

# Factors Associated with Malnutrition among Lactating Women in Subsistence Farming Households from Dedo and Seqa-Chekorsa Districts, Jimma Zone, 2014

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## Abstract

**Background:** Nutritional status of women is particularly important, because it is through women and their off-spring that the pernicious effects of malnutrition are propagated to future generations. The extra calories and nutrients required to support breastfeeding makes lactating mothers among groups with special nutritional needs. Nevertheless, many African lactating mothers, including Ethiopians, remained to be undernourished and there is scarcity of studies both nationally and in the study locality. **Objectives:** This study was aimed to assess factors associated with malnutrition among lactating mothers living in Home-based food production and child centered counseling project Kebeles in Dedo and Seqa-Chekorsa districts of Jimma zone, south-west Ethiopia from Feb. 3 to March 2, 2014. **Methods:** A community-based cross-sectional study was conducted in Feb. 3 to March 2, 2014 on 355 lactating mothers who were beneficiaries of the Home-based food production and child centered counseling project. Demographic characteristics and nutritional risk factors were assessed through structured interview, whereas anthropometry measurements were done to assess nutritional status. Data was entered using Epi-data version 1.4.4.0 and exported to SPSS version 20 for analysis. Percentages, means and standard deviations were used to describe the study population. Logistic regression was used to identify the predictors of underweight among the explanatory variables. **Result:** The mean and standard deviation of dietary diversity score of study participants was 4.9 and 1.9 respectively. Majority of study participants consumed cereals in the preceding 24 hour of data collection. 92% of study participants didn't consume additional meal other than common family meal. 40.6% of lactating mothers were underweight. Maternal dietary diversity score was identified as predictor of undernutrition. **Conclusion:** Feeding practice of study participants was poor while undernutrition was high among participants so that Home-based food production and child centered counseling project, woreda health offices, health extension workers and other responsible sectors have to give due attention to improve the situation.

**Keywords:** Lactating women, underweight, dietary diversity, feeding practice, southwest Ethiopia

## Background

About 870 million people are estimated to have been undernourished (in terms of dietary energy supply) in the period 2010–12. This figure represents 12.5% of the global population, or one in eight people. The vast majority of these, 852 million, live in developing countries, where the prevalence of undernourishment is now estimated at 14.9% of the population (1).

The nutritional status of women and children is particularly important, because it is through women and their off-spring that the pernicious effects of malnutrition are propagated to future generations. A malnourished mother is likely to give birth to a low birth-weight (LBW) baby susceptible to disease and premature death, which further undermines the economic development of the family and society, and continues the cycle of poverty and malnutrition (2).

Maternal under-nutrition remains a persistent problem in developing countries, where women usually fall behind men in having access to food, health care, and education (3). Evidences showed underlying determinants such as female illiteracy, poverty, and lack of empowerment of women as major barriers to improvement in maternal nutrition in developing countries (4). Women with low status in societies tend to have weaker control over household resources, tighter time constraints, less access to information and health services, poorer mental health, and lower self-esteem (5).

Women often lack access to sufficient healthy food and eat smaller portion sizes due to cultural practices within the household. Women's heavy workloads and domestic responsibilities also make them vulnerable to malnutrition. When food is in short supply, one coping strategy may be for women and girls to eat less so there is

more for men and boys. Not only do women and girls have less access to food, but they also often eat poorer quality, unhealthy, and even unsafe foods. In addition, inadequate access to safe drinking water and poor sanitation put women and their children at increased risk of illness, malnutrition, and death (6).

Poor health has repercussions not only for women but also their families. Women with poor health and nutrition are less likely to be able to provide food and adequate care for their children. They are also more likely to give birth to low weight infants. Women's health affects the household economic well being, and as women with poor health will be less productive in the labour force (7).

Some evidence in developing countries indicate that malnourished individuals, that is, women with a body mass index (BMI) below 18.5, show a progressive increase in mortality rates as well as increased risk of illness (8).

