

**Household Food Insecurity, Underweight Status and Associated
Characteristics among Women of Reproductive age Group in
Asyaita District, Afar Regional State, Ethiopia.**

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Abstract

Background: Poor nutritional status of 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. Despite the humanitarian and food aid given, food insecurity and maternal underweight are very high in Afar region. A factor that has not been adequately studied in Afar is household food insecurity, as it may be a possible determinant of the high rate of underweight status among women in reproductive age group hence the aim of this study was to assess the prevalence of household food insecurity, underweight status and its association among reproductive age women in Assayita District, Afar, Ethiopia.

Method: The study was conducted in Assayita district on June 2015 and community based cross-sectional study design was used among non-pregnant women. Household data was collected using structured questionnaire. Multistage cluster sampling procedure that constitutes two pastoral and two agro-pastoral Kebelles which have been selected using simple random sampling was applied. Systematic random sampling was used to select respondents. The total sample size was 549 households. Household Food Insecurity Access Scale (HFIAS) and anthropometric data were used to determine food insecurity and underweight respectively. Multivariate regression models were used to measure association between dependent and independent variables.

Results: The prevalence of HFIAS was 70.4 with a mean 7.0 (3.6 \pm SD); 26.1%, 30.20% and 14.1% were mild, moderate and severe food insecurity respectively. Underweight prevalence (BMI <18.5) was 41.1% with prevalence to mild, moderate and severe underweight of 34.5%, 3.9% and 2.7% respectively. Maternal age, number of children ever born (parity) and having > 2 under five children were statistically associated with both household food insecurity and maternal underweight. However, Participants with severely food insecure were more than 6 times odds of being underweight than their counterpart (OR 6.9, 95% CI; 2.7 to 18.4). Women with \geq 2 under five children had more than 9 times odds of being underweight compared with those who had no (OR 9.3, 95% CI; 3.4, 25.6).

Conclusion and Recommendation: Household food insecurity and maternal underweight was very high in this study. Maternal age, the numbers of children ever born (parity) and having \geq 2 under five children were associated with household food insecurity. Correspondingly, maternal

underweight were significantly associated with maternal age, marital status, parity, number of <5 children, household food insecurity and vocation of the respondents. The regional and federal government should design appropriate policy that focused on family planning provision and improvement of household economy. Programs that address food insecurity and under nutrition should be strengthened to solve the current problems.

Background

Food insecurity is a state or a condition in which people experienced limited or uncertain physical and economic access to safe, sufficient, and nutritious food to meet their dietary needs or food preferences for a productive, healthy and active life (1). Food security, on the other hand, is achieved when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (2). Food insecurity is a major public health problem in both developing and developed nations. However, the proportion of undernourished people remains highest in sub-Saharan Africa (3).

Ethiopia, one of the most food insecure countries in Africa, has long history of famines and food shortages. More than half of the African's food insecure population lives in Ethiopia and six other countries (4). The nutritional status of a mother is important, both as an indicator of her overall health and as a predictor of pregnancy outcome for both mother and child (5). The proportions of women who are malnourished in selected sub-Saharan African countries for which a DHS was recently conducted range from 7 to 37 percent. Ethiopia has highest proportions of undernourished women (6). The national prevalence of maternal BMI <18.5 was 26% with 40% distribution in Afar region (7).

Household food insecurity has been associated with several health and nutrition outcomes (8). Women's nutrition affects a wide range of health and social issues, including family care and household food security (9). Food insecurity and under nutrition in adolescent and pregnant women, compounded with gender discrimination, leads to an intergenerational cycle of nutritional problems (10). One consequence is lowering of birth weight due to malnutrition in pregnancy which perpetuates malnutrition between generations (6).

Ethiopian projection/forecasting for 2016 indicate that 0.4 and 1.7 million people will face severely and moderately acute under nutrition. Climatic shocks greatly affecting successive harvests and high food price inflation have combined to drive food insecurity and under nutrition significantly higher (11). Pastoralists and agro-pastoralists make up nearly 15 per cent of Ethiopia's total population and are among the poorest (12). Ethiopia's pastoralists remain at

the margins of national economic life. However pastoral women are ‘doubly marginalized’ since they experience the discrimination and marginalization (13).

