

Non-Farm and Off-Farm Activities in Achieving Livelihood Security in the Amhara Region: Case Study of Lay Gayint District

Arega Bazezew Berlie

Department of Geography and Environmental Studies, Bahir Dar University, Bahir Dar, Ethiopia

Corresponding author: aregaberlie@gmail.com or bazezewarega@yahoo.com

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Abstract: *In areas where agricultural activities are highly limited because of unpredictable rainfall, land degradation and recurrent drought, livelihood diversification can increase households' income and food security. However, a range of factors from physical environmental circumstances to policy and institutions related issues determine households' participation in non/off-farm activities in the study area. The general objective of the study was to identify factors that determine households' participation in non/off-farm activities in drought-prone areas of the Amhara Region using Lay Gayint district as a case study site. Questionnaire survey, in-depth interview and focus group discussions were the major data collection techniques. Both qualitative and quantitative research methods were used for data analysis and the later included descriptive statistics and regression modeling. A major finding is that despite the low level of productivity related to local environmental constraints, rural livelihoods remain undiversified with small-scale rain-fed agriculture providing the primary source of livelihood for the large majority of sample households. Only small percentage of respondents (25%) participated in some form of non-farm/off-farm activities, with little contributions to their sources of income. The study found out that non/off-farm activities that meet the shortfall of consumption needs such as selling charcoal and fuel wood, casual labor and out migration were the major sources of income for the poor and vulnerable households. The study forwarded that improving livelihood security of rural households in the study area requires integrated development interventions aimed at improved natural resources management and livelihood diversification including interventions in the area of non-farm employment opportunities and skill trainings at household level.*

Key words: Agro-ecology, wealth categories, gender, livelihood diversification, Lay Gayint

1. Introduction

The thinking of livelihood diversification to development had been recognized since the late 1980s when the concept becomes popularized by the prominent researchers such as Chambers and Conway (Devereux *et al.*, 2004; Kollmair and Juli, 2002). As a result, the promotion of livelihood diversification as a way out of poverty has gained widespread support among development agencies (Ibekwe *et al.*, 2010). In this regard, Thomas *et al.* (2006) indicated that contrary to the traditional image, diversification into rural nonfarm employment is extremely imperative in augmenting the livelihoods of the poor in many developing countries. Hence, diversification of income sources has been put forward as one

of the strategies households employ to minimize household income variability and to ensure a minimum level of food self-sufficiency (Ahmed, 2012). Ibekwe *et al.* (2010) added that the rural households in sub-Saharan African countries usually have to cope with both poverty and income variability to shift from subsistence agriculture to a more pluriform society where farm and non-farm opportunities are available. In general, livelihood diversification is the process by which rural families construct a diverse portfolio of activities and social support capabilities for survival and improve standards of living (Ellis, 2000). As indicated by Ibekwe *et al.* (2010), though livelihood diversification is a viable way in reducing poverty and destitution, little policy efforts have been made to promote these activities in many sub-Saharan Africa countries.

For generations, rural communities in Ethiopia practiced livelihood diversification such as sharecropping, renting land, water-harvesting techniques, growing different types of crops, rearing varieties of livestock and engaging in off-farm and non-farm activities to keep up the food security status of their families. Despite some minor changes in livelihood diversification, agriculture continues to play a crucial role to the livelihoods of the majority of the rural households in Ethiopia. Josef and Laktech (2009) as well as Mamo and Ayele (2003) in Ethiopia and Libo Kemekem of the Amhara Region, respectively indicated that, nearly 90% of the rural poor are dependent on agriculture for their major livelihood security. This is due to the fact that governments in many developing countries have focused solely on agricultural developments as the way to reduce rural poverty and achieve sustainable economic growth (Ahmed 2012). However, according to Thomas *et al.* (2006) agriculture as a traditional vision of rural economies is clearly obsolete. That is, farm households across the developing world nowadays earn an increasing share of their income from nonfarm/off-farm sources away from agriculture. In this regard, writers such as Barrett *et al.* (200), John *et al.* (2014), Tagel (2012), Woldeamlak and Conway (2007), Woldeamlak (2009), Yishak *et al.* (2014) and Yaro (2006) substantiated that in developing countries the carrying capacity of the agricultural sector is declining because of increasing population growth, erratic rainfall/occurrence of drought, high input prices and sever land degradation.

