ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

Household Food Insecurity, Underweight Status and Associated Characteristics among Women of Reproductive age Group in Aysaita district, Affar Regional State, Ethiopia

BY

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Advisor: Solomon Shiferaw (MD, MPH)

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Approved by the examining board

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List Abbreviations and Acronyms

AAU: Addis Ababa University

AOR: Adjusted Odds Ratio

ARHB: Afar Regional Health Bureau

BMI: Body Mass Index

CED: Chronic Energy Deficiency

CI: Confidence Interval

COR: Crude Odds Ratio

CSA: Central Statistics Agency

EDHS: Ethiopian Demographic and Health Survey

FAO: Food and Agriculture Organization

FCS: Food Consumption Score

FFQ: Food Frequency Questionnaire

GDP: Gross Domestic Product

HFIAS: Household Food Insecurity Access Scale

HH: Households

HHS: Household Hunger Scale

MOH: Ministry of Health

OR: Odds Ratio

SD: Standard Deviation

UNICEF: United Nations International Children's Emergency Fund

WHO: World Health Organization

Abstract

Background: Ethiopia has experienced rapid, sustained improvement in undernutrition during the past 15 years. However, undernutrition among children and women remains an urgent concern, requiring greater multi-sectoral efforts. Poor nutritional status of children and women has been a serious problem in Ethiopia for many years. Rural women are more likely to be undernourished than urban women, and those residing in the Affar region are the most likely to be undernourished (43.5%) of any region.

Objective: To assess the prevalence and identify risk factors associated with both household food insecurity and underweight status among women in the reproductive age (15–49 years of age) group, in Aysaita district of Affar regional state, eastern Ethiopia.

Method and Materials: A community based cross-sectional study was conducted among non-pregnant women on May 2015. The Household-Food-Insecurity-Access-Scale (HFIAS) classified food insecurity and anthropometric data classified underweight. Further survey questions assessed dietary diversity and socio-demographics. Multiple binary regression models was used to quantify the association between household food security and nutritional outcomes among women of reproductive age, while accounting for other covariates potentially associated with the outcome variables of interest.

Results: the mean Household Food Insecurity Access Scores (HFIAS) were 7.0 (3.6 ±SD), out of 27 classifying 26.1% as mild, 30.2% as moderate and 14.1% as having severe food insecurity. Underweight prevalence (BMI <18.5) was 41% among non-pregnant participants (n=490), with frequencies of mild, moderate and severe underweight of 34.5%, 3.9% and 2.7% respectively. Multiple logistic regression predicting underweight (vs. non-underweight) found that participants with moderately food insecure were more than 2 times odds of being underweight compared with those food secure(AOR=2.66, 95% CI; 1.27, 5.58), while severely food insecure were more than 6 times odds of being underweight compared with those food secure (OR 6.99, 95% CI; 2.66 to 18.38). Women with ≥2 under five years old children had more than 9 times odds of being underweight compared with those who had no (OR 9.27, 95% CI; 3.35, 25.59).

Conclusion: High levels of underweight were associated with women's age, categorized HFIAS food insecurity, marital status, parity, vocation and increasing number of <5 y of children. The factors with strongest effect for household food insecurity were education, parity, vocation and having ≥2 under five children in a family.

1. INTRODUCTION

1.1 Background

Malnutrition in all its forms imposes unacceptably high costs on society in human and economic terms on countries at all income levels (1). The latest FAO estimates indicate that 805 million people – about one in nine of the world's population were chronically undernourished in 2012–14, with insufficient food for an active and healthy life. The vast majority of hungry people live in developing regions about one in eight people, or 13.5 percent of the overall population, remain chronically undernourished in these regions. Sub-Saharan Africa has become home to more than a quarter of the world's undernourished people (2).

Ethiopia is experiencing one of the worst droughts in decades. The two main rainy seasons –were not successful in 2015. This affected smallholder farmers and pastoralists in Afar and Somali regions. The meher/ post-summer assessment and 2016 projections indicates: 0.4M Severely Acute Malnourished, 1.7M Moderately Acute Malnourished, 2.0M Without safe drinking Water, 0.8M Displaced due to shocks. Climatic shocks greatly affecting successive harvests and high food price inflation have combined to drive food insecurity and malnutrition significantly higher (3).

Women's nutrition affects a wide range of health and social issues, including family care and household food security (4). Food insecurity and malnutrition in adolescents and pregnant women, compounded by gender discrimination, leads to an intergenerational cycle of nutrition problems (5). One consequence is likely to be a lowering of birth weight due to malnutrition in pregnancy, perpetuating malnutrition between generations. Considering the inter-generational transition of undernutrition, maternal nutrition needs stronger emphasis in the further acceleration of nutrition work in Ethiopia (6).

Ethiopia has experienced rapid, sustained improvement in undernutrition during the past 15 years. However, undernutrition among children and women remains an urgent concern, requiring greater multi-sectoral efforts (4). Poor nutritional status of children and women has been a serious problem in Ethiopia for many years. Rural women are more likely to be undernourished than urban women, and those residing in the Affar region are the most likely to be undernourished (43.5%) of any region (7).

1.2 Statement of the problem

Household food insecurity has been associated with several health and nutrition outcomes, in both developed and developing countries (8). The relationship between household food insecurity and nutritional status of adults and children, primarily in developing countries, is not well recognized (9). Poverty in general and food insecurity in particular remains one of the challenges of developing countries in achieving their national development goals (10). Africa remains the region with the highest prevalence of undernourishment, with around one in four people estimated to be undernourished. While sub-Saharan Africa has the highest prevalence of undernourishment (11).

The proportions of women who are malnourished in sub-Saharan African countries for which a DHS was recently conducted range from 7 to 37 percent. Ethiopia has one of the highest proportions of malnourished women *(12).* The national prevalence of BMI <18.5 was estimated as 30% in 2000, and 26% in 2011. The trends by region show that in the Afar region underweight in women (low BMI) is around 40%, which is high and indicates considerable need for intervention (13).

Prior studies suggest that Ethiopia should address the relatively slow progress in the pastoralist and agro-pastoralist areas to meet its national development goals (14). For instance, about 92% of the population in Afar is food insecure in terms of calorie intake, and about 56% of the total population of the region is classified as poor (15). And 53% of the agro- pastoral households are below the poverty line (16).

Human development indicators and poverty in pastoralist areas are worse than elsewhere in the country. Pastoral areas have proven difficult to reach with traditional basic services. Studies and reports suggest that a lot more has to be done to achieve the MDGs in the pastoral areas where the overall socio-economic level of development is far below in the other areas (17).

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1.3 Rational and Significance of the study

Pastoralists and agro-pastoralists make up nearly 15 per cent of Ethiopia's total population and are among the poorest and most vulnerable rural people in the country *(18).* Ethiopia's pastoralists, like pastoralists the world over, remain at the margins of national economic and political life. However pastoral women are 'doubly marginalized' since they experience the discrimination and marginalization described above, while also living in remote, under-serviced areas, leading a lifestyle that is misunderstood by many decision makers (19).

Afar Regional State is one of the least developed of the nine regions within Ethiopia which is also the major pastoralist regions of the country (20). The region also recognized as being hotspot for the reason that a combination of high food insecurity, moderate to high malnutrition rates and rapid onset of emergencies like epidemic outbreaks, floods or conflicts (21).

A factor that has not been adequately studied in Afar is household food security, as it may be a possible determinant of the high rate of underweight status among women. A significant literature gap is that, as of 2015, no surveys have used primary food security measures, such as the Household Food Insecurity Access Scale score, for quantifying household food insecurity. It is unknown if HFIAS scores are related to underweight status of women in Afar region.

The significance of this paper is to generate valuable evidence on the extent, determinants of household food security, and relationships between household food security and nutritional outcomes in women of reproductive age in the study area. The results of the study will be useful to the district as well as zonal level planners, policy makers, researchers and development actors in both the governmental and nongovernmental organizations working in the area as well as elsewhere in the country with similar socio-economic, cultural and physical environment.

2. LITERATURE REVIEW

2.1 Definition and concepts of food security

Food security is a complex phenomenon that manifests itself in numerous physical conditions resulting from multiple causes. Food security is defined by the 2009 Declaration of the World Summit on Food Security: "Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life" (22). The World Food Summit of 1996 established four dimensions of food security: availability, access, stability and utilization (23).

Food availability:

Food availability plays a prominent role in food security. Supplying enough food to a given population is a necessary, albeit not a sufficient; condition to ensure that people have adequate access to food (24). Food availability is necessary but insufficient to ensure food access and food access is necessary but insufficient to ensure adequate food utilization (25).

Food accessibility: Access to food has improved fast and significantly in countries that have experienced rapid overall economic progress, notably in Eastern and South-Eastern Asia. Access has also improved in Southern Asia and Latin America, but only in countries with adequate safety nets and other forms of social protection. By contrast, access is still a challenge in sub- Saharan Africa, where income growth has been sluggish, poverty rates have remained high and rural infrastructure remains limited and has often deteriorated (26).

Food Utilization: Utilization problems remain the single largest challenge for developing countries, despite some progress over the past two decades. Most progress has been made in regions that already have relatively high levels of overall food security, such as Eastern Asia and Latin America (26).

Food Stability: Stability remains a challenge in regions that are heavily reliant on international food markets for domestic supplies, have not ensured domestic food access, or are particularly vulnerable because of their limited and fragile natural resource base. These conditions are especially significant in the Near East and North Africa region and the Caribbean (26).

2.2 Determinants of Household Food Security

Several studies in the past have indicated that people of Ethiopia have experienced long periods of food insecurity which may be ascribed to several factors which include occasional droughts and also degradation of farm lands (27)

Factors that affect household food security have been documented in some literature in various developing countries. A study conducted in Guatemala indicated as compared to women from food-secure households, women from households experiencing food insecurity were more likely to have completed only primary education or less. There was not a significant association between employment of the female respondent and food security status. Women from food-insecure households were generally of greater parity (had experienced more live births) at the time of the survey (28). The study conducted in Vietnam also showed that Food insecurity (HFIAS) scores were 6.7 (5.7 SD) out of 27 classifying 51% as having severe, 15% as moderate and 19% as mild food insecurity. Significantly higher levels of food insecurity, were correlated with low maternal education (29).

A study done in Addis Ababa by Birhane et al (30) found that 75% of households were food insecure and 23% were in a state of hunger. Multiple binary logistic regression models indicated that having a lower monthly income (AOR = 3.8, 95% CI = 1.5-9.7) was independently associated with food insecurity. In addition, household heads who were uneducated (AOR = 3.4, 95% CI = 1.6-6.8) daily laborers (AOR = 2.96, 95% CI = 1.1-8.3), and government employees (AOR = 2.3, 95% CI = 1.1-4.9) were more likely to have higher food insecurity. On the other hand those households living in government rental houses were less likely to be food insecure, compared to other residential houses (AOR = 0.34, 95% CI = 0.1-0.95). Sex and age of household head and family size did not show significant associations with household food security status.

A study done in Agro-pastoral communities showed that sex of household head did not have a significant impact on the odds of household being food insecure. Primary education of the spouse of the household head had positive impact on household food security. The odds of households whose spouse of the household head had primary education were about 2.2 times more likely to be food secure than those with no formal education. Household size, and dependency ratio (which

is the ratio of the number of dependents divided by the number of working adults), did not have a significant impact on the odds of food availability in the household. In contrast, the results suggest that households with younger household heads were more likely to be food secure than households with older household heads. In these pastoral communities, however, having access to loans did not have any significant impact on the odds of households being food secure. On the other hand, households who received gifts or food aid were more likely to be food insecure *(31)*.

