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Full Length Research Paper

Factors affecting off farm income diversification and its effects on rural household poverty in Ethiopia

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Data from 500 rural farm households were collected using multistage sampling technique from Gamo Gofa Zone, Southern Ethiopia and the determinants of off farm income diversification and its effect on rural poverty were examined with the help of logit and multinomial logit model. The regression result revealed that age, education, access to infrastructure, livestock ownerships, credits uses, and farm income are the main determinants of households' participation in off farm activities. In addition, off farm participation rate was 76% while off farm income accounts for 51% of the total household income in the study areas. The estimation results of the logit model also showed that off farm participation significantly reduces the probability of being poor of rural farm households. The study also determined the poverty line and about 29.8% of the population were found below poverty line. Therefore, to reduce rural poverty, entry barriers to off farm activities (access to finance, market, education and infrastructures) need to be overcome and off farm opportunities (micro and small enterprises) in rural areas have to be expanded by government.

Key words: Off farm income, livelihood diversification, rural poverty, multinomial logit, Ethiopia.

INTRODUCTION

Lives and livelihoods of rural households of developing countries are married with agricultural activities. But, the rapid population growth and a decline in the ratio of agricultural land to population leads to greater vulnerability and lower resilience to poverty and food insecurity in developing economies, like Ethiopia. Therefore, diversification of income sources, assets and occupation is very important for individuals or household in developing countries. Households in Sub-Saharan Africa are not exception to this phenomenon (Adugna, 2005). Farm households diversify their income sources for at least two motives; pull factors and push factor. The pull factor is diversification undertaken for asset accumulation objectives whereas push factors is diversification undertaken to reduce vulnerability and build resilience to shocks (Abdul-Malek and Usami, 2010).

Diversification driven by pull factors is usually

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associated with a rise in income and accumulation of assets and improves the livelihood of the household whereas the diversification motivated by push factors extracts a household from poverty (Abdul-Hakim and Che-Mat, 2011).

Traditionally, it is believed that rural economy is purely agriculture and off farm sector as a low productivity sector. However, recent years have witnessed a shift away from this position towards recognition of the rural off farm contribution to economic growth, rural development and poverty reduction, promoting growth and welfare by slowing rural urban migration (Lanjouw, 2013).

In rural Africa, evidence indicates that off farm activity accounts 40 to 45% of average household income. Furthermore, off farm activity is positively correlated with income and wealth and hence it is a way out of poverty (Barrett et al., 2006).

Even though agriculture is the main stay of developing economies; it is unable to provide a sufficient means of survival in rural areas due to high population growth, vulnerability to drought and decline in the ratio of agricultural land to population. To alleviate this insufficiency of agriculture, rural households in developing countries use off farm diversification as a survival strategy (Eliss 1998). Furthermore, rural off farm activities; absorb surplus labor in rural areas, help farm-based households spread risks, offer more remunerative activities to supplement or replace agricultural income, offer income potential during the agricultural off-season and provide a means to cope or survive when farming fails (Tesfaye, 2008).

Ethiopia is one of African's largest countries with about 88 million people. It has among the highest dependence on Agriculture of any country in the world. Ethiopia's Agriculture sector is a major contributor to the Ethiopian economy and is central to food security and poverty reduction. Agriculture accounts 44% of GDP, 86% of export and 86% of employment. Nearly 90% of the poor depend on Agriculture for their livelihood (Loening et al., 2009). However, Ethiopian Agriculture is subsistence in nature, land is fragmented, highly degraded and rain fed and unable to absorb the growing population pressure and hence there is a need for diversifying rural income (Demeke, 1997).

Ethiopia's off farm sector is significantly important for rural household. Off farm income account on average for 42% of total income among households that engaged in off farm activities. The majority of off farm enterprises are run part-time, either in parallel with agriculture, or periodically as a substitute for agriculture. Less than 3% of rural households rely exclusively on income from off farm enterprises. Furthermore, off farm activity is often concentrated in the low return sector, particularly for women and food insecure households (Barrette et al., 2001).

According to Haggblade et al. (2009), Reardon (1997) and Ellis (2000) agricultural households use off farm income to diversify risk, minimize seasonal income fluctuations, and finance agricultural input purchases, particularly landless households depend heavily on off farm income for their survival. Ellis (2000) and Aziz (2011) also pointed out that seasonality of agricultural activities, risk, labor market, credit market, age, gender, marital status, education, land size and livestock ownerships are the main determinants of rural off farm income diversification.

Studies by Siti et al. (2011), Owsu and Abdulaia (2001), Adams (2001), Haggblade et al. (2002), Lanjouw (1999), Reardon (2000), Marsland et al. (2000), Gordon and Chiag (2001), Barrett et al. (2001) found a positive association between off farm income diversification and household welfare indicators across most of rural Africa and hence promoting diversification is equivalent to assisting the poor, reducing vulnerability, building resilience to poverty and food security.

Many of the previous studies in rural Ethiopia (Demeke, 1997; Egziabher, 2001; Weldehana, 2002; Tesfaye, 2008) agreed that the number of poor people in rural areas of Ethiopia exceed the capacity of agriculture to provide sustainable livelihood opportunities. Whilst there is a potential for out-migration, urban centers cannot be assumed to be capable of providing adequate livelihood opportunities for all those unable to make a living in agriculture.

Therefore, even though agriculture is the backbone of Ethiopia's economy, it is no longer provides sufficient employment for the growing rural labour force and unable to reduce rural poverty. Thus the promotion of off farm activities in addition to farm activities is indispensable to alleviate rural poverty (Burge and Kumbi, 2006). The study by Carswell (2002) using the survey data from Southern part of Ethiopia finds that off farm diversification has an important contribution to livelihood. Kumbi (2006) and Adugna (2005) using survey data from Ethiopia show that off farm income reduces income inequality, easily accessible to the poor and improves the welfare of the poor and hence alleviates poverty.

