

Determinants of Households Food Security and Coping Strategies for Food Shortfall in Mareko District, Guraghe Zone Southern Ethiopia

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Abstract Better understanding of major determinants of food security at household level is important to design appropriate interventions in order to ensure food security for food insecure households in Ethiopia. This study was conducted to identify major factors influencing farm household food security and coping strategies employed to cope with food shortfall. Households' daily calorie availability was measured to determine household food security status. A total of 130 randomly selected households from Mareko Woreda of Guraghe Zone in Southern Region were involved as source of information. The finding of the study shows that 62 % of sample households were food insecure. Despite the food secure households acquisition of adequate kilo calories they faced 2.46 food deficient months indicating the weekly calories availability per adult equivalent may not best describe food security status year round. The inferential analysis revealed that family size, size of cultivated land, number of oxen, contact with development agent, off-farm income, total farm income, livestock holding measured in tropical livestock unit, perception on absence of adequate rainfall and participation in food aid were significantly differ between food secure and insecure households. Logistic regression model resulted eleven significant variables at less than 10% probability level among 17 variables. These were age of household head, level of education, household size, size of cultivated land, use of improved seed, number of contact with development agents, size of credit received, size of livestock owned, and off-farm income per adult equivalent. The model estimate correctly predicted 90.8% of the sample cases, 90% for food secure and 91.3 for food insecure households. Coping strategies which were practiced by sample households at both initial and sever stages of food shortage are reducing number of meal, reducing size of meal, borrowing cash and grain and receiving food aid, sales of animals, participating in food for work programs, off-farm and non-farm jobs, rent out land and mortgage land. The study recommends that proactive policy in family planning, strengthening extension support, incorporating coping strategy in the government regular projects and programs, promoting land intensive and conservation agriculture should be integrated as food security efforts of the government.

Keywords: food security, calorie acquisition, coping strategy, logit

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1. Introduction

Agricultural growth in sub-Saharan African countries averaged nearly 3% over the past 25 years [4]. This slow growth is partly attributed to low investment in agriculture, poor infrastructure and downsizing of public agricultural institutions for research, extension, credit and marketing of sate role (13). Recently, emerging issues like climate change and population growth along with decline scale of agricultural investment in developing countries, inappropriate rules for trade and investment between rich and poor countries and extreme global inequality of food resources have direct and negative influence on food security status. Despite the availability of resources and the efforts made by governments in most of these countries, food insecurity

and declining food production per capital remained the same or deteriorate overtime [10].

Despite the rapid economic growth that Ethiopia has experienced in the last decade or so, malnutrition and hunger continue to present key policy challenges [14]. Ethiopia is one of the countries characterized by subsistence agriculture, experiencing rapid population growth and severe environmental degradation which have resulted in widespread of poverty and food insecurity. The contribution of agriculture in Ethiopia is to the level that can determine the overall economic performance. It accounts for about 42 % of GDP, 85% labor force and 90% of the export [2]. The economic policy of the country for the last years has been focused on agriculture with the aim of ensuring rapid and sustainable development and poverty reduction through agricultural centered strategy known as

Agriculture Development Lead Industrialization. However, agricultural production has deteriorated over time due to the high and increasing population and diminishing of landholding [16]. This has been manifested on the prevailing pressure on land, resource degradation, farm holdings fragmentation, declining of soil fertility and food per capita. Hence, the sluggish agricultural production growth and its low productivity is a reason to earn low income as well as to be food insecure for about 45% of the population even in good rain fall and suitable climate [8].

Efforts are being made by government and other humanitarian agencies to overcome such problems through enhancing production potential and providing food aid at time of crises but do not guarantee food security to solve the problem at community and household levels. Recently the food security situation reported by [18] indicated that, a humanitarian requirement of the government of Federal Democratic Republic of Ethiopia has identified 5.2 million people in need of emergency food assistance. In addition to this, 7.5 million people are chronically food insecure. Ethiopia is one of the poorest countries and continually affected by chronic and transitory food insecurity. Majority of the peoples live in rural area and dependant on subsistence agriculture. According to [12], Ethiopia has not managed yet to solve the problem of food security. Drought, flood and other factors have been sources of vulnerability to food insecurity in the country. In order to combat threats of food insecurity and poverty by ensuring food security, detailed understanding of the socioeconomic condition of the group affected by it, the determinant factors and how households cope with the problem of food insecurity is critical. This research, therefore, was conducted with the aim of generating location specific data on food security in Mareko Woreda, Gurage zone and this would contribute to literature gap and inform policy makers at

micro and macro level for designing policy about the food security at the community levels.