These situations made livelihood diversification to become a norm for many rural poor households in many developing countries and very few households collect their income from single source (Adugna, 2005; Barrett *et al.*, 2001). Those households who are engaged only in agriculture are among the most vulnerable to food insecurity and they are unable to produce

enough food to feed their families throughout the year (Yaro, 2006). For instance, a study made in Ghana by Asmah (2011) indicated that while recognizing the urgent need to maintain a robust agricultural sector, it is increasingly becoming clear that the agricultural sector alone cannot be relied upon as the core activity for rural households as a means of improving livelihoods and reducing poverty. Likewise, Josef and Laktech (2009) a study made in Ethiopia indicated that in a setting with limited agricultural potential or highly variable weather, income from non-farm/off-farm activities can augment and smooth income flows for rural households. Mesay (2009) stated that non-farm activity is an important factor in rural economy as it allows farmers' greater access to commercial farm inputs that could enhance agricultural production. According to Ahmed (2012), non-farm earnings account for a considerable share of farm household income in rural Africa, typically more so than in other world regions. The same author further pointed out that very few household collect all their income from one source and use their assets in just one activity. Nevertheless, the contribution of non-farm activities to households' income were insignificant mainly due to lack credit availability, deficiency of skilled labor power, absence of job opportunities, lack integrated market situations and limited infrastructural development (Barett *et al.*, 2001; Josef and Laktech, 2009). The push factors on the other hand, like frequent occurrence of drought, insufficient and degraded farmland and shortage of food for several months in the year forced the rural poor to engage in casual labor and out migration (Barett *et al.*, 2001). In this regard, this paper contributes in providing sound empirical information on issues related to non-farm and off-farm activities that require policy attention.

Few scientific works (Alebachew, 2011; Adugna, 2005; Degefa, 2005; Kebede *et al.*, 2014; Kune and Mberengwa, 2012; Mamo and Ayele, 2003; Yenesew *et al.*, 2014; Yared, 2001) had been done in different parts of Ethiopia in relation to livelihood diversification. However, they were not able to give adequate information on households' participation in non-farm and off-farm activities by gender, wealth categories and agro-ecological zones. This is due to the fact that the constraints faced by heterogeneous households who are engaged in heterogeneous set of non-farm/off-farm activities and placed in varied ecological zones; generalization without considering gender, wealth categories and agro-ecological zones becomes too shallow for policy makers. More importantly, as the knowledge of the writer of this paper is concerned, no study has been done so far in relation to livelihood strategies in the study area. This study, therefore, fills these knowledge gaps by focusing on a severely degraded, impoverished and drought-prone area where research evidences on livelihood

diversification in augmenting households' income is lacking. The general objective of the study was to identify the determinant factors affecting households' participation in non/off-farm activities in the study area. The specific objectives include to assessing the situations of non-farm/off-farm activities between gender, wealth categories and agro-ecological zones and identifying the factors influencing rural households' participation in non-farm/off-farm activities in the study area.

2. Materials and Methods

2.1. Description of the Study Area

The study was carried out in Lay Gayint district in the Amhara Region (Figure 1). Lay Gayint covers a total area of 1320.3 km² and has a population density of 185 persons per km² (CSA, 2010), which makes it one of the most populated districts in the Region. The topography is rugged with elevations varying between 1200 m to above 4000 m asl. The area receives annual rainfall of 898.3 mm. June, July and August are the rainy months. The mean annual temperature ranges from 4⁰C (on top of Guna Mountains) to 28⁰C (at the bottom of the Tekeze river valley). Black and red (*Cambisols*) soils, black (*Vertisols*) soils and *Leptosols* are the dominant types of soils in the district (District Agriculture and Rural Development, 2011). Based on the traditional agro-ecological classification, three agro-climatic zones are found in the area: *Dega* (cool), *Woina-Dega* (temperate) and *Kolla* (hot tropical). Small scale mixed agriculture is the dominant source of livelihood to the local people. Barely, wheat, *tef* and potatoes are the principal crops, and from the livestock cattle, sheep, and goats are the dominant ones.