A study conducted by Endale et al (32) in Northwest Ethiopia showed almost all variables like being a female household head, having a large family size, lack of education of the household head, a lack of access to irrigation, lack of income from perennial and off-farm activities and having few or no livestock were significantly and independently associated with food insecurity. In this study, households headed by females were about 3 times (AOR = 3.18, 95% CI: 1.08, 15.21) more likely to be food insecure. Households with family sizes of 4-7 were 2 (AOR = 2.39, 95% CI: 1.21, 4.70) times more likely to be food insecure when compared to families with smaller (1-3) family sizes. Similarly, households with more than 7 family members were about 13 times (AOR = 13.23, 95% CI: 6.18, 28.32) more likely to be food insecure. On the other hand, household heads who were unable to read and write were more than 2.5 times more likely to be food insecure when compared with household heads who could read and write (AOR = 2.59, 95% CI:1.46, 4.60). Access to irrigation was also the other factor significantly associated with food insecurity. Households that had no access to irrigation were about 3.5 times more likely to be food insecure than households that had access to irrigation (AOR = 3.54, 95% CI: 2.14,).

2.3 Effects of Under-nutrition among Women in Ethiopia

With a population of 88.9 million, Ethiopia is Africa's second most populous country. It is a highly rural country, with 83% of the population living in rural areas and subsisting largely on agriculture. Agriculture accounts for nearly half of Ethiopia's GDP of $47.53 billion, and contributes 90% of the country's exports. Ethiopia has made impressive progress since 1990 in reducing hunger and improving health and nutrition for women and children (33). However, maternal and childhood chronic under-nutrition in Ethiopia are still high 27% and 44% respectively (7) which reveals an important food insecurity problem (34). It was also found that there exists a strong association between maternal and child nutritional status and maternal nutritional status and birth weight (35). This indicates that actions towards improving women and child nutrition should always be integrated for effective utilization of scarce resources and to reduce the intergenerational link (mother-child) of undernutrition *(35).* Undernutrition is assumed to be affected by both health and food security status of the individual. Thus the evaluation of undernutrition needs to be seen in light of these two pillars (36).

The proportions of women who are malnourished in sub-Saharan African countries for which a DHS was recently conducted range from 7 to 37 percent. Ethiopia has one of the highest proportions of malnourished women. Underweight appears to be a more serious concern than overweight or obesity among women in Ethiopia. *(12).* Underweight status defined as a Body Mass Index (BMI) <18.5 kg/m2 is an indicator for Chronic Energy Deficiency (CED). The national prevalence of BMI <18.5 was estimated as 30% in 2000, and 27% in 2011. The trends by region show that in the Afar region underweight in women (low BMI) is around 43.5%, which is high and indicates considerable need for intervention (13). The majority of the undernourished women were in rural areas, of which group most were mildly thin (20.5% in 2000, 19.5% in 2005), while others were moderately thin (6.8% in 2000, 5.4% in 2005) or severely thin (4.3% in 2000, 3.5% in 2005) *(36).*

2.4 Determinants of Underweight in Ethiopia

In the rural parts of Ethiopia, less expanded educational institutions, traditional ways of farming as only means of surviving, early marriage, less developed infrastructures, and cultural and religious influences are assumed to have substantial influence on women's nutritional status (36). In the 2000 EDHS, age, marital status, religion, occupation, wealth index and region of residence were found to significantly affect chronic energy deficiency for the total sample of women. In 2005, however, religion and region of residence were no longer determinant factors for women's undernutrition (36). While in the 2011 EDHS (7), age, residence, region of residence, education and wealth index were found to significantly affect chronic energy deficiency for the total sample of women.

2.4.1 Demographic Differentials of Undernutrition

Women's age

The magnitude of chronic energy deficiency among women at different ages reveals how nutritional status varies during the reproductive years. Among all women age 15-49, the prevalence of chronic energy deficiency by age shows that women age 15-19 and 40-49 were most affected, with prevalence of 38.4% in 2000 and 33.0% in 2005 among women age 15-19, and prevalence of 34.9% in 2000 and 30.9% in 2005 among women age 40-49. Among rural women age 15-19, 42.4% in 2000 and 36.0% in 2005 were chronically undernourished. Among rural women age 40-49, 35.7% in 2000 and 33.8% in 2005 were chronically undernourished. Examining the changes between 2000 and 2005 in levels of undernutrition by age group, chronic undernourishment remained relatively high (36). Similarly in 2011 adolescents (age 15-19) are more likely to be undernourished (36 percent) than older women (7). In contrast a study conducted in Guatemala showed that older women had lower odds of underweight than younger women (28).

Parity

The number of children ever born (parity) was another important factor found to significantly affect women's nutritional status. Results in 2000 and 2005 show that women who have never had a child (parity 0) and women with at least five children (parity 5+) were at a higher risk of chronic energy deficiency than other women (36).

Marital status

Never-married women were found to be the most affected by undernutrition, followed by divorced/separated/widowed women. Among never-married women, 35.7% in 2000 and 28.7% in 2005 were chronically undernourished. Among both rural and urban women for both surveys, those married or living together were the least affected by chronic energy deficiency (36). A study conducted in Guatemala also showed that relative to the odds of underweight among unmarried women, women that were married had a 0.59 lower odds of being underweight (28) .

2.4.2 Socioeconomic Differentials of Undernutrition

***Wealth* quintile**

Wealth has an inverse impact on malnutrition among women and mothers. As wealth increases, rates of malnutrition decrease. Thirty percent of all women in the lowest wealth quintile are malnourished compared to 20 percent of all women in the highest wealth quintile. Twenty-seven percent of mothers of children under five years in the lowest wealth quintile are malnourished compared to 16 percent of mothers of children under five years in the highest wealth quintile (12).

The mean BMI increases slightly with wealth, from 20 kg/m2 for women in the lowest wealth quintile to 22 kg/m2 in the highest quintile(7). In 2000 and 2005 EDHS, women in the rich category were less likely (OR= 0.74, 0.68) to be affected by undernutrition than their non-rich counterparts (36). While in 2011 EDHS survey the result showed that those in the lowest wealth quintile also are more likely to be thin than women in other wealth quintiles (7).

Educational status

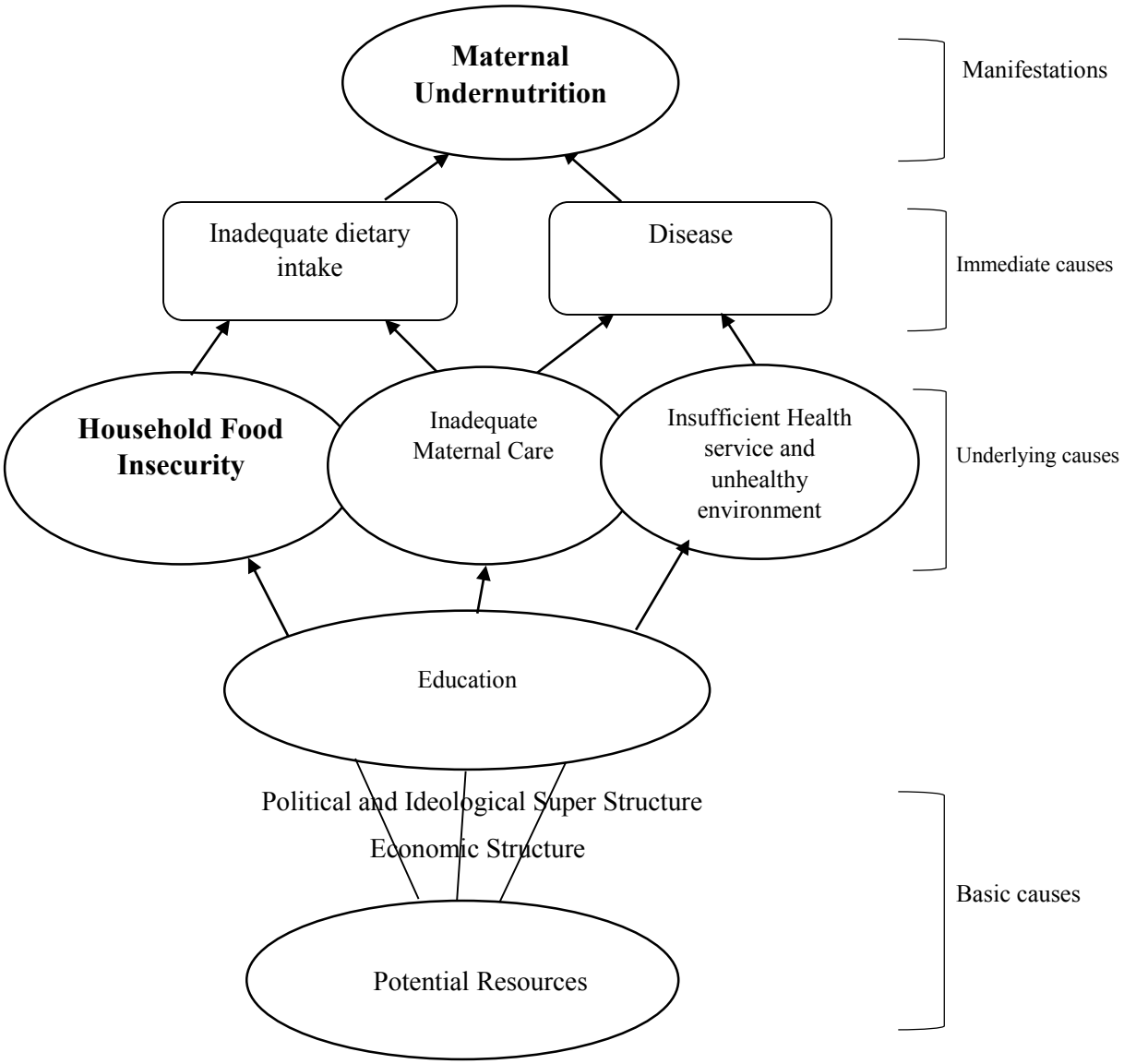
In the 2000 and 2005 EDHS Women's Educational status were no longer determinant factors for women's undernutrition (36). In contrast, in the 2011 EDHS (7) women who have attended up to primary school have the greatest likelihood of being thin. A study conducted in Guatemala showed that relative to women with a primary education or less, having more than a primary education was associated with a greater odds of underweight. Nationally, the odds of being underweight among women with greater than primary education was 1.7 times higher than the odds for women with primary education or less; in the Western Highlands, the odds of being underweight among women with greater than primary education was 3.1 times higher than the odds for women with primary education or less (28).

Rural Setting and Women's Undernutrition in Ethiopia

In rural areas, occupation was found to be one of the determinant predictors of risk of undernutrition. Unemployed women are more likely, and non-manual and professional women are less likely, to be undernourished than agricultural/skilled/unskilled women. The probable reason for this could be that women who work in agriculture have lower educational status than women working in non-agricultural jobs (EDHS, 2005), and they have relatively less decision-making autonomy and less control over income than women with non-agricultural jobs (36).

The level of undernutrition in rural Ethiopia was significantly affected by age, marital status, occupation and region of residence. Rural women age 15-19 and 40-49 were more than 1.5 times more likely to be affected by chronic energy deficiency than women age 20-29. Never-married women were 1.6 times more likely to be affected by chronic energy deficiency than married women (36). The result in 2011 EDHS showed that rural women were more likely to be thin than urban women, and those residing in the Affar region were the most likely to be thin of any region (7). A study conducted in Lagos state, Nigeria also showed that in rural communities, there were significant association between nutritional status of mothers and family setting, age at first birth, and level of education of mothers (37).

Figure 1: UNICEF conceptual framework for causality analysis, 1990



Source: UNICEF, 1990.

3. OBJECTIVES

3.1 General Objective:

- To assess the prevalence of household food insecurity and underweight status among women in the reproductive age (15–49 years of age) group, in Aysaita district of Affar regional state, eastern Ethiopia.