2. Conceptual Framework of Food Security

Food security has three components viz., food availability, access, and utilization. [9] Stated that availability refers to the physical existence of food, be it from own production, purchase from markets or from transfer, [15] elaborates that food access is ensured when all households and all individuals within those households have sufficient resources to obtain appropriate foods for a nutritious diet. Food access is a function of the physical, social and policy environment which determine how effectively households are able to utilize their resources to meet their food security objectives. Drastic changes in these conditions, such as during periods of drought or social conflict, may seriously disrupt production potential or ability to acquire income thereof threaten the food access of affected households. These shocks not only compromise households' access to food temporally but often lead to the loss of productive assets such as livestock; they also have severe implications for the future productive potential of households and, in turn, their long-term food security. This idea implies that when these conditions become worsened, households may become food insecure and their calorie intake can be below 2100kcal/day per person in adult equivalent. Utilization has been well described in different literatures by different authors. For example, [9] has described about utilization as, it has a socio-economic and a biological aspect. Adequate food utilization is realized when food is properly used, proper food processing and storage techniques are employed, adequate knowledge of nutrition, health and sanitation services exist [18].

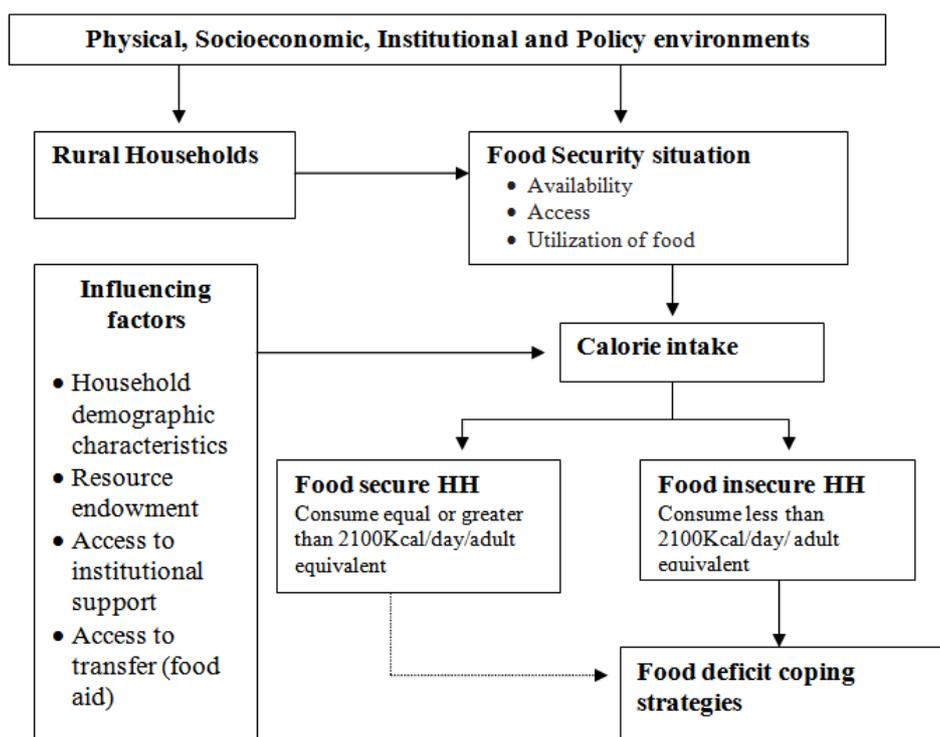


Figure 1. Conceptual framework of food security developed for the study

The broken line indicates that food secured households satisfy the daily calories requirement despite they also faced some months of food deficit over the year and forced to employ coping strategies