However, in Ethiopia, policy makers by tradition were favoring agriculture as an exclusive means of rural economic development for a long time. This excluded rural off farm activities [1]from much attention, thereby ignoring an important source of livelihood. This might be because the role of the rural off-farm sector is the least understood component of the rural economy, and its role in the broad development process is not well known. Furthermore, there is also a mistaken view that all rural households of Ethiopia are exclusively engage in Agriculture, off farm enterprise are economically unimportant in rural Ethiopia and therefore it is more

[1] According to Demeke (1997), rural off-farm activities thus includes rural agricultural wage employment and any other nonagricultural activities that are used by rural communities to access livelihood. In other words, the rural off farm activities includes all rural economic activity outside of agriculture and agricultural wage Employment (laborers). It includes self-employment (milling, weaving, handicraft, trade in grain and livestock, collecting and selling firewood and selling local food and drinks) and wage employment.

important to support Agriculture than off farm enterprise. In order to avoid such mistaken views and to bring policy focus towards off farm income diversification, there is a need to have an in-depth understanding of the context (socio cultural, economic and policy) in which off farm rural livelihood options are pursued currently, and in which new options can be developed. As to the best of the researcher knowledge, many of the pervious empirical study of Ethiopia did not address the impact of off farm income diversification on rural poverty.

Considering the limitation of previous studies and to fill the gap of knowledge on the existing literature on off farm diversification of Ethiopia and using the new survey, this study tried to critically examine and evaluate the effect of off farm diversification on rural poverty and investigate the different patterns of off farm diversification and also identify the basic impediments of off farm diversification in the study areas.

The objective of the present study was to examine the major determinants of household's participation in off farm activities and the effect of off farm income diversification on rural poverty in Gamo Gofa Zone, Southern Ethiopia.

RESEARCH METHODOLOGY

Description of the study areas

Gamo- Gofa zone has a total area of 12581.4 km^2 and consists 15 Districts and the general elevation of the zone ranges from 600 to 3300 masl. The topography of the land characterizes an undulating feature that favors for the existence of different climatic zones in the area. The total population of the zone is estimated about 1597767 (2007) with a population density of 80 inhabitants per kilometer square.

The land scarce Chencha District is located at a distance of 540 km away from Addis Ababa, the destination of most migrants of the District. The total population of Chencha District was estimated to be 145,002 in 2014 based on the 1999 population and housing census. Female constituted about 55% of the total population and the residual 45% are male (Chencha District FEDO population issues coordinating and implementing core work process, 2007). The discrepancy between the number of male and female in this particular District attributed to the common phenomenon of male out migration in the area. The total area of Chencha District is 41,553.95 ha which contains 45 rural farmers associations (kebeles) and five rural small towns. About 17% of the total population of the District lives in these five rural small towns while the remaining 83% of the population lives in rural areas.

In terms of landholdings, Chencha District households have possessing mostly in the range between 0.1 and 0.5 ha. The agricultural census survey and Rural Development Office of Chencha District indicated that about 84% of the landholders have land size, equal to or below half a hectare. Chencha District is among the most densely populated District in SNNPR with crude density of 380 persons per kilometer square (Abera, 2006). In addition, regarding the livestock population of the woreda, there are 50754, 5450, 4882 and 209 cattle, sheep, goat and mule, respectively (CSA, 2003).

Regarding the ecological zone of the District, 82% of the total area considered as Dega and the residual 18% is considered as Weyna Dega. About 65% of the total land area is mountainous and 3, 17 and 5% are plateau, sloppy and valleys, respectively. From the total land area of the Woreda, 27,523.05 ha of land are under cultivation of which 24,420.54 ha are covered by annual plants (wheat, barley, potatoes, beans, peas…etc) while about 3,102.51 ha are covered by permanent plants (Enset, Apple …etc). The annual rainfall of the woreda lies between 900 and 1200 mm and the minimum and maximum temperature records said to vary between 11 and 23 respectively (Belete, 2006).

The total areas of Mirab Abaya District is 110853.37 ha which contains 23 rural kebeles and one small rural town. The total population of the District was estimated to be 95, 351 with male – female ratio of 0.99 in 2014 based on the 1999 population and housing census. The average land holding of the woreda is about 1.05 ha which is higher than the average land holding of Chencha District.

Sampling and sample size determination

To achieve the objectives and answer research questions stated above, the study used primary data collected from rural farm households in the study area through a structured questionnaire. The total sample size for the study was 500 households which was determined using the sample size determination formula of Yamane Taro (1963) as follow:

_____

Where, N is the total households in the two Districts, n is the sample size and is the level of significance for the present study and it is fixed at 5%. The total number of households in Chencha District is 18,553 while that of Mirab Abaya is 11,724. Thus, the total household in the two Districts are 30,277 and the above formula gave the following sample size for the study.

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But, to account for the limitation[2] of this sample size determination formula, the researcher increased the current sample size to 500 households.

Thus, information from these 500 households was collected by using multistage sampling technique. In the first stage, two districts will be chosen purposively from Gamo Gofa zone which is one of the 15 Zones of the Southern Nations Nationalities and Peoples Regional State on the basis of the availability of off-farm activities, Agricultural practice and agro-ecological diversity. Chencha District was selected from Dega while Mira Abaya District was chosen from Kola climatic zone.

There are 45 and 23 rural kebeles in Chencha and Mirab Abaya District respectively and in the second stage, 10 peasant associations (kebeles) were selected from the two Districts, 6 kebeles from Chencha District and 4 kebeles from Mirab Abaya District proportionately. But, each sample kebele was selected from each District purposively on the basis of concentration of off-farm activities. Kebeles from both high off farm income diversification and low off farm income diversification were included to make comparison.

In the third stage, sample households were selected proportionately from each 10 kebeles using systematic random sampling technique. Finally, a total of 500 households were selected from the two study areas for the present study. Therefore, the present study used both probability and nonprobability techniques of sampling

[2] The limitation of Yamane Taro sample size determination formula is that, for any number of population, the sample size never exceeds 400 at 5% level of significance.

Empirical model specification

In accordance with the stated objectives and the research questions raised, and to address them properly and adequately, the researchers specify various econometric models. To answer some of the specific objectives of the present study which are beyond the scope of descriptive analysis, appropriate empirical model is formulated such as logit and multinomial logit models.