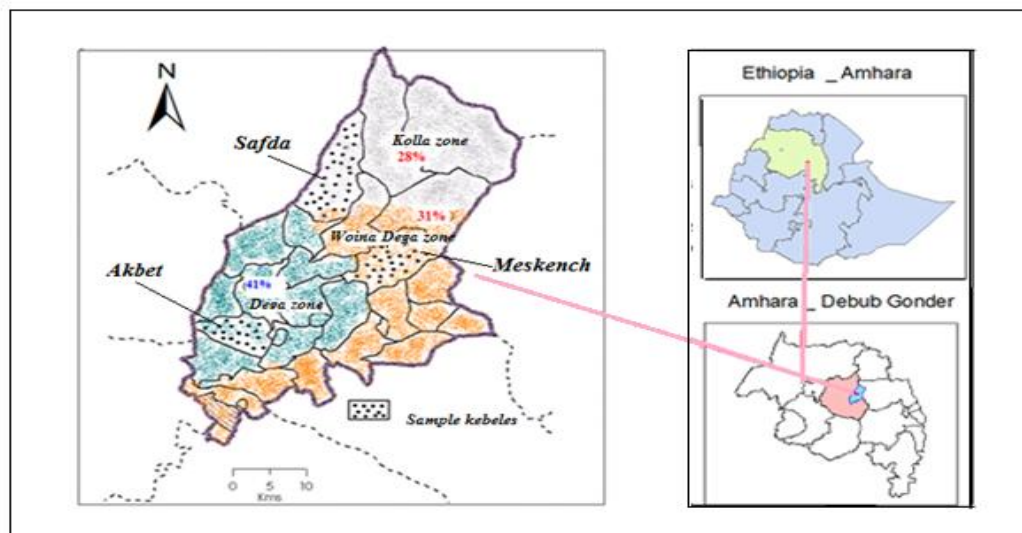


Figure 1. Location map of Lay Gayint district in South Gondar Administrative Zone of ANRS

2.2. Data Collection Instruments

The study employed purposive, stratified and random sampling methods to select specific sample sites and households. Selection of the study district was purposive based on the researcher's prior knowledge of the area. The specific Rural *Kebele* Administrations (RKAs) were selected in a stratified sampling methods where all the RKAs in the district were first classified into three major agro-ecological zones (*Kolla*, lowland; *Woina-Dega*, mid-highland and *Dega*, highland, with respective elevations of 500-1500, 1500-2300 and above 2300 m asl). The assumption was in similar agro-ecological zones the households share similar opportunity to secure their livelihoods. Households in each RKA were further grouped into wealth categories based on the information obtained from focus group discussions (FGDs), key informants interview, authors' prior experience and secondary sources. It was assumed that the same risk/shock has different impact on households in different wealth groups. The total households in the three selected RKAs were 4100. For a population of about 4000, margin error = 0.03, alpha = 0.01 and $t = 2.58$, the minimum sample size assigned is 198 (Barrett *et al.*, 2001). For this study, fear of missing data, 210 sample sizes were determined to fill the questionnaire. In relation to this, Naing *et al.* (2006) indicated that it is wise to oversample 10% - 20% in case there is missing data. Finally, a total of 210 households were sampled for a questionnaire survey from the three RKAs using proportional stratified systematic sampling techniques based on the sampling frames obtained from the RKAs offices. However, nine questionnaires were not correctly filled for analysis in *Kolla* agro-ecological zones; this made the total sample size to be 201 in the three selected RKAs. In addition to the household survey, a total of six key informant interviews and three focus group discussions were conducted in each of the three RKAs.

Data collection techniques for this study include structured interview, key informant interview, focus group discussions and direct observation. Structured interview covered issues such as households' participation in non-farm and off-farm activities and challenges faced in the engagement of non/off-farm activities. Key informants interview and focused group discussions (FGDs) were held with the subjects such as the role of non/off-farm activities for livelihood outcomes and households' perceptions about food shortage and vulnerability to food insecurity.

2.3. Data analysis Techniques

Information collected through in-depth interview, FGDs, life history narratives and observations were documented and analyzed textually to substantiate the statistical results from the structured questionnaire. The data generated by the structured questionnaire were entered into the statistical package SPSS and were analyzed using frequencies, tables and percentages as well as statistical modeling. Hence, in analyzing the quantitative data, descriptive statistics and inferential statistics were used. Binary logistic regression model was employed to identify determinant variables affecting households' participation in non-farm/off-farm activities. Such kind of model is suitable when the dependent variable is dummy in this case participation of households in non-farm/off-farm activities. A range of biophysical (farmland owned, number of plots and location), socio-economic (age, sex, family size, number of oxen, occupation and education) and institutional factors (credit services and cash-for-work) generally influences households participation in non-farm/off-farm activities. In relation to this, Adugna (2005) identified the determinants of off-farm/non-farm activities as demographic, livestock ownership, farmland, risk perception, and farm income. In this study, participation of households in non-farm/off-farm activities was taken as a proxy indicator to their livelihood outcomes and hence the dependent variable for the binary logistic regression modeling.

Checking the goodness-of-fit is imperative for binary logistic regression model (Quinn and Keough, 2001). The Pearson χ^2 statistic based on the observed (o) and the expected (e) is used to visualize the two (binary response) and contingency tables (Quinn and Keough, 2001). This showed that the fitness of the logistic model is determined by how similar the observed values are to the expected or predicted values. The null hypothesis that the model fits the data against the alternative hypothesis was also tested using Hoemer- Lemeshow Test. Hoemer - Lemeshow's goodness of fit test indicates that the predicted frequency and observed frequency should match closely; and the more closely they match, the best fit it yields (Alemu, 2007; Tang, 2001). According to Babu and Sanyal (2009), the binary logistic regression model best fits, if the value of the Hosmer-Lemeshow goodness of fit approaches to one.

