized into groups such as married, single, divorced, widowed and separated. Being married may be associated with lower food insecurity. This could be due to shared resources and support

Family Size: Family size refers to the total number of individuals living within a given household. Pregnant women's family members could be one, two, three, four and five or more than five in number.

Education Level of pregnant women and their husbands:

Years of schooling refer to the total number of years an individual has spent in formal education and successfully completed. This measure reflects educational attainment, with examples including 12 years to indicate high school completion. Educational attainment is typically classified into categories such as no formal education, primary education (e.g., completion of primary school), secondary education (e.g., completion of high school), and tertiary education (e.g., completion of college, university, or vocational training). Higher educational attainment of both pregnant women and their husbands correlates with reduced food insecurity and enhances the dietary diversity of pregnant women. Educational attainment could have helped them to have an employment opportunity and enhance their income.

Pregnant Women and their husband occupation:

This variable refers to the type of occupation both the pregnant women and their husbands engage in, and it can be categorized as housewife or husband who stays at home, engaging in private business, or an employee for government or non-governmental institutions.

Both employed women and their husbands show that employed women experience less food insecurity. Pregnant women's occupations also show a significant positive influence on dietary diversity. The occupational status of husbands was also crucial to achieving dietary diversity, particularly for husbands involved in private business. Husbands engaged in private business increase the likelihood of their wives meeting the Minimum Dietary Diversity for Women (MDD-W). The sector of employment influences access to food and the purchasing power of the household. Fluctuations in employment and income levels can impact a household's ability to afford and access food, particularly during periods of economic instability or food price volatility.

Household Income: This variable is a continuous measure, expressed in birr, representing the total monthly income of a household from all sources, including businesses, employment, remittances, rent, and others. Monthly income is a highly significant predictor, indicating that even small increases in income can greatly enhance food security. Monthly income is a significant factor in improving the consumption of a diversified diet by pregnant women.

Type of house a household lives in: This variable identifies the type of housing or residential arrangement in which a household resides. Households may live in an apartment/condominium or villa or in an informal settlement/slum. The type of house that a household lives in also shows that better housing conditions are positively associated with improved food security outcomes. However, respondents living in slum houses are relatively food insecure. This could be because improved housing often reflects a higher socioeconomic status and better access to resources that contribute to food security. Improved housing conditions also contribute to greater stability and access to a wider variety of food options.

Access to health care services

These variable references both physical and financial access of a household to health care services. A household who has health insurance can have better access to health care services. This variable did not show any significant effect on either food security or dietary diversity of pregnant women.

Access From Savings and Credit intuitions

These organizations are anticipated to be positively correlated with food security by increasing access to financial resources, which can help households invest in income-generating activities, smooth consumption, and better manage economic shocks. Access to credit service exhibits a significant positive association indicating that access to credit correlates with increased food security

Access to Training: Training is the process of equipping individuals with the essential skills required to perform their jobs effectively. Pregnant women who have access to training service have better access to diversified diet. The training may have enhanced their skill and helped them to engage in a better livelihood. food security by improving

Access to Social Support Services

It may encompass various forms of support, such as food subsidies for at-risk populations, school feeding programs, health insurance, and urban safety net initiatives. It is anticipated that by improving access to necessary resources and lowering vulnerability, the initiative will improve food security. Access to social security is also a significant factor indicating that recipients may experience higher levels of food security.

3.10 Data Quality Management

All the questionnaires were in English and then translated to Amharic. Before the collection of data from the pregnant women, the researcher instructed the data collectors, who hold BSC degrees in public health, on the methods and instruments to be utilized in the data-gathering process as well as how to get pregnant women's consent beforehand. The verbal consent of the respondents was obtained before being interviewed by data collectors. In order to guarantee data quality and prevent duplication, the questionnaire was pilot tested, questions with similar or overlapping results were eliminated, unclear questions were clarified, structures were changed, and more delicate questions were positioned near the conclusion. To guarantee data quality and allow for remote monitoring of the data collection process, the researcher uploaded all the questions onto Kobo Toolbox, a free and open mobile application.

3.11 Data Processing and Analysis

The data collected through Kobo Toolbox was downloaded, checked for completeness and consistency, and thereafter exported to SPSS version 26 (Statistical Package for Social Sciences) for analysis. The study utilized descriptive statistics, which included frequency distributions and measures of central tendency like the mean, minimum, maximum, and standard deviation, to convey and summarize the relationships between variables. Descriptive analysis was also performed to present the data in numbers and percentages.

To assess the relationship between independent and dependent variables, regression analysis was conducted. This analysis helped to determine how much variance in the dependent variable could be explained by the independent variables and identify significant predictors. The results were evaluated using p-values, with a 95% confidence interval (CI). A p-value of less than 0.05 indicated statistical significance, and an adjusted odds ratio (AOR) with 95% CI was calculated to identify statistically significant associations with the dependent variables. To check the model's fitness, the chi-Square test and Omnibus tests were applied. Respondents' food security status was estimated using their Household Food Insecurity Access Scale (HFIAS) scores. Pregnant women's dietary diversity was measured by the minimum dietary diversity of women (MDD-W). Finally, based on the data type, the results were presented in text, tables, and graphs.

3.11.1 Ordered Logit Regression

The ordered logistic regression model was used to analyze the data, providing a framework to detect the likelihood of a household being food secure, mildly secure, moderately food insecure, and severely food insecure. Since HFIAS categorizes household food access into four distinct categories: food secure, mildly food secure, moderately food insecure, and severely food insecure. The ordered logistic regression was appropriate for modeling these four variables. To evaluate the factors influencing the household's food security status, the HFIAS score was used as the dependent variable. This allowed for an in-depth examination of the factors influencing the likelihood of a household food security.

3.11.2 Binary Logistic Regression

Pregnant women were grouped as having diversified diet intake or not having diversified dietary intake. The Minimum Dietary Diversity for Women (MDD-W) indicator classifies pregnant women into two groups based on their dietary diversity: those who meet the criteria for diversified diets (consuming at least five out of ten food groups in a 24-hour recall period) and those who do not meet this threshold, indicating limited or no dietary diversity. The outcome variable is dichotomous; either a woman has a diversified diet, or she does not. Binary logistic regression is well suited for this analysis. This model allows for the estimation of the probability that a pregnant woman falls into one of these two categories based on a set of predictor variables.

3.12 Ethical Consideration

Before the collection of data from the pregnant women, ethical clearance was acquired from the Center Research Ethics Committee and College of Development Studies Institutional Review Board (IRB) of Addis Ababa University and Addis Ababa Health Bureau. The data collectors did explain the purpose of the study for the pregnant women, and the pregnant women provided verbal consent for the collection of data. The pregnant women did get verbal assurance that confidentiality will always be upheld, no one except the researcher will have access to their answers to the questions, and their identity will not be revealed in study reports. The participants were aware that if a finding from the study is released, only data pertaining to the entire group will be released. The data collectors also informed the pregnant women that participation in the interview is entirely voluntary, and it won't affect the services that the pregnant woman or anyone who is a member of their family could get from the public health centers in any way, nor will it affect their reluctance to answer or cease answering the questions.

CHAPTER FOUR: RESULTS AND DISCUSSION

4. 1 Result

4.1.1 Socio-Economic and Demographic Characteristics of The Study Participants

The results in table 1 below reveal important demographic characteristics of pregnant women in the study. A majority, 99.5%, are married, indicating a stable family structure, while only 0.3% are single or divorced. Family sizes vary, with most women living in households of two (37.5%) or three members (28.5%), indicating that many have relatively small family units. In terms of education, 8% of the pregnant women have no formal education, while 45.8% have completed primary school and 34.7% have reached secondary education. Only 11.6% pursued college education. The educational status of their husbands shows a similar trend, with 2.8% having no formal education, 30.1% completing primary school, and 39.6% achieving secondary education, while 27.5% have attended college.