To examine the determinants of households' decision to participate in off farm activities (local off farm and migration) in the study areas, multinomial logit model is specified as follow.

Multinomial logit model is a simple extension to the logit model when the dependent variable can take more than two categorical values. A respondent is provided with more than two alternatives and he is expected to choice one. There is no order within the categories of the dependent variable and any of a choice can be the baseline for comparison.

If the first category is the reference category, multinomial logit model can be specified as follow.

(1)

(2)

Where, *AGE, MALE, EDUC, LS, FS, INFR, CREDIT, TLU, INC and DD* refer to age of household head, dummy for gender, years of schooling, land size, family size, and access to infrastructure, credit use, tropical life units, household annual income and location dummy. The location dummy is defined in such a way that, 1 is given for households from Chencha and 0 is given for households from Mirab Abaya District. Once, Equation 2 is estimated and the coefficient of the log odds ratio of multinomial logit model is interpreted and the model is tested for individual and overall significance, the odds ratio of multinomial logit model can be estimated as follow.

(3)

This model predicts the probability of household's choice between migrations and local off farm[3] diversification relative to the base category (engage only in agriculture).

Finally, the marginal effect after multinomial logit model can be specified as follow.

(4)

As there are only three categories in this study (only agricultural production, migration[4] and local off farm income diversification), the study determined the following three marginal effects after multinomial logit model.

(5)

(6)

(7)

Equation 5, 6 and 7 determine the probability of choosing one category among the given three alternatives. For instance, Equation 5 predicts the probability of participating only in agricultural production by rural household given the values of explanatory variables. Similarly, Equation 6 estimates the probability of participating in local off farm income diversification given the values of explanatory variables. Finally, Equation 7, estimates the probability of participating in migration of rural households given the values of explanatory variables.

The other objective of this study was to examine the effect of off farm livelihood diversification on rural farm house hold poverty in the study area. In order to examine the effect of off farm livelihood diversification on rural household poverty, the study used a dichotomous/ binary regression model. That means, a logit regression model was used where the dependent variable (Y) is binary which assumes a value of 1 for poor households and 0 for non-poor households. The right hand side variables include individual characteristics, household characteristics, asset endowments, location characteristics and dummy for off farm diversification[5] and the like.

The very objective of the Logit model is to insure/ guarantee that the predicted probability of the event occurring given the value of explanatory variable remains within the [0, 1] bounds. That means,

$$0 \leq Pr(Y = 1|X) \leq 1 \quad (8)$$

This requires a nonlinear functional form for the probability. This can be possible if we assume that the dependent or the error term (Ui) follows some sorts of cumulative distribution functions. One important nonlinear function which is proposed for this is the logistic cumulative distribution function (CDF):

$$Pr\ (Yi = 1/Xi) = Pi = G\ (\beta 0 + \beta 1Xi) = G\ (Zi) \quad (9)$$

Where G is a function taking on values strictly between 0 and 1. This insures that the predicted probability (Pi) strictly lies between 0 and 1. For Logit model G (Zi) is defined as follows:

$$G\ (Zi) = Pi = \quad (10)$$

Therefore,

$$Pi = \quad (11)$$

Where $Zi = \beta 0 + \beta 1Xi$.

Thus, in this study, Pi measures the probability of being poor of rural farm households while, 1-Pi measures the probability of being non-poor of rural farm households in the study areas.

$$Pi = \quad (12)$$

$$1\text{-}Pi = \quad (13)$$

Taking the ratio of the probability of an event occurring (Pi) to the probability of an event not happening (1-Pi) and the resulting ratio is called odds ratio:

[3] If the rural household engaged in local off farm activities or both in local off farm activities and migration, it is included under local off farm income diversification

[4] If the rural household engaged only in migration of at least one household member, it is categorized under migration

[5] Off farm diversification = local off farm diversification + migration

$$\frac{Pi}{1-Pi} = \frac{e^{Zi}}{1+e^{Zi}} = e^{Zi} \quad (14)$$

Take the natural log of the above odds ratio and the resulting equation is called logit.

$$\text{——} \quad (15)$$

(16)

Where, Li is called Logit which is linearly related with Xi and Xi is explanatory variables. Finally, an empirical model for the determinants of rural poverty which uses the logit model can be specified as:

(16)

Where, , OFP, FEMALE, EDUC, LANDSIZ, FS, INFR, TLU, PCI, DD and AGE stands for Logit, Off-farm Participation, dummy for gender, years of schooling, land size in hectare, family size, infrastructure, tropical life unit, per capita income of household, dummy for location and age of household head respectively. Regarding the expected sign of the parameters, off participation, years of schooling, land size, tropical life unit, per capita income, access to infrastructure and experience in farming are expected to affect rural poverty negatively while family size is expected to affect rural poverty positively. The variable of interest in this model is off farm participation (OFP) which is a dummy or dichotomous variable which assumes value of 1 for households participating in local off farm activities or migration or both and zero value for households engaging only in agricultural production. Thus, the very objective of estimating this nonlinear binary regression model is to examine the sign as well as the statistical significance of the coefficient of off farm participation,

To estimate the above model, a poverty line was determined using consumption as an indicator of wellbeing and following the cost of basic need (CBN) approach and FGT measures of poverty. Depending on this poverty line, the minimum expenditure required for the household to meet the minimum calorie intake (2200 calories) per day per adult equivalent in the study area, the researcher classified the household as poor and non-poor. The researcher also tried to show the incidence, depth and severity of poverty among farm households in the study area using FGT [6]summary measures of poverty.

Data types, sources and collection

This study used the data collected from primary sources for the period 2015/2016 production season. To supplement the primary data, secondary data were collected from concerned district offices (Like Woreda Agricultural Office, Zonal Agricultural Office, Central Statistical Authority) and from published and unpublished sources. The data collected for this study is cross-sectional and quantitative in nature. Primary data contained detailed information on households' characteristics, socioeconomic characteristics, demographic characteristics, farm characteristics, inputs utilization, output produced and production problems encountered were collected from 500 selected farm households using structured questionnaires filled by trained data collectors who are good at local language.

