Original Research Article

PREVALENCE OF HOUSEHOLD FOOD INSECURITY AND ITS ASSOCIATION WITH NUTRITIONAL OUTCOMES OF CHILDREN AGED 6-59 MONTHS IN HOSSANA TOWN, HADIYA ZONE, SOUTHERN ETHIOPIA

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Abstract: Back ground: Food insecurity and consequent of malnutrition are major barriers to development in Ethiopia. High malnutrition rates in the country set a substantial obstacle to attaining better child health consequents. This study was tried to explore the magnitude of household food insecurity and nutritional status among children aged 6 to 59 months, as well as the association between food insecurity and nutritional status in the study area.

Objective: To assess the prevalence of household food insecurity and its association with nutritional outcomes of children aged 6-59 months in Hossana town.

Methods: A cross sectional study design was conducted to assess prevalence of household food insecurity and nutritional outcomes of children in Hossana Town. Before data collection list of households with eligible children were identified from health extension workers and proportionate to sample size allocation was employed to each kebele. A total 414 sample households were selected from each kebele using systematic random sampling method by calculating the sampling interval (k=4). Data was cleaned and entered into computer by using EPI Info version 3.5.3 and the analysis was done using SPSS version 20.Anthropometric data were entered in WHO anthrosoftware version 3.2.2.Different frequency tables and descriptive measures were used to describe the study variables. Bivariate and multivariable logistic regression was done to see the association between dependent and independent variables.

Results: The result of this study shows8% of children were wasted, 14.4 % were underweight and 43.3 % were stunted. Prevalence of household food insecurity was 79.1 %. Household food insecurity was associated with underweight (AOR= 4.0, 95% CI: 1.33- 11.39). Child age (AOR=0.056, 95% CI: 0.011- 0.288)and child sex (AOR=2.05, 95% CI: 1.186-3.556) were associated with stunting. Family size (AOR=3.9, 95% CI: 2.097- 7.355) and diarrhea (AOR= 8.1, 95% CI: 3.678-17.86) in the last two weeks preceding the survey were predictors of wasting and underweight respectively.

Conclusions: Household food insecurity and malnutrition like underweight, wasting and stunting was high in Hossana town. Household food insecurity was associated with underweight, but not significantly associated with stunting and wasting. Therefore, implementers should focus on improving household food insecurity and nutritional status.

Key words: Stunting, Wasting, Underweight and Food insecurity.

Background: Global, malnutrition and specific nutrient deficiencies are the leading rudimentary cause of immune deficiency, leading to infections and other diseases. Up to the 13-14 million children dying each year in developing countries, 70 percent die of infectious diseases and most are malnourished [1,2].

In developing countries, child under nutrition remains a major public health concern. Much of the burden of deaths resulting from malnutrition, estimated to be over half of childhood deaths in developing countries, can be attributed to just mild and moderate malnutrition, varying from 45% for deaths due to measles to 61% for deaths due to diarrhea [3].

A sharp regional shift in the location of child malnutrition is projected; South Asia's share of total numbers of children will fall from 51% to 47%, but sub-Saharan Africa's share will rise from 19% to near 35 % [4].

In Ethiopia, approximately 14% are children under five years of age. These children and their mothers suffer disproportionately from the poor health and nutrition situation in the country. In fact, malnutrition is the underlying cause of 57% of child deaths in Ethiopia, with some of the highest rates of stunting and underweight in the world [5].

The highest level of stunting is found in Eastern Africa, where, on average, 48% of Pre-school children are currently affected. In this region, stunting has been increasing at 0.08 percentage points per year. In sub-Saharan Africa the absolute numbers of malnourished children are expected to be increasing to 128 million under an optimistic scenario, in which improvements in the determinants is accelerated, by 2020 [6].

Food insecurity and malnutrition are common among children in southern nation and nationality peoples region (SNNPR). According

to Ethiopian Demographic Health Survey (EDHS), the prevalence of stunting in SNNPR is 44.1% (below -2SD height for age z-score) [7]. A study conducted in Ethiopia shows about 10.4%, 42.8% and 75.6% children were wasted, underweight and stunted, respectively [8].

Household food insecurity has been associated with several health and nutrition outcomes in both developed and developing countries. By negatively affecting food consumption, either through reduced quality or quantity of food, or potentially worsen nutritional status. Food insecurity may also affect nutritional status through its effects on stress, depression, parenting, and infant feeding [12].