Occupationally, a significant portion of the pregnant women, 65.3%, are housewives, which may limit their financial independence and access to resources. Only 20.1% are engaged in private business, and 14.7% are employed. In contrast, husbands primarily work in private businesses (66.3%) or are employed (32.6%), showing a more diverse range of occupations among men. Home ownership is remarkably low, with only 31.1% of respondents owning their homes, while 68.9% do not. The type of housing also reflects socio-economic challenges, as 75.1% of the women live in informal settlements or slums, which can limit access to essential services. The analysis of monthly income among the surveyed pregnant women shows that the mean income is 9,591.05. The standard deviation of 5,432.80 reflects significant income variability, with a range from a minimum of 1,000 to a maximum of 30,000.

Table 1 Socio-Economic and Demographic Characteristics of The Study Area

Variable	Response	Frequency	Percent
Marital Status of Pregnant Women	Single	1	0.3
	Married	387	99.5
	Divorced	1	0.3
Family Size of Pregnant Women	One	5	1.3
	Two	146	37.5
	Three	111	28.5
	Four	87	22.4
	Five and above	40	10.3
Pregnant Women Educational Status	No Formal Education	31	8
	Primary School	178	45.8
	Secondary School	135	34.7
	College Education	45	11.6
Husband Education Status	No Formal Education	11	2.8
	Primary School	117	30.1
	Secondary School	154	39.6
	College Education	107	27.5
Pregnant Women Occupation	Housewife	254	65.3
	Private business	78	20.1
	Employee	57	14.7
Husband Occupation	House Husband	4	1
	Private business	258	66.3
	Employee	127	32.6
Having own Home	No	268	68.9
	Yes	121	31.1
Type of House	Apartment/condominium	37	9.5
	House/villa	60	15.4
	Informal settlement/slum	292	75.1
	Total	389	100

Source: Researcher's own findings, 2024

The results in table 2 indicated that a majority, 83.5%, reported having access to health care services, although 16.5% indicated that their access was limited. In contrast, access to credit services appears to be more restricted, with 73.5% of respondents indicating that no credit services are available to them. Among those who do, only 23.9% reported having access to a single credit service, while only 2.6% reported the availability of various types of credit services. Additionally, the availability of credit institutions is quite limited, with 83% of participants indicating that there are no credit-providing institutions in their vicinity. Only 5.9% acknowledged the presence of a single institution, while 11.1% reported the existence of multiple credit institutions. Regarding business management training support, a significant 72.8% of respondents indicated that they did not receive any training, which shows a gap in support that could enhance their entrepreneurial skills. Also, access to social security services is very low, with 80.2% of respondents reporting no access to any social security services. Only a small fraction of participants had access to specific services such as the productive safety net support (2.1%) and school feeding programs (15.4%), while 0.5% reported access to a pension fund

Table 2 Results on Access to Different Services of The Study Area

Variable	**Response**	**Frequency**	**Percent**
Access to Health Care Service	Yes	325	83.5
	Yes, but limited	64	16.5
Access to Credit Services	No	286	73.5
	Yes, is a Credit Service	93	23.9
	Yes, there are different types of Credit service	10	2.6
Availability of credit services institution	No credit providing institution	323	83
	Yes, only one Institution	23	5.9
	Yes, there are different credit institutions	43	11.1
Business Management Training Support	No	283	72.8
	Yes	106	27.2

Availability of Social Security Services	Productive Safety Net Support	8	2.1
	School Feeding program	60	15.4
	Pension Fund	2	0.5
	Don't have Access to SSS	312	80.2
	Have access to more than one SSS	7	1.8
	Total	389	100

Source: Researcher's own findings, 2024

4.1.2 Level of Household Food Security in The Study Area

The Household Food Insecurity Access Scale results indicate that about 81.0% of the surveyed pregnant women are classified as food secure, meaning they have reliable access to sufficient food. However, 14.1% of respondents experience mild food insecurity; a smaller portion, 4.1%, is moderately food insecure, facing more pronounced difficulties in accessing food. Only 0.8% of the women are severely food insecure, representing those with extreme limitations on food access. These findings show that while most women have adequate food security, a significant minority still faces varying levels of food insecurity, which could impact their health and nutrition during pregnancy.

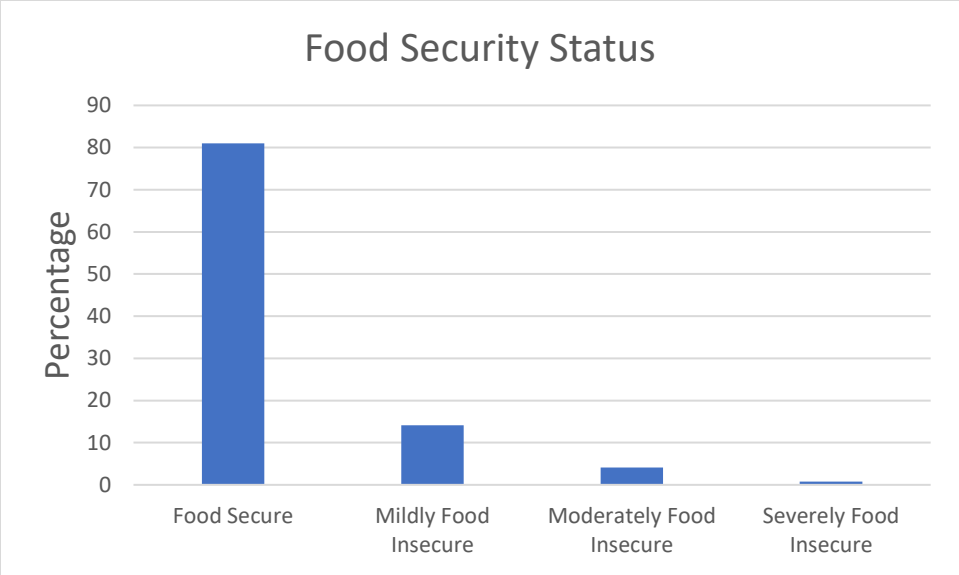

Figure 4 Household Food Insecurity Access Score (HFIAS) of The Study Area

Source: Researcher's own findings, 2024

4.1.3 Correlation Analysis of Household Food Security in The Study Area

The correlation analysis results in table 3 reveal significant relationships between the household food security status and various demographic and socio-economic factors among pregnant women. Age shows no significant correlation with food insecurity ($r = -0.049$, $p = 0.333$), while marital status indicates a small negative correlation ($r = -0.103$, $p = 0.042$), indicating that being married may be associated with lower food insecurity. Educational status emerges as a key factor, with a moderate negative correlation for both the pregnant women's education ($r = -0.243$, $p = 0.000$) and their husbands' education ($r = -0.220$, $p = 0.000$), implying that higher educational attainment correlates with reduced food insecurity. Employment status also plays a role, with a significant negative correlation ($r = -0.162$, $p = 0.001$) showing that employed women experience less food insecurity. Monthly income shows a strong negative correlation ($r = -0.421$, $p = 0.000$), revealing that higher income is significantly associated with lower food insecurity. Additionally, the type of house ($r = 0.237$, $p = 0.000$) is positively correlated with food insecurity, with respondents living in slum houses being relatively food insecure.

Conversely, limited access to credit services (r = -0.166, p = 0.001) and the availability of credit institutions (r = -0.100, p = 0.048) are negatively correlated with food insecurity, meaning that respondents with limited access to credit are less food insecure.