Once the model is fitted to the observed and expected of the binary response variable, a thorough examination of the extent to which the fitted model provides an appropriate description of the observed data is vital in the modeling process (Alemu. 2007). According to

the same author, the fitted logistic regression model may be inadequate because a particular observation, termed as outliers or influential values might have an impact on the conclusions drawn from the results. Some of the statistical techniques, which are employed to examine the model of adequacy, include tolerance and variance inflation rate (VIF). Multicollinearity indicates the strength of the interrelationship between independent variables however, how much the inflation of the standard errors caused by collinearity effect could be checked using tolerance ($1 - R^2$) and VIF ($1/\text{tolerance}$). As a rule of thumb, the VIF rate greater than 10 shows high multicollinearity and tolerance close to zero also indicates high multicollinearity between independent variables (Gupta, 1999).

4. Results and Discussion

4.1. Participation of Households' in Non-Farm/Off-Farm Activities

Under ecological stress and/or severe land degradation, unpredictable rainfall and scarcity of farmland, livelihood diversification is a necessary condition in which the agricultural activities alone are not able to ensure household food security. Livelihood diversification includes non-farm, off-farm and on-farm activities. Non-farm incomes include wage paying activities and self-employment in commerce, remittances, traditional/cottage industries and other services in rural areas (Ellis, 2000). Off-farm activities on the hand include participating in casual labor, selling of fuel wood, charcoal, grass and cake dung, while non-farm activities consist of petty trading, handcrafts, grain milling, and blacksmith, weaving and selling of local alcohols. The survey results showed that public works and causal labor (out migration) were the major activities in the three agro-ecological zones and accounted for 49% and 15.4%, respectively. Causal labor was the highest in the *Dega* zone because of its accessibility to the main road and its nearness to the main town of the district (Nefas Mowucha). The least reported activities were carpentry (1%), blacksmithing (2%) and weaving activities (2.4%). As the KIs and FGDs informed, the majority of the communities in the study area consider these activities as inferior jobs performed by the poor and dismayed households. Kune and Mberengwa (2012) indicated that despite the age-old importance of blacksmiths and other cottage industries in producing, shaping and repairing farm tools, the community attached derogatory names for their services and people looked them down.

The study found out that in all agro-ecologies, about 25% of the respondents were engaged in non-farm/off-farm activities during the field survey, which is lower than the average

country's share (30%) (Tadesse, 2010) and higher than the ANRS (20%) (MoFED,2012). Likewise, a study made by Kebede *et al.* (2014) in northern part of Ethiopia also indicted that 26.7% of the respondents were non-farm employed. The total income per household of the sampled households in all agro-ecologies in the year 2010/11 was Eth. Birr 1,129.1 (Table 1). On per capita basis, it was Eth. Birr 215.2. Agro-ecologically, *Dega* zone with the total income Eth. Birr 2,013 per household was the leading in non-agricultural activities and *Woina- Dega* zone with the total income Birr 443 per household was the least among the three agro-ecological zones. This means that non-farm activities as an alternative strategy in generating additional income outside agriculture is the least developed in all agro-ecologies in the study area. Josef and Laktech (2009), a study made in Ethiopia indicated that non-farm activities are small and own very little capital and the average per capita income per household was roughly Eth. Birr 194 in 2009. KIs and FGD participants indicated that lack of wage labor, shortage of startup capital, limited skills, weak marketing systems and less importance given by the district authorities were the major factors contributing to the poor performance of these activities in the study area. Previous study (Yared, 2001) also indicated that low demand for the products, lack of financial know how, low labor stipulation and distance from urban centers were some of the bottlenecks to engage in non-farm activities. The study revealed that grain trading, grain milling and public works were the dominant sources of income in *Dega* zone. However, the total share of income from grain milling seems the highest, insignificant households (2%) in all agro-ecological zones were participated in this activity. Three of them found in *Dega* zone and the rest (one) is found in *Kolla* zone.