However, the relationship between household food insecurity and nutritional status of adults and children, particularly in developing countries, is not well known. In developed countries, household food insecurity has been associated with overweight and obesity among adults, particularly women, but not all studies have reported this relationship [13].

Therefore, this study will explore the prevalence of household food insecurity and its association with nutritional outcomes of children aged 6-59 months in study area.

Methods

Study design and area: A community based cross sectional study was conducted from February to March 2013 among children aged 6-59 months in households of Hossana town, which is located in Hadiya Zone of SNNPR at 230 km far from Addis Ababa in South West direction and 168 km far from the regional city Hawassa in North West. The area of the town is 693.64 Hectare or 3978.14 Karemeter and 2350 feet above sea level. According to 2007 census report and as projected in 2011 total population in the town is 92,733(males =45,875 and females= 46,858) and total number of under five children is 14,466. Total number of households is 18,925 according to Health Extension Workers report. Climatic condition of town is Woinadega (moderately undulating land), the average temperature of the town is 17.05°c and annual rainfall of town is 1172.75mm. It has three sub cities namely Gofer Meda, Sechduna and Addis Kifleketema

with 8 kebeles and has 3 health centers, 1 General Hospital, 16 non-governmental clinics & 22 total non-governmental pharmacies.

Source and study population: The source populations were all children aged 6-59 months and their index mothers in the households of Hosanna town. All randomly selected children aged 6-59 months and their index mothers in the households of Hosanna town were included in the study. However, those parents who were mentally and physically incapable of being interviewed during the study period were excluded from the study.

Sample size determination and Sampling procedure: The sample size was calculated by a single population proportion formula using Epi-Info version 3.5.3 statistical software by considering proportion of prevalence of underweight 42.8% in Shone district, Hadiya zone [8], 5% marginal error (d), 95% confidence interval and 10% non-response rate, this yields a sample size of 414.

To select required number of sample from source of population a systematic sampling technique was employed. From total; 8 kebeleswere selected randomly and proportionate number of children were assigned for each kebele according to their total number of children 6-59 months of age. Sampling frame was identified from health extension workers (list of households with eligible children for each kebele). Then, sample household with eligible children was selected from the sampling frame for each kebeleby using systematic random sampling method .The first household with eligible child was selected using lottery method from the four houses in the kebele. Then, every fourth household with eligible children were included in the sample till the allocated sample size of children for each kebele was reached. In households with more than one children of age between 6-59 months, only one child was selected randomly.

Data collection procedure:
Data were collected using pre-tested structured questionnaire and anthropometric measurements. Questionnaires were adapted from different literatures based on HFIAS

[14]& UNICEF conceptual framework in English and then, the English version was translated in to Amharic and back translated to English by different individuals who know original version of the questionnaires in order to keep consistency with the original meaning of the questionnaire.

Data were collected from mother of the children in the selected household to fill all part of the questionnaire. Anthropometric measurements were taken from the children and mothers .Weight of the children was measured with minimum clothing and no shoes using a Salter spring scale and UNICEF seca electronic scale in kilogram to the nearest of 0.1 kg.

Height (length) children were measured in a lying position with wooden sliding board for children of age under two years (below 85 cm) and for children above two years stature was measured in a standing position in centimeters to the nearest of 1cm. Weight of the mothers were measured with seca electronic scale to the nearest 0.1 kg and height of the mothers were measured in a standing position in centimeter to the nearest 1 cm. Vaccination status of children were checked by observing immunization card and if not available mothers were asked to recall it. BCG vaccination was checked by observing scar on right (also left) arm.

Data processing and analysis:
After data collection, each questionnaire was checked for completeness and code was given before data entry. Data was cleaned and entered into computer by using EPI Info version 3.5.3 and then the analysis was done using SPSS version 20. Anthropometric data were entered in WHO anthrosoftware version 3.2.2 then it was converted into Z-scores of the indices; height for age, weight for height and weight for age and nutritional data were exported to windows SPSS version 20 for analysis. Different frequency tables and descriptive measures were used to describe the study variables. Bivariate and multivariate logistic regression analysis was used to select variables for multivariate model and see significance of association between dependent and independent variables respectively. All independent

variables with p-value less than 0.25 in bivariate analysis were transferred into multivariate logistic regression analysis to control the effect of confounders. Backward binary logistic regression was carried out to identify factors associated with nutritional status of children aged 6-59 months. Finally adjusted odds ratios with their 95% confidence intervals and explanatory variables with p-value of 0.05 were considered to have significant association with the outcome variable.