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 (14). The region also recognized as being hotspot for combination of high food insecurity, moderate to high malnutrition rates and rapid onset of emergencies like epidemic outbreaks, floods or conflicts (15).

Poor nutritional status of women has been a serious problem in Ethiopia for many years which requiring greater multi-sectoral efforts (8, 16). Rural women are more likely to be undernourished than urban women, and those residing in the Afar region are the most likely to be undernourished (43.5%) of any region (16). The relationship between household food insecurity and nutritional status of women in Afar is not well recognized hence the objective of this study is to verify the prevalence of household food insecurity and maternal nutritional status in Assayita district, Afar region, Ethiopia.

METHODS

The study was conducted on June 2015 in Assayita zone, Afar Regional State which is located 650 Km away from Addis Ababa, the capital of Ethiopia. Based on the 2007 Census result of the Central Statistical Agency of Ethiopia (CSAE), the total population of Afar Region was 1,411,092, consisting of 786,338 men and 624,754 women. Rural inhabitants constitute 1,222,369 (86.6%) of the total population. 67.3% of inhabitants fall into the lowest wealth quintile; adult literacy for men is 27% and 15.6% for women (17). Assayita is one of the largest districts that has thirteen Kebeles; of which two urban, six pastoral and five agro-pastoral Kebeles. Total population of the district was 47,210. Of the total population, 31,162 (66%) live in rural areas and the rest 16,048 (34%) live in urban areas (17). The district has four clinics, three health posts and one health center (18).

A community based cross sectional study design was applied and the source population were all households with reproductive age women while, study population was households of randomly selected agro-pastoral and pastoral community. Households with at least one reproductive age woman were included. However, if more than one eligible woman was available in one household, the one who is responsible for family care and/or being head was considered for this study.

Sample size was computed using single population proportion formula assuming a marginal error of 5%, and 95% confidence interval. During sample size determination prevalence of undernourished women and national prevalence for food insecurity was taken into consideration and the prevalence which yields the maximum sample size was taken as final sample.

Besides this the prevalence of undernourished at national food insecurity of 35% (19) at 5% allowance for possible non response and multiplying by design effect of 1.5, gives us a maximum sample size of 549. The sample was distributed across the selected Kebeles proportional to their household size. In regard to sampling procedures first multi-stage stratified

sampling procedure was deployed to get a representative data. Two pastoral and two agro-pastoral Kebeles was selected using simple random sampling. Systematic random sampling was used to identify respondents and probability proportionate to size (PPS) technique was applied.

Data was collected through interviews and anthropometric measurements. During interview structured questionnaire consisted of socioeconomic and demographic characteristics, frequency of 24-hour dietary recall, and household food insecurity measurements were used. The questionnaire was initially prepared in English and then translated into Amharic. Six experienced data collectors who had Diploma certificate in health and able to speak the local language fluently collects the data. Meanwhile, two supervisors from the district health office were involved in supervising the overall data collection process.

Household Food Insecurity Access Scale (HFIAS) 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. Nine item questionnaire with 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 were used.

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 (20). 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 household 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 score between 0 and 6. These values are then used to generate the household 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 (21)

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 consumed, with 1 being the minimum score and 12 as the maximum (22).

To determine the impact of household food insecurity on nutritional status of reproductive age women weight and height measurements were taken from all study subjects. Weight was measured to the nearest 0.5 kg using a Weight measurements scale.

Height was measured to the nearest centimeters also using a tape meter; the scales were calibrated after each session of measurements. Malnutrition in women was 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 ($BMI = \text{kg}/\text{m}^2$). A BMI below 18.5 among non-pregnant, non-lactating women indicates chronic energy deficiency or under nutrition. When BMI is above 25, women are considered overweight (5). Underweight prevalence ($BMI < 18.5 \text{ kg}/\text{m}^2$) was further categorized by WHO standards for mild ($BMI 18.5-17 \text{ kg}/\text{m}^2$), moderate ($BMI 16.99-16.00 \text{ kg}/\text{m}^2$), and severe underweight ($BMI < 16 \text{ kg}/\text{m}^2$) (23).