Maternal diet and nutritional status have also been found to influence both the quantity and the quality of milk. The volume of breast milk produced by malnourished women is reported to be lower than that produced by women adequately nourished, which in turn affects the nutritional status of infants and children (9).

Since the health status of mothers before, during and after pregnancy is predictive of the nutritional status of new borns and infants (11), In order to have healthy and well nourished mothers, community and household members should be informed of the importance of making additional food available to women before they become pregnant, during pregnancy and lactation. Efforts to increase the amount of food available to adolescent, pregnant, and lactating women can be the most effective way of improving their health and that of their infants. To support lactation and maintain maternal reserves, most mothers in developing countries will need to eat about 500 additional kilocalories every day (an increase of 20 percent to 25 percent over the usual intake before pregnancy). Consumption of a variety of foods is the best dietary advice (10).

Besides the information it gives about maternal and child health status, nutritional status of women and children is a good indicator of the overall well-being of a society. It reflects not only maternal and child care practices, but also household food security, health, and environmental conditions (11).

Though studies were conducted to identify factors associated with undernutrition among mothers, yet many focus on pregnancy period, urban areas, and health facility based. No previous study was conducted in the study area by incorporating both groups of lactating mothers who have access to health care facility and their counterparts. Therefore, the outcome of this study is hoped to identify the main determinants of undernutrition among rural resident mothers from subsistent farming households that are more vulnerable to malnourished.

Seqa and Dedo sub-districts are among the rural districts of Jimma zone, Western Ethiopia. These sub-districts are characterized by subsistence farming and high prevalence of malnutrition. Hence, the study findings can also be utilized by zonal and regional policy makers and planners who are interested in the study area and other similar settings

Since this study reveals important determinants of nutritional status among farming households in Dedo and Seqa Cheqorsa districts, the result can be utilized as a valuable evidence for determinants of nutritional status among lactating mothers in rural Ethiopia.

## **Methods and materials**

### ***Study setting***

This study is part of a baseline survey for the HFP-CCC project (home-based food production and child-centered counseling) which was conducted from Feb. 3- March 2, 2014. The HFP-CCC is a nutrition intervention research to improve dietary adequacy and growth of young children implemented by a collaboration of Jimma University, Nestle Foundation and VLIR project. This project targets lactating mothers and their infants from subsistent farming households in 8 selected rural Kebeles of two districts (Dedo & Seka-Chokorsa), Jimma Zone.

Jimma Zone is one of the 20 administrative zones in Oromia Regional State with a total population of 2.5 million from which 94% are rural inhabitants. Jimma town, the capital of Jimma zone, is located 346 Km away from Addis Ababa. Subsistence farming is the dominant form of livelihood in the zone where only 15% of the population is in non-farm related jobs (12). Dedo and Seka-Chokorsa Woredas are among the 18 administrative districts in Jimma Zone where the eight HFP-CCC project Kebeles are located. This setting was selected to represent subsistent farming households in rural southwestern Ethiopia and additional project implementation criteria.

### ***Study design***

The study employed community-based cross-sectional design to assess determinants of nutritional status among study participants.

### ***Sample size and sampling technique***

#### **Sample size**

The sample size of this study was 355 lactating mothers that were under the HFP-CCC project. With regard to a formula to estimate a single population proportion, using 95% level of confidence, this sample size allowed us the estimation of an expected prevalence rate of 25% underweight (13) with precision of 0.045. Therefore, the above sample size is adequate for this study.

### **Sampling procedure**

All HFP-CCC project beneficiary mothers were taken for current study. This study assessed all the 355 HFP-CCC project beneficiary lactating women from 8 rural Kebeles. These women are assumed to represent lactating women from rural farming households in Jimma area.