Table 1. Total incomes from non-farm and off-farm activities by agro-ecological zones (Eth. Birr) in 2010/11 (Eth. Birr 17.67 = US\$ 1.0)

| Sources of income | <i>Dega</i> | <i>Woina- Dega</i> | <i>Kolla</i> | Total | % of total |
|--------------------------|---------------|--------------------|--------------|---------------|------------|
| Grain trading | 14,760 | 500 | 3500 | 18,760 | 8.27 |
| Livestock trading | 3,000 | 4,300 | 5000 | 12,300 | 5.42 |
| Selling local alcohol | 380 | 1,250 | 6807 | 8,437 | 3.72 |
| Weaving | 2,300 | - | 5,850 | 8,150 | 3.9 |
| Selling commodities | 1,000 | 600 | - | 1,600 | 0.7 |
| Carpenter | - | 280 | - | 280 | 0.1 |
| Public works | 29,200 | 19,630 | 15,500 | 64,330 | 28.3 |
| Blacksmith | 5,000 | 0.0 | 1,300 | 6,300 | 2.8 |
| Grain milling | 48,000 | 0.0 | 2,000 | 50,000 | 22.0 |
| Causal labor | 25,047 | 4,150 | 2605 | 31,802 | 14.0 |
| Selling cake dung | 2,000 | - | 3270 | 5270 | 2.3 |
| Selling of charcoal/fuel | 7,145 | - | 7,000 | 14,145 | 6.2 |
| Selling of grass | 3,080 | 300 | 2,200 | 5,580 | 2.5 |
| Total income | 140,912 | 31,010 | 55,032 | 226,954 | 100 |
| Total | 2013.0 | 443.0 | 902.2 | 1129.1 | |

One-way ANOVA result showed that there were statistically significant associations between agro-ecologies and engagement in non/off-farm activities (at $p < 0.001$). The multiple comparisons of ANOVA (Table 2) showed that *Dega* zone is significantly different from *Woina-Dega* and *Kolla* zone (at $p < 0.05$ and at $p < 0.1$, respectively) while *Woina-Dega* zone does not show significant difference from *Kolla* zone (at $p > 0.1$).

Table 2. Multiple comparisons among agro-ecological zones

| Dependent variable | (I) agro-ecological zone | (J) agro-ecological zone | Mean Difference (I-J) | Std. Error | Sig. |
|---------------------|--------------------------|--------------------------|-----------------------|------------|-------|
| Non/off-farm income | <i>Dega</i> | <i>Woina-dega</i> | 535.78571* | 189.08582 | 0.014 |
| | | <i>Kolla</i> | 439.70843 | 195.93620 | 0.066 |
| | | <i>Dega</i> | - | 189.08582 | 0.014 |
| | | | 535.78571* | | |
| | | <i>Kolla</i> | -96.07728 | 195.93620 | 0.876 |
| | | <i>Dega</i> | -439.70843 | 195.93620 | 0.066 |
| | <i>Kolla</i> | <i>Woina-dega</i> | 96.07728 | 195.93620 | 0.876 |

* The mean difference is significant at the 0.05 level

The mean difference of 535.78571 in Table 2 showed that *Dega* have more than Ethiopian Birr (ETB) 535.78571 to *Woina Dega* households and more than ETB 439.70843 to the *Kolla* zone.

4.2. Engagement in Non-Farm and Off-Farm Activities by Wealth Categories

The study revealed that the average incomes for the better-off, the middle and the poor households were Eth. Birr 2,633.70, 688.10 and 990.35 per household, respectively (Table 3). This showed that the poor were relatively better than the middle because the poor might engage in casual labor and out migration better than middle households might. Misselhorn (2006) in her close analysis of the interview findings indicated that, while financial source is undeniably an important indicator of vulnerability to food security, the means to generate non-farm income significantly differs between wealth categories. As it is shown in Table 3, grain mills, and grain trading (that need high start-up capital), were dominated by the better-off households, while casual labor and public works (which demand little capital) were the major activities of the poor households.

Table 3. Total incomes from non-farm and off-farm incomes by wealth categories (Eth. Birr) in 2010/11 (Eth. Birr 17.67 = US\$ 1.0)

| Source of income | Wealth category | | | (% of total |
|-----------------------------|-----------------|--------------|--------------|-------------|
| | Better-off | Middle | Poor | |
| Grain trading | 14,400 | 2,360 | 2000 | 8.3 |
| Livestock trading | 6000 | 3300 | 3000 | 5.4 |
| Selling local alcohol | 0.0 | 1187 | 7250 | 3.7 |
| Weaving | 0.0 | 1000 | 7150 | 3.9 |
| Selling commodities | 0.0 | 400 | 1200 | 0.7 |
| Carpentry | 0.0 | 280 | 0.0 | 0.1 |
| Public work | 0.0 | 9,085 | 55,245 | 28.3 |
| Blacksmithing | 4000 | 1000 | 1300 | 2.8 |
| Grain milling | 46,000 | 4000 | -0.0 | 22.0 |
| Income from casual labor | 687 | 8,250 | 22,865 | 14.0 |
| Selling cake dung | 570 | 1500 | 3,200 | 2.3 |
| Selling charcoal/ fuel wood | 800 | 7445 | 5900 | 6.2 |
| Selling grass | 1300 | 1480 | 2800 | 2.5 |
| Total income | 73,757 | 41,287 | 111,910 | 100 |
| Total | 2,634.2 | 688.1 | 990.4 | |