Table 3 HFIAS Correlation Analysis of The Study Area

Household Food Insecurity Access Scale			
Spearman's rho	Household Food Insecurity Access Scale	Correlation Coefficient	1.000
		Sig. (2-tailed)	
	Age of pregnant women	Correlation Coefficient	-.049
		Sig. (2-tailed)	.333
	Marital Status of Pregnant Women	Correlation Coefficient	-.103*
		Sig. (2-tailed)	.042
	Family Size of Pregnant Women	Correlation Coefficient	.064
		Sig. (2-tailed)	.210
	Pregnant Women Educational Status	Correlation Coefficient	-.243**
		Sig. (2-tailed)	.000
	Husband Education Status	Correlation Coefficient	-.220**
		Sig. (2-tailed)	.000
	Pregnant Women Occupation	Correlation Coefficient	-.162**
		Sig. (2-tailed)	.001
	Husband Occupation	Correlation Coefficient	.043
		Sig. (2-tailed)	.393
	Monthly Income	Correlation Coefficient	-.421**
		Sig. (2-tailed)	.000
	Having own Home	Correlation Coefficient	-.088
		Sig. (2-tailed)	-.084
	Type of House	Correlation Coefficient	.237**
		Sig. (2-tailed)	.000
	Access to Health Care Service	Correlation Coefficient	.200**
		Sig. (2-tailed)	.000
	Access to Credit Services	Correlation Coefficient	-.166**
		Sig. (2-tailed)	.001
	Availability of credit services institution	Correlation Coefficient	-.100*
		Sig. (2-tailed)	.048
	Business Management Training Support	Correlation Coefficient	-.097
		Sig. (2-tailed)	.056
	Availability of Social Security Services	Correlation Coefficient	-.096
		Sig. (2-tailed)	.058
		N	389

Source: Researcher's own findings, 2024

4.1.4 Household Food Security Ordinal Regression Analysis of The Study Area

The ordinal logistic regression analysis in Table 4 indicated the key factors affecting food security status. The overall model demonstrates a significant fit (X^2=133.992, P=0.000), indicating that the predictors collectively contribute to explaining the variability in food insecurity status. The Nagelkerke R^2 of 0.411 indicates that approximately 41.1% of the variance in food security status can be explained by the model. The goodness-of-fit tests with p-values of 1.000 show that the model fits the data well, as there is no significant difference between the observed and expected frequencies.

Table 4 Logistic Regression Model Summary and Model Fit Statistics For HFIAS

Model	-2 Log Likelihood	Chi-Square	Df	Nagelkerke	Sig.
Final	338.499	133.992	30	0.411	0.000

Source: Researcher's own findings, 2024

Table 5 Ordinal Logistic Regression Analysis of The Study Area

	Estimate	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
Marital status	-4.090	1.920	.033	-7.853	-.327
Family size	-.019	.161	.905	-.335	.296
PW Education	-.547	.252	.030	-1.042	-.053
Husband Education	.269	.228	.238	-.178	.717
PW Occupation	.055	.267	.835	-.468	.579
Husband Occupation	.322	.300	.283	-.266	.910
Monthly Income	.000	7.091E-5	.000	-.001	.000
Residential	-.017	.373	.963	-.749	.714
Housing Type	1.710	.624	.006	.487	2.933
Healthcare Service	-.213	.379	.573	-.956	.529
Credit Services	1.161	.550	.035	-2.238	-.083
Credit institution	.660	.356	.064	-.037	1.357

	Training Support	.432	.475	.363	-.499	1.363
	Social security	-.318	.180	.077	-.671	.035

Source: Researcher's own findings, 2024

4.1.5 The Level of MDD of Pregnant Women in The Study Area

The Study found out that 63.2% of the surveyed pregnant women consumed a diversified diet while 36.8% of the women did not consume a diversified diet.

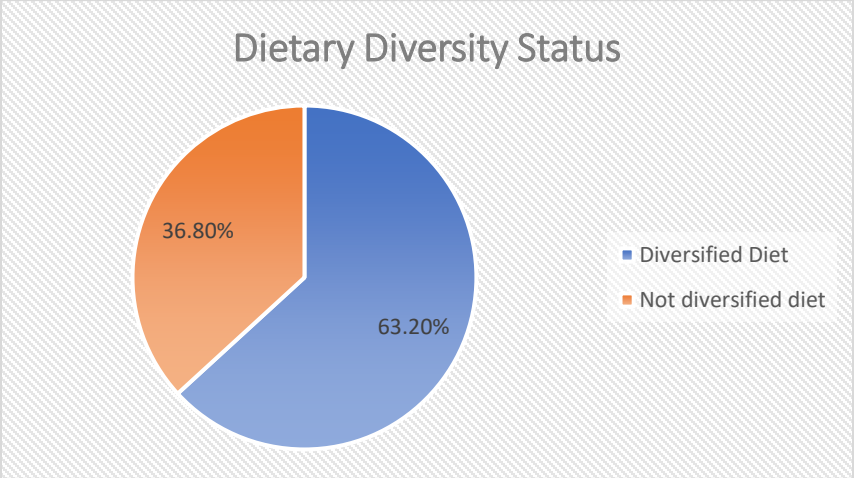

Figure 5 Pregnant Women Minimum Dietary Diversity Status

Source: Researcher's own findings, 2024

4.1.6 Pregnant Women MDD Regression Analysis of The Study Area

The binary logistic regression analysis results in Table 7 revealed the factors influencing the diversity of diets among pregnant women in the research area. The Omnibus Tests of Model Coefficients show a Chi-square value of 132.245 with a significant level (p-value) of 0.000. This indicates that the model as a whole is statistically significant. The Nagelkerke R^2 value is 0.394 indicating that approximately 39.4 % of the variance in the outcome variable (dietary diversity) can be explained by the predictors in the model. While

these values indicate a moderate level of explanatory power, they also imply that there are other factors not included in the model that may contribute to the outcome.

Table 6 Logistic Regression Model Summary and Fit Statistics of MDD-W in The Study Area

Chi-square	Df	-2 Log likelihood	Nagelkerke R Square	P-value
132.245	31	379.423	0.394	0.000

Source: Researcher's own findings, 2024

4.1.7 MDD-W Correlation Analysis of The Study Area

According to the correlation analysis of Table 6 below, Minimum Dietary Diversity, pregnant women's educational status showed a positive correlation ($r = 0.270$, $p < 0.001$), indicating that higher educational attainment is associated with greater dietary diversity. Similarly, the education level of husbands also demonstrates a positive correlation ($r = 0.300$, $p < 0.001$), showing that increased education among husbands may positively influence the dietary choices of pregnant women. Monthly income exhibits a strong positive correlation ($r = 0.410$, $p < 0.001$), implying the importance of financial resources in accessing a diverse diet. Additionally, having one's own home correlates positively with dietary diversity ($r = 0.132$, $p = 0.009$), while the type of house shows a significant positive correlation ($r = 0.260$, $p < 0.001$), indicating that housing quality may impact dietary choices. Pregnant Women's Occupational status showed a positive correlation ($r = 0.219$, $p < 0.001$), indicating that higher educational attainment is associated with better dietary diversity. Access to credit services and the availability of credit institutions both demonstrate positive correlations ($r = 0.156$, $p = 0.002$ and $r = 0.203$, $p < 0.001$, respectively), indicating that financial support systems can enhance dietary diversity. Business management training support demonstrates a positive correlation with Dietary diversity ($r = 0.107$, $p = 0.034$). In contrast, marital status and the household food insecurity access scale exhibit negative correlations ($r = -0.000$ and $r = -0.297$, $p < 0.001$, respectively), imply that food insecurity is significantly associated with lower dietary diversity. Conversely, access to healthcare services shows a negative correlation ($r = -$

0.122, p = 0.016), indicating that better access to healthcare may not necessarily lead to improved dietary diversity.