### **Data collection and measurement**

Data was collected through face to face interview using pre-tested structured questionnaire prepared in Afaan Oromo (local language) by 8 data collectors supervised by 2 supervisors. The questionnaire included information on demographic characteristics, household wealth indicators and different nutritional risk factors including maternal health service utilization, recent illnesses, and diet and food security. Household wealth status was assessed by asking about household assets, utilities and housing characteristics used to generate household wealth index in EDHS (14) and then analyzed by using principal component analysis method on SPSS version 20 software.

### **Food security**

Food security was assessed using Household Food Insecurity Access Scale (HFIAS), a tool validated in other developing countries. The HFIAS has nine questions asking household's last month experience about three domains of food insecurity: feeling uncertainty of food supply, insufficient quality of food, and insufficient food intake and its physical consequences. Study households were categorized into different levels of food-security (food-secure and mildly, moderately, or severely food-insecure) according to the recommendation in HFIAS manual (15).

### **Dietary assessment**

A 24-hour dietary recall method was used to assess quality of diet. Women's Individual Dietary Diversity Score (IWDDS) of subjects was calculated by adding their responses for food groups consumed. For this study 14 food groups were used as recommended by FAO, namely: 1) Cereals; 2) Vitamin A rich vegetables and tubers; 3) White roots and tubers; 4) Dark green leafy vegetables; 5) Other vegetables; 6) Vitamin A rich fruits; 7) Other fruits; 8) Organ meat; 9) Flesh meat; 10) Eggs; 11) Fish; 12) Legumes, nuts and seeds; 13) Milk and milk products; and 14) Oils and fats

### **Anthropometry**

Weight and height measurements of all subjects were taken using calibrated equipments; UNICEF SECA Electronic weighing scales ( $\pm 10$  g precision Scale) for weight and a portable stadiometer capable of measuring to 0.1 cm for height. All measurements were done according to standardized technique with the subjects wearing light clothing and no shoes (16).

### **Data management and analysis**

Data were coded, entered and cleaned using Epi-data version 1.4.4.0 and all analyses were done with Statistical Package for Social Studies (SPSS version 20). Proportions and means (SD) were used to describe the study population by explanatory variables and nutritional status. Bivariate logistic regression was done to identify the differentials of anemia and underweight in the study population. The important predictors of anemia and underweight were determined using multivariable logistic regression model. Stepwise backward procedure was used for modeling by including variables with significant or marginally significant association in the bivariate logistic regression (p-value  $< 0.25$ ). All statistical tests were considered significant at alpha  $< 0.05$ .

### **Quality control**

Pretest was done on 20 mothers in the Buyo kechema kebele to ensure appropriateness of the study tools and to acquire common understanding on the assessment tools. There was regular supervision of the data collection process by the principal investigator and supervisors. The interviewers were trained prior to data collection. Anthropometry equipments were calibrated, some of the records were re-checked by the supervisors and extreme values were re-assessed.

### **Ethical consideration**

The actual research activity was conducted after Jimma University College of health and medical science ethical committee approved the clearance. Permission from the local government administration bodies was received and informed written consent was obtained from the participants. Participants were informed that they have full rights to participate or not to participate in the study. Furthermore, the objective of the study, harms and benefits were clearly communicated. The respondents were also informed that their responses will be kept confidential.

## **RESULT**

### **Socio-demographic characteristics of the respondents**

Three hundred and forty-two lactating mothers were assessed making a response rate of 96.3%. The mean (SD) age of study participants was 26.4 (5.6) years. Majority of mothers (n=210) were found in the age category of 25-34 years. Three hundred and seven (93.8%) of the respondents were from Oromo ethnic group whereas 10 (3.1%) were from Amhara. 292 (87.1%) participants were Muslim, and 96.5% were married. As to educational status, only 83 (24.9%) of the participants were able to read and write. The mean (SD) family size and number of under five children were 5.8 (2.94) and 1.66 (1.75), respectively. (**Table 1**)