Food security is a dynamic phenomenon: its impact varies depending on its duration, its severity, and the local socioeconomic and environmental conditions. It may be chronic or transitory. Chronic food insecurity means that a household runs a continually high risk of inability to meet the food needs of household members. In contrast, transitory food insecurity occurs when a household faces temporary decline in the security of its entitlement and the risk of failure to meet food needs of short duration. When facing both cases, households respond in different ways to reverse the situation. The variety of measures taken by households is commonly known as coping strategies. As a result, the food security status of the households can be improved. But if the frequency of the problems increases overtime, a negative outcome on food security can follow. [7] Described this reality as “Over time, as a crisis deepens, household responses become increasingly costly, leading to the loss of productive assets (e.g. land degradation, loss of ox, etc.) which can ultimately undermine future livelihoods and, again, their long-term food security status”. The present study follows the following conceptual framework.

3. Materials and Methods

3.1. Description of the Study Area

This study was undertaken in Mareko Woreda, Guraghe zone which is located in the northern part of SNNPR State. According to the Central Statistical Authority summary and statistical report of population and household census and 2012 projection the total population of the woreda is 74,863. Agriculture is the dominant means of livelihood in the woreda [11]. The sector is characterized by traditional production and subsistence orientation. The data for this research were collected from farm households resides in five rural kebeles, in Mareko Woreda in Guraghe zone. The woreda consists of 25 rural kebeles falling into the two agro ecological zones, Woina-dega (temperate) and Kolla (Semi-arid). All 25 kebeles in the woreda are chronically food insecure [11].

3.2. Sampling

A two stage sampling procedures was used. In the first stage, 5 kebeles from the 25 kebeles were randomly selected. In the second stage, a total of 130 representative farm households were randomly selected for interview. During this process, the list of household heads in each kebele was used to perform random selection of the representative farm households. The number of representative households/respondents from each kebele was different depending on the total number of the household in each kebele. Therefore, the respondents were selected randomly in proportion to size of households in each kebele.

3.3. Data Type and Collection Method

In order to generate the required information for this study, two instruments of data collection were developed. These were interview schedule and focus group discussion. The interview schedule was used as a major source of information. The interview schedule helped to elicit

information related to the different aspects of the household and individual characteristics while the focus group discussion employed to collect community level information from representative discussants.

3.4. Analysis of Food Security Status

Household calorie availability was computed from each food item consumed and grouped into seven food groups. These food groups are (1) cereal, roots and tubers, (2) pulses and legumes, (3) dairy products (4) meats, fish and eggs (5) oils and fats, (6) fruits, and (7) vegetables. The reported amount is adjusted for food processing to obtain the net weekly calorie availability. The net weekly calorie availability was divided by seven to obtain the household daily calorie intake. The family size of each household was converted into adult equivalent family size which considers age, sex, and activity level of each family member in the household. The daily net calorie consumption of the household was divided by the adult equivalent family size to obtain the daily calorie availability per adult equivalent of the household. Households with daily calorie consumption greater than or equal to 2100 kcal per day were categorized as ‘food secure’, and those households whose calorie intake fallen below this food security threshold grouped as ‘food insecure (EHNRI)’ based on Ethiopian Health and Nutrition Research Institute (EHNRI) recommendation (5). This formula used to convert into Kcal is given as follows:

$$HFS_i = \frac{\text{Total net calorie consumed by a household daily}}{\text{Household size measured by adult equivalent}}$$

Where: HFS_i is Household Food Security of the *i*th household and *i*=1, 2, 3...130.

Therefore, based on the HFS_i value, the households’ food security status was determined that those households whose HFS_i is greater or equals to 2100 kcals per day were generalized as food secured and the others were concluded as food insecure. The level of calorie intake and the resulting food security status of the respondent households are presented in Table 1.