Table 7 MDD-W Correlation Analysis in The Study Area

Minimum Dietary Diversity for Women			
Spearman's rho	Minimum Dietary Diversity for Women	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
	Marital Status of Pregnant Women	Correlation Coefficient	.000
		Sig. (2-tailed)	1.000
	Family Size of Pregnant Women	Correlation Coefficient	.006
		Sig. (2-tailed)	.907
	Pregnant Women Educational Status	Correlation Coefficient	.270**
		Sig. (2-tailed)	.000
	Husband Education Status	Correlation Coefficient	.300**
		Sig. (2-tailed)	.000
	Pregnant Women Occupation	Correlation Coefficient	.219**
		Sig. (2-tailed)	.000
	Husband Occupation	Correlation Coefficient	-.081
		Sig. (2-tailed)	.111
	Monthly Income	Correlation Coefficient	.410**
		Sig. (2-tailed)	.000
	Having own Home	Correlation Coefficient	.132**
		Sig. (2-tailed)	.009
	Type of House	Correlation Coefficient	.260**
		Sig. (2-tailed)	.000
	Access to Health Care Service	Correlation Coefficient	-.122*
		Sig. (2-tailed)	.016
	Access to Credit Services	Correlation Coefficient	.156**
		Sig. (2-tailed)	.002
	Availability of credit services institution	Correlation Coefficient	.203**
		Sig. (2-tailed)	.000
	Business Management Training Support	Correlation Coefficient	.107*
		Sig. (2-tailed)	.034
	Availability of Social Security Services	Correlation Coefficient	.000
		Sig. (2-tailed)	.995
	Household Food Insecurity Access Scale	Correlation Coefficient	-.297**
		Sig. (2-tailed)	.000
		N	389

Source: Researcher's own findings, 2024

4.1.8 MDD-W Binary Regression Analysis in The Study Area

According to the results of Pregnant women binary logistic analysis in Table 8, family size and the educational status of pregnant women do not appear to significantly influence dietary diversity, as none of the categories yield statistically significant results. Conversely, the husband's education level presents a significant finding (Exp(B) = 1.522, p = 0.039). Monthly Income also presents a significant finding (Exp(B) = 1.000, p = 0.000), suggesting that higher income may positively influence and enhance dietary diversity among pregnant women. Occupational status is also crucial, particularly for husbands involved in private business, which demonstrates a significant positive relationship (Exp(B) = 2.243, p = 0.007). Pregnant women's occupations show a significant positive influence on dietary diversity (Exp(B) = 2.015, p = 0.045).

Table 8 Binary Logistic Regression Analysis of Pregnant Women in The Study Area

	B	S.E.	Sig.	Exp(B)
Family Size of Pregnant Women			.578	
Family Size of Pregnant Women (1)	.791	1.413	.576	2.206
Family Size of Pregnant Women (2)	-.363	.526	.490	.696
Family Size of Pregnant Women (3)	-.063	.512	.902	.939
Family Size of Pregnant Women (4)	.220	.504	.663	1.246
Pregnant Women Educational Status			.354	
Pregnant Women Educational Status (1)	-1.083	.789	.170	.338
Pregnant Women Educational Status (2)	-1.034	.611	.091	.356
Pregnant Women Educational Status (3)	-.671	.580	.248	.511
Husband Education Status			.039	
Husband Education Status (1)	-.158	.902	.861	.854
Husband Education Status (2)	-.517	.439	.239	.596
Husband Education Status (3)	.420	.425	.323	1.522
Pregnant Women Occupation			.045	

Pregnant Women Occupation (1)	-.247	.460	.591	.781
Pregnant Women Occupation (2)	.701	.529	.186	2.015
Husband Occupation			.019	
Husband Occupation (1)	-.818	1.637	.617	.441
Husband Occupation (2)	.808	.300	.007	2.243
Monthly Income	.000	.000	.000	1.000
Having own Home (1)	-.225	.316	.477	.799
Type of House			.046	
Type of House (1)	1.267	.710	.074	3.550
Type of House (2)	.788	.410	.055	2.199

Source: Researcher's own findings, 2024

4.2 Discussion

4.2.1 Factors Affecting Food Security in The Study Area

The current findings indicated that 19% of surveyed pregnant women's households are food insecure, which is similar to a study done in Addis Ababa (18.28%) and Pakistan (19%) (Khalid et al., 2012; Sibhatu, 2023). However, other studies found a lower result: Malda district of India (68.38%), Kinshasa (70%), Dire Dawa town (43%), Humbo (28.4%), Farta district (70.7%), Manna district (42.9%), were food insecure (Aschalew & Ayalneh, 2009; Ismail, 2012; Khalid et al., 2012; Mequanent et al., 2014; Meseret, 2022; Sadler, 2009; Worku et al., 2014). These findings highlight that food insecurity is a widespread issue globally, though its prevalence and frequency vary across different regions.

In contrast, the current study reports a relatively lower prevalence of food insecurity, with 14.1% of households experiencing mild food insecurity, 4.1% facing moderate food insecurity, and 0.8% experiencing severe food insecurity. This could suggest that factors

such as socio-economic conditions or interventions like urban productive safety nets and school feeding programs for children of pregnant women have positively influenced food security levels. The observed variation may also be attributed to differences in geographical settings and socio-economic characteristics across the study areas. For instance, it was reported that only 69.1% of pregnant women had complete food security, with significant portions experiencing varying degrees of food insecurity (Yadegari et al., 2017).

The regression analysis reveals several significant and insignificant variables influencing food security status. Among the significant predictors, monthly income is highly significant (B=0.000, p = 0.000), indicating that even small increases in income can greatly enhance food security. The correlation analysis also indicated that monthly income shows a strong negative correlation (r = -0.421, p = 0.000), revealing that higher income is significantly associated with lower food insecurity. Income enables households to access diverse and nutritious foods, reducing reliance on coping strategies such as skipping meals or prioritizing less nutritious options. This highlights the importance of income-generating activities and economic empowerment programs in enhancing household food security. Similarly, it was found that monthly household income, the husband's occupation, and education were significant factors influencing food security in Jashore, Bangladesh (Ahmed et al., 2019).

Income was found to be negatively associated with food insecurity among pregnant women in North Carolina, as emphasized by. (Laraia et al., 2006) The study's findings indicate that household income level is the strongest predictor of household food security status. A study conducted in Iran identified a significant correlation between income and food insecurity, revealing that low-income families are three times more likely to experience food insecurity than others (Yadegari et al., 2017)

Furthermore, studies conducted in various Ethiopian towns such as in Wolita Sodo town, Dire Dawa, Bahirdar, and Godar town showed that compared to households with lower earnings, those with greater monthly incomes had a lower likelihood of experiencing food insecurity (Abraham et al., 2017; Aschalew & Ayalneh, 2009; Dersolegn et al., 2023).

Housing type also shows significance (B = 1.71, p = 0.006), showing that better housing conditions are positively associated with improved food security outcomes. Additionally, the type of house (r = 0.237, p = 0.000) are positively correlated with food insecurity with respondents living in slum houses are relatively food insecure. Previous studies also indicated significant correlations between food security and factors like housing (P = 0.000) and husband's occupational status (P = 0.002) (Yadegari et al., 2017).

Accordingly, to the current study educational status emerges as a key factor, with a moderate negative correlation for both the pregnant women's education (r = -0.243, p = 0.000) and their husbands' education (r = -0.220, p = 0.000), implying that higher educational attainment correlates with reduced food insecurity. It was also found that education level is a significant determinant of food insecurity among urban households, with a statistically significant association at $P < 0.05$ (Ephrem et al., 2024). The findings different studies indicated that households headed by individuals with higher levels of education are more likely to experience food security compared to those led by illiterate household heads (Abraham et al., 2017; Adimasu et al., 2019; Ngema et al., 2018; Tsegamariam & Wakjira, 2019). This observation is grounded in the idea that education plays a crucial role in both individual and societal advancement. Education contributes to improved work efficiency, skill development, diversified income opportunities, and the ability to create an environment that supports the education of dependents. Ultimately, this approach can lead to lasting improvements in living standards, contrasting sharply with the challenging conditions often faced by those without educational opportunities(Akukwe, 2020; Habta et al., 2023).

As per the current study. Age of pregnant women shows no significant correlation with food insecurity (r = -0.049, p = 0.333) and the current finding contradicts other studies. There was a positive correlation between household food insecurity and the age of the head of the family. As people grow older, the experience may increase their understanding of the potential advantages of having a variety of livelihood options and enhance the food security of their family (Dersolegn et al., 2023; Ephrem et al., 2024; Malla et al., 2017; Militao et al., 2023). Conversely, other studies have identified a negative relationship between age and household food insecurity. As people age, they may experience a decline in energy and

face limited employment opportunities, which can hinder their ability to engage in income-generating activities (Ejigayhu & Abdi-Khalil, 2012; Militao et al., 2023).

