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Full Length Research Paper

Determinants of Rural Household Livelihood Diversification Strategy in South Gondar Zone, Ethiopia
By

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This study empirically examines the determinants of rural household livelihood diversification strategy in South Gondar zone, Ethiopia using cross sectional data collected through multistage sampling techniques. Descriptive statistics and multinomial logit regression model were used to analyze the collected data. The descriptive statistics result showed that, agricultural activities account 89.5% of the total annual income of household head. The remaining 10.5% gain from non-farm and off-farm activities. From the total 300 sampled respondents only 39.33% were participated in non-farm and off-farm activities and the majority 60.67% were not participated in livelihood diversification strategies. The empirical result revealed that, the participation and the contribution of livelihood diversification strategies were determined by gender, education, dependency ratio, credit access, having saving account, proximity to town and market, agro-ecological zone, and access to electricity positively and age, cultivated land size, and extension agent training and frequency of contact negatively. On the contrary the irrigation activities, livestock numbers and land ownership certificate were insignificantly determined the rural household livelihood diversification strategy. Thus, this implies that, these positive and negative factors need to be considered and included by policy makers in planning of the rural development strategies' and policies to overcome the determinants of rural livelihood diversification strategies.

Keywords: livelihood diversification strategy, multinomial logit, non-farm, off-farm and rural household.

INTRODUCTION

Agricultural activity is an important predominant sector for the majority of developing countries rural households' livelihood including Sub Sahara African; which offers a strong option for inducement growth and overcoming poverty through increasing food security (WB, 2008). In history agricultural activities in Ethiopia were started before **11** thousand years ago. Before **6000** years cropping activities and using them as food source were started and **3000** years ago farmers used metal plough by introducing for world (ANRS OA, 2015). In Ethiopia it is the mainstay of the economy and the main source of rural household livelihood by accounting nearly half (44%) of GDP, 90% of exports, 85% of total employment and the base of living 85% of the population (WFP and CSA, 2014). However, today researchers state that, the agricultural sector in developing countries is the most complex and vague sector to understand. It also characterized by decreasing farm land, low level of productivity per farm owned (with increasing in production being driven mainly by area), a high degree of subsistence nature farming, low soil fertility, infrastructural inadequacy, risk, out banding population

growth with the current production capacity of the farm land, uncertainty and seasonality (Jirström M. et al, 2011; Oluwakemi, 2013). Additionally, SSA farmers cannot take world opportunities because of limited capital asset (Hazell P.et al, 2007), and cannot repeat the Asian green revolution experience of the 1970s; nor can it be the sole engine for rural growth, employment and poverty reduction (Ellis, 2005). Poverty is continues phenomenon in agrarian with large regional disparities, deeper and more severe than urban poverty (Chaudhry et al, 2006). Oxford University press of January 2014 revealed that, 85% of world poor live in rural areas. Rural living is also further prominent in unconstrained employed and low income generating opportunities due to the absence of livelihood diversification, commercial and industrial facilities (WB, 2008). Rural households cannot switch from low value crop production activity to high value production activities (Ellis, 2007). In addition to that, the rural household means of livelihood to attain food and livelihood security is influenced by carrying capacity of agriculture in lack of non and/off-farm income sources with the effect of frequently occurring drought and continuously erode the productive to become poor (Workneh, 2008; Waqar A et al, 2011; Moreda, 2012).