Table 1. Food security status of respondent households

Level of food security Food security status	Calorie consumption per person per a day	Proportion of households
Food secured	Above 2100 kcals	50 (38%)
Food insecure	Below 2100 kcals	80 (62%)

4. Estimation procedure

The data were analyzed using descriptive analysis such as frequency, mean and inferential statistics such as t-test and chi-square test. Econometric model i.e. binary logistic regression model was used to determine the factors affecting household food security. The functional form of the logit model is presented as follows:

$$f(Z_i) = \frac{e^{Z_i}}{1 + e^{Z_i}} \text{ for } -\infty < Z_i < \infty = X_i \quad (1)$$

Where $Z_i = \alpha + \beta_2 X_i$, $f(Z_i)$ is the logistic density function for logit model. Let P_i be the probability that the household is food secure. As per the above logistic

function, the probability of an individual household is being food secure is given in equation 02.

$$P(C/X) = \frac{1}{1 + e^{-zi}} \quad (2)$$

While the probability of household that is not food secure is given by

$$1 - P(C/X) = 1 - \frac{1}{1 + e^{-zi}} \quad (3)$$

$$\text{The Odd's ratio} = \left[\frac{P(C/X)}{1 - P(C/X)} \right] = e^{-zi} \quad (4)$$

By taking the logarithms in both sides, the specific logit model to predict the odds' of household food secure is given in equation 05.

$$\ln \left[\frac{P(C/X)}{1 - P(C/X)} \right] = Z_i = \alpha + \beta X_i + \mu \quad (5)$$

Where α is the constant, and β_i where $i = 1, 2, n$ are the coefficients of the exogenous variables to be estimated. X_i is a vector of explanatory variables; μ_i is the error term with zero mean and constant variance.

5. Results and Discussions

As per Table 1 38% of the households were food secure and acquire 2100 kilo calorie and above per adult equivalent, while majority 62% are never escape transitory food insecurity. The finding on food deficient months respondent households experiencing (See Table 2) show that 100% of the food insecure households and 66% of the food secure households faced difficulty to satisfy their food requirement from their own production year round. About 27.5%, 61.3% and 11.3% of the food insecure households experienced 1-3, 4-7 and 8-10 food deficit months respectively. On the contrary, 34%, 30% and 2% of the food secure households reported food shortage for 1-3, 4-7 and 8-10 months in that order. The mean food deficient months of food secure and insecure households were 2.46 and 4.84 respectively. The finding implies that a weekly calorie acquisition method may not best describe the food security status of the household year round rather

reveals households' food security status at the time of the study.

Table 2. Distribution of households by food deficit months from own farm production

Food deficit months in households	Food insecure		Food secure		Total	
	No.	%	No.	%	No.	%
0	0	0	17	34	17	13
1-3	22	28.5	17	34	39	30
4-7	49	61	15	30	64	49
8-10	9	11	1	2	10	8
Total	80	100	50	100	130	100
Mean	4.84		2.46			
St. Dev.	2.1		2.5			

Source: Filed survey, 2011.

6. Data Description

The mean age of food insecure and food secure households were 45 and 44 years respectively and there is no statistical difference in age between the two groups. The average household size of respondent households was 6.12 persons while food insecure and food secure household family size was 6.14 and 5.64 respectively. The observed difference in family size between food insecure and food secure was statistically significant at 10% level. The average farm size of food secure households was significantly larger (1.44 hectare) than food insecure (0.97 hectares) and the difference was significant at 1% level. Livestock endowment measured in Tropical Livestock Unit (TLU) was shown significant difference between food secure and insecure households. The average number of oxen owned by food secure households is significantly larger than the food insecure at 5% level. Oxen the sole provider of draft power and determinant of on time land preparation, is not uniformly distributed between food secure and insecure households. Access to extension measured in contact with development agents show significant difference between food secure and insecure households. Total farm income and non farm income which demonstrate the ability of a household to secure entitlement to food through purchase also demonstrate the presence of difference between food secure and insecure households.