Marital status indicates a small negative correlation (r = -0.103, p = 0.042), indicating that being married may be associated with lower food insecurity. This finding aligns with similar studies conducted in Wolaita Sodo, South Africa, Dire Dawa and, Bahirdar Town. Married households tend to reduce expenses that they would have otherwise incurred separately, contributing to improved food security (Aschalew & Ayalneh, 2009; Dersolegn et al., 2023; Ndobo & Sekhampu, 2013).

The current study found out that employment status also plays a role, with a significant negative correlation (r = -0.162, p = 0.001) showing that employed women experience less food insecurity. A study conducted in Wolaita Sodo similarly found that employed women experienced lower levels of food insecurity (Abraham et al., 2017). However, self-employed women were able to manage multiple jobs, which helped them partially offset the impact of high food prices. In addition, studies conducted in Bangladesh and India align with the current study (Chinnakali et al., 2014; Faridi & Wadood, 2010).

Additionally, credit services exhibit a significant positive association (B = 1.154, p = 0.034), indicating that access to credit correlates with increased food security. Credit enables households to bridge income gaps during difficult periods, invest in food production, or purchase food items. However, the association being negative indicates that credit may act as a buffer during food insecurity crises rather than a long-term solution. Effective credit mechanisms tailored to the needs of food-insecure households could strengthen this relationship further. Access to credit services has been found to be negatively related to food insecurity, as reported by (Aschalew & Ayalneh, 2009; Dersolegn et al., 2023). Their findings align with the findings of the current study. Similarly, poor households in developing countries are particularly vulnerable to food insecurity, even when overall food supplies are adequate. This vulnerability arises because these households often lack access to credit, preventing them from diversifying into income-generating activities that could help buffer against unpredictable shocks and seasonal fluctuations (Islam et al., 2016). Furthermore, a study carried out in Bangladesh showed

that microcredit has benefited three crucial areas of national development: food security, women's empowerment, and poverty reduction (Sharmin, 2014). The findings of the current study, however, contradict the findings of some of the previous studies (Abraham et al., 2017; Phami et al., 2020).

Access to social security is also significant (B =0.368, p = 0.037), indicating that recipients may experience higher levels of food security. This suggests that households receiving social safety nets, such as cash transfers or food assistance, are less likely to experience food insecurity. These programs provide critical support, particularly for vulnerable populations, helping stabilize access to food and reduce the severity of food insecurity. Food security was shown to be higher among households that took part in urban productive safety net initiatives than among those that did not ($p < 0.05$). This result aligns with earlier research findings (Ephrem et al., 2024; Yibrah, 2014). The rationale behind urban productive safety net programs can be explained by the fact that these programs empower urban communities facing persistent food insecurity. They also promote asset creation and strengthen resilience, ultimately advancing efforts toward achieving food self-sufficiency (Diriba et al., 2017; Wondim, 2018).

4.2.2 MDD-W in the study area and Its Association with Food Security

The current research shows a strong correlation between pregnant women decreased dietary diversification and household food insecurity, aligning with previous research. This connection underscores the critical role food security plays in shaping dietary choices of the pregnant women, as food secure households can afford and prioritize diverse food groups necessary for balanced nutrition. Conversely, pregnant women who live in a household facing food insecurity may have limited dietary diversity options, often relying on staple foods that lack variety and essential nutrients, which can negatively impact dietary quality and overall health outcomes. For instance, a significant relationship between family food security status and diversified diet consumption was reported, highlighting that households with better food security are more likely to provide access to a variety of nutritious foods (Sudaryati et al., 2021).

Likewise, research in the Gurage Zone has discovered a statistically significant correlation between food security and sufficient dietary diversification. The dietary diversity of pregnant women with secured food is higher than that of those with unsecured food (severely food insecure) (Tolesa et al., 2022). A study conducted in the Tigray region found similar results (Kemal & Mukemil, 2019).

Similar research in Malaysia demonstrated that pregnant women experiencing food security were more likely to maintain adequate dietary diversity compared to their food-insecure counterparts (Mohamadpour et al., 2012). Additionally, pregnant women from food-insecure households were reported to be nearly twice as likely to be undernourished, reinforcing the notion that food insecurity has a significant adverse effect on nutritional outcomes. Addressing food insecurity in such contexts is therefore critical to improve maternal and child health outcomes (Mamo et al., 2018). Conversely, it was found that household food insecurity was not linked to overall diet quality, indicating variability in how food security impacts dietary patterns (Gamba et al., 2016).

4.2.3 Factors Associated with MDD of Pregnant Women in The Study Area

The Minimum Dietary Diversity for Women survey results showed that 63.2% of the surveyed pregnant women consumed a diversified diet, indicating access to a variety of food groups that support nutritional health. Conversely, 36.8% of the women do not have a diversified diet, which may limit their nutrient intake and impact their overall health during pregnancy. This study is almost identical to one that was carried out in Tigray, northern Ethiopia, northern Ethiopia (61.2%) and Kolfe Keranyo sub city health centers, Addis Ababa (60.9%) (Kemal & Mukemil, 2019; Walelgn et al., 2020).However, the results of this study are higher than those of similar studies conducted in Dire Dawa City, Eastern Ethiopia (43.0%) , East Gojjam Zone, Northwest Ethiopia (44.3%), Bale Zone, Southeast Ethiopia (44.8%) , Northern Ghana (46.1%) and Bangladesh (37%) (Aman et al., 2018; Saaka et al., 2017; Shamim et al., 2016; Sintayehu & Bedasa, 2019; Tebikew et al., 2019).

According to the current study pregnant women's educational status showed a positive correlation ($r = 0.270$, $p < 0.001$), indicating that higher educational attainment is associated with greater dietary diversity. The current findings align with previous research highlighting socioeconomic factors; for instance, it was found that maternal education and access to nutritional information were strongly associated with dietary diversity practices, with mothers who could read and write having higher odds of consuming a diverse diet (OR = 1.82), which means mothers who read and write were 1.82 times more likely to consume a diverse diet compared to those who are illiterate (Abebaw et al., 2021).

This indicates that education plays a vital role in enhancing dietary choices. In addition, studies conducted in Gurage, Northeast Ethiopia, Nepal, Kenya, and rural Bangladesh revealed that pregnant women who had completed elementary, secondary, college, and higher education levels had more varied and appropriate diets than those who were illiterate (Kiboi et al., 2017; Seid et al., 2019; Shamim et al., 2016; Shrestha et al., 2021; Tolesa et al., 2022). The researchers clarified that, compared to illiterate pregnant women, educated women often have better job opportunities and a steady income, which can directly or indirectly enhance their purchasing power for various foods and agricultural inputs. Additionally, more educated women may possess valuable knowledge about proper feeding practices.

The finding of the current study also indicated that husbands' education status is significantly associated with dietary diversity suggests that higher levels of education among husbands positively influence their wives' dietary diversity. Specifically, the odds ratio (Exp(B) = 1.522) implies that for each level of increase in the husband's education, the likelihood of the pregnant woman meeting the minimum dietary diversity (MDD-W) threshold increases by approximately 52.2%.

The current finding indicated that monthly income is a highly significant factor ($p = 0.000$) in improving dietary diversity suggests a strong and direct relationship between household income and the variety of foods consumed by pregnant women. This result is consistent with the premise that greater financial resources enable households to access a wider range of foods, including those from various food groups that contribute to a diverse and balanced diet. This finding complements the results from a study where women from households with greater wealth were more likely to eat a varied diet, supporting the notion that eating

habits are influenced by their financial status (Shrestha et al., 2021). Additionally, research revealed that pregnant women with greater monthly incomes were more likely than their counterparts to have had a varied diet (Kiboi et al., 2017; Tolesa et al., 2022; Vakili et al., 2013). The regression analysis showed that Pregnant women's occupations also show a significant positive influence on dietary diversity (Exp(B) = 2.015, p = 0.045). The correlation analysis also supports this, pregnant women's occupational status showed a positive correlation ($r = 0.219$, $p < 0.001$), indicating that employment is associated with better dietary diversity. The current study indicated that Pregnant women who are employed have a higher likelihood of achieving adequate dietary diversity compared to unemployed counterparts. Employment among pregnant women often correlates with financial autonomy, enabling them to make independent decisions about food purchases and dietary choices. Working women might also have better exposure to nutritional information through workplace health programs or interactions.