3.2 Specific Objectives:

- To assess the extent of household food insecurity among women in the reproductive age group
- To describe underweight status of women in the reproductive age group
- To identify risk factors associated with underweight status of women and household food insecurity in women of reproductive age (15–49 years of age)

4. METHODS

4.1 Study design and period

A community based cross sectional study design had been carried out on May, 2015.

4.2 Study area

The study was conducted in Afar Regional State. Based on the 2007 Census result of the Central Statistical Agency of Ethiopia (CSA), the Afar Region was predicted to have a total population of 1,411,092, consisting of 786,338 men and 624,754 women. Rural inhabitants number 1,222,369 or 86.6% of the population. With an estimated area of 96,707 km2, the region has an estimated density of 14.59 people per square kilometer. For the entire region 247,284 households were counted, which results in an average for the Region of 5.7 persons to a household, with rural households had on average 6.1 people (38).

According to CSA's reports, as of 2004, 48.57% of the total population had access to safe drinking water, of whom 26.89% were rural inhabitants. Values for other reported common indicators of standards of living for the Afar Region as of 2005 include the following: 67.3% of inhabitants fall into the lowest wealth quintile; adult literacy for men is 27% and for women 15.6% (38).

Aysaita is one of the largest districts in the region and located in eastern part of Afar National State. It has a total area of 138,800 hectares and thirteen Kebeles; of which two urban, six pastoral and five agro-pastoral Kebeles. Naturally, it is plain in terms of topography. The mean annual temperature is between 30 and 45°C (39). According to Central Statistical Agency (CSA) Summary and Statistical Report of the 2007 Population and Housing Census, the total population of the district was estimated to be 47,210. Of the total population, 31,162 (66%) live in rural areas and the rest 16,048 (34%) live in urban areas (38). According to the Regional Bureau of Pastoral Agriculture and Rural Development report, there are four clinics, three health posts and one health center (39).

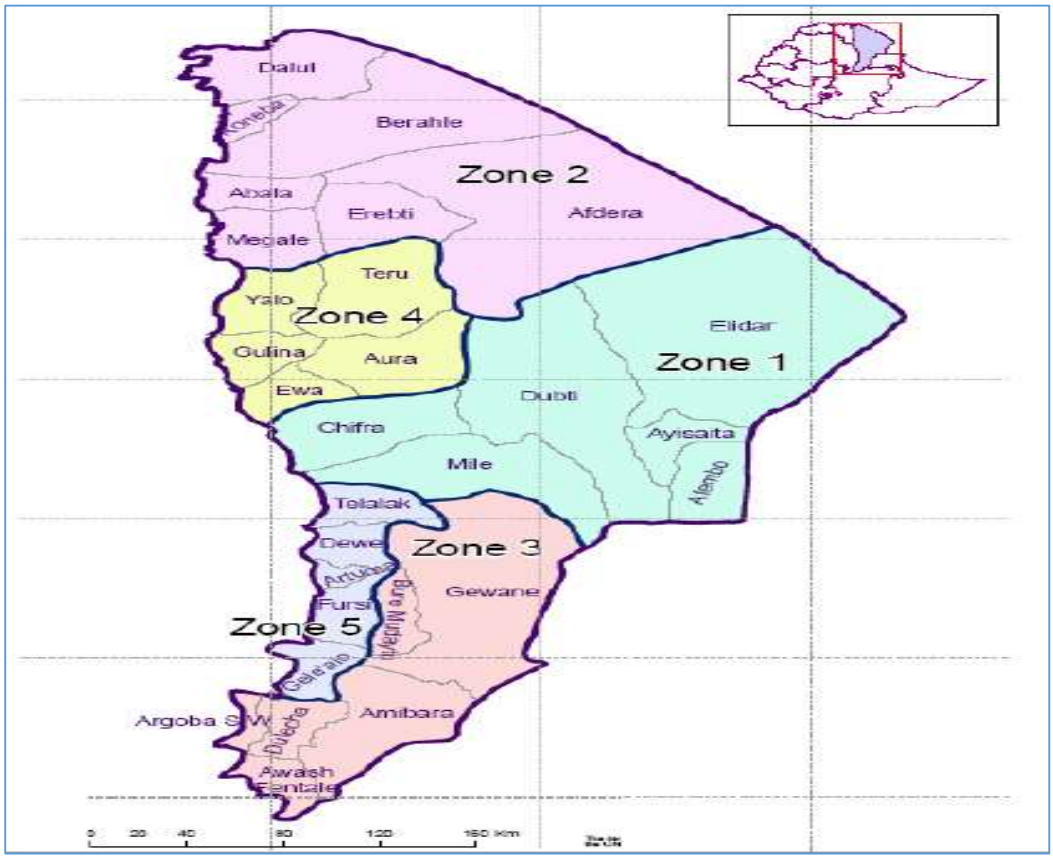


Figure 2: Location Map of the Study Area

4.3 Source population

All HHs located in Aysaita district of zone one in Afar Region

4.4 Study subjects

The study was conducted on HHs selected from agro-pastoral and pastoral community

***4.5 Inclusion criteria*:** All HHs located in Aysaita district with at least one woman in the reproductive age group were included in the interview. Where more than one eligible woman was available in one HH, the one who was responsible for family care and/or HH head was selected.

***4.6 Exclusion criteria*:** pregnant and lactating women were excluded in measurement of weight and height due to the effects of pregnancy on weight gain.

4.7 Sample size Determination

The number of households needed for this study was calculated based on the prevalence of undernourished women in the Affar region which was estimated at 43.5 % (7) and the prevalence of national food insecurity 35% (40). The sample size was computed using simple proportion formula:

$$\mathbf{n = pqZ^2/d^2}$$

Where:

n_1- Sample size one

n_2- Sample size two

Z- Parameter related to error risk, equals 1.96.

P = Expected prevalence of food insecurity in the population

d- Degree of accuracy

q = 1-p, expected proportion of food insecurity in the population

If;

$p_1 = 43.5\%$ $p_2 = 53\%$

$q_1 = 46.5\%$ $q_2 = 47\%$

$z_1 = 1.96$ $z_2 = 1.96$

$d_1 = 5\%$ $d_2 = 5\%$

By substitution;

$n_1 = p_1q_1Z^2/d^2$ $n_2 = p_2q_2Z^2/d^2$

$n_1 = (0.435x0.465)\ (1.96)^2 / (0.05)^2$ $n_2 = (0.35x0.65)\ (1.96)^2 / (0.05)^2$

$n_1 = (0.202275)\ (3.8416) / (0.0025)$ $n_2 = (0.2275)\ (3.8416) / (0.0025)$

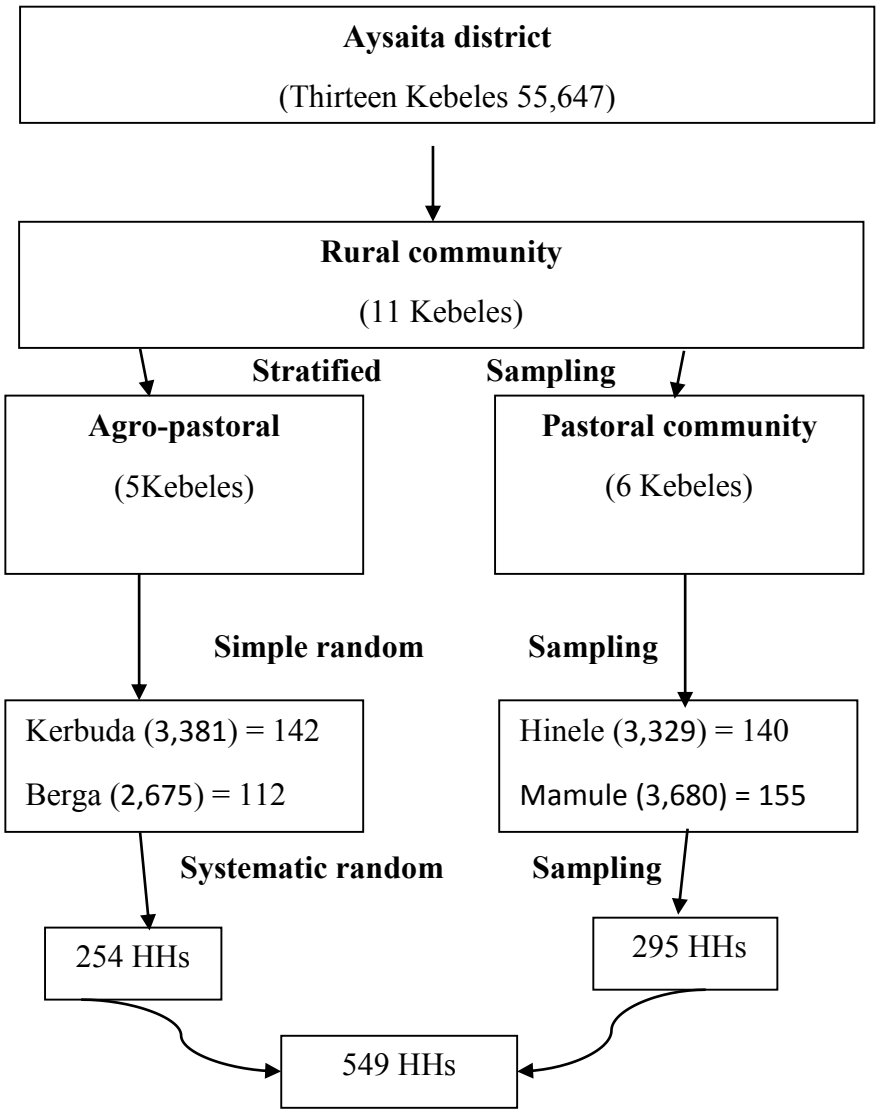
$n_1 = 310$ **$n_2 = 349$**

Adding a 5% allowance for possible non response and multiplying by design effect of 1.5, the final sample size one and two was **488 and 549** respectively. By taking into consideration the prevalence of undernourished women and national prevalence of food insecurity, the prevalence which yields the maximum sample size was taken. The sample was distributed across the selected Kebeles proportional to their HH size.

4.8 Sampling procedures

Firstly, Aysaita district was chosen purposively because of its well-functioning governmental administration system and about 52.8% the sampled households have been living below the poverty line (41). To get a representative data, a multi-stage stratified sampling procedure was employed to select the required Kebeles randomly. Secondly, two pastoral and two agro-pastoral Kebeles was selected using simple random sampling out of the total Kebeles in the district. Thirdly, systematic random sampling was used to select households from the total list by applying probability proportionate to size (PPS) technique to have a total of 549 households.

Figure 3: Diagrammatic representation of sampling procedures and sample size distribution



4.9 Data collection procedures and measurement tools

Data was collected through interviews and anthropometric measurements. The interview consisted of a structured questionnaire and included questions on household socioeconomic and demographic characteristics, frequency of occurrence, 24-hour dietary recall, and a Household Food Insecurity measurement. The questionnaire was initially prepared in English and then translated into Amharic. The questionnaires were administered by hiring six experienced enumerators who had Diploma certificate in health and can speak the local language fluently. Two supervisors were selected from the District health office. The responsibilities of the supervisors were checking whether the questionnaires were correctly completed or not.

4.9.1 Household Food Insecurity Access Scale (HFIAS)

Commonly used tools to measure food security at the household level in developing country settings include the Household Food Insecurity Access Scale. Responses to the questions in the scale were used to create a continuous numeric food insecurity "score," which can then be compared to established cut-points to categorize the level of food insecurity experienced by the household. The HFIAS, a 9-item questionnaire, queries respondents about three domains of food insecurity, including anxiety/uncertainty about the household food supply, insufficient quality of food (including variety and food preferences), and insufficient food intake and its physical consequences. The participant responses indicate a frequency of occurrence of; never, rarely (1to 2 times), sometimes (3 to 10 times), and often (>10 times) for each of the questions, over the previous 30 days. This was then used to calculate HFIAS scores. HFIAS scores range from 0 to 27 with a higher score indicating greater food insecurity (42).