Table 3. Summary of means of continuous variables

Variables	Total sample (No.= 130)		Food insecure (No.= 80)		Food secure (No.=50)		T- Value
	Mean	St. Dv.	Mean	St. Dv.	Mean	St. Dv.	
Age of household head	44.68	13.68	44.91	13.11	44.32	14.68	-0.239 ^{ns}
Family size	6.12	2.19	6.41	2.14	5.64	2.21	-1.974 [*]
Dependency ratio	1.12	1.05	1.15	1.19	1.08	0.77	-0.374 ^{ns}
Cultivated land (ha.)	1.15	0.86	0.97	0.61	1.44	1.09	3.151 ^{***}
Number of oxen	0.67	1.89	0.35	0.60	1.18	2.89	2.484 ^{**}
Number of contact with DAs	2.00	1.29	1.51	1.02	2.78	1.29	6.201 ^{**}
Amount of credit taken (birr)	468.81	696.54	403.25	675.01	573.70	724.19	1.362 ^{ns}
Total farm income (in birr)	2918.52	4826.60	2198.21	2287.48	4071.00	7119.88	2.184 ^{**}
Nonfarm income (birr)	181.91	589.14	70.05	134.20	360.88	911.93	2.865 ^{***}
TLU	0.98	2.79	0.38	0.66	1.94	4.28	3.211 ^{***}

***, ** and * significant at 1%, 5% and 10% probability levels respectively and ^{ns} = non significant.

Source: Filed survey, 2011.

Table 4 reveal that in most of categorical variables such as sex, household head education level, fertilizer and

improved seed utilization and experiencing plant disease and pest damage the food secure and insecure households

didn't differ significantly. Other study also confirms that there is no marked disparity in the distribution of households according to both gender and education level of head of household in food security status [1]. However, the two groups were found to differ significantly in their

perception on adequacy rainfall at 2010/11 production season and their participation in food aid programme at 10 and 1% level respectively. The majority of respondents in both food secure and insecure households received food aid despite the proportion difference.

Table 4. Proportion of households with value of 1 for dummy variables (%)

Variables	score	Food secure (N=50)		Food insecure (N=80)		Total (N=130)		Chi-square
		No.	%	No.	%	No.	%	
Sex of HH	1(male)	34	68	47	58.8	81	63.3	1.121 ^{ns}
	0(Female)	16	32	33	41.3	49	37.7	
Education status of HH	1(educated)	21	42	28	35	49	37.7	0.642 ^{ns}
	0(uneducated)	29	58	52	65	81	62.3	
Fertilizer use	1	29	58	42	52.5	71	54.6	0.376 ^{ns}
	0	21	42	38	47.5	59	45.4	
Improved seed	1	20	40	33	41.3	53	40.8	0.02 ^{ns}
	0	30	60	47	59.8	77	59.2	
Absence of adequate rainfall	1	15	30	9	11.3	24	18.5	7.186*
	0	35	70	71	88.8	106	81.5	
Plant disease and pest infestation	1	10	20	13	16.2	23	17.7	0.297 ^{ns}
	0	30	80	67	83.8	107	82.3	
Access to food aid	1	31	62	66	82.5	97	74.6	6.827***
	0	19	38	14	17.5	33	25.4	

^{ns} = non significant, ***, ** and * significant at 1%, 5% and 10% probability levels respectively.

Source: Own survey result (2011).

The descriptive analysis shade light that the food secure and food insecure households differ considerably in many counts. The finding show that the two groups differ in demographic aspect, resource endowments, access to institutional support and so on.

7. Estimation Result

As it is depicted in the Table 5 out of 17 variables fitted in the binary logistic regression model 11 of them significantly influenced food security statuses of the farm households in the study area. These are age of the

household head, education level of household head, size of the household, cultivated land, improved seed use, off-farm income, contact with Development Agent, animal holdings measured in TLU, absence of adequate rainfall, Plant disease insect and pest damage, credit received and on-farm income. The variables direction and strengths of influence discuss here under.