Wealth index analysis: initially, reliability test was performed using the socioeconomic variables involved in measuring the wealth of the households and Chronbach's alpha was calculated to be 0.748. The variables which were employed to compute the alpha value were entered in to the principal component analysis. At the end of the principal component analysis, the wealth index was obtained as a continuous scale of relative wealth. Finally, tercile of the wealth index was created to see the association with nutritional status of children.

Household food insecurity: In this analysis, household food insecurity was assessed using a short version of the Household Food Insecurity Access Scale (HFIAS) developed by the Food and Nutrition Technical Assistance (FANTA) project [14].The HFIAS tool consists of nine questions that were believed to capture all three core domains that reflect a household's inadequate access to food.

Ethical consideration:
Ethical clearance was obtained from the ethical clearance committee of Jimma University. A formal letter, University was submitted to Hadiya zone health department, Hossana Town administration, kebele, to all relevant offices and concerned bodies to obtain their co-operation. All participants' right to self-determination and autonomy were respected. All study participants were informed about the purpose of the study and any additional information was given verbally.

Participation was voluntary and participants can withdraw from the study at any stage/time without explanation and penalty or loss of benefit. Maximum effort was made to maintain confidentiality during data collection and analysis that their name was not registered and used during data collection and analysis.

Results

Socio-demographic characteristics of respondents:
From the total of 414 households, 411 households were participated completely to the interview with response rate of 99%. A total of 411 households, having at least one child aged 6-59 months, were included in the analysis. Three hundred fifty seven households (86.9%) were headed by males. Among the respondents, 394(95.9%) were married. The mean household size was 5.18 (SD: 1.746, range: 2 to 10), meanwhile, the mean of children born to a mother was 2.84 (SD: 1.721, range: 1 to 10) and this figure for under five years age group was 1.39 (SD: 0.566, range: 1 to 3)

Regarding educational status the majority, 209(50.9%) mothers were completed grade 1-8, and most of husbands completed grade 9-12, 175 (42.6%). Majority of the mothers 314(76.4%) were housewives and 168(40.9%) fathers were daily workers. Among respondents 307(74.7%) were from ethnic group Hadiya and 253(61.6%) were followers of protestant religion. Regarding household wealth about 33.3% households were poor **(Table1).**

Child characteristics:
From the total children, 56.7% were males. The interval between births was two for 40.3% of children and three for 25.3% of children. Place of delivery was at home for 26.8% of the children. Birth weight was small for 7.4% of the children and was larger than the average for 11.3%. Ninety (21.9%), seventy six (18.5%) and 115(28%) of children had diarrhea, acute respiratory infection and fever in the past two weeks preceding the study **(Table 2).**

Child caring practice:
Majority of mothers 242(58.9%) initiated breast feeding within one hour after delivery. only 26 (6.3%) discontinue breast feeding before 12 months.

Majority 373(90.8%) of mothers exclusively breast fed their children 4-6 months. Twenty eight (6.8%) of mothers started complementary

food for their children before 6 month. About 152(37%) of mothers breast fed their children one to two years and 42.3% of children are still breast feeding.

Regarding immunization status of children, majority 409(99.5%) of children were vaccinated. and 392(95.8%) were finished measles vaccination. Majority of children 381 (92.7%) got vitamin A supplementation in the last six months preceding the survey **(Table 3).**

Maternal characteristics:

Majority of mothers 237(57.7%) were in the age group 25-34 years. The mean age of mothers was 26.89(SD: 4.6, Range 18 to 38). Average total children born to a mother was 2.84 (SD: 1.7, range 1 to 10). Regarding ANC majority 383(93.3%) of mothers attend health facility for ANC. No extra food was taken from the usual time during pregnancy and lactation for 32.2% of mothers. Underweight was prevalent in 7.9% of mothers, 14.5% were overweight and1.7% were obese **(Table 4).**

Prevalence of household food insecurity:

The nine food insecurity questions in the HFIAS were used to examine the distribution of the households in different categories of food access (uncertainty, quality and quantity).The questions were followed a progression that begins with anxiety about the food supply, followed by a decrease in the quality of food, a decrease in the quantity of food, and finally going to sleep hungry and going all day and night without eating any food (during the 4 weeks preceding the survey). A very high proportion of the households were given affirmative responses to worrying about food inaccessibility (64.8 %), inability to eat preferred food (71%) and availability of a limited variety of food (68.4 %)