Table1: Defining Household Food Insecurity Access Scale (HFIAS) by category of food insecurity

	Frequency		
Question	**Rarely**	**Sometimes**	**Often**
Food insecurity domain: anxiety and uncertainty			
Worried about food	Food secure	Mild	Mild
Ate less preferred foods than desired	Mild	Mild	Mild
Ate less variety than desired	Mild	Moderate	Moderate
Ate undesirable foods	Mild	Moderate	Moderate
Food insecurity domain: insufficient food quantity			
Ate less food than felt needed	Moderate	Moderate	Sever
Ate fewer meals than desired	Moderate	Moderate	Sever
No food in the house*	Sever	Sever	Sever
Went to sleep hungry*	Sever	Sever	Sever
Lacked food for over 24hrs*	Sever	Sever	Sever

* Used also in HHS scale

The last three questions of the HFIAS were used to calculate the Household Hunger Scale (HHS). The three questions inquired about whether participants 'had no food in the house', 'went to sleep hungry' or 'lacked food for 24hrs'. The HHS score recode the responses to each frequency-of-occurrence question from three frequency categories ("rarely," "sometimes," "often") into two frequency categories ("rarely or sometimes" and "often"). Each household will have an HHS score between 0 and 6. These values are then used to generate the HHS indicators which intern categorized in to (0-1) little to no hunger in the household, (2-3) moderate hunger in the household (4-6) severe hunger in the household (43)

Table 2. Household Hunger Scale (HHS) scoring and categorization of cumulative cutoffs of HHS

	Frequency		
Question	**Rarely**	**Sometimes**	**Often**
No food in the house	+1	+1	+2
Went to sleep hungry	+1	+1	+2
Lacked food for over 24hrs	+1	+1	+2

Little to no hunger in the household 0-1

Moderate hunger in the household 2-3

Severe hunger in the household 4-6

4.9.2 Household Dietary Diversity Score (HDDS)

Data on household dietary diversity was collected using a 24-hour recall method and information was entered into the Household Dietary Diversity Score (HDDS) sheet. The HDDS captures dietary diversity in a normal 24-hour period by the household as a whole and not a single member. Food consumed outside the home that was not prepared in the home was not included. A set of 12 food groups were used to guide the scoring as per the food items consume, with 1 being the minimum score and 12 as the maximum (44).

4.9.3 Anthropometric measurements

To determine the impact of household food insecurity on nutritional status in women of reproductive age anthropometric measurements of weight and height were taken from all the subjects. Weight was measured to the nearest 0.5 kg using a Weight measurements scale. Height was measure to the nearest centimeters also using a transportable tap meter; the scales was calibrated after each session of measurements. Malnutrition in women can be assessed using the body mass index (BMI), which is defined as a woman's weight in kilograms divided by the square of her height in meters (BMI=kg/m_2). A BMI below the suggested cutoff point of 18.5 among non-pregnant, non-lactating women indicates chronic energy deficiency or undernutrition. When BMI is above 25, women are considered overweight or obese (12). Underweight prevalence (BMI<18.5 kg/m2) was the main anthropometric indicator and was further categorized by using WHO standards for mild (BMI 18.5-17 kg/m2), moderate (BMI 16.99-16.00 kg/m2), and severely (BMI<16 kg/m2) underweight (45).

4.10 Operational definitions

Anthropometry: Underweight defined as BMI < 18.5 kg/m2, normal weight BMI ≥ 18.5 and < 25 kg/m2 and overweight BMI > 25 kg/m2 (45).

Food secure Household: Household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely.

Mildly food insecure (access) Household: worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. But it does not cut back on quantity nor experience any of three most severe conditions.

Moderately food insecure household: sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. But it does not experience any of the three most severe conditions.

A severely food insecure Household: has forced to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely.

Dietary diversity: the number of different foods or food groups consumed over 24 hour period

Household Asset is the number and types of Household furniture and asset materials like basic Household possessions such as beds, table and chairs, sofa sets, radios and/or televisions, computers, jewelries, transport assets such as bicycle, motorcycle or car.

Coping strategies: Coping strategies are the means people employ to master, tolerate, reduce, or minimize the negative consequences of changes in food price and their food security status.

Head of Household: A head of a Household is a person who economically supports or manages the Household or for reasons of age or respect, is considered as head by members of the Household or declares himself as head of a Household.

4.11 Study variables

4.11.1 Dependent variables:

- Household food insecurity status (Yes, No)
- Underweight status among women of reproductive age (Yes, No)

4.11.2 Independent variables:

- **Socio-demographic and household variables:**
  - ✓ Sex of the household head (Male, Female)
  - ✓ Number of household members (≤5, ≥5)
  - ✓ Number of children under 5 years of age in the household (0, 1, & ≥2)
- **Maternal variables:**
  - ✓ Age (15-19, 20-29, 30-39, and 40-49)
  - ✓ Parity (number of live births)
  - ✓ Educational level (Illiterate, primary education & above)
  - ✓ Vocation (Agro-pastoral, Pastoral)
  - ✓ Marital status (Married, Divorced % Widowed)
  - ✓ Height (<145cm, ≥145cm)
  - ✓ Weight

4.12 Data Analysis procedures

The data was entered using Epi-info version7 and recheck for accuracy to minimize errors. Analysis was done using Statistical Package for Social Sciences (SPPS) Version 21. To describe the characteristics of households in each level of food security, as well as the nutritional outcomes associated with each level of food security, descriptive statistics was tabulated for the variables, stratified by food insecurity status. For variables expressed as percentages or proportions chi-square tests was used to assess differences between food security classifications. Multiple binary regression models was used to quantify the association between household food security and nutritional outcomes among women of reproductive age, while accounting for other covariates potentially associated with the outcome variables of interest.

4.13 Data Quality Assurance

To assure the quality of data, a pre-coded and pre-tested structured questionnaire was employed to attain the require information after getting both written and verbal consent from the concerned bodies. The collected data was daily checked for completeness and consistency. The enumerators and supervisors were given training for one day on procedures, techniques and ways of collecting the data. The questionnaires was pretested in a community similar to the study population before beginning the actual data collection process and the necessary modification was made.

4.14 Ethical Considerations

Ethical clearance was obtained from ethical review committee of Addis Ababa University College of Health Science and this was communicated to the Afar Regional Health Bureau. After obtaining the permission, the data collection was commence. Before the data collection, written or verbal consent was obtained from the interviewee. All information that was obtained from the individual was treated confidential. The respondents right were guarantee to stop or refuse participation was respected.

4.15 Dissemination of results

The results of the study will be disseminated to AAU, and relevant organizations that can make use of the findings, including the MOH, Regional Health Bureaus and non-governmental organizations. It will be communicated to the scientific community through publications.

5. Results

A Total of 549 households were eligible for the study, but only 490 of them had participated in the study. Pregnant women (*n*=35) were excluded due to confounding problems associated with BMI. The rest (24) households migrated to another area at the time of interview. Thus, the response rate in the present study was 89.3%.

5.1 Socio demographic characteristics

The socio-demographic profiles of the study participants were shown in (Table 1). The mean age of the respondents was 33.8 (±5.1 SD). The mean family-size was 6.29, with a range of 12. The mean age of the women was 32.4 y with a standard deviation of 6.7 year. Underweight prevalence (BMI <18.5) was 41% among non-pregnant participants (n=490), with percentage of mild, moderate and severe underweight of 34.5%, 3.9% and 2.7% respectively.

Table 3: Demographic characteristics of study participants Aysaita district, May 2015 (n = 490).

Characteristic	N= 490	Percent	Mean ± SD
Age, years (mean) ±SD*	**490**		**33.81 ± 5.1**
Household size (mean)	**490**		**6.3 ± 2.3**
Marital status (% married)	**457**	**93.3**	
Parity (mean)			**4.4 ± 2.2**
Number of children < 5 years (mean)			**1.4 ± 1.0**
Education (% illiterate)	**445**	**90.8**	
Education (% primary or higher)	**45**	**9.2**	
Agro-pastoralist (% yes)	**251**	**51.8**	
Pastoralist (% yes)	**239**	**48.2**	
Weight (kg)	**490**		**42.5 ± 3.6**
Height (cm)	**490**		**1.51 ± 0.1**
BMI (kg/m2)	**490**		**18.53 ± 1.0**
Normal (18.5-25)		**59**	
Underweight (<18.5)		**41**	
Mild (17-18.5)		**34.5**	
Moderate (16.9-16)		**3.9**	
Severe (<16)		**2.7**	

*SD = standard Deviation

5.2 Prevalence of household food insecurity

Close to three-quarters of all households (70.8%) reported worrying about the availability of enough food in the household, and nearly two-thirds (68.6%) reported the absence of the preferred food to eat and 63.3% of respondents reported that they consumed a limited variety of food in the past 30 days. Lower percentages of households reported eating fewer meals in a day, or had family members that go to sleep at night hungry or complained of no food to eat in the 30 days prior to the survey.

Figure 4: Percentage of households that experienced specific food insecurity related conditions in the last 1 month preceding the survey: Aysaita district, May 2015 (n = 490).

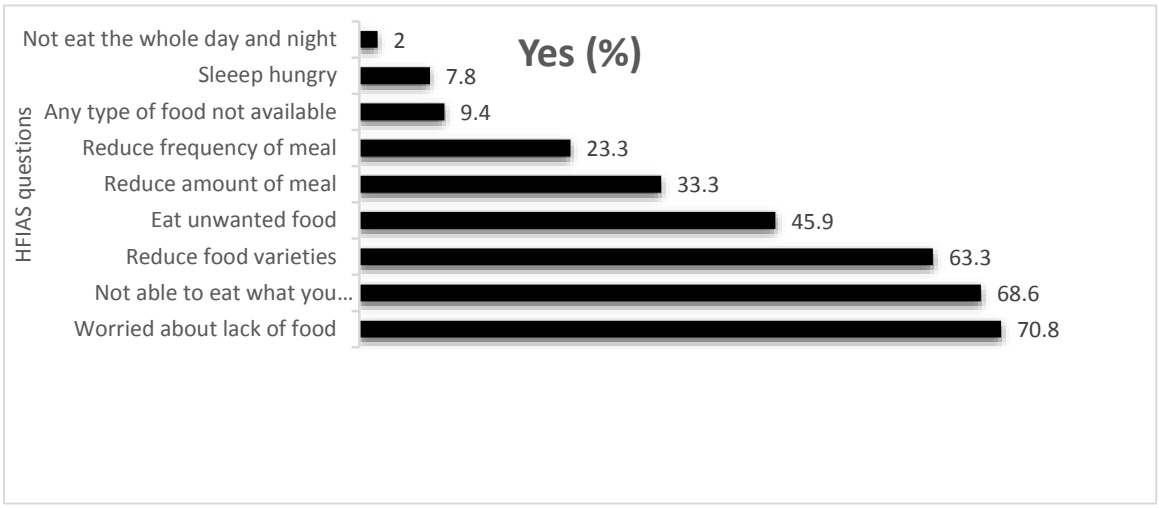
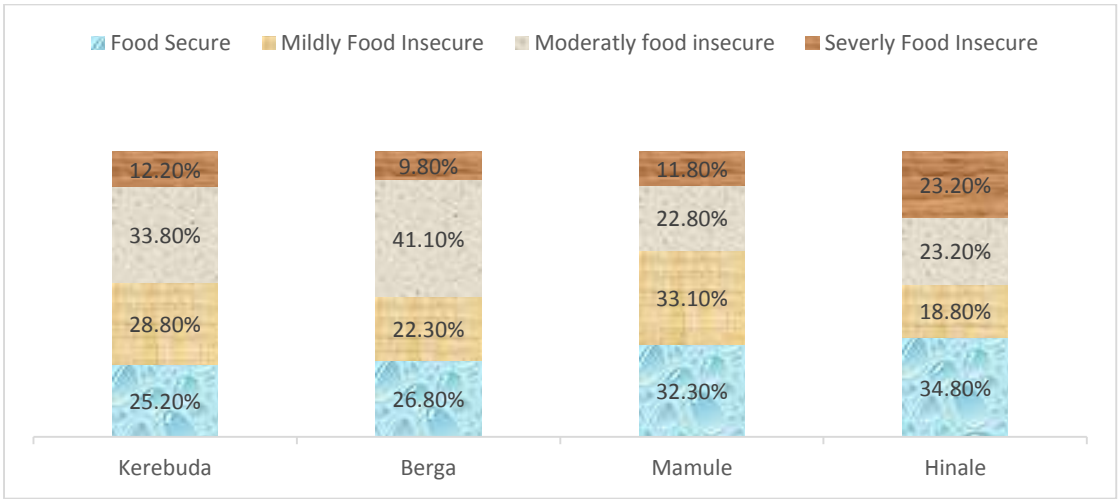


Figure 5: Percentage of households in each category of food insecurity for each of Agro-pastoral and Pastoral kebeles, Aysaita district, May 2015 (n = 490).