### ***Maternal health service utilization***

One hundred and nineteen (35.0%) of the study participants responded that they had illness during their lactation time; whereas only 84 (71.2%) sought medical service. Regarding family planning utilization, only 136 (37.2%) of the respondents were using family planning to prevent pregnancy. Among study participants, 30 (9.1%) had miscarriage. Regarding birth spacing, 82 (27.8%) of study participants delivered their current child before the older child celebrate his second year. Out of 342 lactating mothers, 190 (55.6%) received at least one ANC service and 78 (22.8%) of study participants received at least four visits for their last pregnancy. Two hundred and seventy three (81.5%) mothers delivered their last child at home. (**Table 2**)

### ***Dietary Practice***

The mean Individual Dietary Diversity Score (SD) of study participants was 4.9 (1.9) with range of 1 to 11. Only 111 (32.8%) participants consumed at least 6 food groups. Cereals and legumes were the most commonly consumed food groups eaten by 323 (95.0%) and 303 (89.4%) participants, respectively whereas foods from fish, organ meat and flesh meat groups were consumed by only 8(2.4%), 15(4.4%) and 26(7.6%) of study participants, respectively. (**Figure: 1**)

Based on the Household Food Insecurity Access Scale (HFIAS) measurement, 22 (6.8%) of study participants were food insecure. Concerning the usual number of meals, the mean (SD) number of meals was 2.96 (0.68) per day with 33 (9.8%), 271 (80.4%) and 33 (9.8%) of participants consumed <3, 3 and >3 meals per day. Only 96 (28.2%) participants reported to consume meals additional to family meals during lactation. (**Table 3**)

### ***Magnitude of underweight***

The mean (SD) BMI of respondents was 19.2 (7.6) kg/m<sup>2</sup>. Among the 342 respondents, 139(40.6%) were underweight with mild, moderate and severe degrees of underweight occurred in 88 (25.9%), 24(7.1%) and 26 (7.6%) of the respondents, respectively. (**Figure 2 and Table 4**)

### ***Predictors of undernutrition***

After controlling for confounding using backward stepwise multivariable logistic regression, dietary diversity score of mother was found to be independently associated with underweight. (Table 6)

Study participants who ate six or more food groups in the preceding 24 hour of interview were 39.6% less likely to be underweight as compared to those who ate three or less food groups, AOR=0.604 (95% C.I: 0.381, 0.958). (**Table 5**)

## **DISCUSSION**

Regarding family planning utilization, 37.2% of study participants were using contraceptive to prevent pregnancy mostly injectable contraceptive. This finding is higher than national report of EDHS 2011, in which out of the surveyed married rural women 23.4% were using contraceptive. Similarly, this finding is higher than Oromia regional contraceptive prevalence where 26.2% were using contraceptive (14). This discrepancy might be the effect of improved health service coverage compared to the survey time.

ANC follow up is one of the most important factors which can help mothers to be healthy during pregnancy and lactation. In this study, 55.4% of study participants received ANC service at least once. This result is far higher than EDHS report in which nationally 34% of Ethiopian mothers visit at least once but lower than a cross sectional study conducted in Northern Ethiopia, Samre woreda where 92% of lactating mothers had at least one visit. This study shows 22.8% of study participants had received the WHO standard (at least four visits) for their last pregnancy. This result is consistent with EDHS 2011 report in which 19% of pregnant mothers received the standard ANC service. Improvement in institutional delivery was observed from current study in which 18.4% of mothers delivered their current child at health facility, which is higher than national report, in which only 10% gave birth in health facility. (13, 14)

Eating balanced diet is essential for human body to be immune and perform metabolic activities. This study used 24 hour recall method to find out food groups eaten by respondents in the day preceding interview. Respondents were asked to tell all the food types eaten in the preceding day and their response was categorized in to 14 food groups which FAO recommends for individual dietary diversity score.

The mean dietary diversity score of study participants was 4.9 which is consistent with average dietary diversity score of 5 in Northern Ethiopia but slightly higher than national report of 4.0. This might be due to improvement in socio-economy status (both national and regional) which by itself enables individuals to be capable of purchasing goods including variety of food. (14, 18) Nevertheless, the average dietary diversity score of the study participants was lower than half of the recommended food groups.