So, research result suggests that, agricultural dynamism in Africa is a strong option in terms of diversification for stimulating growth, generating enough income to feed and fulfill basic needs for household members, achieve the goal of reducing poverty and improving food security (Djurfeldt G. et al, 2008; Oluwakemi, 2013; Emanuel, 2011; Reta & Ali, 2012). Incomes from non-farm sources account 35–50% of rural household incomes in SSA and in South Africa about 80–90%, but the common pattern is for such activities to be prevalent in areas with good agricultural potential, better market access, near to urban areas and those with better access to infrastructure (Haggblade S. et al, 2010; Losch B. et al, 2011). For these reasons there is a strong argument that any development intervention to increase the fraction of labour force in scarce rural land, improve the livelihood and food security situation of the rural poor need and to enhance to cope with increasing agricultural vulnerability must take agriculture along with the non-farm and/off-farm livelihood diversification strategy without excessive preference being given to farming as the unique solution to rural poverty (Haggablade, 2007; WB, 2007; Christopher, 2014; Tuyen, 2014). Even if, livelihood diversification strategies are the centre of human livelihoods, the determinants in Ethiopia have received little attention in developing strategies and policies (Adugna and Wegayehu, 2012).

In the study area because of unexamined and uncontrolled factors only 14% -25% rural households are participated in non and/off-farm activities; almost all are highly dependent on rain-fed cereal crop productivity which has low economic returns and unable to feed full year their family members (WB, 2006; Arega et al, 2013). And, the highest prevalence of poverty 35% and food energy deficient 49% households are found in the study area region (WFP and CSA, 2014). As a result, they are forced to migrate to employ in low return daily labor works. Therefore, this study was crucially designed to recognize and analyses on up to date and area specific are a paramount importance for the future prospect of rural household development to secure their livelihoods which vary from household to household depending on numerous factors in the household life cycle. Understanding of these factors may hold the key to effective rural development policy formulation, to develop better poverty reduction strategies, and to filling the literature gap of rural household livelihood diversification strategy by providing detail knowledge into the factors that explained in the study area by addressing the following questions.

❖ What are the main determinants of rural household livelihood diversification strategy in the study area?
❖ What types and characteristics of non/off-farm activities existing in the study area?
❖ What are the contributions of non-farm and off-farm activities to the household head annual income in the study area?

Objectives of the Study

The main objective of the study is to identify and analysis the major determinants of rural households decisions to choose alternative livelihood diversification strategy in South Gonder zone. Its specific objectives are:

♥ To identify the main determinants of livelihood diversification strategy in the study area.
♥ To examine and analysis the existing farm alone, non-farm and/or off-farm activities in the study area and
♥ To assess the relative importance and contribution of existing livelihood strategies to the total annual household income in the study area.

RESEARCH METHODOLOGY

Description of the Study Area

The study area (Figure 1) is located at 98km distance from the regional capital city of Bahir Dar and at 665 km Addis Ababa the capital of Ethiopia. The total area of the study area covers 14,095.19km^2 with 41.50% arable land and located at latitude 116667'N and longitude 380000'E. The total populations in 2015/16 were 2,395,981 within an average of 4.38 persons in family and 49.7% were female. Only 9.53% were live in

