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RESEARCH ARTICLE

ASSESSMENT OF MICRO LEVEL RISK FACTORS FOR FOOD INSECURITY AND COPING MECHANISMS IN DALE WOREDA OF THE SIDAMDA ZONE, SNNPR, ETHIOPIA

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ABSTRACT

The main objective of this study was to assess micro level risk factors for food insecurity and identify coping mechanisms in Dale woreda. About 150 sampled households were selected for the study. The result from sampled households revealed that 38.7 and 61.3 percents were found food insecure and food secure respectively. The main risk factors for food insecurity perceived by households in study area were found to be erratic rainfall, food and input price rise, drought, shortage of income, lack of off-farm activities, land shortage, population pressure, poor saving practices, lack of credit, poor fertility of land and soil erosion. The main coping mechanisms employed by households during food insecurity in the study area were diversifying livelihood strategies, reducing diversity and frequency of meals, reducing size of meals, decreasing social event, selling of firewood and charcoal, petty trading and sale of livestock. Eating immature enset, selling and renting immature crops in the field and engaging oneself socially undermined jobs also were the other indigenous practices in the study area. Based on the regression result, household size, livestock holding, input use, input price, off-farm activities and perception of fertility of land were found to be major factors determining food security status, number of perceived risk factors for food insecurity and number of food insecurity coping mechanisms at household level in the study area.

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INTRODUCTION

Background of the study: According to Food and Agricultural Organization of the United Nations (FAO, 2010), 925 million people worldwide did not have access to sufficient food to meet their dietary energy requirements. The situation is particularly severe in Sub-Saharan Africa (SSA) where almost 27 percent of the population is undernourished (FAO, 2010; Adeleke et al., 2011). Ethiopia is one of the poorest and most food insecure countries in SSA. In the country, about 33.6 percent of the total population is food insecure and 38 percent of rural households are exposed to food insecurity (MOA, 2009; MoFED, 2012). The proportion of the population rated food insecure varies from year to year depending on weather condition, specifically rainfall. During drought and erratic rainfall and good rainfall season, the proportion of food insecure people is as high as 52 percent and as low as 30 percent respectively (MoA, 2009; MoARD, 2010). In Ethiopia, 33 percent people consuming below the recommended calorie requirement (2100 kcal) per EA day (Jean-Marc et al., 2005; MoARD, 2010; FAO, 2010).

Statement of the Problem: Food insecurity is one of the main problems in Ethiopia. Both chronic and transitory food insecurity problems are widespread and severe in rural Ethiopia (FDRE, 2002; MoARD, 2010). About 41 percent of country's population has been affected by these problems (FAO, 2010). The blend of man-made and natural factors result serious and growing food insecurity problem. These in turn expose 5.23 to 6.5 million people to food insecurity problem in each year (CSA, 2010; FAO, 2010) Dale is one of the woredas that is identified as food insecure problem in Sidama zone. The major food insecurity problems in the study area are the natural, socio-economic problem like recurrent drought, erratic rainfall, declining soil fertility, natural resource depletion, and growing population pressure (Samueal et al., 2005). The personal experience also revealed that farm households faced seasonal food shortage almost every year. Even in years of adequate rainfall and good harvest, great deals of households in the study area were food insecure. Therefore, assessing micro level risk factors for food insecurity and coping mechanisms as well as suggest possible recommendation for the problems are the base of this study.

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Objectives of the study: The general objective of the study is to assess micro level risk factors for food insecurity and identify the coping mechanisms used by households in Dale wore a. The specific objectives of the study include:

- To assess households' level of food accessibility in the study area
- To identify the main socio-economic and demographic factors associated with food security status in the study area.
- To identify food insecurity coping mechanisms employed by the households
- To recommend suggestion and appropriate food security intervention options specific to the study area

Research Questions: Parallel to the objectives the following questions whose answers are believed to clarify facts to assessing of micro level risk factors for food insecurity and coping mechanisms.

- What is the level of household food accessibility at Dale woreda?
- What are the key socio- economic and demographic factors associated with food security at study area?
- How do households in Dale woreda cope with food insecurity?
- What are options for intervention of food security for Dale?

Significance of the study: This study is undertaken to assess the risk factors for household food insecurity and coping mechanisms at study area. The findings of this study can be helpful to development practitioners to acquire better knowledge to carry out food insecurity development interventions at the right time and place to decrease vulnerability and food insecurity situations of the dwellers in the study area. This study is undertaken to fill the source gap of literature review and reference materials for students and all those who pursue their studies in area of food insecurity. It also provides information for government and non- government organizations for better decision making in the area of food insecurity.

Scope of the study: The scope of the study is assessing micro level risk factors for household food insecurity and coping mechanisms involving both primary and secondary data from the year Megabit 2003 to Megabit 2004 E.C. This study is conducted in Sidama zone, Dale woreda in three kebeles among 12 woredas in the zone, which categorized in food insecurity problems. Attempting all the food insecure woredas of the Zone to include in this research, results the research complex, expensive and time and resource consuming. Thus, the study was confined to a specific area in the selected woreda.

LITERATURE REVIEW

Conceptualization of Food Security: Food security as a concept originated in 1970's and since then it has been a topic of considerable attention. Since the 1980s, it has been recognized as the achievement of food security requires paying attention to both supply-side and demand-side variables. The concept of food security attained wider attention that shifted from global and national level to household and individual

levels. The World Food Summit 1996, defined food security as: "Food security exists when all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet the dietary needs and food preferences for an active, healthy life" (FAO 1996). According to the refined definition, food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets dietary needs and food preferences for an active and healthy life (FAO, 2002; FIVIMS, 2003).

Household Food Security: A household is usually defined as a group of people living together, even if not relatives of each other, who share food from the same pot and are answerable to the same household head (Bonfiglioli, 2007). The initial concern of food security was on global, regional and national food supply or stocks in which food security was considered as the adequacy of food supply at these levels. Such conceptualization of food security focuses on aggregate supply of food but overlooks the micro-level food access. In other words, food security at a global or national level does not guarantee and ensure food security at a household or community level. That is, the attaining of a macro-level food sufficiency does not ensure the achievement of household level food production and investment in food production and storage (Debebe, 1995).