Giving additional food to malnourished mothers during pregnancy and/or lactation may help increase milk production and will certainly improve their own nutritional status and provide additional energy to care for themselves and their families. To support lactation and maintain maternal reserves, mothers need to eat about 500 additional kilocalories every day. However, only 9.8% of lactating mothers in this study eat more than three meals per day. Sadly, the rest eat three or less meals per day. This is lower than study conducted in northern Ethiopia where 28.8% eat additional meal during lactation (14). This might be due to difference in awareness about feeding

practice confounded by study area as the current study focused on only rural women but the earlier study focused on both rural and urban areas.

Two women in every five (40.6%) of study participants were underweight with BMI below 18.5kg/m<sup>2</sup>. this is comparable with a study done in three regions in India, Ladakhi , Jammu and Kashmiri region, in which 36.6% of lactating women were underweight. Similarly, 40% of rural lactating women in another study conducted in India are underweight (19, 20). But the result of this study is higher than studies conducted in Addis Ababa, northern Ethiopia, EDHS 2011 and Fars-Iran where 27.1, 25, 29.1 and 21% of mothers were underweight respectively (13, 14, 20, 21).

The mean BMI of current study was 19.2 kg/m<sup>2</sup> which shows lower level compared to national level of women in Ethiopia (i.e. 20 kg/m<sup>2</sup>), which is directly related to proportion of underweight population. (14)

Regarding the severity of undernutrition, 25.9%, 7.1% and 7.6% of respondents were mildly, moderately and severely underweight respectively. This result is comparable with study conducted in rural India (22).

The proportion of overweight and obesity was quite low (1.5%) in this study. This is far lower than national prevalence (6%) of Ethiopian women as well as lactating women from India (14, 22). This might be due to the difference in life style of individuals which varies with their residence, whereas current study exclusively focused on mothers from subsistent farming households who reside in rural districts.

Dietary diversity score of mother was found to be independently associated with underweight. I.e. Study participants who ate six or more food groups in the preceding 24 hour of interview were 39.6% less likely to be underweight as compared to those who ate three or less food groups, AOR=0.604 (95% C.I: 0.381, 0.958) implying that eating diverse food groups as a protective to undernutrition.

In contrary to findings of studies conducted in other areas, wealth index, marital status, Anti-natal follow up, Place of delivery, birth interval and health problem faced during delivery had no statistically significant association with undernutrition on multivariable regression.

## **STRENGTH AND LIMITATION OF THE STUDY**

### ***Strength of the study***

- This study used community based cross-sectional study design to investigate determinants of malnutrition by using primary data

### ***Limitation of the study***

- Seasonal variation in food consumption might exist so that results regarding dietary information are only limited to the specific season of the year in which the study was conducted.

## **CONCLUSION AND RECOMMENDATION**

### ***Conclusion***

Feeding practice of the study subjects was poor, which by itself contributes to undernutrition whereas institutional delivery and ANC service was better than national level in which more than half of study participants had ANC visit at least once. Undernutrition is prominent among study participants, where two in every five mothers were underweight. Individual dietary diversity score was independent predictor of undernutrition among the study participants. Therefore, HFP-CCC project as a longitudinal project has to give due attention to improve feeding practice of project beneficiaries. Also district health offices have to strengthen inter-sectoral collaboration with government and non-governmental organizations to improve the nutritional status of mothers. Furthermore, health extension workers, as they have close contact with mothers, have to work hard by providing health and nutrition education to improve maternal nutritional status in the study community.

### **Author's contribution**

Mihiretu A and Alemayehu A.: Conceived the study; Alemayehu A: Participated in the design of the study and supervised data collection; Mihiretu A, Alemayehu A and Abebe G.Mariam: Obtained ethical clearance and permission for the study, interpreted the data, involved in drafting article, involved in analysis of the study; All authors read and approved the final manuscript.