Table 5. Results of the logistic regression model analysis

Explanatory variables	Estimated Coefficient	Wald Statistics	Odds Ratio (Exp(B))	Significance Level
1 Age of household head	0.065	3.149	1.068	0.076*
2 Sex of household head	0.568	0.228	1.759	0.633
3 Education level of HH head	1.764	2.276	0.171	0.097*
4 Family/HH Size (number)	-1.352	12.134	0.259	0.000***
5 Dependency ratio	-0.036	0.003	0.964	0.954
6 Cultivated land in ha	2.457	5.497	11.665	0.019**
7 Fertilizer use	-0.064	0.005	0.938	0.946
8 Improved seed use	1.680	2.151	5.365	0.081*
9 Number of oxen	1.544	2.510	4.683	0.113
10 Livestock holding (TLU)	1.331	4.236	3.783	0.040**
11 DA contact	2.199	14.479	9.019	0.000***
12 Absence of adequate rain	-3.570	5.130	0.028	0.024**
13 Absence of plant disease, insect and pest damage	2.204	3.125	9.066	0.077*
14 Credit received (in birr)	0.051	1.251	1.001	0.049**
15 Total farm income in birr	0.000	0.615	1.000	0.433
16 On-farm income per AE in birr	0.007	6.694	1.007	0.010**
17 Access to food aid	-1.021	0.681	0.360	0.409
Constant	-6.088	3.065	0.002	0.080
-2log likelihood	55.648 ^a			
Chi2	117.58			
Correctly predicted ^a (count R ²)	90.8			
Specificity ^b	90.0			
Sensitivity ^c	91.3			

Source: Own Survey result, 2011.

*, **, and *** significant at 10%, 5% and 1 % probability levels, respectively

^a Based on a 50-50 probability classification scheme.

^b Correctly predicted food secure groups based on 50-50-probability classification scheme.

^c Correctly predicted food insecure groups based on a 50-50-probability classification.

Age of the household head was significant at less than 10% probability level and showed positive relationship in explaining the household food security status. Which means, as the age of the household head increases by a single year, keeping other factors remain the same, the likelihood of the households being food secure increases by a factor of 1.07. This finding supports the assumption that when the heads age advances, they were expected to have stable economy, accumulate wealth, experience and food secure than younger heads. This shows that the household heads who are at adulthood age engage in different off farm activities and get income to be invested to improve their household food security status.

The educational attainment of the head of the household was important in explaining the variations in household food security and it was found significant at less than 10% level. As a result, education does help much to improve the food security status of households. Keeping other factor constant, an increase in a year of schooling of the household head improves the likelihood of the households being food secure by a factor of 0.171.

Household size measured in number of household members was found to negatively and significantly influence household food security status at less than 1 % probability level. The presence of relatively more number of household members in a household demanding a minimum of 2100 Kilo Calories on the face of small degraded physical and natural farm resources could be the justification for family size to affect food security negatively. If all other things are held constant, the odds ratio in favor of being food insecure ($\exp \beta$), shows that an increase in the size of family by one person, increases food insecurity by a factor of 0.4 unit. It was prior hypothesized that family size has negative impact on the state of food security, in such a way that households with large family size are food insecure than those with small numbers of family members. So, the finding favors the prior hypothesis. Tshediso also reported larger household sizes are associated with a negative food security status as larger household sizes require increase food expenditure and competition for limited resources [17].

Cultivated land has positive impact on the probability of food security status of farm households in the study area and was found significant at 10% probability level. In this sense, ownership of the larger cultivated land, the higher the probability of being food secure to the farm households. This means, the farm households due to ownership of larger size of cultivated land would have higher the probability to produce more food and sources of cash products than households with smaller size of cultivated land. As a result of using this resource, the farm households would have probability of acquiring capital which might enable them to invest on other production resources and inputs that contributes to food security of the households. In this study, all other factors kept constant, as the size of cultivated land increased by one hectare, the odds ratio in favor of being food secure increases by a factor of 3.298 implying the size of cultivated land positive influence on food security status.

Use of improved seed has positive impact on the probability of being food secure among the farm households. In this study it is significant at 10% probability level. This implies that farm households who use improved seed properly have more chance to be food

secure than those who do not use. The result of this study reveals that, all other factors are remaining constant, the odds ratio in favor of being food secure increases by a factor of 5.365 as a farm households improved seed use increases by one unit.