Food Security Situations in Ethiopia: In the last three decades, food production in Ethiopia has never been sufficient to enable the populations to be food secure. Accordingly, Ethiopian economy could not attain food security by supplying food at national and household level. For this reason food aid become important and turn out to be a common practice in the country to save millions of lives both in the emergency and development programs. Ethiopia consistently receives large amount of food aid. National grain supply/demand balances are domestic availability 17.11MT (opening stocks for EFSRA 290,000 tones & total production 16.82MT) and total utilization 18.27MT. Currently an estimated 6.5 million people will require emergency food assistance. This equates to a net food gap and requirement of 639,000 tones. This shows that the country has continues to depend on food imports, mainly on food aid (FAO, 2010; WFP, 2010).

Household Coping Mechanisms: Coping Mechanisms defined as mechanisms by which households or community members meet their relief and recovery needs, and adjust to future disaster-related risks by themselves without outside support. Households are not passive victims of food insecurity or drought.. The study by Dagne (1993) revealed that household responses to food shortages can be examined as: production based-a self-insurance strategy which involves changing production patterns; market based-income stabilization strategy including reducing consumption, diversifying secondary economic activities, depending on kin and friends support, borrowing, sales of small animals, selling family labor, rationing food consumption, eating wild foods, depending on relief food, and begging; and non-market based-such as depending on the use of different institutional and societal income transfer systems; asset disposal based-both productive and non-productive; and distress migration and family separation.

Empirical Evidences on Determinants of Food Insecurity: A number of studies made use of various methodologies to

identify determinants of household food insecurity and coping mechanisms in different parts of Ethiopia. A combination of factors has resulted in serious and growing problem of food insecurity in the country. The study conducted by Nigatu Regassa in Sidama zone documented that some demographic and socio-economic variable such as age of the household head, household size, educational status, land holding and access to main social service have associations with the number of coping strategies practiced by the food insecure households (Nigatu, 2011).

METHODOLOGY OF THE STUDY

Description of the study area: Dale woreda is one of the 19 rural woredas and 2 city administrations found in Sidama zone of Southern Nations Nationalities and People Region (SNNPR). Dale woreda is located between 6°27'00" - 6° 51'00" N latitude and 38°00'00" -38°37'00"E longitude. The altitude ranges from 1650-2800 masl. The mean annual rainfall (1989-1998) at Awada Research sub-centre in Yirgalem is 1314 mm (IPMS, 2005). The woreda is divided into 36 rural kebele administrations and covers total areas of 28440 ha, at about 320 km south of Addis Ababa. According to CSA (2007), the population of the woreda is estimated as 229,363 of which women account for 49.3 percent and men account 50.7 percent of the population. The average land holding per family is 0.5 ha with average family size of 6. Polygamy is common in the Woreda.

Data Sources: Both primary and secondary data sources were used to conduct this study. The primary data were collected from sample households, FGD participants and key informants. Secondary data were collected from secondary sources including government line offices, websites (CSA), reports and journals. Tools like structured and semi structured questionnaire were used to collect the data from the field.

Study Design: The study was primarily based on the empirical assessment of micro level risk factors for food insecurity and coping mechanisms in study area. It employed cross-sectional survey to collect both qualitative and quantitative data.

Sampling Design: A multi-stage sampling procedure was used to select woreda, kebeles and eligible respondents. Dale woreda is purposively selected being one of the food insecure woreda in Sidama zone. Out of 36 kebele administrations in the woreda, based consultation of woreda experts 17 food insecure and 19 food secure kebeles were identified. The list of all food insecure kebeles from the woreda office of agriculture and rural development (WoARD) is used as sample frame to select study kebeles. Thus, based on the resource and time available, three kebeles were selected by using simple random sampling technique from food insecure kebeles. The desired sample size is determined by using Cochran 1977 method (see Appendix Illustration A). Accordingly, the total sample size of this study was 150 households. To determine the size of sample from each Kebele maintaining gender aggregation, probability proportional sampling (pps) methods was used (table 1). The list of households in each kebeles is used as sample frame and systematic random sampling technique was employed to select representative respondent from each Kebele.

Data Types and Collection Methods: Both quantitative and qualitative data were collected to assess micro level risk

factors for food insecurity and coping mechanisms during the survey period. Structured questionnaires that designed for this purpose was focused at household level used to collect data from sampled households. To collect reliable data, appropriate questionnaire was developed with close consultations of experts, pre-tested on none respondents and amended before commencement of final survey.

Method of Data Analysis and Presentation: Upon completion of the data collection, data were analyzed using both quantitative and qualitative analytical methods. The computer software program known as Statistical Package for Social Sciences (SPSS) version 20 tool was used for both descriptive and inferential analysis. The quantitative data were analyzed using descriptive statistics (frequencies, percentages, means, and standard deviations), bi-variate (chi-square) using cross-tabulation and multivariate (multiple regressions). Data were presented using tables, charts and graphs. Qualitative data were analyzed through transcription and organization of the themes.

RESULTS AND DISCUSSION

In this chapter, findings from descriptive statistics and inferential analyses are presented in detail.

Socio-economic characteristics of the sampled households: The annual income which is other socio-economic variable also presented in this section. As revealed in table 1, the minimum and maximum annual income generated by the sampled households was Birr 1010.00 and 25,100.00 respectively. The mean and the standard deviation of annual income are birr 5784.83 and 5022.65 respectively. The annual income distribution of sampled households was follows: less than Birr 5,580 (62 %), between 5,580-13,368 (29.3 %) and above 13,368 (8.7 %). The main sources of annual income for sampled households are both on-farm and off-farm sources. An on-farm income source includes sale of livestock and their products and crop produce. Sampled households were also engaged themselves in off-farm income activities in order to support their subsistence life. The sources of the off-farm income in the study were found to be daily labor wage, petty trading, selling fire wood, selling local drinks, like 'areke', 'tella' and 'kineto'. Income distribution of respondents was described diagrammatically as follows: Information accessibility of household heads was also assessed in the survey data and the following results were found. 34 percent of sampled respondents have access to information through either listening radio or reading news paper and 66 percent have no access to information.