Household food insecurity status and Underweight status among women of reproductive age were considered as dependent variables. Whereas, Socio-demographic characters, Height, Weight and BMI were our independent variables.

To assure quality of data, structured questionnaire was employed to attain the required information after getting written and verbal consent from the respondents. The data collectors and supervisors were trained on objectives of study sampling procedures, techniques of interviews and data handling. The questionnaire was pretested in a community similar to the study population and the necessary modification was made. The supervisors and principal investigator were closely following the day-to-day data collection process and ensure completeness and consistency of questionnaire administered each day. Statistical software was used to analyze data. The data was entered using Epi-info version 7 and analysis was done using Statistical Package for Social Sciences (SPSS) Version 21.

Descriptive statistics was tabulated to describe the characteristics of households in each level of food security, as well as the nutritional outcomes associated with food security. For variables expressed as percentages or proportions chi-square tests was used to assess differences between food security classifications. Multiple binary logistics regression models were used to quantify the association between household food security and nutritional outcomes among reproductive age women.

Ethical clearance was obtained from ethical review committee of Addis Ababa University College of Health Science. An official letter was also obtained from Afar Regional Health Bureau and district health office. Similarly, written consent was obtained from interviewee before proceeding to data collection. All information that was obtained from the individual was treated confidentially.

In this study Underweight was defined as $BMI < 18.5 \text{ kg/m}^2$, normal weight $BMI \geq 18.5$ and $< 25 \text{ kg/m}^2$ (23). Food secure Household was defined as Household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. 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 or experience any of three most severe conditions is termed as mildly food insecure household.

Moderately food insecure household is considered if 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. when 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 this is assumed as severely food insecure Household. Dietary diversity is the number of different foods or food groups consumed over 24 hour period.

Results

A total of 490 households which is 89.3% response rate were assessed in this study. The majority (93.3%) of the household heads interviewed were married. Two hundred sixty nine (54.9%) of the respondents were in the age group of 30-39 years and the mean maternal age was 32.4 (± 6.7 SD). The mean family-size was 6.3 (± 2.3 SD). More than two thirds (63.1%) of households had 4-7 family members. Four hundred forty five (90.8%) of mothers were illiterate or with no formal education. of the total respondents 251(51.8%) and 239 (48.2%) were agro-pastoralist and pastoralist respectively.