Livestock holding (in TLU) is significantly related at less than 5% probability level and the odds ratio in favor of being food secure increase by a factor of 3.783 when other factors remain constant. Livestock contribute to food security status of households in different ways such as by providing cash income, nutrition (meat, milk, etc.), draft power, manure, etc. Also livestock serve as savings of assets and used for coping food insecurity problems during food shortage. It was hypothesized that households who own larger size of livestock in TLU are less likely to be food insecure than households who own no or smaller size of livestock in TLU. According to this study, total size of livestock holding is positively and significantly associated with the probability of households' being food secure in the study area.

Development Agent (DA) contact has significant positive influence on food security status of households at 1% probability level. Increased contacts or visits of DAs to the farm households increases the probability of households to be food secure as a result of dissemination of agricultural extension and improved technologies to the farm households by DAs that in turn increases production and productivity. Holding other variables constant, the odds ratio in favor of being food secure increases by a factor of 9.019 as a farm household's contacts/visits of DAs to increases by one round.

As expected absence of adequate rainfall influence household food security status negatively and significantly at 5%. The finding reveals that as the household perception changed from having adequate rainfall during cropping season to inadequate, the odds ratio in favor of food security decrease by a factor of 0.028.

Absence of plant disease, insect and pest damage also contribute to household food security status and its influence was significantly at 10% level. The variable is measured as dummy and the result implies that when the household status changed from absence of plant disease, insect and pest damage to experience incidence of plant disease, insect and pest damage the likelihood of food insecurity increase by a factor of 9.066.

Off-farm income per AE was hypothesized to have positive impact on food insecurity. It is an income of the households in cash or in kind. Households in the study area engaged in different off-farm activities, particularly when they face crop failure and food shortage as a source of food. So, it serves as one of the major coping strategies of food shortage/insecurity. In this study, in agreement with the hypothesis, off-farm income per AE is positively and significantly associated with food security status of farm households at 5% probability level. The odds ratio, other factors held constant, in favor of food security increases by a factor of 1.007 as the off-farm income per AE of farm households increases by one unit.

8. Coping Strategies

Most households in Mareko woreda are affected by chronic food insecurity for many years. The level of the

food shortage problem varies from household to household. Food insecure households use different strategies to cope with the food shortage [3,7]. Various coping strategies are practices that a household take as a decision to mitigate and escape during shortfall of food availability and access. So, there are about 10 strategies being practiced by the households at early stage of food shortfall. Accordingly at initial stage of food insecurity 60% and 73.5% of food secure and food insecure households were reducing the number of meals, respectively. Reducing size of meal also was employed as coping strategy by 60% and 72.5% of food secure and food insecure households, respectively. Borrowing grain and cash was used as third coping mechanism was employed by 42% of food secure and 62.5% of food insecure households. About 38% and 45% of food secure

and food insecure households, respectively practiced receiving food aid as the fourth coping mechanism. Sale of small livestock was used as fifth coping mechanism by 36% and 42.5% of food secure and insecure households, respectively. Participation in food for work programs, which is ranked sixth, was practiced by 38% and 37.5% of food secure and insecure households. Wage from daily paid laborer was equally used as coping mechanism by 26% of food secure and insecure households. Renting out and mortgaging of land was the eighth and ninth coping mechanism. Renting out land was practiced by 10% and 16.25% of food secure and insecure households whereas mortgaging land by 4% and 11.25% of food secure and insecure households, respectively. Pity trade was used as the tenth coping mechanism by 10% and 3.7% of food secure and insecure households, respectively.

Table 6. Coping strategies of households to food insecurity at initial stage

S. No.	Coping strategies to food insecurity	Initial stage			
		Food insecure households		Food secure households	
		No.	%	No.	%
1	Reduce size of meal	58	72.5	30	60
2	Reduce number of meal	59	73.7	30	60
3	Borrow grain or cash from relatives	50	62.5	21	42
4	Sale livestock	34	42.5	18	36
5	Food aid	36	45	19	38
6	Participation in food for work programs	30	37.5	19	38
7	Wedge from daily paid labor work	21	26.25	13	26
8	Rent out land	13	16.25	5	10
9	Mortgaging land	9	11.25	2	4
10	Pity trade	3	3.7	5	10

Source: Survey result (2011).