The proportion of affirmative responses were given for the last three items was smaller compared with the first six items, during the reference period, 0.7 % reported going for a whole day and night without food; 3 % reported going to sleep without any food; and 23.1 % of the respondents were given affirmative responses to 'ever no food to eat'. On the basis of these categories, the computed average for the second domain (food quality) was 68.03 %

and for the third domain (food quantity) was 27.14 %**(Table5).** The finding of the study revealed that the prevalence of household food insecurity was 79.1%. Two hundred twenty six households (55%) moderately food insecure, 48(11.7%) households were severely food insecure (**Figure 1**)

Anthropometric measurements:

Among 411 children, 233 (56.7%) were males. The mean age, HAZ, WHZ and WAZ were 27.61 months (SD: 12.94, Range: 6-59), -1.4569 (SD: 1.4, Range: -4.85 to 2.67), 0.076 (SD: 1.4, Range: -3.97 to 3.07), and 0.71 (SD: 1.1, Range: -3.45 to 1.76), respectively.

Thirty three (8%), 59(14.4%) and 178 (43.3%) children were wasted, underweight and stunted, respectively **(Table 6).**

Household food insecurity and nutritional outcome of children

Food insecure households and having large family sizes were four times more likely to be underweighted than food secured households and small family sizes (OR= 4.0, 95% CI: 1.33-11.39) and (OR=3.9, 95% CI: 2.097- 7.355) respectively **(Table7).**

Male children were two times more likely to be stunted than female children (OR=2.05, 95% CI : 1.186-3.556) and age 48-59 months were less likely to be stunted as compared to 6-11 months(OR=0.056, 95% CI: 0.011-0.288)**(Table 8).**Children who had diarrhea in the past two weeks were eight times as likely to be wasted than those children who had no diarrhea(OR= 8.1 ,95% CI: 3.678-17.86) **(Table 9).**

Discussion: This study revealed that, the prevalence of underweight, wasting and stunting in the study area was 14.4%, 8% and 43.3%, respectively. This finding was lesser when as compared to study done North Show zone, Gumbrit and Antioquia, Colombia [12, 13, 15] .This might be due to that our study specifically focused on food insecure households which may vary nutritional status. Although the prevalence rates of malnutrition outcome computed from the anthropometric measurements of the study children were not very severe as compared to the national figure of EDHS data which was indicated that

underweight, wasting and stunting were 29%, 10.9% and 44%, respectively [7].

The prevalence of wasting 8% was almost similar with the national figure, which was 10.9%. Severe wasting was lower 0.7% as compared to 2.2% of the national figure. Also, the proportions of children underweight (14.4%) and severely underweight (1.9%) were smaller 29% and 9% (national), and 28.3% and 9.6% (SNNP regional), respectively. However, the figures of wasting and severe wasting were consistent with SNNP regional figures of wasting (6.6 %) and severe wasting (0.9%). Similarly, the prevalence of stunting (43.3%) was similar with national (44%) and regional (44.1%) figures, whereas the prevalence of sever stunting is lower than regional and national figure [7]. The discrepancy might be attributable to the difference in the study area and sample size.

This study showed high prevalence of household food insecurity computed from full version of HFIAS tool. Very high proportion of the households were given affirmative responses to worrying about food inaccessibility (64.8 %), inability to eat preferred food (71%) and availability of a limited variety of food (68.4 %). The figures were similar with findings of the study conducted in Sidama zone (66.5 %) worrying about food inaccessibility, inability to eat preferred food (70.9 %) and availability of a limited variety of food (72.9 %). Taking overall pictures of HFIAS the prevalence of household food insecurity was 79.1%. It was also consistent with the prevalence in Sidama zone which was 82.3% [16]. Similarly in a study conducted in Tanzania using the HFIAS revealed that 79.3 % were food insecure, more than 50% of the households experienced some degree of food insecurity with 34.5% reporting child hunger. This was suggesting that the overall severity of food insecurity may influence the patterns of response to the anxiety/worry item [17]. A study on coping strategies conducted in South Africa also showed that 74 % of respondents limited their variety of food, limited portion size (80 %) or skipped meals (68 %) [18]. Likewise a study conducted in Bangladesh showed more households affirmed consuming lower-quality food (55.3 %) more often than worrying about their food supply (36.3 %) [19, 20].This might be due to children were vulnerable to the consequences of food insecurity and malnutrition because of their physiology and high calorie needs for growth and development.