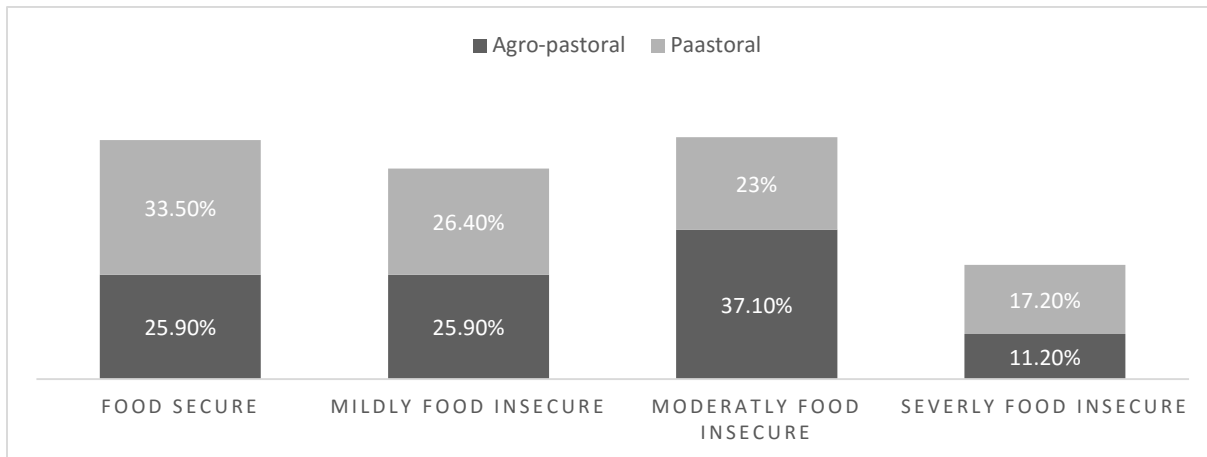


Figure 1: Percentage of households in each category of food security for Agro-pastoral and Pastoral households, Assayita district, June 2015 (n = 490).

The mean household food insecurity access scale score was 7.0 (± 3.6 SD). 345(70.4%) of respondents were found with food insecurity. close to one fifth of households 69 (14.1%) were experienced severe food insecurity while 148 (30.2%) and 128 (26.1%) households were moderately and mild food insecure respectively. This study also indicated that 11.2% of agro pastoralist and 17.2% pastoralists were experienced severe food insecurity.

Nearly three-quarters of households (70.8%) reported that they worrying about the availability of enough food in the household, and more than 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. 7.8% of households were 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 last 30 days prior to the survey.

Households were asked about their coping strategies when faced with food insecurity, 84(17.1%) say reducing the amount of consumed diet per meal, 90 (18.4%) have cut the number of meals consumed per day, 22(4.5%) shifting to less quality/ inexpensive foods, 53(10.8%) reducing nonfood expenditure, 167(34.1%) households have receive for food or cash aid, and 167(15.1%) selling any household asset.

The study reveals that the mean dietary diversity score of households were 4.7 ± 1.9 (SD). Using this mean score, households were categorized into three equal parts thus 258 (52.7%) of households had consumed 5 or less food groups (poor dietary diversity) while 67 (13.7%) 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.

Underweight status in reproductive age women was assessed using BMI and the prevalence of underweight (BMI <18.5) was 41.1% among non-pregnant women (n=490), with percentage of mild, moderate and severe underweight of 34.5%, 3.9% and 2.7% respectively. The mean weight, height and BMI were 42.49 kg, 1.51M, and 18.53 kg/m² respectively.

In the binary logistic regression analysis, maternal age, maternal educational status, parity and having more than two under five children were found to be associated with increased HFIAS scores. Women between 20-29 years old had less odds of food insecurity compared to women with age 40-49 years (COR = 0.35, 95% CI: 0.18, 0.69). Household heads with no formal education had more than 3 times the odds of food insecurity when compared with household heads with primary education (COR = 3.10, 95% CI: 1.64, 5.69).

Similarly, households with at least five children (parity 5+), had higher odds of food insecurity compared with those who have never had a child (parity 0) (COR = 10.56, 95% CI: 1.62,

68.88). On the other hand, households with ≥ 2 under five children had significantly higher odds of food insecurity when compared with those who had no under five children, (COR 5.96, 95% CI; 3.55 to 10.01).

The secondary, analytical objectives were to assess hypothesized predictor variables of underweight. Binary logistic regression explored predictor variables of underweight (BMI < 18.5) were age of the female respondent, marital status of women, family size, parity, < 5 children, food insecurity and vocation were a significant predictor of underweight.

This result has shown women between 30-39 years old, had less odds of underweight compared to women with 15-19 years old (COR = 0.51, 95% CI: 0.27, 0.96). Never married women had more than 3 times odds of underweight compared with those who married women (COR=3.61, 95% CI; 1.68, 7.75). The number of children ever born (parity) was another important factor found to significantly affect women's nutritional status.

Similarly, women with ≥ 7 family members were more than 2 times (COR=2.91, 95% CI; 1.38, 6.13) to be underweight compared women with 1-3 family members. Women with two or more under five years old, had a significantly higher odds of underweight compared with those who had no children, under five years old (COR 4.99, 95% CI; 3.07 to 8.13). On the other hand, women with 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). 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).