[6] $=\Sigma$ —— , where

RESULTS AND DISCUSSION

The data obtained from primary and secondary sources were analysed using descriptive and econometric methods of data analysis.

Descriptive data analysis

As can be seen from the following descriptive statistics in Table 1, the mean age of household head in the study area is about 45 years while the mean family size of households is 6.4 which is almost equals the national average family size. The mean monthly off farm income of the rural farm household in the study area is 569.02 Birr[7] and this account for about 51% of the mean annual income of the households. This result is in agreement with the finding of the study conducted by Demeke (1997) in Tigray Regional State and who found that about 59% of the income of rural farm households comes from off farm activities.

This household survey witnessed that, from the total of 500 sample households, 12% are female headed while the residual (88%) stands for male headed households. In addition to this, 59 female headed households (96%) and 321 male headed households (73%) are participating in off farm activities in the study areas and this implies that off farm participation of female headed households is greater than that of male headed households in the study areas.

The average land holding of 0.82 ha of rural farm households in the study areas means that land size is a binding resource in Chencha and Mirab Abaya Districts. The average livestock holding of the rural farm households in the study areas is about 2.8 when measured in tropical live units. This low livestock population in the study areas is associated with the scarcity of land resources owned by each households.

Out of 500 rural farm households in the study areas, 379 households (76%) are engaging in off farm activities while 121 households (24%) do not participate in off farm activities. Moreover, out of the total sample households of 500, 149 households (29.8%) are found to be poor (lie below the poverty line) while 351 rural households (70.2%) are found to be non-poor (lie above poverty line). That means, using the cost of basic need (CBN) approaches of measuring poverty, both the general and food poverty lines are determined for the study areas using the household consumption data in the study areas.

The determination of these two poverty lines are done in three steps. First, determining the bundle of food items that provides 2200 calories per day per adult equivalence in the study areas. Second, finding the monetary cost of these food items, which gives the food poverty line in that

[7] One US Dollar = 20 Ethiopian Birr

Table 1. Descriptive statistics on sample characteristics of households

Variable	Variable description	Mean	Std. Dev.
AGE	Age of household head (in years)	45.10	10.84
OFI	Monthly off-farm income (in birr)	569.02	856.95
FARM_INCOME	Annual total values of farm income	9897.05	8780.91
FAMSIZ	Family size	6.39	2.56
LANDSIZ	Land size (in hectares)	0.82	0.70
EDUC	Years of schooling (in years)	3.31	3.64
TLU	Tropical life units	2.80	2.02
PCI	Per capita income in birr	2086.59	2922.06
EXPD	Monthly expenditure per adult equivalent	380.91	237.98
Some qualitative variables			
Dummies	**Categories**	**Numbers**	**Percentages**
GENDER	Male	439	0.88
	Female	61	0.12
POVERTY	Poor	149	0.298
	Non-Poor	351	0.702
OFF FARM	Participants	379	0.76
PARTICIPATION	Non-Participants	121	0.24

Source: Own Survey data, 2016

particular areas. Third, by regressing the food expenditure share on the log of the ratio of the total expenditure to food poverty line, the general poverty line in the study areas is determined. Accordingly, the food poverty line in the study areas is 204 Birr per adult equivalence per month which is 2482 Birr per year per adult equivalence. The general poverty line[8], which constitutes food and non-food expenditures, is also found to be 248.88 Birr per adult equivalence per month.

Thus, using the above two poverty lines, the incidence of food poverty and general poverty in the study areas are 25.2 and 29.8% respectively. But, the food poverty and general poverty gaps in the study areas are determined as 5.87 and 6.88%, respectively. The head count index (HCI), incidence of poverty, measures the proportions of households below the poverty while the poverty gap measures the average deviation of the expenditures of the poor from the poverty line. That means, if the income of the poor increases by 5.87% of the food poverty line, this poor household will move above the food poverty line.

As can be evidenced from Table 2, the mean value of age, family size, adult equivalence and annual off farm income of poor households are greater than that of non-poor households. In other words, the difference between the mean values of age, family size, adult equivalence and annual off farm income of poor and non-poor are statistically different at 1% level of significance. That means, the mean annual off farm income of poor household (7509.96 Birr) is more than the mean annual off farm income of non-poor household (6537.24 Birr) and the difference is statistically significant.

But, the mean values of tropical life unit, years of schooling, land size and expenditure per adult equivalent per month of poor households are found to be lower than that of non-poor households, as evidenced from Table 2 and also difference is statistically significant except for land size.

As can be presented in Table 3, family size and adult equivalent increase the probability of households' participation in off farm activities. This result is in line with economic theory where family size positively affects the chance of households' participation in off farm activities.

As predicted by economic theories, land size and tropical life unit are negatively related with the probability of participating in off farm activities as can be seen from the table. That means, households with greater land size and number of livestock in rural areas are less likely to engage in off farm income diversification as they may be busy with farm activities.

Years of schooling of household head is found to be positively related with off farm participation and statistically significant. The average consumption expenditure per adult equivalence per year of household's participating in off farm income diversification (4210.92 Birr) is greater than that of household's without off farm income diversification (3744.0 Birr).

The implication is that, rural off farm income diversification plays a paramount importance in reducing poverty or increasing the consumption /welfare of the rural households. Therefore, off farm participation and

[8] General poverty line = (food poverty line) (2-), where is the constant term obtained from the regression of the share of food expenditure on the log of the ratio of total expenditure to poverty line.

Table 2. Sample characteristics of poor and non-poor households.

Variable	Non-poor households (N=349)		Poor households (N=151)		Mean difference	t-value
	Mean	Std. Dev.	Mean	Std. Dev.		
Age	43.87	10.55	47.96	10.99	-4.1	-3.9***
Off-farm income	**6537.24**	**701.56**	**7509.96**	**1142.00**	**-972.72**	-2.8***
Family size	5.79	2.24	7.79	2.72	-2.0	-8.5***
Adult equivalent	4.77	1.91	6.69	2.32	-1.92	-9.6***
Land size	0.84	0.71	0.78	0.68	0.06	0.85
Education	3.60	3.77	2.64	3.27	0.95	2.6***
Tropical life unit	2.97	2.07	2.40	1.83	0.57	2.9***
Percapita income	2378.39	3360.79	1405.75	1213.50	799.5	2.5**
Expenditure per adult	5541.48	241.71	2306.04	40.18	269.6	13.57***

Source: Own Survey, 2016. ****, ** and *, 1, 5 and 10% level of significance, respectively.