In our study, food insecure household was more likely to be underweighted when as compared to food secured households. This finding was consistent with study done in Antioquia, Colombia [15].This might be due to that significant association between household food insecurity and underweight was expected because of the substantial evidence that a household's access to food is among the key determinants of the nutritional status of children .However lack of association with wasting may show that household food insecurity was necessary but not sufficient prerequisite for these outcome variables

In our finding, households having large family sizes were higher risk of having underweight children than households having small family sizes. The effect of a large family size with overcrowding and inadequate spacing had been implicated as a risk factor for malnutrition in different studies as well [21, 22]. This finding was supported the notion that non-nutritional factors should be essential components in the effort to reduce malnutrition in Ethiopia.

In our study, children age 48-59 months were lesser likely to be stunted than children age between 6-11 months. Male children were more likely to be stunted than female children. This result was consistent with EDHS 2011[7].Most cross-sectional studies in developing countries [23] had shown that female children were at higher risk of stunting than male children. Few studies showed boys were more malnourished than girls[24]. Similarly, a study conducted in West Gojam Zone revealed that male children face nutritional disadvantages compared to female children [25].This differences might be attributed to unmeasured factors such as parental care-giving behaviors. In light of the fact that males were more likely to be stunted than females in Hossana town, sex-related differences in diet and child care require further.

In our study, children who had diarrhea in the past two weeks had highly wasted when as compared to children having no diarrhea in the past two weeks. This finding was indicated that childhood illness is the main factor for acute nutritional problem; illness affects dietary intake and utilization. This was not surprising since there is a reciprocal relationship with diarrhea leading to malnutrition and malnutrition predisposing to diarrhea. The result of this study might be suggested that children suffered from repeated bouts of diarrhea which was detrimental to their nutritional status**.**

Strength and limitation of the study

Since it was community based study it has resulted valuable and generalizable finding as per objectives of the study. Even though this study had identified many factors that associated with magnitude of household food insecurity and its association with nutritional status of children aged 6-59 months; it was not free of biases due to respondent may not tell the real information about their food security status due to the need for aid.

Conclusion:

Household food insecurity and malnutrition as measured by underweight, wasting and stunting was highest in Hossana town. Household food insecurity was associated with underweight. However its lack of association with wasting might be showed that household food insecurity was necessary but not sufficient prerequisite for this outcome variable. Child sex (male), child age (48-59 months), presence of diarrhea in the last two weeks and large family size were also associated with measures of under nutrition. Therefore, health professionals give attention on prevention and control of diarrheal disease through improving sanitation and hygiene practices develop strategy design on promotion of better child and maternal caring practices.

Abbreviations

ANC: Antenatal Care; BCG: Bacillus Calmette-Guérin; EDHS: Ethiopian Demographic Health Survey; FANTA: Food and Nutrition Technical Assistance (FANTA); HAZ: Height for Age Z score; HFIAS: Household Food Insecurity Access Scale; SD: Standard Deviations; SNNPR: Southern Nation and Nationality Peoples Region; UNICEF: United Nations Children Emergency Fund; WAZ: Weight for Age Z- score; WHO: World Health Organization; WHZ: Weight for Height Z- score

Competing interests

The authors declare that they have no competing interests and the manuscript has not been published before or submitted elsewhere for publication.

Authors' contributions

KD made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data and had been involved in drafting the manuscript or revising it critically for important intellectual content; TB, CHand EA were involved in facilitation of field work, supervision of data collection and manuscript reviewing. All authors were involved in conduct and reporting of the survey and approved the final manuscript.

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Table 1: Socio demographic characteristics of households Hossana town, Hadiya zone, South Ethiopia, March 2013

Characteristics		Number	Percent
Head of household	Female	54	13.1
	male	357	86.9
Marital status of mothers	Single	2	0.5
	Married	394	95.9
	Divorced	14	3.4
	widowed	1	0.2
Total family size	2-5	230	56
	>5	181	44
Number of under five children	1	269	65.5
	2	125	30.4
	3	17	4.1
Educational level of mother	illiterate	56	13.6
	Grade 1-8	209	50.9
	grade 9-12	110	26.8
	Collage and above	36	8.7
Educational level of father	illiterate	39	9.5
	Grade 1-8	129	31.4
	grade 9-12	175	42.6
	Collage and above	68	16.5
Occupation of mother	House wife	314	76.4
	Farmer	5	1.2
	Merchant	31	7.5
	Working in NGO	15	3.7
	Government employee	46	11.2