In multiple binary logistic regression analysis, maternal age, number of children ever born (parity) and having ≥ 2 under five children were significantly and independently associated with food insecurity. women between 20-29 and 30-39 years old, had less odds of food insecurity compared to women with age 40-49 years (AOR = 0.34, 95% CI: 0.12, 0.95) and (AOR = 0.34, 95% CI: 0.14, 0.79) respectively. Similarly, households with at least five children (parity 5+), had significantly higher odds of food insecurity compared with those who have never had a child (parity 0) (AOR = 10.76, 95% CI: 1.38, 84.28). On the other hand, households with one under five year of old children, had a significantly higher odds of food insecurity when compared with those who had no under five years old children, under five years old (AOR 2.03, 95% CI; 1.03 to 3.98).

Table 1: Multivariate analysis on factors associated with food insecurity in households of Assayita district Afar, Ethiopia, June 2015, (n = 490).

Variables	Food insecurity status		N	COR (95% CI)	AOR (95% CI)
	Secure (%)	Insecure (%)			
Maternal age (years)					
15-19	8(1.6)	36(7.3)	44	1.44 (0.55 to 3.76)	2.13 (0.71 to 6.36)
20-29	55(11.2)	60(12.2)	115	0.35 (0.18 to 0.69)	0.34 (0.12 to 0.95)
30-39	67(13.7)	202(41.2)	269	0.96 (0.51 to 1.83)	0.34 (0.14 to 0.79)
40-49 (Ref*)	15(3.1)	47(9.6)	62	1.00	1.00
Educational status					
No education	121(24.7)	324(66.1)	445	3.10 (1.64–5.69)*	1.22 (0.51–2.93)
Primary education (Ref*)	24(4.9)	21(4.3)	45	1.00	1.00
Parity					
0 (Ref*)	2(0.4)	13(2.7)	15	1.00	1.00
1-2	55(11.2)	35(7.1)	90	0.10 (0.02 to 0.46)*	0.09 (0.02 to 0.48)*
3-4	85(17.3)	91(18.6)	176	0.17 (0.04 to 0.75)*	0.18 (0.04 to 0.89)
≥5	3(0.6)	206(42.0)	209	10.56 (1.62 to 68.88)*	10.76 (1.38 to 84.28)
Number of <5y children					
0 (Ref*)	59(12.0)	67(13.7)	126	1.00	1.00
1	56(11.4)	75(15.3)	131	1.18 (0.72 to 1.93)	2.03 (1.03 to 3.98)
≥2	30(6.1)	203(41.4)	233	5.96 (3.55 to 10.01)*	1.96 (0.85 to 4.49)

Ref* = reference category

* = p- value < 0.05, which was considered significant.

Multiple logistic regression model was used to predict the probability of underweight among women of reproductive age. Variables that were significantly associated with female underweight included maternal 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 30-39 had less odds of underweight (AOR=0.10, 95% CI; 0.04, 0.27). Relative to the odds of underweight among married women, women that were never married 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 number of children ever born (parity) were less likely to be underweight (AOR=0.28, 95% CI; 0.09, 0.83). 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 (AOR 9.27, 95% CI; 3.36, 25.59).

Another important factor found to significantly affect women's nutritional status were food security categories and multiple logistic regression analysis found the likelihood of underweight status among severely food insecure were more than 6 times to be underweight when compared with food secure women (AOR 6.99, 95% CI; 2.66 to 18.38). On the other hand, pastoral women were more than 2 times to be underweight when compared with agro-pastoral women (AOR 2.14, 95% CI; 1.33 to 3.44).

Table 2: Multivariate analysis on underweight among women 15–49 years of age in households of Assayita district Afar, Ethiopia, June 2015, (n = 490).