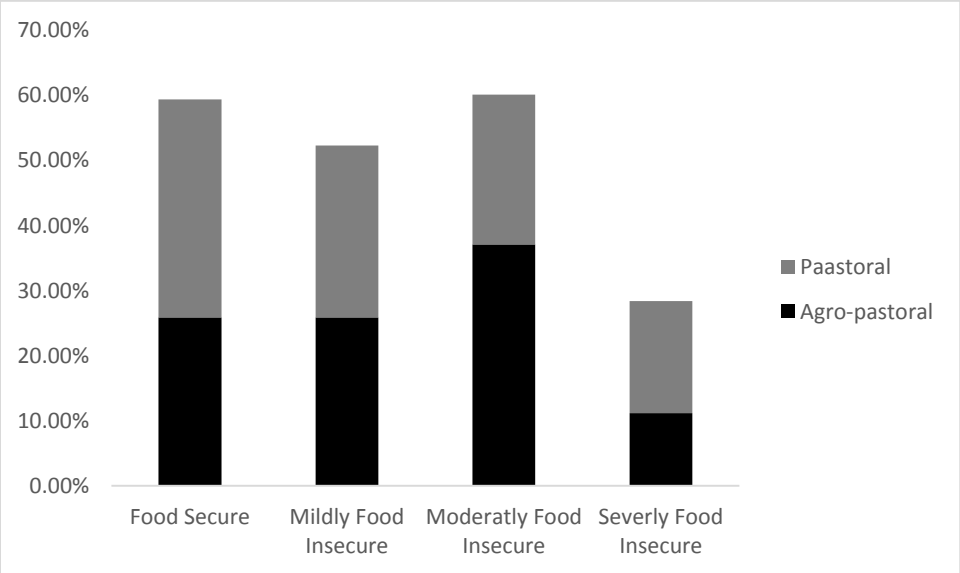


5.3 Household access to food, dietary diversity and coping strategies

The mean HFIAS score of the sample households was 7.0 (3.6 ±SD). A total of 143 (29.2%) households had a score of 0, indicating they never experienced any form of food insecurity, 42 (8.6%) respondents reported that they have ever experienced sleeping hungry, and 22 (4.5%) participants reported that they did not eat for an entire day at the time of survey. One hundred sixty seven (34.1%) households have receive for food or cash aid, 84 (17.1%) have reduced the amount of food that they consume, and 90 (18.4%) have reduced their meal frequency. Households used a range of coping strategies when faced with food insecurity, including reducing the amount of meal (54.7%), shifting to less quality/ expensive foods (51.8%), skipping meals (36.8%), and reducing nonfood expenditure (47.3%).

Near to two-thirds of all households 342 (69.9%) experienced all form of food insecurity in the month preceding the survey. Severe food insecurity was experienced by close to one fifth of households 69 (14.1%) while 148 (30.2%) and 128 (26.1%) households were moderately and mild food insecure respectively.

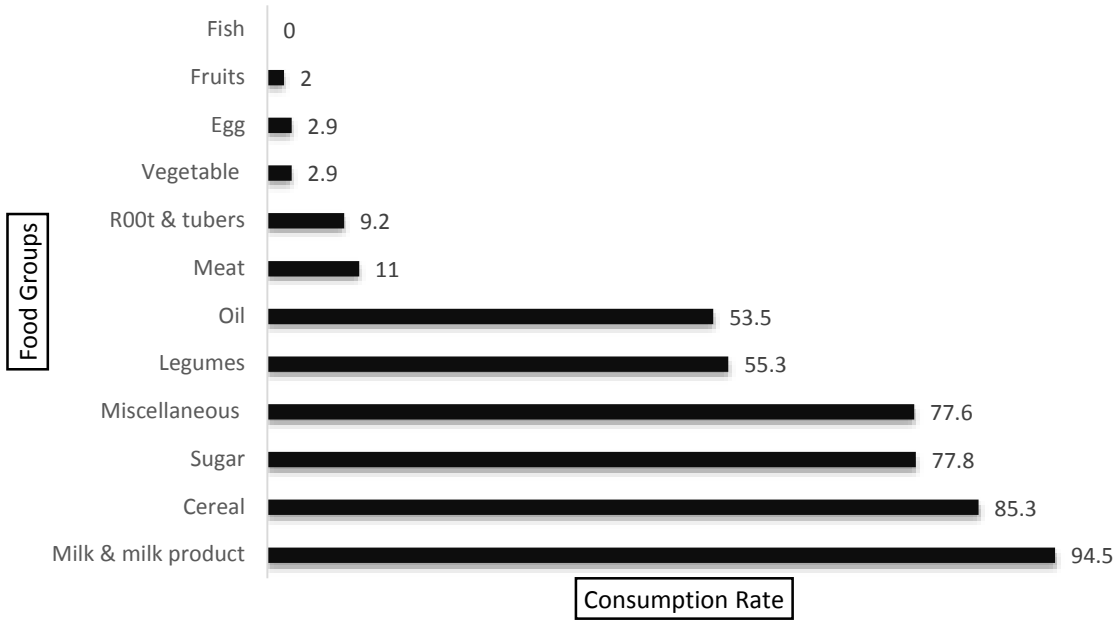
Figure 6: Percentage of households in each category of food security for Agro-pastoral and Pastoral households, Aysaita district, May 2015 (n = 490).



5.4 Dietary Diversity Score

The mean dietary diversity score of households was 4.69 ± 1.99 (SD). Using this mean score, households were categorized into three equal parts: 258 (52.7%) of households had consumed 5 or less food groups (poor dietary diversity) while 67 (13.9%) had consumed 7 or more food groups (high dietary diversity). Milk and milk products (94.5%), cereals (85.3%), sugar (77.8%), and miscellaneous foods like tea and coffee (77.6%) were the most commonly consumed food groups, while fish (0%), fruits (2.0%), egg (2.9%) vegetable (2.9%) and root (9.2%) were the least consumed food groups (**Figure 7**).

Figure 7: Households' Consumption rate of different food groups, Aysaita district, May 2015 (n = 490)



5.5 Food security status and underweight among women of reproductive age:

Anthropometric measurements

On average, non-pregnant women in the Aysaita district from households had a mean weight of 42.49 kg, height of 1.51 m, and BMI of 18.53 kg/m2 (**Table 4**). Underweight prevalence (BMI <18.5) was 41% among non-pregnant participants, with frequencies of mild, moderate and severe underweight of 34.5%, 3.9% and 2.7% respectively. Weight and height of women of reproductive age were lower if they came from households with food insecurity. Short stature among women (height < 145 cm) was associated with greater food insecurity. The relationship between BMI and food security status was similar to that of Weight and height: There was a significant difference in the BMI of women from households classified by household food insecurity status, moderately or severely food insecure were significantly lower than the BMI of women in food secure households.

Table 4: Anthropometry of female respondents of households in the Agro-pastoral and Pastoral kebeles of Aysaita district, stratified by household food insecurity status, May 2015 (n = 490).

Characteristics	All (n = 490)	Food secure (n = 145)	Mildly food insecure (n = 128)	Moderately food insecure (n = 148)	Severely food insecure (n = 69)
Weight, kg (mean)	42.5	44.29	42.59	41.97	39.36
Height, m (mean)	1.51	1.53	1.51	1.50	1.47
% short stature (< 145 cm)	11.6	0.82	1.43	3.47	5.70
BMI kg/m2 (mean)	18.53	18.88	18.68	18.57	18.09
% Normal (>18.5 kg/m2)	59	23.7	16.9	15.3	3.1
% underweight (< 18.5 kg/m2)	41	5.9	9.2	14.6	11
%Mild (17-18.5)	34.5	5.9	7.8	10.4	10.4
%Moderate (16.9-16)	3.9	0	1.4	2.2	0.2
%Severe (<16)	2.7	0	0	2.2	0.4

5.6 Bivariate analysis

5.6.1 Determinants of Household Food Insecurity

The HFIAS scale scores ranged from 0-27 and bivariate analysis (n=490) showed significant positive association in between educational status, parity, and having under five children with increased HFIAS scores. The number of children ever born (parity) was another important factor found to significantly affect household food insecurity. Results of Table 5 show that women who have never had a child (parity 0) and women with at least five children (parity 5+) were at a higher risk of household food insecurity (COR = 10.56, 95% CI: 1.62, 68.88). Households with <5y children ≥2 were 2 (COR = 5.96, 95% CI: 3.55, 10.01) times more likely to be food insecure when compared to households with no <5y children. On the other hand, household heads who were uneducated were more than 3.1 times more likely to be food insecure when compared with household heads with primary education (COR = 3.10, 95% CI:1.64, 5.69).

Table 5: Binary logistic Regression analysis of factors associated with food insecurity in households of Aysaita district, Afar, Ethiopia, May 2015 (n = 490). OR significant at < 0.05 & < 0.25 level are bolded.

Variables	Food insecurity status			OR (95% CI)
	Secure (%)	Insecure (%)	N	
Marital status				
Married	26.7	66.5	457	1.83 (0.89–3.77)**
Divorced/ Widowed (Ref*)	2.9	3.9	33	1.00
Educational level				
No education	24.7	66.1	445	**3.10 (1.64–5.69)***
Primary education (Ref*)	4.9	4.3	45	1.00
Family size				
1-3	3.1	4.5	37	0.01 (0.00 to 0.04)
4-7	26.5	36.5	309	0.02 (0.01 to 0.05)
>8 (Ref*)	0	29.4	144	1.00
Parity				
0 (Ref*)	0.4	2.7	15	1.00
1-2	11.2	7.1	90	**0.10 (0.02 to 0.46)***
3-4	17.3	18.6	176	**0.17 (0.04 to 0.75)****
≥5	0.6	42.0	209	**10.56 (1.62 to 68.88)***
Number of <5y children				
0 (Ref*)	12.0	13.7	126	1.00
1	11.4	15.3	131	1.18 (0.72 to 1.93)
≥2	6.1	41.4	233	**5.96 (3.55 to 10.01)***
Vocation				
Agro-pastoral	13.3	38.0	251	**1.44 (0.98 to 2.13)****
Pastoral (Ref*)	16.3	32.4	239	1.00

Ref* = reference category * p- value < 0.05 ** p-value< 0.25

5.6.2 Determinant Variables of Underweight

The secondary, analytical objectives were to assess hypothesized predictor variables of underweight and household food insecurity. Binary logistic regression explored predictor variables between underweight (BMI <18.5) and non-underweight women in Aysaita district as shown in (table 6) Age of the female respondent, marital status, family size, parity, <5y children dependent, food security category and vocation were a significant predictor of underweight.