Household food security status and calorie acquisition: In this study, calorie consumption per adult equivalent (AE) per day was used to measure whether a household is food secure or not. To obtain the actual calorie consumption by the household, the gross household food consumption for 7days was converted into kilocalories by using the conversion factor for each kilogram of food items consumed, and dividing the converted total kilocalories to 7days, which is the reference period. Then, this result was also divided to the number of AE in the household. Finally, kilocalories outcome consumed by AE per day was compared to the minimum recommended calorie intake (2100kcal) per AE per day. If the energy consumed per AE per day in the household is less than the recommended amount (2100kcal), then the household is

Table 1. Percentage distribution of respondents by selected socio-economic characteristics in Dale woreda, April 2012 (n=150).

Characteristics		Frequency	Percent
Household Labour force	Productive	516	54.1
	Dependent	437	45.9
	Total	953	100.0
Religion	Protestant	100	66.8
	Orthodox	15	10.0
	Catholic	3	2.0
	Muslim	4	2.7
	Traditional	9	6.0
	Others	19	12.7
	Total	150	100.0
Educational Level	Unable to read and write	42	28.0
	Primary 1 st cycle(1-4)	33	22.0
	Primary 2 nd cycle(5-8)	59	39.3
	High school(9-10)	12	8.0
	Preparatory(11-12) and above	4	2.7
	Total	150	100.0
Land Holding of household (ha)	Less than 0.25	62	41.3
	0.25-0.50	61	40.7
	0.51-1.00	16	10.7
	1.01-1.50	9	6.0
	Above 1.5	2	1.3
	Total	150	100.0
	Mean	0.500	
	Standard Deviation	0.370	
Annual income of the household (birr)	Less than 5,580	93	62.0
	5,580-13,368	44	29.3
	Above 13,368	13	8.7
	Total	150	100.0
	Mean	5784.83	
Standard Deviation	5022.65		
Livestock holding of The household (TLU)	Less than 1	59	39.3
	1-2	43	28.6
	2.01-3	22	14.7
	3.01-4	16	10.7
	Above 4	10	6.7
	Total	150	100.0
	Mean	2.17	
	Standard Deviation	1.25	

Source: Computed from own survey data (2012)

Table 2: Percentage distribution of households by food security status using in calorie acquisition in Dale woreda, April 2012 (n=150)

Characteristics	Percent	Mean	Standard Deviation	Minimum	Maximum
Food Insecure	38.7	1582.52	340.58	901	2075
Food Secured	61.3	2754.84	500.77	2111	3994
Total	100	2302.68	724.78	901	3994

Source: Computed from own survey data (2012)

Table 3: Percentage distribution of respondents of affirmative responses to the HHS items and the Level of household hunger during the past 4 weeks, in Dale woreda, April 2012 (n=150)

Item	Percent
Summary of respondents affirmative responses to HHS indicators	
No food to eat of any kind in your household due to lack of resources	40.7
Go to sleep at night hungry due to not enough food	27.3
Go a whole day and night without eating any food due to not enough food	16.7
Summary of based on Household Hunger Scale Categories	
Little to no household hunger	65.3
Moderate household hunger	28.0
Severe household hunger	6.7
Total	100.0

Source: Computed from own survey data (2012)

categorized as food insecure, otherwise, as food secure (Hoddinott, 2002). The result presented in Table 2 revealed that the study area could be regarded as comparatively food secured given the fact that 61.3 percent of the sample households were able to meet 2,100 kilo calorie per AE per day. The remaining 38.7 percent do not meet the minimum

kcal requirement. 901 kcal and 2075 kcal is the minimum and maximum amount of energy consumed by food insecure households respectively. On the contrary, the minimum amount of energy consumed by food secure households is 2111 kcal and the maximum is 3994 kcal. As a whole, it was found that the total mean energy consumed by respondents is

Table 4. Percentage distribution of respondents' perception of risk factors for food insecurity in Dale woreda, April 2012 (n=150)

Characteristics	Percent
Poor soil fertility perception	48.7
Erratic rain fall	92.0
Land shortage	61.3
Lack of access inputs	5.3
Insect or pest infestation & crop diseases	20.0
Shortage of income	63.3
Animal diseases	6.7
Drought	72.7
Soil erosion	28.0
Population pressure	60.0
Limited access to extension services	8.7
Lack of credit	40.7
Lack of information	66.0
Lack of off-farm/non-farm activities	63.3
Poor saving practices	58.0
Food Price rises	95.3
Lack of health	24.0
Unexpected crop failure	26.0
Input Price rises	86.0
Fragmentation of land	9.3

Source: Computed from own survey data (2012)

Table 5. Percentage distribution respondents by reported food insecurity coping mechanisms Dale woreda, April 2012 (n=150)

Characteristics	Percent
Sale of livestock	27.3
Borrowing grains or cash from relatives	24.0
Reducing diversity and frequency of meals	75.3
Reducing size of meals	56.7
Selling of firewood and charcoal	30.0
Begging food	6.7
Decreasing social event(wedding)	91.3
Diversifying livelihood strategies	93.3
Selling labor in town/wage labour	24.0
Withdrawing children from school	11.3
Seasonal migration	19.3
Petty trading	25.0
Selling of home utensil	3.3
Sending children as servant	8.7
Eating Enset residue	16.0
Eating immature enset	58.7

Source: Computed from own survey data (2012)

Table 6. Association of sampled household food security status by selected demographic variables in Dale woreda, April 2012.