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### Competing interests

All authors declared that we have no competing interests.

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**Table 1: Socio-demographic characteristics of Study Participants, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)**

Variables	Frequency (%)
Age	
15-24	92(27.2)
25-34	210(61.9)
35-49	37(10.9)
Religion	
Muslim	292(87.1)
Orthodox	27(8.1)
Protestant	16(4.8)
Ethnicity	
Oromo	307(93.8)
Amhara	10(3.1)
Others	10(3.1)
Marital status	
Single	11(3.5)
Married	300(96.5)
Education of mother	
Illiterate	251(75.1)
Literate	83(24.9)
Husband's occupation	
Farmer	310(94.2)
Others (Government, Merchant, Daily laborer, NGO)	19 (5.8)

**Table 2: Health service utilization of Study Participants, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)**

Variables	Frequency (%)
<b>Illness in the past 2 weeks</b>	
No	242(70.6)
Yes	101(29.4)
<b>FP use</b>	
No	213(62.8)
Yes	126(37.2)
<b>Birth interval</b>	
< 24 month	82(27.8)
24-48 month	160(54.2)
> 48 month	53(18.0)
<b>Miscarriage</b>	
No	299(90.9)
Yes	30(9.1)
<b>ANC</b>	
No	152(44.4)
Once	14(4.1)
Twice	43(12.6)
Three times	55(16.1)
Above three times	78(22.8)
<b>Place of delivery</b>	
Health facility	273 (81.5)
Home	62(18.5)

**Table 3: Feeding practice of respondents, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)**

Variables	Number (%)
<b>Eat additional foods other than common family food</b>	
No	246(71.9)
Yes	96(28.1)
<b>Number of meals per day</b>	
Less than or equal to 3	305(90.2)
4 meals	31(9.2)
5 meals	2
<b>Amount of food intake</b>	
Increased	120(35.5)
Decreased	6
No change	212(62.7)

**Table 4: Prevalence of underweight by demographic, maternal and dietary characteristics of study participants (n=532), 2014**