Table 3. Characteristics of off farm participant and non-participant households.

Variable	Off-farm[#] participant (N=379)		Non-participant[&] households (N=121)		Mean difference	t-Value
	Mean	Std. Dev.	Mean	Std. Dev.		
Age	45.23	10.93	44.21	10.00	1.02	0.90
Family size	6.32	2.66	6.6	2.20	-0.28	-1.51**
Adult equivalent	5.24	2.27	5.67	2.04	-0.43	-1.98**
Land size	0.80	0.71	0.87	0.66	-0.07	-0.45
Education	3.39	3.65	3.07	3.65	0.32	1.82**
Tropical life units	2.75	2.10	2.80	1.73	-0.05	-0.02
Per capita income*	2388.84	3203.19	1129.4	1382.1	1259.4	4.15***
Annual per capita expenditure in Birr	4210.92	236.14	3744.0	139.62	466.4	2.1**

*Annual per capita income. Source: Own survey, 2016. ****, ** and * refer to 1, 5 and 10% level of significance respectively. [#]Off farm participant households= Households who engaged in local off farm activities, migration or both; [&]Non-Participant households= Households who engaged only in agricultural activities.

rural poverty are negatively related in the study areas.

As can be evidenced from the Table 4, the major types of off farm activities in Chencha and Mirab Abaya Districts are cottage industries (weaving and hand Craft), commerce (business), fishing and remittance.

Table 4 shows that about 38, 18 and 11% of sample households in Chencha District are participating in weaving, receiving remittance and trade in livestock and grains respectively. Therefore, weaving is the leading and dominant off farm activities in Chencha District and this is because the area in which this study is undertaken is very known by weaving and, on top of that, Dorze people who are the creator and teachers of weaving are found in this District.

Since this District is also known by male out migration, receiving remittance is a second important sources of off farm income in this area followed by commerce (trade in livestock and grains). Moreover, farming activity in this area is based on rain-fed agriculture. As a result, farmers are disguisedly unemployed during dry seasons. Therefore, during this period, they look for off farm activities to increase their income. The cumulative effect, that is, being living with Dorze people, greater male outmigration and disguisedly unemployed, lead to a greater participation in off farm activities in this District. About 86% of rural households are participating in off farm activities in this District. But, in Mirab Abaya District, a significant source of off-farm activity is Trade or commerce. According to this study, about 31% of sample households in Mirab Abaya Woreda are participating in trade in grains and livestock. The second dominant sources of off farm activity in this area are fishing and this is due to the fact that this District is bordered from the east by Abaya Lake, one of the seven Rifty Valley lakes in Ethiopia. Thus, cottage industries, commerce, agricultural wage employment, fishing and remittance are the various sources of off farm income in the study areas.

Moreover, the motives for off farm income (local off farm and migration) diversification of rural farm households in the study areas are presented in Table 5.

Table 4. The pattern of off farm activities in Chencha and Mirab Abaya districts.

Off farm activities	Chencha district		Mireab-Abaya District	
	Participant households	Percentage	Participant households	Percentage
Weaving	97	**38**	2	2
Hand crafts	8	3	7	6
Trade in livestock	14	5	20	16
Trade in grains	27	11	18	15
Selling of beverages	6	2	6	5
Farm workers	11	4	5	4
Firewood collection			5	4
Fishing			25	20
Remittance	49	19	3	2
Cobblestones			8	7
More than one activities	45	18	23	19
Total	**257**	**100**	**122**	**100**

Source: Own Survey, 2016

Table 5. Push versus pull factors for off farm income diversification in study areas.

Reasons for participation in off farm activities	Chencha Woreda		Mireab Abaya Woreda	
	Number of households	Percentage	Number of households	Percentage
Limited farm income	187	**73**	76	**62**
Good demand for goods	23	**9**	12	**9**
Seasonal nature of agricultural labor	6	2	5	4
Large family	10	4	8	7
Proximity to urban area	5	3	13	**11**
Availability of off farm job opportunities	12	4	1	1
Small land size	14	**5**	7	6
Total	**257**	**100**	**122**	**100**

Source: Own Survey, 2016

The table reveals that most rural farm households in the Chencha and Mirab Abaya Districts participated in off farm activities due to push factors (limited farm income). Therefore, the objective of off farm income diversification in the study areas are primarily for removing liquidity constraints, survival and risk reduction strategies and not asset building or accumulation. That means, most off farm participant households are poor and their primary goal of income diversification is to smooth consumption at a period of low agricultural production or to reduce vulnerability to shocks.

Regarding entry barriers to off farm activities in both Chencha and Mirab Abaya Districts, missing credit markets or lack of finance is one factor that impede diversification into off farm activities. About 51 and 40% of non-participant households in Chencha and Mirab Abaya woreda responded that missing credit is the main reason for their non-participation in off farm activities respectively. Moreover, agricultural labor supply and old age are another factors impeding households participation in off farm activities in the study area.

Hence, government rural development policy has to aim at removing the underlying factors that hinder participation in off farm activities such as credit constraints through the provision of credit and increase the opportunities of off farm activities in rural areas.

Estimation of multinomial logit model

As evidenced from Table 6, years of schooling, household income, access to credit and location dummy positively and statistically significantly affect the probability of households' participation in local off farm income diversification in the study areas. That means, better years of schooling, higher household income, better access to credit and being in Chencha District increase the probability of households participation in

Table 6. Estimation results of multinomial logit.