Results of (Table 6) show that Women age 20-29 and 30-39 were less likely (COR=0.65, 95% CI; 0.33, 1.32) and (COR=0.51, 95% CI; 0.27, 0.96). As expected, women divorced/widowed were more than 3.6 times (COR=3.61, 95% CI; 1.68, 7.75) to be affected by undernutrition than married women. Having ≥7 family members were more than 2 times (COR=2.91, 95% CI; 1.38, 6.13) to suffer from undernutrition compared with 1-3 family members. Women with two or more dependents under five years old, had a significantly higher odds of underweight compared with those who had no children dependents, under five years old (COR 4.99, 95% CI; 3.07 to 8.13). On the other hand, women with mild, moderate and severely food insecure were more than 14 times more likely to be underweight when compared with women food secured (COR = 14.40, 95% CI:.7.14, 29.06). The number of children ever born (parity) was another important factor found to significantly affect women's nutritional status. Being pastoral women were 1.66 times more likely to be underweight when compared with agro-pastoral women (COR = 1.66, 95% CI: 1.16, 2.39).

Table 6: Binary logistic regression model of underweight among women 15–49 years of age in households of Aysaita district Afar, Ethiopia, May 2015 (n = 490). OR significant at < 0.05 & < 0.25 level are bolded.

Variables	Underweight status		N	OR (95% CI)
	Yes (%)	No (%)		
Age (yrs.)				
15-19 (Ref*)	4.7	4.3	44	1.00
20-29	9.8	13.7	115	**0.65 (0.33 to 1.32)****
30-39	19.6	35.3	269	**0.51 (0.27 to 0.96)****
40-49	6.9	5.7	62	1.11 (0.51 to 2.41)
Marital status				
Married (Ref*)	36.6	56.9	457	1.00

Divorced/ Widowed	4.7	2.0	33	**3.61 (1.68 to 7.75)***
Educational level				
No education	37.1	53.7	445	1.16 (0.57 to 1.96)
Primary education (Ref*)	3.9	5.3	45	1.00
Family size				
1-3 (Ref*)	2.9	4.7	37	1.00
4-7	19.4	43.7	309	0.73 (0.36 to 1.48)
>7	18.8	10.6	144	**2.91 (1.38 to 6.13)***
Parity				
0	2.0	1.0	15	1.32 (0.44 to 3.99)
1-2	3.1	15.3	90	**0.13 (0.07 to 0.25)***
3-4	10.2	25.7	176	**0.26 (0.17 to 0.40)***
≥5 (Ref*)	25.7	16.9	209	1.00
Number of <5y children				
0 (Ref*)	6.1	19.6	126	1.00
1	5.9	20.8	131	0.91 (0.51 to 1.63)
≥2	29.0	18.6	233	**4.99 (3.07 to 8.13)***
HFIAS Categories				
Secure (Ref*)	5.9	23.7	145	1.00
Mild	9.2	16.9	128	**2.17 (1.26 to 3.74)****
Moderate	14.9	15.3	148	**3.89 (2.32 to 6.54)***
Sever	11.0	3.1	69	**14.40 (7.14 to 29.06)***
Vocation				
Agro-pastoral (Ref*)	18.0	33.3	239	1.00
Pastoral	23.1	25.7	251	**1.66 (1.16 to 2.39)***

Ref* = reference category * p- value < 0.05 ** p-value< 0.25

5.7 Multivariate analysis

5.7.1 Determinants of Household Food Insecurity

In multivariate logistic regression analysis, the number of children ever born (parity) and lack of education, having ≥2 under five children, and being agro-pastoralist were significantly and independently associated with food insecurity. Results of (Table 7) show that women who have never had a child (parity 0) and women with at least five children (parity 5+) were at a higher risk of household food insecurity (AOR = 7.15, 95% CI: 0.99, 51.55). Women who have ≥2 under five children were at a higher risk of household food insecurity when compared with households with no under five children (AOR = 1.56, 95% CI: 0.76, 3.19). On the other hand, household heads who were uneducated were more than 1.64 times more likely to be food insecure when compared with household heads with primary education (AOR = 1.64, 95% CI:.75, 3.60). Being an agro-pastoral households were 1.44 times more likely to be food insecure when compared with pastoral households (AOR = 1.44, 95% CI: 0.89, 2.35).

Table 7: Multiple logistic Regression analysis of factors associated with food insecurity in households of Aysaita district Afar, Ethiopia, May 2015 (n = 490). OR significant at < 0.05 & < 0.25 level are bolded.

Variables	Food insecurity status			Crude OR (95% CI)	Adjusted OR (95% CI)
	Secure (%)	Insecure (%)	N		
Educational level					
No education	24.7	66.1	445	**3.06 (1.64–5.69)***	**1.77 (.79–3.92)****
Primary education (Ref*)	4.9	4.3	45	1.00	1.00
Parity					
0 (Ref*)	0.4	2.7	15	1.00	1.00
1-2	11.2	7.1	90	**0.10 (0.02 to 0.46)***	**0.09 (0.02 to 0.46)***
3-4	17.3	18.6	176	**0.17 (0.04 to 0.75)***	**0.14 (0.03 to 0.65)***
≥5	0.6	42.0	209	**10.56 (1.62 to 68.88)***	**7.15 (0.99 to 51.55)***
Number of <5y children					
0 (Ref*)	12.0	13.7	126	1.00	1.00
1	11.4	15.3	131	1.18 (0.72 to 1.93)	1.28 (0.73 to 2.25)
≥2	6.1	41.4	233	**5.96 (3.55 to 10.01)***	**1.56 (0.76 to 3.19)****
Vocation					
Agro-pastoral	13.3	38.0	251	**1.44 (0.98 to 2.13)****	**1.44 (0.89 to 2.35)****
Pastoral (Ref*)	16.3	32.4	239	1.00	1.00

Ref* = reference category * p- value < 0.05 ** p-value< 0.25

5.7.2 Determinant Variables of Underweight

Multiple logistic regression model was used to predict the probability of underweight among women of reproductive age. As shown in (**Table 8)**, Variables that were significantly associated with female underweight included age, marital status, parity, number of <5y children, food insecurity status and vocation of the respondents. As compared women with age group 15-19 women age 20-29 and 30-39 were less likely to be underweight (AOR=0.44, 95% CI; 0.17, 1.17) and (AOR=0.10, 95% CI; 0.04, 0.27). Relative to the odds of underweight among married women, women that were divorced/widowed had more than 8 times higher odds of being underweight (AOR = 8.58, 95% CI: 2.98, 24.73). Unlike women with ≥5 number of children ever born (parity) women with 1-2 and 3-4 number of children ever born (parity) were less likely to be underweight (AOR=0.28, 95% CI; 0.09, 0.83) and (AOR=0.58, 95% CI; 0.26, 1.28). Another important factor found to significantly affect women's nutritional status were food security categories and multivariate analysis found the likelihood of underweight status among the moderately food insecure were more than 2 times to be underweight when compared with food secure women (AOR=2.66, 95% CI; 1.27, 5.58) while severely food insecure (OR 6.99, 95% CI; 2.66 to 18.38). On the other hand, being pastoral women were more than 2 times to be underweight when compared with agro-pastoral women (OR 2.14, 95% CI; 1.33 to 3.44). Women with two or more under five years old, had a significantly more than 9 times higher odds of underweight compared with those who had no, under five years old (OR 9.27, 95% CI; 3.35, 25.59).

Table 8: Multiple logistic regression model of underweight among women 15–49 years of age in households of Aysaita district Afar, Ethiopia, May 2015 (n = 490). OR significant at < 0.05 & < 0.25 level are bolded.

Variables	Underweight status			Crude OR (95% CI)	Adjusted OR(95% CI)
	Yes (%)	No (%)	N		
Age (yrs.)					
15-19 (Ref*)	4.7	4.3	44	1.00	1.00
20-29	9.8	13.7	115	**0.65 (0.33 to 1.32)****	**0.44 (0.17 to 1.17)****
30-39	19.6	35.3	269	**0.51 (0.27 to 0.96)****	**0.10 (0.04 to 0.27)***
40-49	6.9	5.7	62	1.11 (0.51 to 2.41)	0.78 (0.26 to 2.32)
Marital status					
Married (Ref*)	36.6	56.9	457	1.00	1.00
Divorced/ Widowed	4.7	2.0	33	**3.61 (1.68 to 7.75)***	**8.58 (2.98 to 24.73)***

Family size					
1-3 (Ref*)	2.9	4.7	37	1.00	1.00
4-7	19.4	43.7	309	0.73 (0.36 to 1.48)	0.66 (0.16 to 2.68)
>7	18.8	4.6	144	**2.91 (1.38 to 6.13)***	0.86 (0.170 to 4.26)
Parity					
0	2.0	1.0	15	1.32 (0.44 to 3.99)	0.76 (0.09 to 6.17)
1-2	3.1	15.3	90	**0.13 (0.07 to 0.25)***	**0.28 (0.09 to 0.83)****
3-4	10.2	25.7	176	**0.26 (0.17 to 0.40)***	**0.58 (0.26 to 1.28)****
≥5 (Ref*)	25.7	16.9	209	1.00	1.00
Number of <5y children					
0 (Ref*)	6.1	19.6	126	1.00	1.00
1	5.9	20.8	131	0.91 (0.51 to 1.63)	2.77 (1.08 to 7.07)
≥2	29.0	18.6	233	**4.99 (3.07 to 8.13)***	**9.27 (3.35 to 25.59)***
HFIAS Categories					
Secure (Ref*)	5.9	23.7	145	1.00	1.00
Mild	9.2	16.9	128	**2.17 (1.26 to 3.74)****	1.35 (0.65 to 2.82)
Moderate	14.9	15.9	148	**3.89 (2.32 to 6.54)***	**2.66 (1.27 to 5.58)***
Sever	11.0	3.1	69	**14.40 (7.14 to 29.06)***	**6.99 (2.66 to 18.38)***
Vocation					
Agro-pastoral (Ref*)	18.0	33.3	239	1.00	1.00
Pastoral	23.1	25.7	251	**1.66 (1.16 to 2.39)***	**2.14 (1.33 to 3.44)***

Ref* = reference category * p- value < 0.05 ** p-value< 0.25

6. DISCUSSION

6.1 Underweight Prevalence

Undernutrition is assumed to be affected by both health and food security status of the individual. Thus the evaluation of undernutrition needs to be seen in light of these two pillars (36). This study found a high rate of underweight women with rates very similar to EDHS 2011 national survey for Aar region (35). In this study, among non-pregnant women (15y-49y) (n=490), the rate of underweight was 41%, which is higher than the 2011 EDHS national rates of 27% and down from the rate of 43.5% found in EDHS 2011, data specific to Afar region (7).

6.2 Risk factors for Underweight

Multiple logistic regression analysis found six main risk factors associated with underweight status among women. The factors were women's age, categorized HFIAS food insecurity, marital status, parity, vocation and increasing number of <5 y of children. All were positively correlated with underweight among women. This study was not able to observe a significant association between maternal education level and underweight status. Previous studies have reported similar results in Vietnam (29). However; some studies in Ethiopia and elsewhere in Africa and in Guatemala have been reported differently (7, 35-36, 28). This lack of significant effect in the current study may be due to a small sample size with insufficient power to detect such findings.