The current study also found out that occupational status was also crucial, particularly for husbands involved in private business, which demonstrates a significant positive relationship (Exp(B) = 2.243, p = 0.007), husbands engaged in private business increase the likelihood of their wives meeting the Minimum Dietary Diversity for Women (MDD-W). This suggests that private business ownership or involvement, often associated with higher income stability and entrepreneurial flexibility, positively impacts household dietary diversity. This can lead to greater financial resources for purchasing a diverse range of foods.

Moreover, while previous studies emphasized maternal education and wealth status, the current analysis introduces housing types as a significant factor (B = 1.71, p = 0.006) (Melaku et al., 2019; Seid et al., 2019). Additionally, the current study highlights that improved housing conditions can contribute to greater stability and access to a wider variety of food options, an aspect that previous research has not explicitly explored. While previous reports have focused on education and wealth, the current findings do not show maternal education as significantly associated with dietary diversity.

CHAPTER 5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study aimed to investigate the level of food security and dietary diversity among pregnant women in Addis Ketema Sub City. The demographic characteristics of the participants reveal a predominantly married population with varying educational backgrounds. While a significant portion of the women have completed primary education, there remains a notable percentage with no formal education. The occupational distribution indicates that many women are housewives, which may limit their access to financial resources and, consequently, their dietary choices. Additionally, the low rate of home ownership and the prevalence of informal housing show the socio-economic challenges faced by these women, potentially impacting their food security and dietary diversity.

The findings regarding food security indicate that a majority of the pregnant women surveyed are classified as food secure, yet a considerable minority experiences varying degrees of food insecurity. This variation emphasizes the requirement for focused actions to assist individuals who are having difficulty accessing foods. The correlation analysis reveals significant relationships between food security status and various demographic factors, including educational attainment and employment status. Higher education levels among both pregnant women and their husbands correlate with reduced food insecurity, emphasizing the importance of education in improving dietary outcomes. Additionally, employment status and monthly income emerge as key factors, implying that economic stability is vital for ensuring food security during pregnancy. Moreover, the analysis of housing conditions indicates that women living in slum areas are more likely to experience food insecurity. The study also identifies access to credit services as a significant factor negatively associated with food insecurity, indicating that financial support can enhance food access for pregnant women.

The findings of the study on dietary diversity among pregnant women in the study area reveal that a majority of participants consume a diversified diet, which is essential for their nutritional health during pregnancy. However, many women lack access to a variety of food groups, potentially compromising their nutrient intake and overall health. The findings also show that higher educational attainment among both pregnant women and their husbands is associated with better dietary choices. Additionally, higher income levels were also correlated to a more varied diet. The positive correlation between home ownership and dietary diversity further emphasizes the importance of stable living conditions in facilitating better nutritional choices. The education level of husbands and their occupational status had a positive impact. This points to the importance of support from partners in enhancing dietary choices. Additionally, women's employment status is linked to improved dietary diversity, showing that economic empowerment can lead to better nutritional outcomes.

5.2 Recommendations

Based on the findings presented above, the following recommendations are made to different stakeholders:

- Financial institutions and NGOs should develop microfinance programs to support income-generating activities for pregnant women, enabling them to improve their financial stability and access to diverse food options.
- Addis Ketama sub-city Food security offices should facilitate access to affordable and diverse food options through community programs, food cooperatives, and partnerships with local markets to ensure that pregnant women can obtain a variety of nutritious foods.
- Addis Ketema Sub City Government Construction Office should advocate for policies aimed at improving housing conditions in informal settlements, as stable and safe living environments can positively impact access to food and overall well-being.

- Health centers in Addis Ketema sub-city should engage in awareness campaigns about the importance of nutrition during pregnancy, targeting both men and women to promote shared responsibility for dietary choices.
- Further research should be conducted to investigate the obstacles faced by pregnant women in accessing diverse food options, including cultural, economic, and geographic factors.
- Longitudinal studies should be initiated to assess the long-term impacts of dietary diversity on maternal and child health outcomes.

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Annexes

Annex 1. Information Sheet

Information sheet and Form of Consent for Pregnant Women (English version)

Addis Ababa University, College of Development Studies, Department of Food Security and Development Studies.

Section **I: Information Sheet**

1. Name of the study area (hospitals): _____
2. Questionnaire identification no. _____

INTRODUCTION: Good morning/afternoon? My name is _____.

We kindly ask for your assistance in a brief (20–30 minute) conversation, conducted by Addis Ababa University's College of Development Studies. Before we begin, please listen to the study's purpose and conditions, then let us know if you agree to participate.

This study aims to assess household food security and dietary diversity among pregnant women attending ANC clinics in public hospitals in Addis Ketema sub-city. The study will be conducted through interviews. The findings will help design food security interventions for pregnant women and inform government sectors about barriers to dietary diversity.

Confidentiality will be always maintained. Each participant will be assigned a unique code; names will not be used. Your responses will remain private, and your identity will not be revealed in reports. Only group data will be shared in any published results.

Participation is voluntary. Your choice to participate, decline, or withdraw will not affect the services you or your family receive.

1.**[X] Yes. 2. [X] No. Thank** you!!! NB: 1. Proceed to the consent form if the study participants agree to take part.

Annex 2. Form of Consent

Section II. Form of Consent for Expectant Mothers (English Version)

I have been informed about the purpose of this research project and understand that I will respond to the questions based on my knowledge of the topic. I am aware that the information I provide will be used solely for this study and that my personal details will remain confidential.

I understand that my participation is entirely voluntary, and I have the right to decline participation or refuse to answer any questions. Additionally, I have been informed that I may withdraw from the process at any time by choosing not to respond to further inquiries.

With this understanding, I willingly consent to participate in this study.

NB: 1. If the study subject is willing to participate in the study, start the interview.

1. The interviewer's signature certifies that informed consent has been given verbally by the respondent.

Name _____

Signature _____

Date _____

Do not hesitate to approach the lead investigator or the interviewer for clarification if necessary.

Address of the interviewer

Selamawit Bekele

Addis Ababa University, College of Development Studies, Department of Food Security,

Mobile: 09-13-20-00-27

Email: elshalomhabtamu@gmail.com

Annex 3. English and Amharic Version of The Questionnaire

Table 1 Socio-Economic and Demographic Characteristics

S.no.	Question	Response	Skip
1.	Age	18-39 40-49 50-54	
2.	Marital status	Single Married Divorced widowed Separated	
3.	Family size	One Two three four Five and above	
4.	Educational level	No formal educ. Primary School Secondary Sch. College Edu. Other Specify_____	
5.	Husband Educational level	No formal Edu. Primary School Secondary Scho College Education. Other Specify___	
6.	Your Occupation	Housewife Private business Employee Other Specify _____	
7.	Your husband occupation	Househusband Private business Employee Other Specify _____	
8.	Monthly income	_____	

Table 2 Socio-Economic Characteristics

S.no.	Question	Response	Yes	No
1.	What type of housing do you live in?	1.Apartment/condominium 2. House/villa 3. Informal settlement/slum 4. Other (please specify) _____		
2.	Do you have access to healthcare services?	1.Yes, I have health insurance and regular access to healthcare. 2. Yes, but I have limited access to healthcare due to financial constraints. 3.No, I do not have access to healthcare services.		
3.	Do you have access to Credit services?	No there is no credit service Yes, there is a credit service Yes, there are different credit service		
4.	Are there institution in your area that give credit services	1.No, there is no institution 2.Yes, there is only one institution 3. Yes, there are different institutions		
5.	Is there any training support in addition to the credit service?	1.No, I did not get any training support 2.Yes, I got training support		
6	Do you have access to any social security services	Productive safety net support 2. Schol Feeding program Pension Fund		