Variables	Food Insecure (n=58)		Food Secured (n=92)		Total (n=150)	Chi-square (χ^2) & P-Value (P)
	Percent	Percent	Percent	Percent		
Sex of Headship	Female Headed	4.7	2.7	7.3	100.0	$\chi^2=3.121$ P=0.077*
	Male Headed	34.0	58.7	92.7		
	Total	38.7	61.3	100.0		
Age of Household	21-35yrs	14.0	30.0	44.0	100.0	$\chi^2=5.105$ P=0.164
	36-50yrs	13.3	16.7	30.0		
	51-64yrs	6.0	4.0	10.0		
	Above 64yrs	5.3	10.7	16.0		
	Total	38.7	61.3	100.0		
Household Size	0-3	2.7	4.7	7.3	100.0	$\chi^2=7.342$ P=0.025**
	4-6	14.0	35.3	49.4		
	Above 6	22.0	21.3	43.3		
	Total	38.7	61.3	100.0		
Marital Status	Single	1.3	1.3	2.7	100.0	$\chi^2=1.855$ P=0.603
	Married	34.0	56.0	90.0		
	Divorced	0.7	0.7	1.4		
	Widowed	2.7	4.0	6.6		
	Total	38.7	61.3	100.0		
Marital form	Polygamous	8.0	10.0	18.0	100.0	$\chi^2=0.463$ P=0.496
	Monogamous	30.7	51.3	82.0		
	Total	38.7	61.3	100.0		

** And * significant at 5 and 10percent respectively. Source: Computed from own survey data (2012)

Table 7. Association of food security status with social characteristics of household in Dale woreda, April 2012.

Variables		Food Insecure (n=58)	Food Secured (n=92)	Total (n=150)	Chi-square (χ^2) & P-Value
		Percent	Percent	Percent	
Religion	Protestant	25.3	41.3	66.8	$\chi^2 = 5.534$ P=0.354
	Orthodox	4.0	6.0	10.0	
	Catholic	1.3	0.7	2.0	
	Muslim	0.7	2.0	2.7	
	Traditional	4.0	2.0	6.0	
	Others	3.3	9.3	12.7	
	Total	38.7	61.3	100.0	
Education	Unable to read and write	18.0	10.0	28.0	$\chi^2 = 18.646$
	Primary 1 st cycle(1-4)	7.3	14.7	22.0	
	Primary 2 nd cycle(5-8)	12.0	27.3	39.3	
Background	High school(9-10)	1.3	6.7	8.0	P=0.001***
	Preparatory(11-12) and above		2.7	2.7	
	Total	38.7	61.3	100.0	

*** Significant at 1percent. Source: Computed from own survey data (2012)

Table 8. Association of food security status by selected economic variables in Dale woreda, April 2012

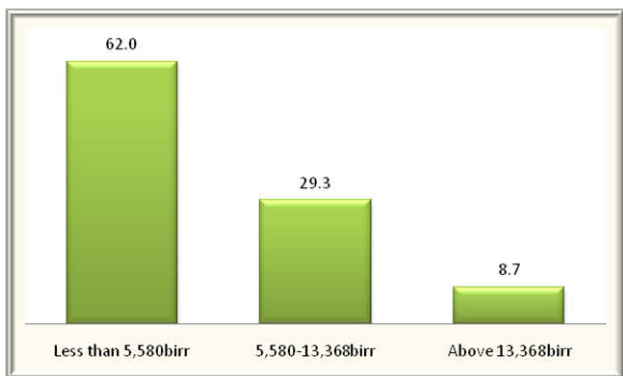
Variables		Food Insecure (n=58)	Food Secured (n=92)	Total (n=150)	Chi-square (χ^2) & P-Value(P)
		Percent	Percent	Percent	
Land Holding	Less than 0.25ha	17.3	24	41.3	$\chi^2 = 3.076$ P=0.545
	0.25-0.50ha	16.7	24	40.7	
	0.51-1.00ha	3.3	7.3	10.7	
	1.01-1.50ha	1.3	4.7	6.0	
	Above 1.5ha		1.3	1.3	
Total	38.7	61.3	100.0		
Annual Income	Less than 5580birr	34.0	28.0	62.0	$\chi^2 = 28.061$ P=0.000***
	5580-13368birr	4.7	24.7	29.3	
	Above 13368birr		8.7	8.7	
	Total	38.7	61.3	100.0	
Livestock Ownership	Less than 1TLU	22.0	17.3	39.3	$\chi^2 = 35.905$ P=0.000***
	1-2TLU	15.3	13.3	28.6	
	2.01-3TLU	1.3	13.3	14.7	
	3.01-4TLU		10.7	10.7	
	Above 4TLU		6.7	6.7	
	Total	38.7	61.3	100.0	
Off-farm activities	Participated	4.7	34.0	38.7	$\chi^2 = 28.208$ P=0.000***
	Not participated	34.0	27.3	61.3	
	Total	38.7	61.3	100.0	
Soil fertility perception	Fertile	8.3	21.0	29.3	$\chi^2 = 14.121$ P=0.001***
	Not fertile	30.4	40.3	70.7	
	Total	38.7	61.3	100.0	

Source: Computed from own survey data (2012) *** Significant at 1percent

Table 9. Association between sampled household food security status and institutional Variables in Dale woreda, April 2012.

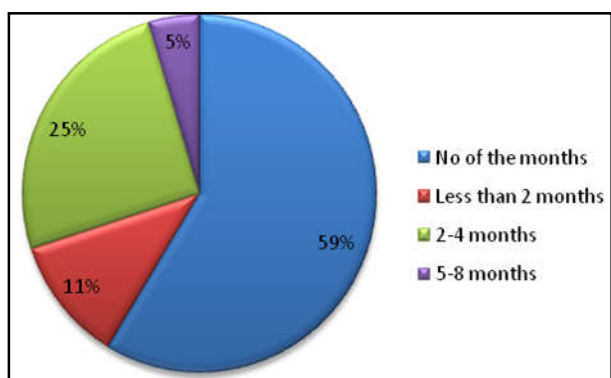
Variables		Food In secured (n=58)	Food Secured (n=92)	Total (n=150)	Chi-square(χ^2) & P-Value(P)
		Percent	Percent	Percent	
Credit Access	Users	10.7	10.7	21.3	$\chi^2 = 2.203$ P=0.138
	Not Users	28	50.7	78.7	
	Total	38.7	61.3	100.0	
Inputs Use	Users	7.3	46.7	54.0	$\chi^2 = 46.727$ P=0.000***
	Not Users	31.4	14.7	46.0	
	Total	38.7	61.3	100.0	
Productive Safety Program(PSNP)	Net Participated	10	9.3	19.3	$\chi^2 = 2.585$ P=0.108
	Not participated	28.7	52	80.7	
	Total	38.7	61.3	100.0	
Inputs Price	Yes	37.3	48.7	86.0	$\chi^2 = 8.745$ P=0.003***
	No	1.3	12.7	14.0	
	Total	38.7	61.3	100.0	