Diversification		Coefficient	Std. error	Z	P-value
Only agriculture			**Base outcomes**		
	AGE	0.0125	0.0133	0.94	0.349
	MALE	0.0099	0.3511	0.03	0.977
	EDUC	0.0823	0.0412	1.99	**0.046**
	INCOME	0.0001	0.0001	3.66	**0.000**
	FS	0.0347	0.0344	0.640	0.324
Local off farm activities	LS	0.2995	0.2183	1.37	0.170
	CREDIT	0.3816	0.2615	2.22	**0.026**
	INFR	-0.2702	0.1552	-1.74	**0.082**
	TLU	-0.1393	0.0758	-1.84	**0.066**
	DD	1.7495	0.2775	6.310	**0.000**
	CONSTANT	-1.2294	0.8376	-1.47	0.142
	AGE	0.00664	0.0172	0.39	0.699
	MALE	1.19268	0.6276	1.90	**0.057**
	EDUC	0.00042	0.0535	0.01	0.994
	INOME	0.0001	0.0001	4.19	**0.000**
	FS	0.2722	0.0786	3.46	**0.001**
Migration	LS	0.1489	0.2975	0.50	0.617
	CREDIT	0.3521	0.3326	1.06	0.290
	INFR	-0.7176	0.4273	-1.68	**0.093**
	TLU	-0.1413	0.0947	-1.49	0.136
	DD	0.4772	`0.4115	1.16	0.246
	CONSTANT	-0.6216	1.3984	-0.44	0.657
Diagnostic tests		Wald chi^2 (20) = 107.32; total observations = 500; Prob>$x^2 = 0.000$ Pseudo R^2 = 0.1528; Multicollinearity: VIF=1.21			

Source: Own Survey, 2016.

local off farm activities.

Table 6 also showed that, tropical life units and distance from all-weather roads negatively and statistically significantly affect the probability of rural households participation in local off farm income diversification. Regarding participation in migration in the study areas, Table 6 revealed that gender, household income and family size positively and statistically significantly affect the probability of out migration by at least one household members. In other words, higher household income, larger family size and being male headed households increase the probability of participation in rural out migration by at least one household members in the study areas.

Theory predicts that gender affects off farm income diversification due to culturally defined roles, social mobility limitations and differential ownership of/access to assets between male and female (Brehanu, 2007).

In this study, it is found that females are more probable to participate in local off farm activities while male households are found to be more likely to participate in migration. This result is in line with the descriptive analysis and the fact that Chencha District is known for its male out migration in Ethiopia.

As secondary data shows, about 55% of the population in the District are female whereas the residuals, 45% are males. Thus, gender is found statistically significantly affect male household participation in migration at 5% level of significance. Male is 10.61% more likely to participate in out migration than female in the study areas and the opposite is true for the female counterparts.

Age of household head is found to negatively influence household's decision to diversify to local off farm activities, which implies that older households are less likely to participate in local off-farm activities. As it can be seen from Table 7, the likelihood of a rural household's participation in migration is also found to decreases as age of household head increases. The possible reason is that farmers, whose age is relatively younger, leaving other factors constant, could be pushed to engage more in local off-farm activities and migration than agriculture alone. This is because, younger farm households cannot get enough land to support their livelihood compared to the older farm households.

But, at older age, asset accumulation is lower and some productive family members may leave their family

Table 7. Marginal effect (probabilities) after multinomial logit model.

Diversification	Marginal effect for base category (Only in agriculture)	Marginal effect for local off farm diversification	Marginal effect for migration
AGE	-0.0004	-0.0020	-0.0016
MALE	-0.0231	-0.0829	0.1061**
EDUC	-0.0097*	0.0178**	-0.0081
INC.	-0.0001**	0.0001**	0.0002**
FS	-0.0303	0.0193**	0.0110**
LS	-0.0392	0.0503	-0.0111
CREDIT	-0.0776**	0.0912**	-0.0136
INFR	0.0501**	0.0121	-0.0622*
TLU	0.0200**	-0.0163	-0.0037
DD	-0.2328**	0.3396**	-0.1068**

Source: Own Survey, 2016.

and this may lead to lower probability of participating in off-farm activities. This result is congruent with previous studies by Destaw (2003) and Mulat (2006).

Years of schooling is one of the most important determinants of off farm earnings, especially in more remunerative salaried and skilled employment in rural Africa (Barrett et al., 2001). Education is critical since the better-paid local jobs require formal schooling, usually the completion of secondary school or beyond. As years of schooling increases, theory predicts that, it is more probable for households to participate in local off farm activities. The result of the present study also showed that households with more years of schooling have greater probability of participating in local off farm activities than engaging only in agriculture. The result is in line with the findings of Galab et al. (2002) and Berhanu (2007).

In line with prior expectation, livestock holding in TLU negatively influence household's choice of local off farm activities and migration at 5% level of significance. That means the farmer with lower livestock holding would be obliged to diversify livelihoods into local off and out migration in order to meet its needs. In this study, the likelihood of participating or engaging only in agriculture increases by 2% as tropical live units (TLU) increases by one unit and this is statistically significant at 5% level of significance as presented in Table 7. This result is in line with the findings of Tesfaye (2003) and Berhanu (2007). Regression results in Table 7 further revealed that, the distance from all-weather road also hinders the opportunities to engage in income diversification and increases the likelihood of staying on farm activities.

As can be seen from the estimation results, the more the distance from all seasons road, the less likely for rural households to participate in out migration and this is statistically significant at 5% level of significant. This finding is in line with that of Babatunde and Qaim (2010).

As economic theory predicts, family size is found to have positive and significant relation to diversification of livelihood strategies into local off farm activities and migration 10% probability level. The positive correlation between family size and diversification might be due to the relation between larger family size and household labor or corresponding higher demand for food in the household which implies that while an additional member to the household increases the probability of being participated in local off farm activities and out migration in order to meet basic needs to the family.

This means, one extra person in the household increases the likelihood of diversifying in to local off farm activities and migration by 1.9 and 1.1%, respectively. In other words, additional family member decreases the odds to work only on farming as the study areas are agricultural land scarce. Again, this result is in agreement with the finding of Chang and Mishra (2008).