Table 3: Questions on Household Food Insecurity Access Scale (HFIAS)

No	Questions	Answer	Code
2.1	In the past four weeks, did you worry that your household would not have enough food?	0= Yes 1= No (skip to Q2.2)	
2.1a	How often does this happen?	= Rarely = Sometimes = Often	
2.2	In the past four weeks, were you or any HH member not able to eat the kinds of foods you preferred because of a lack of resources?	0= Yes 1= No (skip to Q3)	
2.2a	How often does this happen?	1= Rarely 2= Sometimes 3 = Often	
2.3	In the past four weeks, have you or any HH member have to eat a limited variety of foods due to a lack of resources?	0=Yes 1= NO (skip to Q4)	
2.3a	How often does this happen?	= Rarely = Sometimes = Often	
2.4	In the past four weeks, did you or any HH member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0= Yes 1= No (skip to Q5)	
2.4a	How often did this happen?	= Rarely = Sometimes = Often	

2.5	In the past four weeks, did you or any HH member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = Yes 1= No (skip to Q6)	
2.5a	How often did this happen?	= Rarely = Sometimes = Often	
2.6	In the past four weeks, did you or any other HH member have to eat fewer meals in a day because there was not enough food?	0 = Yes 1= No (skip to Q7)	
2.6a	How often did this happen?	= Rarely = Sometimes = Often	
2.7	In the past four weeks, was there ever no food to eat of any kind in your HH because of lack of resources to get food?	0= Yes 1= No (skip to Q8)	
2.7a	How often does this happen?	= Rarely = Sometimes = Often	
2.8	In the past four weeks, did you or any HH member go to sleep at night hungry because there was not enough food	0 = Yes 1= No (skip to Q9)	
2.8a	How often did this happen?	= Rarely = Sometimes = Often	
2.9	In the past four weeks, did you or any HH member go a whole day and night without eating anything because there was not enough food?	0 = Yes 1= No	

2.9a	How often did this happen?	= Rarely = Sometimes = Often	

Table 4: Minimum Dietary Diversity for Women (MDD-W)

Questions	Yes?	Yes?	Remark
Did you consume any food items yesterday or last night?			
Did you eat any of the following food groups?			
Grains, white roots, tubers, and plantains			
Pulses (beans, peas, lentils)			
Nuts and seeds			
Dairy			
Meat, poultry, and fish			
Eggs			
Dark green leafy vegetables			
Other vitamin A-rich fruits and vegetables			
Other vegetables			

የመረጃ ወረቀት አማርኛ ቅጂ

ነፍሰ-ጡር የሆኑ ሴቶች የመረጃ መስጫና የፈቃደኝነት መጠየቂያ ቅጽ

አዲስ አበባ ዩኒቨርስቲ

ኮሌጅ አፍ ዴቬሎፕመንት ስትዴይስ

የመረጃ መስጫ ቅጽ

1. ጥናቱ የሚካሄድበት ሆስፒታል ስም ----------
2. የመጠይቁ መለያ ቁጥር ----------

መግቢያ፡

እንደምን አደሩ/ዋሉ፤

ስሜ ---------- ይባላል። በአዲስ አበባ ዩኒቨርስቲ፤ በኮሌጅ ኦፍ ዴቬሎፕመንት ስደተዲይስ ት/ቤት አስተባባሪነት በሚከናወነው ጥናት እኔና አርሰዎ አጠር ያለና ከ 15-20 ደቂቃ የሚወስድ ውይይት ይኖረናል። ለዚህምም ውይይት እንዲተባበሩኝ በትህትና እጠይቃለሁ። ወደ ውይይቱ ከመግባታችን በፊት ስለ ጥናቱ አላማና ጠቅላላ ሁኔታ ስለማነብልዎት በጥሞና እንዲያዳምጡኝ እጠይቃለሁ፡ በመጨረሻም በጥናቱ ለመሳተፍ መስማማተዎንና አለመስማማትዎን ይነግሩኛል።የዚህ ጥናት አላማ በአዲስ ከተማ ክፍለ ከተማ የሚኖሩ ሴቶች የቤተሰባቸውን የምግብ ዋስትና እና የራሳቸውን የተመጣጠነ ምግብ አመጋገብን ለማጥናት ሲሆን ጥናቱ የሚካሄዴበት መንገድ በመረጃ ሰበሳቢው በሚቀርብ መጠይቅ ይሆናል። እርሰዎ የሚሰጡት መረጃ በአዲስ አበባና በሀገር አቀፍ ደረጃ የሚገገኙ ነፍሰ-ጡር ሴቶች ስለ ምግብ የሚያስፈልጋቸውን መረጃ ለማድረስ ይረዳል። በቆይታዎ ምስጢር እንደምንጠብቅ እያረጋገጥኩኝ ለእያንዲነደ ተሳታፊ የተለየ መለያ ቁጥር ያለው ሲሆን ስምዎን ግን አንጠቅስም። ለማንኛውም ጥያቄ የሚሰጡት ምላሽ ለሌላ ሰው ተላልፎ አይሰጥም። የጥናቱ ውጤት ሪፖርትም ስለእርሰዎ አይገልጽም። በተጨማሪም የጥናቱ ሪፖርት ቢታተም የሚያወጣው ስለአጠቃላይ ተሳታፊ ሰዎች ብቻ ይሆናል። መጠይቁ በፈቃደኝነት ላይ ብቻ ሲሆን የእርሰዎ መሳተፍ ወይም አለመሳተፍ እንዲሁም ጥያቄዎችን ለመለስ ፈቃደኛ አለመሆንና በጥያቄው ወቅት አቋርጦ መውጣት አሁንም ይሁን ወደፊት እርሰዎም ይሁኑ ቤተሰበዎ በሚያገኙት አገልግሎት ላይ ምንም አይነት ተጽዕኖ አይኖረውም፤ በጥናቱ ሊይ ተሳታፊ በመሆነዎም የሚሰጥ ክፍያም አይኖርም።

ለመሳተፍ ፈቃደኛ ነዎት?

1. ( ) አዎ 2. ( ) አይደለሁም

አመሰግናለሁ!!

ክፍል 2፡ ነፍሰ-ጡር የሆኑ ሴቶች የፈቃደኝነት መጠየቂያ ቅጽ

ከታች ፊርማዬን ያኖረኩት እኔ የጥናቱ ዓላማ የተነገረኝ ሲሆን ለምጠየቀው ጥያቄ የማቀውን መመለስ እንደምችል፤ እኔ የምሰጠው ምላሽ ለዚህ ጥናት አገልግሎት ብቻ የሚውል ሲሆን ስሜንና የምሰጠውን መረጃ በምስጢር እንደሚጠበቅ ተነግሮኛል። ፍላጎት ከሌለኝ በጥናቱ ያለመሳተፍ ፤ጥያቄ ያለመመለስና በጥያቄው መካከል አቋርጬ መውጣት እንደምችል ተነግሮኛል።

በዚህ መሰረት በጥናቱ ለመሳተፍ ፈቃደኛ መሆኔን በፊርማዬ አረገግጣለሁ

ፈርማ ---------- ቀን ----------

ማስታዎሻ፡

1. የጥናቱ ተሳታፊ በጥናቱ ፈቃደኛ ከሆኑ መጠይቁን ይጀምሩ።
2. የጥናቱ ተሳታፊ ፈቃደኛ መሆናቸውን የሚያረጋግጥ የመረጃ ሰብሰባቢው ስምና ፊርማ