Variables	Underweight status		N	COR (95% CI)	AOR(95% CI)
	Yes (%)	No (%)			
Maternal Age (yrs.)					
15-19 (Ref*)	23(4.7)	21(4.3)	44	1.00	1.00
20-29	48(9.8)	67(13.7)	115	0.65 (0.33 to 1.32)	0.44 (0.17 to 1.17)
30-39	96(19.6)	173(35.3)	269	0.51 (0.27 to 0.96)	0.10 (0.04 to 0.27)*
40-49	34(6.9)	28(5.7)	62	1.11 (0.51 to 2.41)	0.78 (0.26 to 2.32)
Marital status					
Married (Ref*)	178(36.6)	279(56.9)	457	1.00	1.00
Never married	23(4.7)	10(2.0)	33	3.61 (1.68 to 7.75)*	8.58 (2.98 to 24.73)*
Family size					
1-3 (Ref*)	14(2.9)	23(4.7)	37	1.00	1.00
4-7	95(19.4)	214(43.7)	309	0.73 (0.36 to 1.48)	0.66 (0.16 to 2.68)
>7	92(18.8)	52(10.6)	144	2.91 (1.38 to 6.13)*	0.86 (0.17 to 4.27)
Parity					
0	10(2.0)	5(1.0)	15	1.32 (0.44 to 3.99)	0.76 (0.09 to 6.17)
1-2	15(3.1)	75(15.3)	90	0.13 (0.07 to 0.25)*	0.28 (0.09 to 0.83)*
3-4	50(10.2)	126(25.7)	176	0.26 (0.17 to 0.40)*	0.58 (0.26 to 1.28)
≥5 (Ref*)	126(25.7)	83(16.9)	209	1.00	1.00
Number of <5y children					
0 (Ref*)	30(6.1)	96(19.6)	126	1.00	1.00
1	29(5.9)	102(20.8)	131	0.10 (0.03 to 0.34)	2.77 (1.08 to 7.07)*
≥2	142(29.0)	91(18.6)	233	4.99 (3.07 to 8.13)*	9.27 (3.36 to 25.59)*
HFIAS					

Categories					
Secure (Ref*)	29(5.9)	116(23.7)	145	1.00	1.00
Mild food insecurity	45(9.2)	83(16.9)	128	2.17 (1.26 to 3.74)*	1.35 (0.65 to 2.82)
Moderate food insecurity	73(14.9)	75(15.3)	148	3.89 (2.32 to 6.54)*	2.66 (1.27 to 5.58)*
Sever food insecurity	54(11.0)	15(3.1)	69	14.40 (7.14 to 29.06)*	6.99 (2.66 to 18.38)*
Vocation					
Agro-pastoral (Ref*)	88(18.0)	163(33.3)	239	1.00	1.00
Pastoral	113(23.1)	126(25.7)	(251)	1.66 (1.16 to 2.39)**	2.14 (1.33 to 3.44)*

Ref* = reference category

* = p- value < 0.05, which was considered significant.

Limitation of the study

This study is exposed to a recall and response bias, while respondents asked on 24 hour recall and when asked what happened 4 weeks/30 days back to complete HDDS and HFIAS/HHS questions respectively. In calculating the HDDS to captures dietary diversity in a normal 24-hour period by the household as a whole, foods consumed outside the home which were not prepared in the home were not included and this can underestimate HDDS in situations where consumptions out side he home of foods not prepared in the household is common, but in this study such situations were not common.

DISCUSSION

In this study the prevalence for household food insecurity and maternal nutritional status were 345(70.4%) and 41.1% respectively. Maternal age, number of children ever born (Parity), having ≥ 2 under five children were significantly associated with household food insecurity. Correspondingly, marital status, maternal age, parity, number of < 5 year children, food insecurity and vocation of respondents were found to be important predictors of maternal underweight status.

Underweight is affected by both health and food security status of the individual. Thus the evaluation of under nutrition needs to be seen in light of these two pillars (24). In this study, among non-pregnant women (15-49) the rate of underweight was 41.1%, which is higher than EDHS 2011 national rates of 27% but very similar with the rate specific to Afar region (43.5%) found in EDHS 2011 (16). This study found a high rate of underweight women with rates similar to EDHS 2000 national survey for Afar region (25).