*** is significant at 1percent. Source: Computed from own survey data (2012)



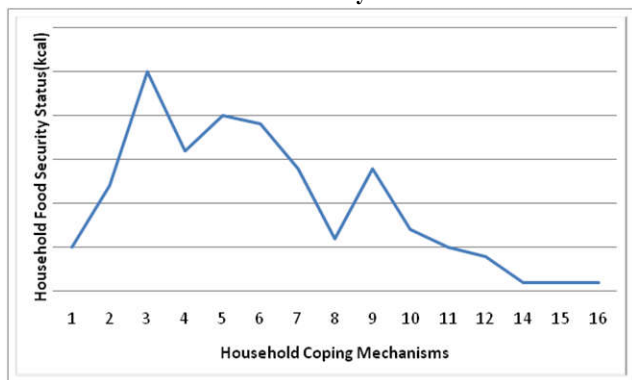
Source: Computed from own survey data (2012)

Figure 1. Percentage distribution of by respondents' annual income



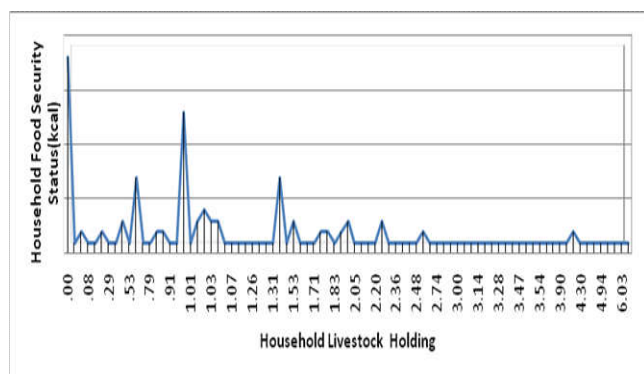
Source: Computed from own survey data (2012)

Figure 2. Percentage distribution of respondents who face food insecurity



Source: Computed from own survey data (2012)

Figure 3. The relationship between food security status and coping mechanisms



Source: Computed from own survey data (2012)

Figure: 4 The association between food security status and livestock holding

2302.68 kcal with the standard deviation of 724.78. Mean energy for food insecure and food secure households is 1582.52 kcal and 2754.84 kcal respectively. The standard deviation for food insecure was 340.38 kcal and that of food secured was 500.77 kcal. Table 3 describes the frequency of inadequate household food access and household hunger scale of respondents in the study area. The Household Hunger Scale (HHS) is used to assign households along a range of severity in food access from no hunger to severe household hunger. The three food insecurity questions in the HHS were used to examine the distribution of the households' food inaccessibility. As can be seen in Table 5, the questions follow a progression that begins with no food to eat of any kind in your household due to lack of resources followed by go to sleep at night hungry due to not enough food and finally Go a whole day and night without eating any food due to not enough food during the previous 4 weeks (Ballard et al., 2011). According to the finding of this result, 40.7 per cent of the respondents have 'no food to eat of any kind in their house because of lack of resources to get food. Likewise, 27.3 percent reported that they went to sleep at night hungry because of not enough food and the remaining 16.6 percent went a whole day and night without eating anything because of lack of enough food. The household hunger scale measure of this study also indicated that 6.7 percent of respondents under study area were under severe household hunger, 28.0 percent under moderate household hunger and 65.3 percent under little to no household hunger.

Household food insecurity seasons in a year: The HHS is also used to assess the change in the household food insecurity situation between years, or to measure the impact of an intervention, it is important to administer the HHS at the same time of the year. When using the scale to measure the prevalence of food deprivation or for establishing a baseline prevalence estimate, it is advisable to administer the HHS during or directly after the worst of the lean season, as this is when the greatest number of households is expected to be affected by food insecurity. The HHS is highly relevant in the current global environment and can facilitate improved geographic targeting of food insecurity interventions and monitoring and evaluation of food security policies and programs. More broadly speaking, the HHS can help to advance evidence-based research to improve food insecurity and household hunger globally while also strengthening the ability of governments and international and national agencies to advocate for policies and programs to prevent and address household hunger (Deitchler et al., 2010).

The sampled respondents in the study area were identified critical food insecurity seasons in a year. The survey showed that sampled households' food insecurity during months of March, April and May seriously and months of June, July and August moderately in a year. Accordingly, 59 percent of respondents replied that they do not face any food insecurity month problem in a year. 11 percent of respondents respond that they face food deficit for less than two months in a year. 25 percent of respondents replied that they face food deficit 2 to 4 months within a year. Only 5 percent respond that they face food insecurity from 5 to 8 months in a year. Focus group discussants were also confirmed the same food insecurity months. Moreover, the discussants also explained that food insecurity was faced in these months- mainly due to poor saving practices during harvested period and lack of awareness to reserve the surplus food produced.

Respondents' Perception of Risk Factors for Food Insecurity:

The frequency of perceived risk factors varied from one household to other. The characteristics of perceived risk factors for food insecurity stated on table 4 were based on the report of respondents. Each character was independently present in terms of percentage. Accordingly, about 95.3 percent respondents reported that food price rises were the most common (frequent) perceived risk factors for food insecurity. The common perceived risk factors for food insecurity distribution reported by sampled households also were as follows: erratic rainfall (92.0%), input price rises (86%), drought (72.7%), both shortage of income and lack of off-farm activities (63.3%), land shortage (61.3%), population pressure (60.0%), poor saving practices (58.0%) and poor soil fertility perception (48.7%).