ስም _____
ፈርማ_____
ስልክ _____

ማንኛውም ገለጻ የሚያስፈልጋቸው ነገሮች ካሉ መረጃ ሰበሰባቢውንም ሆነ ዋና ተመራማሪውን በአካልም ሆነ በአድራሻው ይጠይቁ።

<u>የዋና ተመራማሪው አድራሻ፡</u>

ሰላማዊት በቀለ

አዲስ አበባ ዩኒቨርሲቲ፤ ኮሌጅ ኦፍ ዴቨሎፕመንት ስተዲስ፤ የምግብ

ዋስትና የትምህርት ክፍል፤ ድህረ ምረቃ ት/ቤት

ስልክ ቁጥር 0913200027

ኢሜሌ፡ elshalomhabtamu@gmail.com

አዲስ አበባ

ክፍል አንድ፡ ማህበራዊና ነባራዊ ሁኔታ

ተ.ቁ	ጥያቄ	መልስ	
1.	ዕድሜ (በዓመት)	18-39 40-49 50-54	
2.	የጋብቻ ሁኔታ	1.	ያላገባ
		2.	ባለትዳር
		3.	የፈታች
		4.	ባል የሞተባት
		5.	ሌላ ካለ (ይጠቀስ) _____
3.	የቤተሰብ ብዛት	1.	አንድ
		2.	ሁለት
		3.	ሦስት
		4.	አራት
		5.	አምስትና ከዛ በላይ
4.	የትምህርት ደረጃ	1.	መደበኛ ት/ት ያልተማረ
		2.	1-8ኛ ክፍል
		3.	9-12ኛ ክፍል
		4.	የኮሌጅ ት/ት እና ከዛ በላይ
5.	የባለቤትዎ የት/ት ደረጃ	1.	መደበኛ ትምህርት ያልተማረ
		2.	1-8ኛ ክፍል

		3.	9-12ኛ ክፍል
		4.	የኮሌጅ ት/ት እና ከዚያ በላይ
6.	የስራ ሁኔታ	1.	የቤት እመቤት
		2.	የግል ስራ
		3.	የመንግስት ሰራተኛ
		4.	ሌላ ካለ ይጠቀስ
7.	የባለቤትሽ የስራ ሁኔታ	1.	የቤት እመቤት
		2.	የግል ስራ
		3.	የመንግስት ሰራተኛ
		4.	ሌላ ካለ ይጠቀስ
8.	የወር ገቢ		_____

ክፍል ሶስት፡ የተመጣጠነ ምግብ አመጋገብን በተመለከ

ጥያቄ	መልስ
ከሚከተሉት የምግብ አይነቶች ውስጥ ላለፈት 24 ስዓት የተመገቦቸውን እየመረጡ በምርጫው ላይ ምልክት ያድርጉ	
ጥራጥሬዎች	
አትክልት	
ፍራፍሬ	
ስራስር	
ስጋ ነክ	
እንቁላል	
አሳና የባህር ምግብ	
ወተትና የወተት ተዋፆ	
ስብ/ቅባት ነክ	
ማር እና ጣፋጭ ምግቦች	
ሌላ የመሳሰሉትን	

ክፍል 2፡ አጠቃለይ የቤት ወስጥ የምግብ እጥረትን በተለመከተ

ተ.ቁ	ጥያቄ	መልስ	ኮድ
2.1	ለባለፈት 4 ሳምንታት በቤት ውስጥ ምግብ አጣለሁ የሚል ስጋት አድሮበዎት ነበር	1.አዎ አላደረብኝም (ካሉ ወደ ተራ ቁ 2.2 ይለፈ)	
2.1a	ምን ያክል ጊዜ ስጋት አደረበዎት	1.ብዛት የለውም 2.አልፎ አልፎ 3.ብዙ ጊዜ	
2.2	ለባለፈት 4 ሳምንታት በችግር ምክኒያት በቤት ምግብ ሳይበለ የቀረ አለ	1.አዎ 2.አላደረብኝም (ካሉ ወደ ተራ ቁ 2.3 ይለፈ)	
2.2a	ምን ያክል ጊዜ	1.ብዛት የለውም 2.አልፎ አልፎ 3.ብዙ ጊዜ	
2.3	ለባለፈት 4 ሳምንታት በችግር ምክኒያት በቤት የምግብ አይነቶች ሳይበላ የቀረ አለ	1.አዎ 2.አላደረብኝም (ካሉ ወደ ተራ ቁ 2.4 ይለፈ)	
2.3a	ምን ያክል ጊዜ	1. ብዛት የለውም 2.አልፎ አልፎ 3.ብዙ ጊዜ	

2.4	ለባለፈት 4 ሳምንታት በችግር ምክኒያት በቤት ማይቆልገውን ምግብ የተገበ አለ	1.አዎ 2.አላደረብኝም (ካሉ ወደ ተራ ቁ 2.5 ይለፈ)	
2.4a	ምን ያክል ጊዜ	1.ብዛት የለውም 2.አልፎ አልፎ 3.ብዙ ጊዜ	
2.5	ለባለፈት 4 ሳምንታት በችግር ምክኒያት በቤት ትንሽ ምግብ የተገበ አለ	1.አዎ 2.አላደረብኝም (ካሉ ወደ ተራ ቁ 2.6 ይለፈ)	
2.5a	ምን ያክል ጊዜ	1.ብዛት የለውም 2.አልፎ አልፎ 3.ብዙ ጊዜ	
2.6	ለባለፈት 4 ሳምንታት በችግር ምክኒያት በቤት በጣም ትንሽ ምግብ የተገበ አለ	1.አዎ 2.አላደረብኝም (ካሉ ወደ ተራ ቁ 2.7 ይለፈ)	
2.6a	ምን ያክል ጊዜ	1.ብዛት የለውም 2.አልፎ አልፎ 3.ብዙ ጊዜ	

2.7	ለባለፈት 4 ሳምንታት በችግር ምክኒያት በቤት ምንም ምግብ ሳይኖር የቀረበት ጊዜ አለ	1.አዎ 2.አላደረብኝም (ካሉ ወደ	
		ተራ ቁ 2.8 ይለፈ)	
2.7a	ምን ያክል ጊዜ	1.ብዛት የለውም 2.አልፎ አልፎ 3.ብዙ ጊዜ	
2.8	ለባለፈት 4 ሳምንታት በችግር ምክኒያት ከቤተስብ አባል እራት ሳይበላ የተኛ አለ	1.አዎ 2.አላደረብኝም (ካሉ ወደተራ ቁ 2.9 ይለፈ)	
2.8a	ምን ያክል ጊዜ	1.ብዛት የለውም 2. አልፎ አልፎ 3.ብዙ ጊዜ	
2.9	ለባለፈት 4 ሳምንታት በችግር ምክኒያት ከቤተሰብ አባል ቀንም አዳርም ሳይበላ የቀረ አለ	1.አዎ 2.አላደረብኝም	
2.9a	ምን ያክል ጊዜ	1.ብዛት የለውም 2.አልፎ አልፎ 3.ብዙ ጊዜ	

Annex 4 Glossary of Terms/Words

Antenatal Care: Healthcare provided to women from the beginning of pregnancy until the baby is born.

Food secure HH: The household rarely experiences food insecurity or concerns about food availability, indicating minimal or infrequent instances of such conditions (Coates et al., 2007).

Household: A group of individuals, regardless of their relationships, usually live together in the same household and share common cooking and dining practices (CSA, 2012).

Household food Security: Refers to households having adequate, safe, and nutritious food to meet their dietary needs and preferences for an active, healthy life (Smith et al., 2017).

Household size: The total count of individuals residing in a household (CSA, 2012).

Mildly food insecure (access) HH: Mildly food-insecure individuals often worry about running out of food, struggle to access preferred foods, and rely on monotonous diets. However, they do not experience severe food shortages or hunger (Coates et al., 2007).

Moderately food insecure HH: Individuals experiencing mild food insecurity often compromise on food quality by consuming repetitive or less preferred foods and may reduce portion sizes. However, they do not experience severe food insecurity or hunger (Coates et al., 2007). Households facing moderate food insecurity experience uncertainty about food availability and may reduce both the quality and quantity of their food intake due to financial constraints or limited resources.

Severely food insecure HH: Households experiencing severe food insecurity often reduce the number of meals they eat and may face extreme conditions, such as running out of food, going hungry, or skipping meals, even if these situations occur infrequently or rarely