In multiple logistic regressions analysis six main risk factors associated with underweight status among women has been identified. Variables that were significantly associated with female underweight included maternal age, marital status, parity, number of <5 year children, food insecurity status and vocation of the respondents. 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 (26). However; some studies in Ethiopia and elsewhere in Africa and

in Guatemala have been reported differently (16, 25, 27). This lack of significant effect in the current study may be due to a small number of educated household heads relative to household heads with no education.

Another important determinant of the nutritional status of women is maternal age (age 30-39) are less likely to be underweight than women 15-19 years which is very similar with other studies results (16, 25, 27). Lack of awareness in adolescent women about their own health and nutritional status could be a reason associated with their poor nutritional status. Moreover, women age 15-19 need adequate nutrients to support fast physical, mental and emotional growth (24). Never married women are more likely to be underweight than women who are married. Other studies have found similar results (25, 27, 28). The reason could be 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 (24).

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 (26). Regarding parity, women with 1-2 number of children ever born (parity), had lower odds of underweight compared with those who had more than five number of children ever born (parity). Similar results have found in Ethiopia and Guatemala (25, 27, 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 (24).

Household food insecurity was a significant factor associated with underweight status. Both bivariate and multivariate results, confirmed that those with severely food insecure households are at a higher risk of underweight than their food secure counterparts. This finding is also consistent with other studies (26). 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 that limits their required dietary intake from crop products (24).

Food insecurity is one of the most crucial problem threatening millions of people in Ethiopia. The HFIAS scale measurement revealed that 70.4% of the households faced food insecurity

which was higher than findings reported from, Tigray (42.7%) and Amhara (43.8%) (29, 30). The possible justifications might be in most of Afar region the Belg rains were far below average. With little pasture regeneration or refilling of water points, most areas remained in the dry season. Accordingly, livestock body conditions have deteriorated, and livestock production and productivity have declined. Unseasonal livestock migration has occurred, reducing milk access for most household members. As per the National Meteorology Agency (NMA), central and north-eastern Ethiopia experienced a very poor first season (Belg, February-April) of rainfall in 2015. The reason for the decrease can be attributed to the prevailing El- Niño episode and the weakened moisture incursion from the Indian Ocean (8).

The factors with strongest effect for household food insecurity were maternal age, the number of children ever born (parity) and having ≥ 2 under five children. Household food insecurity studies in rural Guatemala found rural living, low socio economic quintiles, more children $< 5y$ were the major determinants of food insecurity (28).

Women age between (age 20-29) and (age 30-39), had less odds of food insecurity than women (age 40-49). 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 (26, 28). In contrast, a study done in Somalia and Oromia Agro-pastoralist showed that dependency ratio did not have a significant impact on the odds of food availability in the household (31). Women who have at least five children (parity 5+) household were at a higher risk of household food insecurity compared to women with never had a child (parity 0). The reason could be women who have ≥ 2 under five children and parity 5+ belong to households with relatively poor economic status, which may also make it more difficult to obtain sufficient food (24).

Conclusion

This study concludes that the magnitude of household food insecurity (70.4%) and maternal under nutrition (41.1%) were very high. Similarly, maternal age, number of children ever born (parity) and having ≥ 2 under five children have shown statistically significant with household food insecurity. Variables that were significantly associated with female underweight include maternal age, marital status, parity, number of < 5 y children, food insecurity status and vocation of the respondents.

Policy measures directed towards the provision of family planning to reduce household size should be given adequate attention. Effort should be made to provide basic social services such as education and health to overcome immediate consequence of food insecurity and under nutrition which ultimately increase human capital and vital in changing the lives of the poor pastoral and agro-pastoral communities.

Availability of data and materials

The datasets supporting the conclusions of the study are included in the article. Any additional data will be available on request.

Competing interests

This is to declare that we all authors have no competing interest in this research title.

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Authors' contribution

JA has conceived of the study, carried out the overall design and execution of the study, performed data collection and statistical analysis. MK and MG has participated in the design, supervised data collection and guided writing of the manuscript. All authors read and finally approved this manuscript for submission.

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