.Occupation of father	Farmer	20	4.9
	Government employee	88	21.4
	Merchant/Trade	76	18.5
	Private Org	59	14.4
	daily laborer	168	40.9
Religion of mother	Protestant	253	61.6
	Orthodox	128	31.1
	Muslim	17	4.2
	Catholic	10	2.4
	Jehovah witness	3	.7
Wealth index	Poor	137	33.3
	Middle	138	33.6
	Rich	136	33.1

Table 2: Child characteristics, Hossana town, Hadiya Zone, southern Ethiopia, March 2013

Characteristics	Category	Number	Percent
Child sex	male	233	56.7
	female	178	43.3
Child age	6-11	41	10
	12-23	132	32.1
	24-35	124	30.2
	36-47	71	17.2
	48-59	43	10.5
Birth interval** (n=273)	One year	40	14.7
	Two years	110	40.3
	Three	69	25.3
	More than four	54	19.7
Place of delivery	Health facility	301	73.2
	home	110	26.8
Gestational age at birth	9 month	388	94.4
	>9 month	19	4.6
	< 9 month	4	1.0
Child weighed at birth	Yes	205	49.5
	no	206	50.5
How much was the weight(n=204)*	<2.5kg	15	7.4
	2.5-3.5kg	166	81.4
	>3.5	23	11.2
How big was the child	Very large	12	2.9
	Larger than average	122	29.7
	Average	238	57.9
	small	39	9.5
Type of birth	Multiple/twin	38	9.2
	single	373	90.8
Diarrhea in the last two weeks	Yes	90	21.9
	no	321	78.1
Presence of respiratory disease in the last 2 weeks	Yes	76	18.5
	no	335	81.5

fever	Yes	115	28
	no	296	72
Measles	Yes	5	1.2
	no	406	98.8

* Weight of children as reported by mothers

**birth interval for those children who are not first order births

Table 3: Child care practice in Hossana town, Hadiya zone, Southern Ethiopia, March 2013

Characteristics	Category	Number	Percent
Ever breast fed the child	Yes	411	100
	No	0	0
How long after birth the child breast fed	Immediately	242	58.9
	After an hour	166	40.4
	After one day	3	0.7
At what age did you start additional food	1-5 month	28	6.8
	6-12 month	383	93.2
	Bottle	126	30.7
What do you use to feed the child	Cup	157	38.2
	Spoon	102	24.8
	dish	26	6.3
Duration of breast feeding	<6 month	2	0.5
	6-12 months	24	5.8
	13-24 months	152	37
	>2 years	59	14.4
	Still feeding	174	42.3
How many Months Exclusively breast fed	<=3 month	7	1.7
	4-6 month	373	90.8
	>6 month	31	7.5
Child immunization	Yes	409	99.5
	No	2	0.5
Vitamin A supplementation in 6 months	Yes	381	92.7
	No	30	7.3
Who is taking care of baby feeding	Mother	335	81.5
	Grand mother	24	5.8
	Sister	27	6.6
	House maid	25	6.1

Table 4: Maternal characteristic in Hossana Town, Hadiya Zone, South Ethiopia, March 2013

Characteristics	Category	Number	Percent
Mothers age	15-24	128	31.1
	25-34	237	57.7
	35-45	46	11.2
Total number of children ever born	<=4	335	81.5
	>4	76	18.5
Extra food consumption during pregnancy and lactation	Yes	278	67.6
	no	133	32.4
ANC visits	Yes	383	93.2
	No	28	6.8
Usually washing hand before handling food	Yes	339	82.5
	No	72	17.5
How do you wash your hands (n=339)	Using water	15	4.4
	Soap and water	323	95.4
	ash	1	0.2
For how long do you think the child should be breast fed	1-12 month	27	6.6
	13-24 month	242	58.9
	>24 month	142	34.5
Mothers BMI	<18.5	32	7.9
	Normal	312	75.9
	Overweight	60	14.5
	Obese	7	1.7

Table 5: Prevalence of household food insecurity in Hossana Town, Hadiya Zone, Southern Ethiopia, March 2013