The location dummy in Table 7 stands for the difference in the ecological zones between the two Woredas. There is a difference in the quality and size of land, the amount and distribution of rainfall and population densities between the high lands (Chencha) and lowlands (Abaya). This difference is expected to create difference in the decisions to participate in local off farm activities and migrations. This means, the tendency that the household diversify livelihoods into off farm and migration, increases as we go from high lands to lowlands. But, the probability of diversifying into local off farm activities by households in Chencha Woreda is greater than that of Mirab Abaya Woreda by 34% and statistically significant at 5% level of significance. It is also found that 23% less likely for households in Chencha Ditsrict to engage only in agricultural production. This may be due to the scarcity of agricultural land in Chencha Woreda relatively, with average land size of 0.5 ha. In addition, this difference may be due the fact that, in Chencha Woreda, there is greater availability of off farm activities, weaving, compared to Mirab Abaya Woreda. Thanks to the Dorze people, the creators and teachers of weaving in the Woreda, the probability of

participation in off farm activities is higher in this Woreda. Moreover, even if the relationship is statistically insignificant, households with larger land size are less likely to participate in local off farm activities and migration than their counterpart, as can be seen from the estimation results. As predicted by economic theory, land size and local off farm participation are negatively related. This implies that, it is more probable for households with larger land sizes to stay on farm as more land sizes stimulates farming. This supports the view that off-farm and on-farm activities compete over the limited household resources. It also implies that those households who expect secured agricultural income stay on farm and lower off-farm activities. Lanjouw and Lanjouw (1995) also found out that landholdings per capita are negatively correlated with participation local off farm activities and migration.

As expected**,** credit use is found to have statistically significant and positive impact on the probability of participating in off farm activities and negative effects on the likelihood of participating in migration and engaging only in agriculture. Households which use credit have 9.12% higher probability of being participated in local off farm activities than households which do not use credit. This more implies that the formal and informal credit facilities that avail for rural farmers are a very important asset in rural livelihoods diversification. The result of the study, therefore, strongly suggest that farmers' access and use of credit would play important role in promoting rural income diversification than agricultural production.

As shown in Table 7, credit uses decreases household's participation on agricultural production and this may be due to the risk averse behaviors of our rural farm households. As agriculture is a risky business, rural households would not use credit for investment in agriculture and rather they use for less risky local off farm activities. This result is in agreement with the finding of Raju (2014).

Estimation of logit model

To examine the effect of off farm income diversification on rural poverty, a probability model which relates the probability of falling below poverty line (Y=1) with off farm participation, household characteristics, farm characteristics, asset holdings of households, public assets (infrastructure), location characteristics is used. That means, a binary logit model is used to examine the effect of participation in off farm activities on rural poverty (probability of being poor) using data collected from 500 households in Chencha and Mirab Abaya Districts and the regression result is presented in Table 8.

As apparent from Table 8, age of household head, participation in off farm activities, land size, per capita income, years of schooling and tropical life units diminish the probability of being poor in the study areas whereas family size and distance from all season road (infrastructure) positively affect the probability of being below poverty line of households.

As predicted by economic theory, the regression result showed that, participation in off farm activities (livelihood diversification) diminishes the probability of being poor of rural farm households. Thus, participation in off farm activity negatively and statistically significantly affects the rural poverty. Most of rural households depend on agricultural production which is heavily affected by vagaries of nature and this motivates rural farm households to diversify their livelihood strategies and manage any risk associated with low agricultural production. The coefficient of off farm participation (OFP) showed that the probability of being poor of households participating in off farm activities is lower than that of households with no off farm activities by 7.5% and this is also statically significant.

Regarding the age of household head, as the age of household head increases, the probability of being poor of rural farm household significantly decreases as the coefficient of the regression result shows. This implies that, as the age of house hold head increases, his/her asset holdings increases and the dependency ratio in the family also decreases and this may enable the house hold to spend more on consumption. The coefficient of female, which a dummy for gender, is negative and this implies that the probability of being poor of female headed households in the study areas is greater than that of male headed households by 7.3%, though it is statistically insignificant. As can be seen from the regression results, resources ownerships (land size and livestock holdings) are the major determinants of rural poverty in the study areas. That means, when the livestock holdings and land size of rural farm household increase, the probability of falling below poverty line decreases significantly.

The average land holding of households in the study areas is 0.82 ha (0.68 ha at Chencha and 1.055 ha at Mirab Abaya Districts).

Similarly, the average livestock holdings of the rural farm households in the study areas as given by tropical life unit are about 2.97. The lower the average number of livestock in the study areas may be due to the scarcity of land. This implies that, in such land scarce Districts, land ownership is the main determinants of rural poverty. The other household characteristics, family size, negatively and significantly affect the probability of being poor of rural farm households.

Table 8. Regression results of the logit model with odds ratio and marginal effect.

Variable	The logit model		Odds ratio		Marginal effect	
	Coefficients	Std. errors	Coefficients	Std. errors	Coefficients	Std. dev.
AGE	-0.0269	0.0120	0.9642	0.0215	-0.0043	0.0019
OFP	-0.0465	0.0290	0.9238	0.0296	-0.0755	0.0473
FEMALE	-0.5137	0.4526	0.5982	0.2708	-0.0733	0.0563
FAMSIZ	0.3715	0.0565	1.4499	0.0819	0.0598	0.0090
INFR	0.2522	0.1323	1.0245	0.1028	0.0406	0.0210
PCI	-0.00002	0.00004	0.9989	0.00004	4.74e-06	0.0001
FARMSIZ	-0.3890	0.2209	0.6777	0.1497	-0.0626	0.0352
EDUC	-0.0792	0.0398	0.9238	0.0367	-0.0127	0.0063
DD	-0.4024	0.2763	0.6686	0.1847	-0.0663	0.0463
TLU	-0.2089	0.0772	0.8114	0.0626	-0.0336	0.0123
CONS.	-3.2351	0.7695	0.0935	0.0302	-0.0663	0.0463
Number of observations = 500; LR (10) =95.94; Pseudo = 0.1718; Probability> = 0.0000						

Source: Own Survey, 2016.

Given the small number of livestock population of the households associated with the scarcity of land resources, an increase in family size may increase the probability of being poor of rural farm households.

As human capital theory predicts, the best investment of all is the one made in people and therefore, greater educational attainment may imply a larger set of employment opportunities and specifically in a rural context a better awareness of the full potential of the new agricultural technology and associated agricultural practices. The coefficient of education in the above binary regression model showed that as years of schooling rises, the probability of being poor of households decreases and statistically significant.