Consistent with this result, Adugna and Wagayehu (2012) noted that off-farm activities (agricultural wage, land rent and environmental gathering) are survival mechanisms pursued mainly by the poor households. Barrett *et al.* (2001), in a study made in Rwanda, evidently stated that the poor with the least agricultural assets and income are also typically the least able to make up this deficiency through non-farm earnings because they cannot meet the investment requirements (start-up capital) for entry into remunerative non-farm activities. Thus, the better-off as opposed to the poor have greater freedom to choose among a wider range of non-farm activities. Nevertheless, some writers such as Alebachew (2011), Davis (2003) and Degafa (2005) indicated that the poor were engaged more in non-farm activities than the better-off. These differences might arise because of temporal and financial variations.

The One-way ANOVA result showed that there were statistically significant relations between wealth categories and engagement in non/off-farm activities (at $p < 0.001$). As it can

be seen in Table 4, the multiple comparisons showed that the better-off households are significantly different from the middle and the poor households (at $p < 0.001$) while the middle does not differ from the poor households (at $p > 0.1$). The mean difference in Table 4 showed that the better off have more than ETB 3213 to the middle households and more than ETB 3627 to the poor households. The descriptive statistics indicated that the minimum was zero and the maximum was 50,000, which was owned by the better-off households.

Table 4. Multiple comparisons among wealth categories

| Dependent Variable | (I) wellbeing | (J) wellbeing | Mean Difference (I-J) | Std. Error | Sig. |
|--------------------|---------------|---------------|-----------------------|------------|-------|
| Non-farm/off-farm | better off | Middle | 3213.20833* | 864.67193 | 0.001 |
| | | Poor | 3627.47080* | 797.54644 | 0.000 |
| | middle | better off | -3213.20833* | 864.67193 | 0.001 |
| | | Poor | 414.26246 | 603.49388 | 0.772 |
| | poor | better off | -3627.47080* | 797.54644 | 0.000 |
| | | Middle | -414.26246 | 603.49388 | 0.772 |

* The mean difference is significant at the 0.05 level

4.3. Gender and Engagement in Non-Farm and Off-Farm Activities

The study showed that there were variations in non-farm/off-farm activities between sexes of the households in which 33% female-headed households were engaged in non-farm/off-farm activities against 21% male-headed households. The result was consistent with the works of Josef and Laktech (2009) a study made in Ethiopia who found out that 35% of female-headed households participated in non-farm/off-farm activities against 25% of male-headed households. Nkurunziza (2006) noted that only 26% of African female-headed households are engaged in rural non-farm/off-farm activities, which was much lower than the present study. In relation to this, a study made by kebede et al. (2014) showed that 40% of the female-headed annual income and 5% of the male-headed annual incomes were obtained from non-farm activities. The independent T-test also showed that there was significant association between sex of the households and participating in non/off-farm activities (at $p < 0.01$). Though female-headed households were busy in domestic roles such as childcare, cooking, washing cloth, gathering fuel wood, fetching water, they were also engaged in non-farm and off-farm activities to supplement their meager sources of cash. In relation to this,

female KIs indicated that activities such as selling of charcoal, fuel wood, local alcohol (*tella*, *arqie*) and food during marketing days were the major activities run by female-headed households in their communities. This evidenced that female-headed households were self-employed. On the other hand, poor male-headed households were engaged in casual labor hired to the better-off households. Dolan (2005) confirmed that female-headed households are highly dependent on selling cooked food, alcohol and charcoal, which are an indicator of women's self-employment activities compared with their male counterparts. The result was inconsistent to the works of Smith *et al.* (2001) which says female-headed households engaged in less diversified activities than their counterparts did. In relation to these scenarios, one female-headed household in *Woina-Dega* zone narrated her experience as follows:

I engaged in selling tella and arqie (local alcohol) to the surrounding communities. During marketing days, I also sell food (injera with wot, tea and bread). All these activities helped me to have some cash to buy food to my family. I have five family members: most of them are dependent and I am the responsible person to feed them. The incomes obtained from different sources are used for household food consumption and no more savings. The land I owned was sharecropped but the productions collected were too small to feed my family. Before engagement in non-agricultural activities, my family suffered from food shortage. Presently, I am also a member of PSNP run by the government of Ethiopia.