Characteristics	Option	Number	Percent
Worry about food insecurity in the last month	Never	145	35.2
	Rarely	32	7.8
	Sometimes	191	46.5
	Often	43	10.5
Inability to eat preferred food in the last 4 weeks	Never	119	29
	Rarely	58	14.1
	Sometimes	201	48.9
	often	33	8
Availability of limited variety of food in the last 4 weeks	Never	130	31.6
	Rarely	41	10
	Sometimes	208	50.6
	often	32	7.8
Eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	Never	145	35.3
	Rarely	60	14.6
	Sometimes	177	43
	often	29	7.1
Availability of smaller amount of food in the last 4 weeks	Never	173	42.1
	Rarely	67	16.3
	Sometimes	152	37
	Often	19	4.6
Reduced number of meals per day	Never	200	48.7
	Rarely	71	17.3
	Sometimes	132	32.1
	often	8	1.9
Ever no food to eat I the last 4 weeks	Never	316	76.9
	Rarely	40	9.7
	Sometimes	53	12.9
	often	2	0.5
Sleeping without eating any food in the last 4 weeks	Never	399	97
	Rarely	6	1.5
	Sometimes	6	1.5
	often	0	0
Spending the day and the night without eating any food	Never	408	99.3
	Rarely	3	0.7
	Sometimes	0	0
	often	0	0

Table 6: Nutritional status of children Hossana town, Hadiya zone, south Ethiopia, March 2013

Measure	Category	Number	Percent
HAZ	Severely stunted	41	10
	Moderately stunted	137	33.3
	normal	233	56.7
WHZ	Severely wasted	3	0.7
	Moderately wasted	30	7.3
	normal	378	92
WAZ	Severely underweight	8	2
	Moderately underweight	51	12.4
	normal	352	85.6

Table7: Multivariable logistic regression models predicting being underweight among 6-59 months of children in Hossana Town, Hadiya Zone, South Ethiopia, March 2013

Factors	Categories	Status				Crude OR (95%CI)	Adjusted OR(95% CI)
		Underweight		normal			
		N	%	N	%		
Household food insecurity	Secure	4	6.8	82	23.3	1	1
	insecure	55	93.2	270	76.7	4.2(1.469,11.87)*	4.0(1.33,11.39)*
Total family size	2-5	16	26.1	214	60.8	1	1
	>5	43	72.9	138	39.2	4.2(2.259,7.69)*	3.9(2.097,7.355)*
Child sex	Male	40	67.8	193	54.8	1.734(0.966,3.113)	1.54(0.829,2.855)
	Female	19	26.2	159	45.2		1
Diarrhea	Yes	21	17	69	24.1	0.641(0.311,1.320)	1.53(0.78,3.014)
	No	12	83	309	75.9	1	1
Fever	Yes	12	20.3	103	29.3	0.617(0.315,1.211)	0.65(0.317,1.318)
	No	47	79.7	249	70.7	1	1
Exclusive breast feeding	<=3	2	3.4	5	1.4	5.8 (0.657,51.819)	11.43(.806,117.42)
	4-6	55	93.2	318	90.3	2.508(0.582,10.812)	3.5(.799,15.65)
	>6	2	3.4	9	9.3	1	1

*p value <0.05

Table8: Multivariable logistic regression models predicting being stunted among 6-59 months of children in Hossana Town, Hadiya Zone, South Ethiopia, March 2013

Factors	Categories	Status				Crude OR (95%CI)	Adjusted OR (95% CI)
		stunted		normal			
		N	%	N	%		
Educational level of mother	Illiterate	21	11.8	35	15	0.339(0.142,0.809)*	0.739(0.223,2.448)
	Grade 1-8	86	48.3	123	52.8	0.395(0.190,0.823)*	0.614(0.214,1.759)
	Grade 9-12	48	27	62	26.6	0.438(0.201,0.952)*	0.476(0.151,1.501)
	Collage& above	23	12.9	13	5.6	1	1
Child sex	Male	112	62.9	121	51.9	1.571(1.055,2.339)*	2.05 (1.186,3.556)*
	female	66	37.1	112	48.1	1	1
Child age	6-11	12	6.7	26	12.4	0.395(0.161,0.972)*	0.06(0.011,0.288)*
	12-23	74	41.6	58	24.9	1.218(0.611,2.247)	0.68(0.249,1.838)
	24-35	45	25.3	79	33.9	0.544(0.270,1.096)	0.48(0.183,1.260)
	36-47	25	14	46	19.7	0.519(0.240,1.122)	0.41(0.146,1.171)
	48-59	22	12.4	21	9	1	1
Birth interval	One year	14	5.6	26	6.9	0.992(0.421,2.336)	0.88(0.342,2.246)
	Two years	50	33.7	60	39.5	1.531(0.783,3.009)	1.39(0.664,2.908)
	Three	37	10.1	32	17.6	2.130(1.024,4.429)*	1.54(0.690,3.428)
	More than four	19	50.6	35	36.1	1	1
Mothers age in year	15-24	63	35.4	65	27.9	2.746(1.305,5.777)*	2.62(0.978,7.017)
	25-34	103	57.9	134	57.5	2.178(1.075,4.414)*	2.1(0.914,4.839)
	35-44	12	6.7	34	14.6	1	
Health status during pregnancy	Sick	145	81.5	200	85.8	1.379(0.814,2.338)	0.74(0.367,1.516)
	good	33	18.5	33	14.2	1	1