Finally, the coefficient of the locational dummy is negative, implying that the probability of being poor of households in Chencha District is lower than that of the probability of being poor of households in Mirab Abaya District, but statistically insignificant.

CONCLUSIONS AND POLICY IMPLICATIONS

The most dominant and leading off farm activities in the study area are weaving, remittance from migration, trade in grains and livestock, fishing and selling beverages.

As the estimation results of multinomial logit model shows, age of household head, years of schooling of household head, access to infrastructure, livestock ownerships, credits uses, farm income, and locational characteristics are the main determinants of the probability/chance of households' participation in off farm activities in in the study areas.

Besides, the off farm participation rate is 76% and off farm income accounts for 51% of the total household income in the study areas and this is in agreement with the study conducted by Demeke (1997) on the Northern part of Ethiopia who found that off farm income accounts for 59% of rural household income.

Regarding the effect of off farm income on rural poverty, the estimation results of the logit model showed that, off farm participation statistically significantly reduces the probability of being poor of rural farm households by 7.5%. The result also revealed that age, education, off farm participation, family size, farm size, tropical life units, public assets (infrastructure) and per capita income are the major determinants of the probability/chance of being poor of rural farm households.

Using the cost of basic need (CBN) approach and the FGT poverty measures, the food poverty and general poverty lines in the study areas are found to be 204.02 Birr and 248.88 Birr per adult equivalence per month respectively and about 29.8% of the population in the study areas lie below poverty line.

Policy implications

Increasing rural income and reducing rural poverty strongly relies upon the development of off-farm activities, including the development of a local rural micro and small enterprises (MSEs). Therefore, in an economy where there is rapid population growth associated with declining agricultural land to population ratio, rural poverty reduction strategies should aim at the economic transformation of rural areas via the establishment of

micro and small scale enterprises (off farm activities) as they can reduce unemployment and rural poverty. As theory and empirics show, MSEs creates jobs for unskilled, youth, women and disadvantaged groups of the society and can be used as one tool to bring growth and income equality simultaneously. Moreover, micro and small enterprises are assumed to be more of labor intensive and they have been contributing about 64% of employment even in developed countries. Thus, one policy implication of the present study is that entry barriers for disadvantaged households to participate in off-farm activities need to be overcome. This is true whether diversification is due to distress-push or demand-pull. Therefore, to reduce rural poverty, government policies would better aim at increasing access to off-farm activities for all rural households, particularly for households with little human, land and monetary assets (opportunities) and decreasing the constraints that hiders the rural households from participating in off farm activities.

According to the result of the study, the main constraints of participating in off farm activities are lack of finance/credit, rural markets and rural infrastructures. Hence, to overcome this important barrier to enter into more remunerative off-farm activities, massive efforts are required on the part of government to develop rural infrastructure and financial markets. Adequate rural microfinance institutions serving small scale rural investments are important to release the constraints that most rural households face.

The innovative group lending scheme has a paramount important in solving the financial constraints of our poor rural unbanked farm households.

Conflict of Interests

The authors have not declared any conflict of interests.

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REFERENCES

Abdulaia A (2001). Determinants of income diversification amongst rural households in Southern Mali. Food Policy 26(4):437-452.

Abdul-Hakim R, Che-Mat SH (2011). Does farmer's diversification into Non-farm employment reduce their likelihood of Poor? Evidence from Malaysia. J. Bus. Policy Res. 16(1):145-155.

Abdul-Malek M, Usami K (2010). Do non-farm incomes really matter for poverty among small households in rural Bangladesh? A case of advanced villages. J. Dev. Agric. Econ. 2(7):250-267.

Adam, R. (1999). Non-farm income, inequality and land in rural Egypt. World Bank policy research paper #2178.

Babatunde R, Qaim M (2010). Impact of off-farm income on food security and nutrition in Nigeria. Food Policy 35(4):303-311.

Berehanu E (2007). Livelihood Strategies of Smallholder Farmers and Income Poverty in draught prone areas: The case of Gena- Bosa woreda, SNNPRS. An MSc Thesis Presented to the School of Graduate Studies of Haramaya University.

Barrette CB, Reardonb T, Webbc P (2001). Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics and Policy Implications. Food Policy 26(4):315-331.

Carswell G (2002). Livelihood diversification: increasing importance or increasingly recognized? Evidence from Southern Ethiopia. J. Int. Dev. 14:789-804.

Chang H, Mishra A (2008). Impact of off-farm labor supply on food expenditures of the farm household. Food Policy 33(6):657-664.

Demeke M (1997). Rural non-farm activities in impoverished Agricultural communities: the case of Shoa Northern Ethiopia, De-organization and Rural employment. Network, Working papers P 25.

Ellis F (2000). The determinants of rural livelihood diversification in developing countries. J. Agric. Econ. 51:289-302.

Lanjouw J, Lanjouw P (1995). Rural non-farm employment: Policy research working Paper 1463.

Lanjouw P (1999). Rural non-agricultural employment and poverty in Ecuador. Econ. Dev. Cultural Change 48:91-122.

Lanjouw P (2013). Non-Farm Diversification, Poverty, Economic Mobility and Income Inequality: A Case Study in Village India. World Bank Policy Research Working Paper No. 6451.

Raju G (2014). Factors Affecting Nonfarm Income Diversification among Rural Farm Households in Central Nepal. Int. J. Agric. Manage. Dev. 4:2.

Reardon T (1997). Using evidence of household income diversification to inform study of the rural nonfarm labor market in Africa. World Dev. 25(5):735-747.

Reardon T (2000). Household Income diversification into rural nonfarm activities: Transforming the Rural Nonfarm Economy. Johns Hopkins University Press, Baltimore.

Egziabher TG (2001). Non-Farm Activities and Production Decisions of Farmers, the case of Damot gale and Kacha birra Woredas, in Southern Regions of Ethiopia. Soc. Sci. Res. Rep. Series 15:74.

Weldehana T (2002). Promoting farm /non-farm linkages for rural development, FAO, ISBN 92-5-104868-1.