From the discussions, it can be said that female-headed households in the study area are employed in relatively varied livelihood portfolios to satisfy their needs; however, there is no sign of reducing the problem of food security and hunger since about 86% of the female-headed households were food insecure during the field survey. Thus, non-farm/off-farm activities run by female-headed households did not uplift them from asset poverty; they were rather in a vicious cycle of destitution. This is because they were engaged in such activities as selling alcohol, fuel wood and charcoal that paid least for the products. If non-farm/off-farm incomes were taken as a proxy indicator of welfare, female-headed households were extremely disadvantageous since more than 92% against 60% male-headed households earn a total annual income much less than Eth. Birr 1500 from these activities during the field survey. Dolan (2005) confirmed that the mean per capita income of female-headed households was much lower than that of the male-headed households in the three districts of Uganda.

4.4. Challenges to Engage in Non-Farm and Off-Farm Activities in the Study Area

Non-farm and off-farm activities can supplement the farming incomes where the latter are not able to satisfy the needs of the households. As information collected from KIs, FGDs and

survey results, non-farm/off-farm activities have faced multifaceted problems that directly affect the improvements of the households' livelihoods. For example, poor access to credit and high interest rate (18%) were the major drawbacks mentioned by KIs and FGD participants to engage in non-farm activities. Many farmers interviewed indicated that they have a desire to have credit services but they always feel fear for the reason that crop production will fail and difficult repay the loans leave alone to improve further non-farm activities. Poor infrastructure and weak rural development agents that did not have the capacity to spread non-farm activities in the rural areas were also the barriers for the development of the sector. In this regard, KIs in the *Kolla* zone indicated that there is lack of integrated market situations and infrastructure, especially roads, to sell the products to the consumers. The other serious problem mentioned by KIs and FGDs were products produced from non-farm sector (weaving, blacksmith, tanning) were not competitive to the manufactured goods and services. Among these, weaving and tanning have potential threat to compete with the modern products partly because of lack of demand and the market is flooded with imported materials due to globalization. For example, clothes made of nylon and polyester with different colors has attracted the rural women who were once the most consumers of locally woven products. Hence, nylon and/or polyester, which are durable and easy to wash, are the dominant type of clothes almost for all households in the study area. Industrial sacks replaced tannery products such as local sacks (*aqumada*). As compared to other non-farm activities, participating in petty trading had shown better development, though it is suffered from twin problems. One of the problems was lack of finance (85% of the respondents). The other problem mentioned by KIs and FGDs was it is more of seasonal, commonly practiced for not more than three or four months (from January to April) in the year. This result was also consistent with the works of Kune and Mberengwa (2012). In the other months, farmers were busy in agricultural activities. What makes non-farm activities peculiar in the study area is that much of the work is done by very few or a single person. This is very small in nature to make significant contribution to improve the livelihoods of the poor. This means that the income derived from non-farm/off-farm sources was not sufficient to meet the food demand of the sample households (let alone savings).

4.5. Determinant Variables for Households' Participation in Non-Farm/Off-Farm Activities

As it is shown in Table 5, a total of 12 variables were selected for the model. Eight variables were significant at 1%, 5% and 10% probability levels. The omnibus test of model

coefficients has a Chi-square value of 37.227 on 11 degrees of freedom, which is strongly significant at $p < 0.001$ indicating that the predictor variables selected have a high joint effect in predicting households' participation in non-farm/off-farm activities. The predictive efficiency of the model showed that out of the total sample households included in the model, 94.1% were correctly predicted. The sensitivity and specificity were found to be 64.7% and 95.4%, respectively. The model summary indicated that the Cox and Snell R Square and Nagelkerke R Square were 0.43 and 0.61, respectively. These results showed that the model is fitted to run the binary logistic regression model.

The binary logistic regression results showed that the larger the number of oxen owned, the less likelihood that a household would participate in non-farm activities. As oxen ownership increases by one unit, the odds of being engaged in non-farm activities decreased by a factor of 0.438, which is significant at $p < 0.01$. The descriptive result evidenced that from the total sample households who engaged in non/off-farm activities, 67% owned one or no ox. This result is consistent to the works of Adugna (2005). As hypothesized, educational attainment of household heads was found to be an important factor in participating households' in non/off-farm activities. As educational attainment of household heads increases by one unit, the odds ratio of a household being participating in non-farm activities increases by a factor of 10.803 (at $p < 0.1$). The result was inconsistent with the works of Tadesse (2010) and Gebrehiwot and Fekadu (2012) which says education has not significant role in improving non-farm activities.