*p value < 0.05

Table9: Multivariable logistic regression models predicting being wasted among 6-59 months of children in Hossana Town, Hadiya Zone, South Ethiopia, March 2013

| Factors | Categories | Status | | | | Crude OR(95%CI) | Adjusted OR(95% CI) |
		Wasted		Normal			
		N	%	N	%		
Food insecurity	Yes	3	9.1	83	22	2.814(0.838,9.45)	2.59(.707,9.483)
	No	30	90.9	295	78	1	1
Diarrhea in the last 2 weeks	Yes	21	63.6	69	18.3	7.84(3.681,16.686)*	8.1(3.678,17.86)*
	No	12	36.4	309	81.7	1	1
Child age	6-11	3	9.1	38	10.1	1.618(0.256,10.219)	1.214(0.169,8.735)
	12-23	5	15.2	127	33.6	.807(0.151,4.318)	0.796(.135,4.686)
	24-35	15	45.5	109	28.8	2.821(0.618,12.879)	3.489(0.699,17.426)
	36-48	8	24.2	63	6.7	2.603(0.526,12.876)	2.320(0.441,12.598)
	49-59	2	6.1	41	10.8	1	1
Mothers occupation	Housewife	25	75.8	289	76.5	1.24(0.359,4.283)	0.912(0.238,3.493)
	Farmer	2	6.1	3	0.8	9.556(1.127,81.05)*	6.033(0.585,62.186)
	Merchant	2	6.1	29	7.7	0.989(0.155,6.288)	0.532(0.72,3.957)
	Working in NGO&Gov't	1	3	14	3.7	1.024(0.098,10.651)	0.632(0.51,7.848)
						1	1

*P value < 0.05
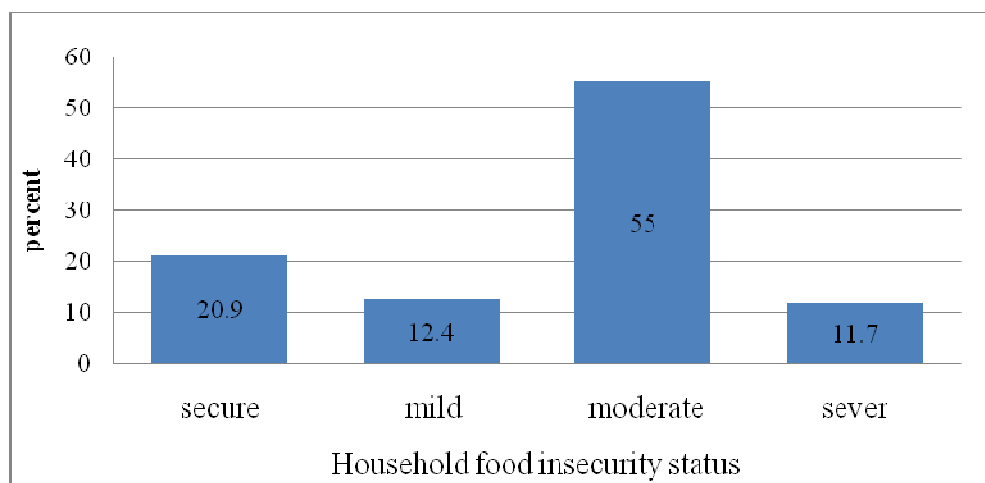
Figure1: Over all prevalence of household food insecurity, Hossana town, Southern Ethiopia, March 2013