Another important determinant of the nutritional status of women is women's age (age 20-29) and (age 30-39) are less likely to be undernourished than women age 15-19. Other studies have found similar results (7, 35-36). Unawareness of adolescent women about their own health and nutritional status could be another reason associated with their poor nutritional status. Moreover, women age 15-19 need adequate nutrients to support fast physical, mental and emotional growth (36). Widowed/Divorced women are more likely to be undernourished than women who are married. Other studies have found similar results (28, 36). Due to cultural values and poor decision-making autonomy, women have little access to higher education and high- and middle-income jobs. Hence, many women are dependent on their partners and thus may not be able to get adequate nutrition if

they have no partner. In addition, in most cases never-married women belong to households with relatively poor economic status, which may also make it more difficult to obtain sufficient food (36).

This study indicated that women with two or more under five years old, had a significantly higher odds of underweight compared with those who had no under five years old. This finding is also consistent with other studies (29). Regarding parity, women with ≥5 number of children ever born (parity) were more likely to be underweight. Similar results have found in Ethiopia and Guatemala (36, 28). This is because of having more under five years old and a relatively higher-level parity (more children ever born), could obligate them to take care of their children rather than protecting their own health and nutritional status, given limited household resources.

Another important determinant of the nutritional status of women is household food security status. As expected, both bivariate and multivariate results, confirmed that those with severely food insecure household are at a higher risk of undernutrition than their food secure counterparts. This finding is also consistent with other studies (29). This may indicate that household food security is a precondition for daily dietary intake for all household members. The pastoral women were more likely to be underweight when compared with agro-pastoral women. The reason could be due to a cultural problem associated with pastoral communities that limits their required dietary intake from crop products (36).

6.3 Risk Factors: Household Food Insecurity

Household Food Insecurity was very high and 70.4% (345) of participants were characterized as food insecure. Household food insecurity was a significant factor associated with underweight status. Women with moderate food insecurity had twice while women with severe food insecurity had six times the risk of being underweight. This was a significant finding as this study was the first to look at primary indicators of household food insecurity using the HFIAS questionnaire in Ethiopia. The factors with strongest effect for household food insecurity were education, parity, vocation and having ≥2 under five children in a family.

An important determinant of household food security status is educational status. Household heads who were uneducated were more likely to be food insecure when compared with household heads with primary education. Other studies have found similar results (28-32). This could be low status household (in terms of educational status) have less access to consistent income which in turn leads to household food security.

Women who have ≥2 under five children were at a higher risk of household food insecurity when compared with households with no under five children. This finding is also consistent with other studies (28-29). In contrast, a study done in Agro-pastoral showed that dependency ratio did not have a significant impact on the odds of food availability in the household (31). Women who have never had a child (parity 0) and women with at least five children (parity 5+) household were at a higher risk of household food insecurity. Agro-pastoral households were more likely to be food insecure when compared with pastoral households.

7. Limitations and strengths

The strengths of the study were that it was the first study to use primary household food insecurity indicators and use logistic regression analysis to explore possible risk factors of both food insecurity and underweight among rural women in Afar. Some of the main limitations of the study were the household food security questions reflect only conditions in the previous 1 month, and many of the outcomes being explored here accrue over a much longer time period, thus requiring some assumptions about the food security status of the household over the long term. In addition, because of the cross-sectional nature of the study, it is impossible to establish a temporal relationship between food security status and nutritional outcomes. Longitudinal studies, which track these conditions over time, would be better suited for understanding and exploring the temporal nature of the relationship between food security status and nutritional outcomes.

8. Conclusion

High rates of both household food insecurity and underweight status were found among women in Aysaita district. This study found underweight status was predicted by higher levels of food insecurity, marital status, parity, and higher numbers of children (<5 y) in a family. Significantly higher levels of food insecurity, were correlated with low maternal education, parity, vocation, and having ≥2 under five children in a family. Therefore, food insecurity was purely dependent on household socio-economic status.

This study found that women age 15-19 and 40-49 were more likely to be undernourished. Divorced/widowed women were more likely than married women to be affected by undernutrition. Pastoral women were more likely to be undernourished, than agro-pastoral women. Regarding food insecurity status, women whose households had severely food insecure were more affected by undernutrition than those whose household's food secured. Unlike women with no (0) number of children ever born (parity) women with ≥5number of children ever born (parity) were less likely to be underweight. On the other hand, women having ≥2 under five children were more likely to be undernutrition when compared without under five children women.

9. Recommendations

Considering these findings, the following recommendations are suggested: Promote increased engagement of household and other community members in playing key role in reduction of maternal undernutrition and household food insecurity through social and behavioral change and create awareness about the condition for better nutrition. The government should put in place programmes that contribute to the reduction of chronic undernutrition and food insecurity in women of reproductive age in the study area through improving access to and utilization of animal source foods; increasing agricultural productivity; promoting health service provision as well as girls' education and strengthen social safety net programs to protect vulnerable groups from food insecurity and undernutrition. The stakeholder's like civic societies, international and local development partners and the private sector should work hand in hand with the government to implement the programs successfully. In order to establish a temporal relationship (and thus causality) between food insecurity status and maternal nutrition, further researches using longitudinal studies suggested to conduct by a researchers.

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Annex I: CONSENT INFORMATION SHEET

Good morning/good afternoon. My name is _____. We came from Addis Ababa University College of health Science School of Public health. We are working for an investigator doing his thesis for the partial fulfillment of master's degree in public health. We would like to ask you few questions about your household food security situation and related factors affecting your nutritional status. This will help us to identify some of the barriers to good nutritional status outcomes based on your answer to our questions.

We will also take some measurements including weight and height from you. If you are interested we can tell your weight and height measurements. You have full right to refuse, withdraw or completely reject part or all of your participation in the study. But we encourage your full participation as the answers you give on this form and your participation in taking your measurements are very important to this study.

We would like to assure you that all of your responses to our questions will be kept confidential throughout the study process. Any of your information you provide will be used only by the research team and will, by no means, be revealed to a third party. We will ask you questions and take measurements in a place where other people or conditions couldn't interfere. We would like to assure you that your participation on this research will not affect any of your interest and other benefit that you get from any organization.

We would be thankful if you spend some time with us answering questions related to the issues described above and cooperating in taking some measurements from you. The questions and measurements will take 30-40 minutes. May I get your permission to continue my interview?

Yes ☐ 1_ if yes, continue

No ☐ 2_ Stop

Data collector's

Name_____

Signature _____

Supervisor's

Name……

Signature……..

Annex II: English Version Questionnaires: To Assess Household Food Insecurity and its Association with Nutritional Status of Women in the Reproductive Age Group, in Aysaita District of Affar Regional State, Eastern Ethiopia, May, 2015.

Questionnaire serial number (code): _____ Date of data collection: _____
Kebele_____ Wereda _____ House hold number: _____

Section 1: Questions about General Households' Economic and Demographic Characteristics

S. No	Questions	Respond options	Code
1.1	Sex of Household head	1. Male 2. Female	|___|
1.2	What is the Age of Household head	1. _____years	|___|
1.3	Religion	1 Muslim 3 Protestant 2 Orthodox 4 Catholic 5 Others __	|___|
1.4	Marital status	1 Married 3 Widowed 2 Divorced 4 Others	
1.5	What is the family size of your Household	_____	
1.6	How many living children's did you have in the household	_____	
1.7	How many under five children's did you have in the household	_____	
1.8	What is the educational status of household head	1 Uneducated 2 Elementary and above	|___|
1.9	What is the occupation of household head	1. Agro-pastoral 2. Pastoral	|___|

Section 2: Occurrence and Frequency of Household Food Insecurity Derived from version 3 of the Household Food Insecurity Access Scale (HFIAS) measurement guide.

S. NO	Question	Response options	Code
2.1.	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes	|___|
2.1.a	How o often did this happen?	1 = Rarely (once or twice in the last 4 weeks) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
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 = No (skip to Q3) 1=Yes	|___|
2.2.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
2.3.	In the past four weeks, did you or any HH member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1 = Yes	|___|
2.3.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times	|___|
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 = No (skip to Q5) 1 = Yes	|___|
2.4.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
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 = No (skip to Q6) 1 = Yes	|___|
2.5.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
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 = No (skip to Q7) 1 = Yes	|___|
2.6.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
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 = No (skip to Q8) 1 = Yes	|___|
2.7.a	How often did this happen?	1 = Rarely (once or twice)	|___|

		2 = Sometimes (3-10 times) 3 = Often (more than ten times)	
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 = No (skip to Q9) 1 = Yes	|___|
2.8.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
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 = No (skip to section 3) 1 = Yes	|___|
2.9.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
2.12	Different people take different actions to cope with food insecurity, what about you and your family member did?	1. Reduce the amount of consumed diet per meal 2. Cut the number of meals consumed per day 3. Shift to less expensive and poor quality diet 4. Reduce on non-food expenditures 5. Receive for food or cash aid 6. Taking a loan from bank or other person 7. Selling any house hold assets 8. Others (specify)_____	|___|

Section 3: Food Diversity & Consumption Score of Households in Aysaita District of Affar Regional State, Eastern Ethiopia, May, 2015.

Now, I will ask you the different food groups if your household members have consumed in the last 24 hours? You will respond by saying Yes or No for each food group.(if there is any special diet ceremony in the house, please ask about the day before that day)			Code
Questions	(1) Yes *(√)*	(2) No (√)	
Cereals (teff, wheat, maiz, rice, sorghum,& their products like 'pasta', Macaroni, porridge)			|___|
Pulses/legumes			|___|
Vegetables			|___|
Fruits			|___|
Root and tubers			|___|
Meat, poultry			|___|
Eggs			|___|
Fish and seafood			|___|
Milk and milk products			|___|
Oil/fats			|___|
Sugar/honey			|___|
Miscellaneous (other foods)			|___|

Section 4: Assessment of maternal nutritional status and Anthropometric measurement in Aysaita District of Affar Regional State, Eastern Ethiopia, May, 2015.

S. No	Questions	Response options	Code
4.1	Mothers age	Age_____	|___|
4.2	Weight kg		
4.3	Height _____ m_____		

I have finished my interview and if you have any question or suggestion you can raise, if not I ask you to put your signature confirming that this data represents you and your household.