Others which have less frequent perceived risk factors for HH food insecurity are also presented on table 4. Focus group discussants also confirmed that every household who have relatively less plot of land exposes to food insecurity challenges due to less production in one side and not using of full extension package and diversification on the other hand. Infertility of land due to lack of crop rotation and lack of fallow land, and input price escalation as it was added by focus group discussion. Added to these, the poor management of their cash crop (coffee) management system in their area was another aggravating risk factor for food insecurity in study area as was briefed by focus group discussants. In this regard, the poor coffee seedling management together with budding practice made them to be food insecure. The social and cultural issues are not undermined in the course of dealing with food insecurity in the study area. For instance, risk factors related with, polygamous types of marriages increasing the population pressure in both household and in community and worsening the production of unproductive age group with competition of food sources rather production accordingly to focus group discussants. Similarly, cultural events like transferring huge amount of money for female family (locally called '*miine*') to get married were other risk factors. These situations force them even to rent and sell their land because of such cultural factors which leads to household food insecurity.

Type of Coping Mechanisms: In this section, household food insecurity coping mechanisms employed by sampled households in study area to mitigate food insecurity was presented. Sample households used different types of coping mechanisms depending on their level of capacity when they faced food insecurity. The average number of coping mechanisms employed by household was 6.0 with the standard deviation of 3.07. As the result, almost all those who employ more than seven numbers of coping mechanisms were found to be food insecure. This study indicates that the higher the number of different coping mechanisms, the higher the rate of food insecurity. The characteristics of coping mechanisms stated on table 5 were based on the report of respondents. Each character was independently present in terms of percentage. Hence, each percent presented in the table revealed the amount that households used as coping mechanisms. Accordingly, households frequently employed coping mechanisms in study area were as follows: diversifying livelihoods strategies (93.3%), decreasing social events (91.3%), reducing diversity and frequency of meals (75.3%) and reducing size of meals (56.7 %). Likewise, sampled households also employed indigenous coping mechanisms like: eating immature 'enset' (58.7 %), eating 'enset' residue (16 %), and sending children

as servant (8.7 %). The others coping mechanisms were less frequently employed by households mentioned on table 7. During focus group discussants also confirmed that selling and renting immature crops in the farming fields, selling their own labor share arrangements to others, sending wives to serve in others better-off houses to receive daily consumption food items, engaging oneself socially undermined jobs like stone splitting, collecting crop residue from the crop field as indigenous risk minimizing mechanisms. The following figure is depicts that the relationship between household food security status and coping mechanisms.

Association between Socio-Economic, Demographic and Institutional Variables and Food Security Status: The association between household food security status and determinants which affect the response variables are described below. Eleven variables (sex, household size, educational level, land holding, livestock holding, annual income, input use, input prices, off-farm activities, access of credit and soil fertility perception) were associated with household food security status. These selected factors were expected to determine inadequate household food access and coping mechanisms. The association was presented on tables 6, 7, 8 and 9.

Association between demographic variables and food security status: Bivariate results of the demographic variables presented in Table 8, which have association with food security status are: sex, age, household size, educational level, marital status and marital form of the household head. In this study, 7.3 percent are female and 92.7 percent are male headed. As table 8 revealed, the proportion of food secured female household heads varied from food secure male headed. Out of 61.3 percent food secured sampled household heads, 2.7 percent are female and 58.7 percent are male. This indicates that variation is attributed because of the headship is biased to male. Out of 7.3 percent female household heads, 4.7 percent was found to be food insecure while only 2.7 percent was food secured. On the other hand, out of 92.7 percent male household heads, 34.0 percent was food insecure and the rest 58.7 percent was found to be food secured.

This is due to the fact that the female household heads have limited access to livelihood assets like land, education, saving, labor force, livestock and credit services. This result shows that male household head are more food secured as compared to secured female headed. In general, the result showed that the female headed sampled households were found to be more food insecure than male headed. Focus group discussion participants also confirmed that female headed households were more food insecure as compared to male household headed, it might be due to less labour force because of cultural barriers that discourage their participation in farming activities. As it can be seen in table 6, as age groups ascends from 21 to 64 and above 64, the responses of food insecure household decreases. This indicates that households obtain experience and knowledge through devoting their time on farm activities were less food insecure. As showed in table 8, out of 38.7 percent food insecure households, large number of food insecure household heads fall under the age range of 21-50(27.4 %) while the remaining smaller number fall under age ranges between 51-64 and above 64(11.3 %). The variability in age of household heads in the study area affects food security status at household level. However, the chi-square test shows this is not association between food security status and age

category. As revealed in table 8, out of 38.7 percent food insecure households, above 6 household sizes constitutes 22 percent, having between 4-6 household size accounts 14 percent and the remaining 2.7 percent have 0-3 household sizes. Figure below indicates the effects of the household size on food security status. Education is one of the important variables which increase households' food production through promoting technological inputs and diversification of household incomes. The educational level of the sample household heads ranges from illiterate to grade 12 and above. The literacy status on table 9 indicated that out of 28 percent illiterate sampled household heads, 18 percent were food insecure and the remaining 10 percent were food secured. Comparing the figures, the illiterate sampled household heads are higher among food insecure than food secure households. Similarly, out of 72 percent literate (grade 1 to 12 and above) households', 20.7 percent were food insecure and the remaining were food secured. Hence, food insecurity was higher among illiterate households who cannot read and write as compared to literate households. The result showed that education has statistically significant impact on the household food security status in the association. The reason of literate households compared to illiterate confirmed during focus group discussion, the literate households are understand, accept and apply modern farming technologies rather than illiterate.

Association between economic variables and food security status: The mean farm land size in the households is 0.500 with the standard deviation 0.370. On table 10, out of 38.7 percent of food insecure sampled household heads, 34 percent of them have less than 0.5ha land size and the remaining 4.7 percent were belonged to land holding size more than 0.5ha. The majority of food insecure household land size was smaller than that of mean land size. That means the smaller the land size, the more household would be food insecure. However, the result shows that statistically insignificant association between land size and food security status. As showed on table 8, the food insecure and food secure households' average annual income was 3058.50 and 7423.60 birr with the standard deviation of 1895.40 and 5636.45 respectively. Out of 38.7 percent food insecure household heads, 34 percent of them have annual income less than 5580birr and only 4.7 percent belonged to income range 5580-13368birr. Hence, most of food insecure household incomes fall below 5580birr while most of food secure household income falls above 5580birr. Hence, annual income has significant association with household food security status. As described by focus group discussants confirms that the household heads who have less annual income never attempt to generate additional income through off-farm activities (like petty trading, pottery, welding metal and hand craft). Even some of them do not have interest to engage in these activities because of some social marginalization. One of the classical example is welding metal is the only income source where only socially marginalized group called 'tunto' practice.