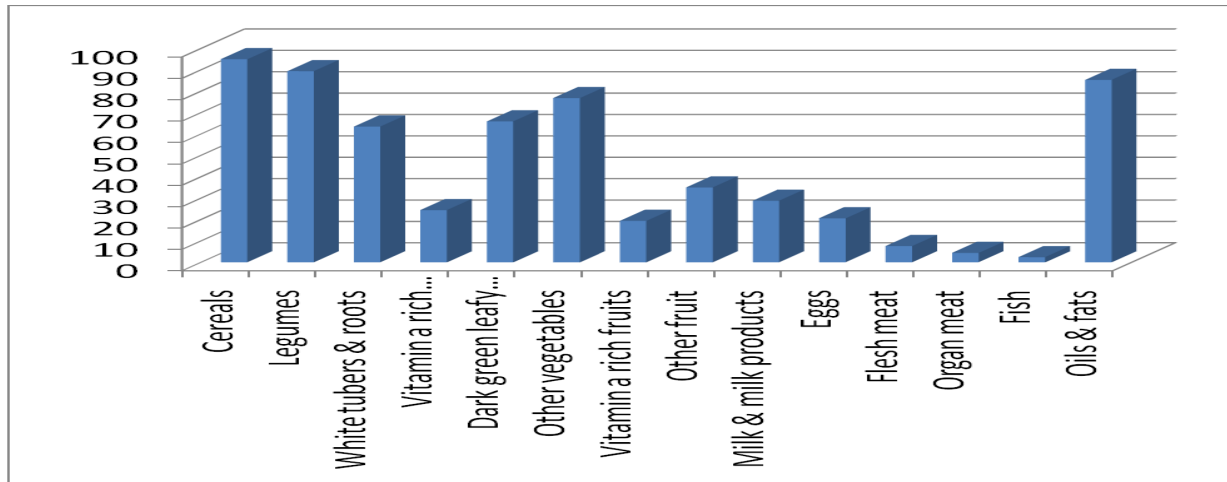
Variables	Total	Underweight (%)	Crude OR (95% C.I.)
Age	15-24	92	37(40.2)
	25-34	210	87(41.4)
	35-49	37	15(40.5)
Religion	Muslim	292	118(40.4)
	Christian	43	21(48.8)
Ethnicity	Oromo	307	125(40.7)
	Amhara	10	6(60.0%)
	Others	10	3(30.0%)
Marital status	Single	11	5(45.5)
	Married	300	121(40.3)
Educational status	Read & write	83	31(37.3)
	Cannot read a d write	251	108(43.0)
Husband's occupation	Farmer	310	128(41.3)
	Other	19	6(13.6)
Household wealth index	Lowest	71	29(40.8)
	Middle	69	30(43.5)
	Highest	68	27(39.7)
Illness in the past two weeks	Yes	100	41(41.0)
	No	241	98(40.7)
Use FP	Yes	95	52(41.6)
	No	212	87(41.0)
Birth interval	< 24 month	81	31(38.3)
	24-48 month	159	65(40.9)
	≥ 49 month	53	21(39.6)
Miscarriage	Yes	30	15(50.0)
	No	297	121(40.7)
ANC	< or = 3	142	65(45.8)
	≥4	120	48(40.0)
Place of delivery	Home	272	113(41.4)
	Health facility	62	24(38.7)
IWDDS	0-3	82	34(41.5)
	4-5	145	59(40.7)
	≥6	110	45(40.9)
Number of meals/day	< Or = 2 times	33	13(39.4)
	3 times	271	115(42.4)
	4 and above	33	10(30.3)
Visit health facility for illness	No	34	15(44.1)
	Yes	84	35(41.7)
Food insecurity	Secure	303	128(42.2)
	Insecure	22	8
Anemia	No	219	87(39.7)
	Yes	88	39(44.3)



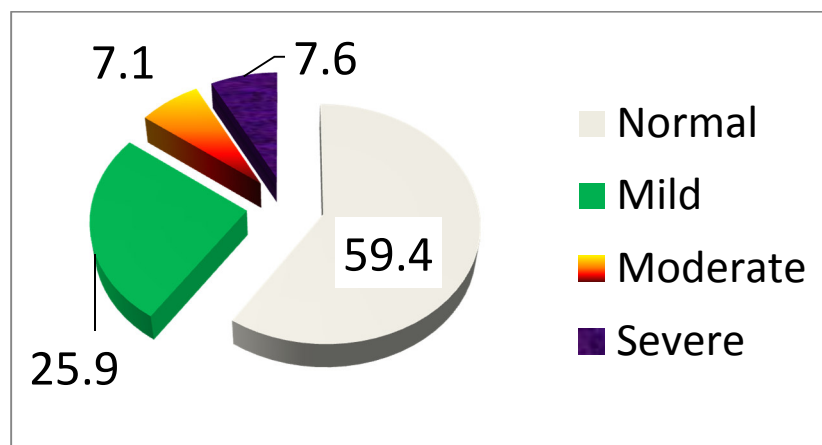
**Table 5: Determinants of underweight among study participants, lactating women (n=342) from selected Kebeles of Dedo and Seqa Chekorsa woredas, Jimma Zone, 2014.**

Variable	Total	Underweight (%)	AOR (95% C.I)
IWDDS			
0-3 food groups	82	34(41.5)	1
4-5 food groups	145	59(40.7)	0.56(0.29, 1.08)
≥6 food groups	110	45(40.9)	0.60(0.38, 0.96)*

\* -significant at p<0.05



**Figure 2: Food groups consumed by respondents in the past 24 hour, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)**



**Figure 3: Magnitude of underweight severity, lactating mothers from Dedo and Seka-Chekorsa Sub-districts (n=342), Feb. 2014**