I confirm that this data is mine: date _____Signature_____

Annex III: (Amharic version) CONSENT INFORMATION SHEET

ይሁንታ ወይም ፍቃድ መጠየቂያና የመረጃ ቅጽ

እንደምን አደራቹህ/እንደምን ዋላቹህ:: ስሜ _____ ይባላል:: የመጣነው ከአዲስ አበባ ዩኒቨርስቲ ጤና ሳይንስ ኮሌጅ የሕ/ሰብ ጤና አጠባበቅ ት/ቤት የማስተርስ (ሁለተኛ ዲግሪ) መመረቂያ ፅሁፉን በሕ/ሰብ ጤና አጠባበቅ ለመስራት የመጣን ተመራማሪ በማገዝ ነው። የቤተሰብ ምግብ ምጣኔ በእናቶች አመጋገብ ላይ ያለውን ተፅኖ ለማየት ጥቂት ጥያቄዎችን ልንጠይቀዎት እንወዳለን። ጥያቄዎቹን በመመለሰዎ በእናቶች አመጋገብ ላይ ያሉ ችግሮችን ለይቶ ለማወቅ ይረዳናል።

ከጥያቄዎቹ በተጨማሪ ክብደተዎንና ቁመተዎን እንለካለን ፍላጎተዎ ከሆነም ውጤቱን እንነግረዎታለን። በቃለ መጠይቁ በከፊል አለመሳተፍ፤ ማቋረጥ እንዲሁም ሙሉ ለሙሉ ያለመስተፍ ሙሉ መብት አለዎት። ነገር ግን የእርሰዎ ተሳትፎ ለጥናታዊ ፅሁፉ ትልቅ ጠቀሜታ ስለሚኖረው በመጠይቁ ሙሉ ተስትፎ እንዲኖረዎት እናበረታታዎትአለን።

በቃለ መጠይቁ ግዜ ለሚሰጡን ምላሽ ሚስጥራዊነቱ የተጠበቀ እንደሚሆን ከወዲሁ ቃል ልንገባለዎት እንወዲለን። የሚሰጡንን ማንኛዉም አይነት መረጃ ጥናቱን በሚሰሩ ሰዎች ለጥናታዊ ፅሁፉ ከመጠቀም ውጭ በምንም መልኩ ለሶስተኛ ወገን አሳልፈን አንሰጥም። ጥያቄዎቹን ለመመለስ እንዲሁም ቁመተዎንና ክብደተዎን ለመለካት ማንም በለለበት ለእርሰዎ አመቺ በሆነ ቦታ እናከናውነውአለን። ሌላው ልናረጋግጥልዎት የሚገባነገር ቢኖር በዚህ ጥናታዊ ፅሁፍ በመስተፈዎ ማንኛውም አይነት የግልም ሆነ ከድርጅት የሚያገኙት ጥቅም እንደማይነዳ ለመግለፅ እንወዳለን።

በመጨረሻም ጥያቄዎችን ለመመለስ እንዲሁም ቁመተዎንና ክብደተዎን ለመለካት የተወሰነ ጊዜ ሰጥተው አብረውን እንዲቆዩ ከፍያለ ምስጋና እናቀርባለን። ጥያቄዎችን ለመመለስ እንዲሁም ቁመተዎንና ክብደተዎን ለመለካት ከሰላሳ እስከ አርባ ደቂቃ ሊፈጅ ይችላል። ከዚህ በላይ ስለጥናቱ የተታፃፈውን መግለጫ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ ተረድቻለሁ በመሆኑም በዚህ ጥናት ለመሳተፍይህን፦

ፍቃደኛ ነኝ 1_ ይቀጥሉ

ፍቃደኛ አይደለሁም 2_ ያቁሙት

የመጠይቁ መለያ ቁጥር _____ መረጃ የተሰበሰበበት ቀን_____

ጥናቱ የተካሄደበት ወረዳ _____ ቀበሌ_____

የመረጃ ሰብሳቢ ስም _____ ፊርማ _____

የመስክ ተቆጣጣሪ ስም _____ ፊርማ _____

Annex IV: Questionnaires (Amharic version)

ክፍል 1፡ ስለ ቤተሰብ አጠቃላይ ሁኔታ ለመዳሰስ የተዘጋጀ መጠይቅ 2007 ዓ.ም

ተ.ቁ		አማራጭ መልሶች	ኮድ
101	የቤተሰብ ሓላፊ ፆታ	1 ወንድ 2 ሴት	[ ]
102	የቤተሰብ ሓላፊ ዕድሜ	---------- ዓመት	[ ]
103	የሚከተሉት ሃይማኖት ምንድነው?	1 ሙስሊም 3 ፕሮቴስታንት 2 አርቶዶክስ 4 ካቶሊክ 5 ሌላ ካለ ይጥቀሱ----------	[ ]
	የጋብቻ ሁኔታ	1 ያገባች 3 ባሏ የሞተባት 2 ያላገባች 4 የተለያዬች	[ ]
104	የቤተሰብዎ ብዛት ስንት ነው		
	በቤተሰብዎ ውስጥ በህወት የተወለዱ ስንት ልጆች አለዎት		
	በቤተሰብዎ ውስጥ ከአምስት አመት በታች የሆኑ ስንት ልጆች አለዎት		
105	የቤተሰብዎ ሓላፊ ምን ያህል ተምረዋል	1- ምንም ያልተማረች 2- 1ኛ ደረጃና ከዛ በላይ	[ ]
106	የቤተሰብዎ ሓላፊ ስራ ምንድነው	1- ከፊል አርብቶ አደር 2- አርብቶ አደር 3- ሌላ ካ ይጥቀሱ----------	[ ]

ክፍል 2፡ የቤተሰብ የምግብ ዋስትና ሁኔታ ለመዳሰስ የተዘጋጀ መጠይቅ 2007 ዓ.ም

ተ.ቁ			
201	ባለፈው አንድ ወር ውስጥ በቤትዎ ውስጥ የምግብ እጥረት እዳያጋጥሞት ተጨንቀው ያውቃሉ?	0-አላውቅም (የለም ካሉ ጥያቄ 201a ይዝለሉት) 1-አዎ	[ ]
201a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
202	ባለፍው እንድ ወር ውስጥ እርሰዎ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክኒያት የሚፈልጉትን ምግብ ሳይመገቡ ቀርተዋል?	0-የለም የለም ካሉ ትያቄ 202 a ይዝለሉት 1-አዎ	[ ]
202a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
203	ባለፈው አንድ ወር ወስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ አቅርቦት ምክኒያት የሚመገቧቸው ምግብ አይነቶች ቀንሰዋል?	0-አላውቅም (የለም ካሉ ጥያቄ 203 a ይዝለሉት) 1-አዎ	[ ]
203a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
204	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ አቅርቦት ምክኒያት የማይፈልጉትን የምግብ አይነት ተመግበዋል?	0-አላውቅም (የለም ካሉ ጥያቄ 204 a ይዝለሉት) 1-አዎ	[ ]
204a	መለስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
205	ባለፈው አንድ በወር ውስጥ እርስዎ ወይም ሌላ ቤተሰብ አባል በምግብ እጥረት ምክኒያት የሚመገቡትን የምግብ መጠን ቀንሰዋል?	0-አላውቅም (የለም ካሉ ጥያቄ 205 a ይዝለሉት) 1-አዎ	[ ]

205a	መልሶ አዎ ከሆነ ይህ ለምንህል ጊዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
206	ባለፈው አንድ ወር ውስጥ በምግብ እጥረት ምክኒያት እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክኒያት በቀን ምግብ የሚበሉባቸው ግዜያቶች ቀንሰዋል?	0-አላውቅም (የለም ካሉ ጥያቄ 206 a ይዝለሉት) 1-አዎ	[ ]
206a	መልሱ አዎ ከሆነ ይህ ለምንህል ጊዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
207	ባለፈው አንድ ወር ውስጥ በምግብ እጥረት ምክኒያት ማንኛውም የሚበላ ምግብ ከቤት ጠፍቶ ያውቃል?	0-አላውቅም (የለም ካሉ ጥያቄ 207 a ይዝለሉት) 1-አዎ	[ ]
207a	መልሶ አዎ ከሆነ ይህ ለምንህል ጊዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
208	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክኒያት እየተራቡ ምግብ ሳይበሉ ተኝተው ያውቃሉ?	0-አላውቅም (የለም ካሉ ጥያቄ 208 a ይዝለሉት) 1-አዎ	[ ]
208a	መልሱ አዎ ከሆነ ይህ ለምንህል ጊዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
209	ባለፈው አንድ ወር ውስጥ ማንኛውም የቤተሰብ አባል በምግብ እጥረት ምክኒያት እየተራቡ ቀንና ለሊት ሙሉ ምግብ ሳይበሉ ቀርተው ያውቃሉ?	0-አላውቅም (የለም ካሉ ጥያቄ 209a ይዝለሉት) 1-አዎ	[ ]
209 a	መልሶ አዎ ከሆነ ይህ ለምንህል ጊዜ ተከስቷል?	1- አልፎ አልፎ (አንዴ ወይ ሁለቴ) 2- የተወሰነ ግዜ (3-10) 3- ብዙ ግዝ (ከ10 ግዜ በላይ)	[ ]
112	እርሶና ቤተሰቦዎ የምግብ እጥረት በሚያጋጥሞት ጊዜ ምን አይነት መቋቋሚያ	1- የምመገበውን የምግብ መጠን መቀነስ 2- በቀን የሚመገቡበት ጊዜ መቀነስ 3- ጥራታቸውንና ዋጋቸው የቀነሱ ምግቦች በመቀየር	[ ]

	ስልቶች ተጠቅመው ያውቃሉ? ((ከአንድ በላይ መልስ መስጠት ይቻላል)	4- ተጨማሪ ስራ በመስራት ገቢያችን በመጨመር 5- ምግብ ነክ ያልሆኑ ነገሮችን ወጪ በመቀነስ 6- የቤት እቃዎችንና ንብረቶችን በመሸጥ 7- የምግብ ወይም የገንዘብ እርዳታ በመቀበል 8- ከባንክ ወይም ከሌላ ብድር በመውሰድ 9- ሌላ ካለ ይጥቀሱ----------	

ክፍል 3: የተለያዩ የምግብ አይነቶችና የአመጋገብ ስሌት ለመዳሰስ የተዘጋጀ መጠይቅ 2007 ዓ.ም

አሁን, በ24 ሰአት ውስጥ ቤተሰበዎ የተለያዩ አይነት ምግቦች ተመግበው እንደሆን እጠይቀዎትአለሁ:: እርሰዎም በእያንዳንዱ የምግብ ምድቦች ተመግቢያለሁ ወይም አልትመገብኩም በማለት ይመልሳሉ:: (በቤት ውስጥ የተለየ የምግብ ድግስ ተደርጐ ከነበር እባከዎን ይጠይቁ)			Code
ጥያቄዎች	**(1) አዎ (√)**	**(2) የለም (√)**	**ኮድ**
እህል (ጤፍ ስንዴ ገብስ በቀሎ ማሩዝ እንዲሁም የነዚህ ውጤት የሆኑት ገንፎ ፓስታ ማካሮኒና ሌሎችም			|___|
የቅባት እህል/ባቄላ መሰል ጥራጥሬ			|___|
ቅጠላቅጠል/አትክልት			|___|
ፍራፍሬ			|___|
ስራስር			|___|
ስጋ/የወፍ ዘሮች የሚበሉ ስጋ			|___|
እንቁላል			|___|
አሳና የባህር ምግቦች			|___|
ወተትና የወተት ውጤቶች			|___|
ዘይት/ፈሳማ			|___|
ስኳር/ማር			|___|
የተለያየ አይት (ሌሎች ምግቦች)			|___|

ክፍል 4: የእናቶች የምግብ ሁኔታ ለመዳሰስ እንዲሁም ቁመትና ክብደት ለመለካት የተዘጋጀ ቃለ መጠይቅ 2007

ተ.ቁ	ጥያቄዎች	አማራጭ መልሶች	ኮድ
4.1	የእናት እድሜ	እድሜ _____	|___|
4.2	ክብደት_____ ኪሎ ግራም		
4.3	ቁመት _____ሜትር		

ጥያቄን ጨርሻለሁ ጥያቄ ወይም አስተያየት ካለዎት ማንሳት ይችላሉ:: ጥያቄ ካለዎት ማንሳት ይችላሉ:: ጥያቄ ከለለዎት እባከዎን ከላይ የሰጡት መረጃ የርሰዎንና ቤተሰበዎን የሚወክል መሆኑን በፊርማዎ ያረጋግጡልን:: ከላይ የሰጠሁት መረጃ የኔ ለመሆኑ በፊርሚያዬ አረጋግጣለሁ:: ቀን _____ ፊርማ _____

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical Conduct of the research project and for provision of required progress reports as Per terms and conditions of the Research Publications Office in effect at the time of Grant is forwarded as the result of this application.

Name of the student: _____

Date._____ Signature _____

Approval of the primary Advisor

Name of the primary advisor:_____

Date._____ Signature _____