These are another risk factors that negatively affecting food security status in the study area. Livestock holding of households plays its own role in household food security status. Maximum livestock ownership for food insecure households was 2.18 in TLU, while 6.42 for food secure households. The result in table 3 shows that the mean livestock holding of the household is 2.17 in TLU with standard deviation of 1.25. The result in table 10 revealed 22 percent of

food insecure households (out of 38.7 %) have less than 1TLU, 15.3 percent have 1-2TLU and only 1.3 percent respondents have above 2TLU. That means out of 38.7 percent of food insecure households, 37.4 percent have less than the average livestock holding (2.17TLU). Figure 10 below describes the effect of households' livestock holding on their food security status. Based on this computed result, livestock holding has association with household food security status and statistically significant at one percent level of significance. As implied in focus group discussion, households with larger livestock holding in TLU would be food secured than households with smaller livestock holding. Livestock sale is also used as the major coping strategy during famine and seasonal food shortage. Table below describes the association between economic variables and food security status. Participation in off-farm activities was measured by whether or not a household head involved in diversified income activities.

Off-farm activities in the study area include daily labor, hand crafting, petty trading, and selling fire wood, producing and selling different local drinks. As shown in Table 8, from the total sample households, 38.7 percent participate on off-farm activities unlike 61.3 percent. In food insecure households (38.7 %), the majorities of respondents (34 percent) were not participated on off-farm activities and the rest of them only 4.7 percent participated. The results on table 10 showed that households who did not engage in off-farm activities, is more food insecure than households who engaged in off-farm activities. The association between food security status and off-farm activities is statistically significant at one percent level of significance. In the study area, households' soil fertility perception is the one of the problem of food security status. The households' soil fertility perception was reported as: 70.7 percent not fertile and 29.3 percent fertile. Out of food insecure households (38.7 %), the soil fertility perception was not fertile constitutes 30.4 percent and the remaining household perception was perceived fertile household constitutes 8.3 percent. The chi-square test revealed that there is a statistically significant association between soil fertility and household food security status. The soil fertility perception problem also confirmed focus group discussants.

Association between institutional variables and food security status: Access to credit can address the financial constraints of households. The finding shows that 78.7 percent of the sample households had no access to credit institutions and the rest 21.3 percent had access to credit. Out of 38.7 percent of food insecure households, 28 percent do not use credit and the remaining 10.7 percent use credit. In the study area, households use credit from different sources like micro finance, relatives and/or friends, money lenders and neighbors. Access to credit service helps the households to purchase agricultural inputs such as fertilizer, improved seeds and livestock, which in turn increases production and secure the calorie level of the credit users. However, the χ^2 test has statistically insignificant association between credit and household food security status. The table 9 describes that inputs use of the household in association with the food security status of the households. The analysis was taken to see the association of inputs users and non-users with the food security status of the households. As shown in the table 11, 54 percent sampled households used different agricultural inputs and 46 percent didn't use any inputs. Out of 38.7 percent of food insecure households, 31.4 percent were not inputs users. Only 7.3 percent were inputs users.

The comparison shows that inputs non-users were found to be more food insecure than inputs users. The association between inputs use and food security status is statistically significant at one percent level of significance. As implied by focus group discussion, the rationale behind for not using of inputs was inputs price rise and unaffordability. Table below describes the association between institutional factors and household food security status. Seasonal food insecurity is common in the study area and households are vulnerable for food insecurity. Hence, productive safety net program (PSNP) has been undertaken during the survey period. Out of the total sampled households, 19.3 percent were beneficiaries of productive safety net program. From PSNP beneficiaries, 10 and 9.3 percents were found to be food insecure and secured respectively. Indeed, the participation in safety net program has enabled the households to fill their food gap and attain food security in the study area.

The focus group discussants also confirmed that there were no big gap among safety net program beneficiaries and non-beneficiaries. Because safety net program beneficiaries are the poorest segment of society who has less plot of land, the program itself also might not bring dynamic change within short period of time. As it is reported (table 9) by majority (86 %) of respondents, inputs price was not affordable in study area. However, few numbers (14 %) reported that they afford to buy such inputs. Of those of respondents, who unable to afford inputs price, 37.3 percent were fall under the group of food insecure households. Among the respondents who replied inputs prices were affordable, only 1.3 percent was found to be food insecure. The association between inputs price and food security status has statistically significant at one percent level of significance.

DISCUSSION

The study measures the household food security status, inadequate household food access, perceived risk factors for households' food insecurity and household food insecurity coping mechanisms in Dale woreda of Sidama zone, SNNPR. Accordingly, the major factors include limited use of chemical fertilizers as the result of inputs price increment, lack of knowledge on organic fertilizer preparation and utilization, poor practice of land fallow because of land shortage and soil erosion leads to increase the household food insecurity. The result of regression also predicts the aforementioned fact. This result is consistent with the findings of the study conducted by Stephen (2000) which found that a decline in soil fertility negatively affects food security.