At sever stage of food shortage households in the study area practiced set of coping mechanisms more or less corresponding to that of the initial stage. However, the orders of importance of the activities and coping mechanisms were different. About 50% and 76.2% of food secure and food insecure households respectively used renting land out as the first coping mechanisms. On the other hand 46% and 70% of food secure and insecure households respectively were using mortgaging land as the second coping mechanisms. Close to 46% and 70% of food secure and insecure households was receiving food aid to cope food shortage. About 22% and 31.2% of food secure and insecure households respectively were borrowing

cash or grain from friends and relatives as means of coping food insecurity. Off-farm income (income from agricultural wage) was also used in the study area as coping strategy by households to cope food insecurity. As the severity of the problem continued some of the members of the households forced to migrate in search of employment ranging from nearby areas to furthest towns. Close to 16% and 32.2% of food secure and insecure households respectively used seasonal migration for coping mechanisms. Sale of livestock, especially cow and ox, was used by 22% and 22.5% of food secure and insecure households, respectively.

Table 7. Coping strategies of households to food insecurity at sever stage

S. No	Coping strategies to food insecurity	Food insecure households		Food secure households	
		No.	%	No.	%
1	Rent out land	61	76.2	25	50
2	Mortgaging land	56	70	23	46
3	Food aid	56	70	19	38
4	Borrow grain or cash from relatives	25	31.2	11	22
5	Off-farm (agricultural employment)	22	27.5	13	26
6	Seasonal migration	26	32.5	8	16
7	Sale livestock	18	22.5	11	22

Source: Filed survey (2011).

9. Conclusions and Recommendations

The result of this study showed 38% and 62% of the sample households were found to be food secure and food

insecure respectively. In the study area food secure household groups were characterized by smaller family size, larger livestock size, and larger number of oxen holding compared to the food insecure groups. Food secure groups produce relatively larger share of food and

earn larger annual income per AE than the food insecure groups. Similarly, food secure groups earned larger off-farm income per AE, using, relatively, more of fertilizer than the food insecure groups. The result of the logistic regression model indicated that household a family size has a negative effect on the probability of being food secure. Cultivated land had positive and significant influence on food security through its role on food production and income generation. Use of Improved seed had negative coefficient and influences food security significant (at 10% probability level). Contact/visit of DAs had positively influenced the probability of being food secure significantly (at probability level of 1%). Off-farm income per AE also had positive and significant influence on the probability (at 5% probability level) of being food secure by increasing household's access to food. Finally, total livestock holding (TLU) had positively and significantly influenced the probability of being food secure (at 5% probability level).

In the study area the coping strategies of the households to food insecurity have been computed in different ranks in order of importance in different stages of severity of food insecurity. Accordingly, the study showed that the most important coping strategies which were practiced by sample households at both initial and sever stages of food shortage are the following. Reducing number of meal, educing size of meal, to borrow cash and grain and receiving food aid, sales of animals, participating in food for work programs, off-farm and non-farm jobs (Wage from daily paid agricultural labor work and Pity trade), rent out land and mortgage land, respectively.

On the basis of the study findings the following recommendations were made in order to benefit those who need to intervene in improving household food security.

1. Household size has direct and negative relation to food security status of household. The rapid growing number of population should be controlled through family planning, health extension service, awareness raising and adult education provision.
2. Cultivated land was found to be related directly and positively to food security of households in the study area. The regional Government should facilitate options which enhance access to land such as resettlement, expansion of soil and water conservation practice on farmlands and reclamation of degraded land to bring into production.
3. Contact with DAs of the households should be enhanced so as to enhance dissemination of agricultural extension services and appropriate technologies in order to improve food security.
4. The use of improved seed, and chemical fertilizer which increase production and productivity encouraged.
5. Harnessing the potential role of coping strategies currently practiced by the households during food shortfall to mitigate food insecurity shall be considered and incorporated as policy options.

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