Table 5. Determinants of participating in non/off-farm activities

| | B | S.E. | Wald | Sig. | odds ratio |
|--|--------|-------|--------|----------|------------|
| Agro-ecological zone (Dega as a reference) | 2.45 | 0.293 | 11.873 | 0.003*** | 7.214 |
| Woina Dega | -3.509 | 1.242 | 7.978 | 0.005*** | 0.030 |
| Kolla | 0.079 | 1.085 | 0.005 | 0.942 | 1.082 |
| Household size | -0.010 | 0.092 | 0.011 | 0.916 | 0.990 |
| Age of the household | 0.028 | 0.015 | 3.292 | 0.070* | 1.028 |
| sex of the household (male as reference) | -3.234 | 1.317 | 6.031 | 0.014** | 0.039 |
| Number of oxen | -0.363 | 0.129 | 7.907 | 0.005*** | 0.438 |
| Farm size | -1.024 | 0.485 | 4.461 | 0.035** | 0.359 |
| Number of plots | -0.792 | 0.512 | 2.395 | 0.122 | 0.453 |
| Level of education | 2.380 | 1.290 | 3.401 | 0.065* | 10.803 |
| Cash for work | 0.466 | 0.818 | 0.324 | 0.569 | 1.593 |
| Occupation of the households | 2.422 | 1.510 | 4.645 | 0.098* | 11.271 |
| Constant | -5.749 | 2.705 | 4.517 | 0.034** | 0.003 |

*Significant at 0.1, **significant at 0.05, *** significant at 0.01, *ns* = not significant

With respect to agro-ecology, it was found out that location in *Dega* zone increased the odds of being participating in non-farm activities by a factor of 7.214 and location in *Woina-Dega* zone decreases participation of non-farm activities by a factor of 0.03. From the discussion, it was learnt that *Dega* is located near to the main town of the district and hence engagement in non-farm activities was much better than the other two zones. Josef and Laktech (2009) and Nkurunziza (2006) noted that non-farm activities are the highest in rural towns and the lowest in remote/inaccessible rural areas. Likewise, Mintewab *et al.* (2010) reported that in low-income rural economies with little infrastructure and thin supplementary markets, the potential of non-farm/off-farm opportunities as alternative to agricultural activities are limited. Consistent to the results Yishak *et al.* (2014) identified that diversifying the livelihoods into farming with non-farming increases as we go from *Kolla* to *Dega*.

Other variables being constant an increase of male-headed households by one unit the odds ratio in participating in non-farm activities decreases by a factor of 0.039 (at $p < 0.05$). The result was consistent to the works of Josef and Laktech (2009), Adugna (2005) and Yishak *et*

al. (2014). Farm size has strong relations to non/off-farm activities in which 71% of the sampled households who owned less or equal to one hectare of land were engaged in these activities. Other variables being constant an increase of farm size by one unit the odds of being engaging in non-farm activity decreases by a factor of 0.359 (at $p < 0.05$). The result was consistent with the works of McDough (2005) which says people engaged in non-farm/off-farm activities in areas where land becomes too scarce to run fully the farming activities. This showed that households who suffer from scarcity of farmland are supplemented by non-agricultural activities to overcome shortage of cash.

5. Conclusion and Recommendations

Nowadays academicians and politicians recognized the importance of livelihood diversification for the reason that agriculture as a major activity is not able to feed the growing population due to natural and socio-economic constraints. In the study area, livelihood diversifications that can supplement households' source of income were extremely low and few households were participated in non-farm/off farm activities during the field survey. In the study area, lack access to non-farm and off-farm activities is perhaps a major cause for the low coping capacities of households at times of food crises. The results of the study indicated that non-farm activities that can be used as a base for cottage industries have faced technological challenges mainly due to globalization and socio-cultural influences. Study participants indicated that lack of wage labor, shortage of startup capital, limited skills, weak marketing systems and less importance given by the authorities were the major factors contributing to the poor performance of non-farm activities. In drought prone areas such as Lay Gayint district where rainfall is unpredictable, it is difficult to imagine an effective rural poverty reduction strategy that does not aim to increase the potential of non-farm sector. Hence, well-integrated interventions that stimulate rural non-farm economy are imperative for poverty reduction in the study area in particular and the country in general. The study also recommends in providing microcredit services with affordable interest rate and considerable maturation period; delivering skill training for the rural poor, creating awareness about the importance of non-farm activities to the rural communities are found to be imperative for the improvement of non-farm activities.

This study strongly underlined the role of policy makers to give focus in providing the necessary incentives for agricultural households to increase crop production per hectare and

try to minimize the constraints by inspiring households to engage in robust livelihood diversification.

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