As the whole, the inadequate household food access, risk factors for food insecurity and coping mechanisms are dependent variables on household size, inputs use and off-farm activities which affect them significantly. This has implication on policy to integrate population policy, appropriate inputs use and diversification of off-farm activities to enhance food security. Likewise, clear understanding of the relationship between household sizes, inputs use and off-farm activities with risk factors for food insecurity has professional relevance during planning food security strategic plans under the context of Dale woreda. But not the least, understanding of the influence of these significant variables on food insecurity play immense role in incorporating of local coping mechanisms under the government plan. Added, education level and inputs price have significant role on inadequate household food

access, inputs price on risk factors for food insecurity and so do livestock holding and soil fertility perception on coping mechanisms. On the other hand, inadequate household food access, risk factors for food insecurity and coping mechanisms reinforce to each other and thus lack of subsidized inputs, lack education, poor livestock asset ownership and poor soil fertility have definitely implications on food security. Thus, it is essential to balance these influencing and significant variables to alleviate shock of food insecurity in study area. In general, identification of the influence of household size, inputs use, off-farm activities, educational level, inputs price, livestock holding and soil fertility perception on micro level risk factors for food insecurity and coping mechanisms specific to Dale woreda are the contribution of this study which yet not traced in depth in Dale woreda by other scholars to this end of related literature review. In addition, it is better to conduct further investigation to analyze the interdependency of food insecurity in relation to coping mechanisms and risk factors associated in study area in depth.

Conclusion and Recommendation

Conclusion

This study was conducted in Sidama zone, Dale woreda taking 150 sampled households with objective to assess micro level risk factors for food insecurity and identify coping mechanisms in general and to assess households' level of food accessibility, to identify the main socio-economic and demographic factors associated with food security status, to identify food insecurity coping mechanisms employed by the households and to recommend suggestion and appropriate food security intervention options in particular. Based on the findings of this study, it is concluded that 38.7 percent of sample households were found to be food insecure in study area. The household hunger scale measure result also indicates that 34.7 percent of respondents under study area were under moderate household hunger to severe household hunger. The main perceived risk factors for above mentioned food insecurity in the study area were erratic rainfall, food and inputs price rise, drought, shortage of income, lack of off-farm activities, land shortage, population pressure, poor saving practices, lack of credit, poor fertility of land and soil erosion. It is also concluded that the main household food insecurity coping mechanisms employed by respondents were diversifying livelihoods strategies, reducing diversity and frequency of meals, reducing size of meals, decreasing social event, selling of firewood and charcoal, petty trading, sale of livestock, eating immature 'enset', selling and renting immature crops in the field and engaging oneself socially undermined jobs in the study area.

The Ordinary Least Squares (OLS) regression result show that household size, educational level, inputs use, inputs price and off-farm activities were found to be significantly affecting variables for inadequate households food access. Likewise, household size, inputs use, inputs price and off-farm activities were found to be significantly affecting variables for the number of perceived risk factors for food insecurity. It is also concluded that the same Ordinary Least Squares (OLS) regression result confirmed that household size, livestock holding, inputs use, off-farm activities and households' soil fertility perception were also significantly affecting variables for the number of coping mechanisms. More specifically, the regression result showed that household size, inputs use and off-farm activities were the three independent variables that

affected the three dependent variables while household size, inputs use, inputs price and off-farm activities were the four independent variables that affected the inadequate household food access and the number of perceived risk factors for food insecurity and stated above.

Recommendation

Based on the key findings of this study, the following key points are recommended to improve the micro level risk factors for household food insecurity and coping mechanisms of the study area:

- Since the major staple food caloric content of 'enset' is low as compared to other crops, sampled households depend on it were found to be food insecure. Thus, government, Agricultural research organizations and others development partners initiatives should be involve on technology generation and dissemination that enhance the caloric content of 'enset' and diversify short term crop that contains large energy contents and high yield per small area.
- Government should pay attention on integration of Agriculture sector with Health sector. Particularly there must be check point for population growth versus with agriculture/food production growth rate. Added to this, family planning and multidimensional training should be provided for rural small holders to spaced children.
- Appropriate (subsidized) inputs supply coupled with appropriate improved inputs use for non inputs users should be provided by government and where possible by private sectors and increase the use of extension service for surplus production. In addition, government also should avail credit with affordable interest rate.
- The private and the public should diversify and promote the off-farm activities to be a viable option to reduce food insecurity and coping mechanisms and promotion of credit facilities and access should be linked with diversified off-farm activities in time.
- The public and the private sectors should add their hands to create awareness in food saving practices to reduce mismanagement of grain at peak harvest season. In addition, introduction of technologies that mitigates erratic rain fall problem (diversification of early maturing crops) and strengthening of the use water harvesting (irrigation) and others.
- Adult and basic education should availed by governments for rural small holders to reduce illiteracy, which in turn helps small holders to adopt modern agricultural practices, improve the quality of labor and to creating off-farm activities.
- Public and private sectors should take measures like shortening of long agricultural credit procedures; enhance more agricultural credit, support and subsidizing the poorest segment of the society.
- To increases food production, government and other partners should improve livestock production and productivity through improving livestock breed, improving veterinary services and increasing livestock feed and housing facilities.
- Strengthening physical and biological conservation measures should be promoted widely to reduce soil erosion, enhance soil fertility and productivity. Moreover, affordable technologies in terms of organic

fertilizer and bio fertilizer should be promoted to maintain soil fertility.

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Acronyms

AE	Adult Equivalent
CSA	Central Statistical Authority
EFSRA	Emergency Food Security Reserve Agency
EHNRI	Ethiopian Health and Nutrition Research Institute
FDRE	Federal Democratic Republic of Ethiopia
FAO	Food and Agricultural Organization
FIVIMS	Food Insecurity and Vulnerability Information and Mapping System
FGD	Focus Group Discussion
HCA	Household Caloric Acquisition
HFIAS	Household Food insecurity Access Scale
HHS	Household Hunger Scale
IFPRI	International Food Policy Research Institute
IPMS	Improving Productivity and Market Success
KA	Kebele Administration
LSRO	Life Science Research Office
MDER	Minimum Dietary Energy Requirement
MOA	Ministry of Agriculture
MoARD	Ministry of Agriculture and Rural Development

MoFED	Ministry of Finance and Economic Development	SPSS	Statistical Packages for Social Sciences
MT	Metric Ton	SZDARD	Sidama Zone Department of Agriculture and Rural Development
NGO	Non-Government Organization	USAID	United States Agency for International Development
PSNP	Productive Safety Net Programme	USDA	United States Department of Agriculture
SNNPR	Southern Nations Nationalities and People's Region	WoARD	Woreda Agriculture and Rural Development
SSA	Sub-Saharan Africa	WFP	World Food Programme