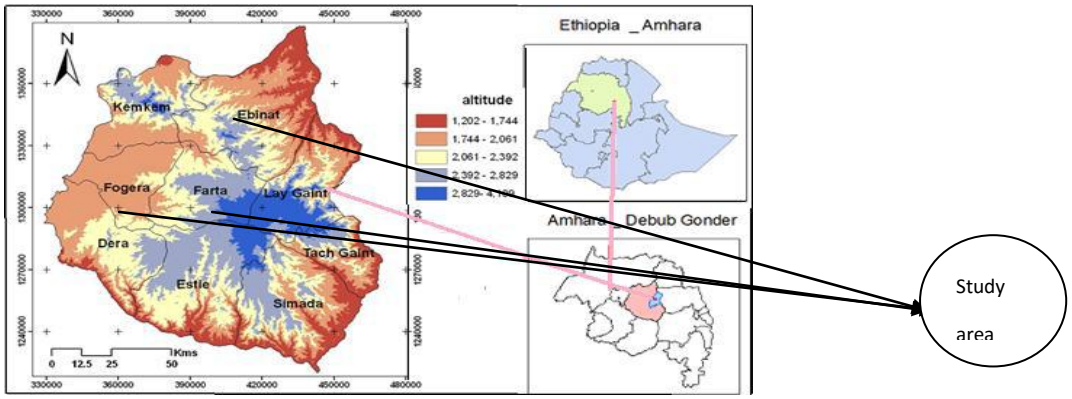

Figure 1: Map of study area

Table1: The sample size distributions in the sample kebeles $n = \frac{n}{N} xn$

No	District	Kebeles	Total number of household head	Total number of sample households
1	Farta	Wukiro	1696	117
2	Ebinat	Mena-Medihanealem	650	45
3	Fogera	Weje-Awuramba	2015	138
	Total		4361	300

Urban (SGDFED basic data, 2014). Population density of the study area was estimated at 170.46/km^2. The road density is very low. The study area is classified into four agro-ecological zones; to Mid-altitude 78.5% of the area; the rest 17%, 4% and 0.5% are described as high altitude, low altitude and cold weather respectively. The altitude of the study area ranges from 4231m to 1500 meter above sea level (ibid). Rapid population growth coupled with the absence of non-farm employment opportunities has led to diminishing farm size and increasing landless individuals in the surrounding. Thereby, the average farm size of the zone is decreased to below 0.75 ha less than the country average of 1.01ha. Mixed farming system is the main agricultural activity (ibid).

Research Sampling Technique and Sampling Frame

A multi-stage sampling technique was used to select sampled respondent households. The first stage was involved in the selection of three districts (Farta, Ebinat and Fogera) from the ten rural districts of study area. In the second stage, three kebeles were selected (Wukiro-Tadomender, Mena-Medihanealem and Weje-Awuramba) from the selected district kebeles which were listed on their agro-ecological zone to stratify highland, mid land and low land by applying simple random sampling techniques by taking account the number of kebeles in each district. In the third stage sampling frame household heads list were obtained from each kebele's administrative office. Then, wealth ranking exercise was conducted with help of participatory rural appraisal tools and by using systematic random sampling technique in order to classify a total sample of 300 households heads under the different wealth categories of 132 poor, 129 medium (less poor) and 39 better-off households. In the fourth stage the probability proportional to sample size methods were applied to draw the sampled household from each wealth category according to the number of heads in different category (Walliman, 2006; Bhattacherjee, 2012).

Sample Size

Based on the purpose of the study and population size, the researcher used to be specified the level of precision (e), the level of confidence or risk (Z), and the degree of variability in the attributes being measurement (p) (Miaoulis George, 1976). Therefore, note that a proportion of 50% indicates a greater level of variability in a population than either 20% or 80% and have the attribute of interest. To yield a representative sample for proportion the researchers used the following formula; $n = \frac{Z^2 pq}{e^2} = (1.96)^2 \frac{0.8x(1-0.8)}{(0.05)^2} = 245.86 \sim 246$. Finally, to reduce sampling error 56 more respondents were added and then the totals of 300 sample respondents were drawn (see table 1).

Method of Data Collection and Type

The primary data on household socio-economic characteristics were collected from sampled households using structural interview schedule to produce household level data on the determinants of to each livelihood diversification strategies. In addition, focus group discussions, key informant interview and observational data were done with focusing on Awuramba community, land less, elders, development agents and females. Pilot informal survey taste on non-sample respondents conducted by the supervision of the researcher and necessary modification was made on the basis of the results obtained in. The secondary data were collected by reviewing from published books, theses, journals and by assessing different unpublished records and reports from reputable organizations and institutions.

Analytical Techniques

Descriptive statistics; frequency, counts and percentages used to describe the socio-economic characteristics of the respondents were analyzed by using STATA 12 software. Qualitative categorical types of data (people opinion, feeling, ideas, traditions, etc) analyzed using representative quotes. While quantitative continuous and descriptive types of variables (household income, farm size, livestock, etc) analyzed by Stata 12 version using minimum, maximum, mean, percentage, chi-square test, F-test, frequency and standard deviation (Walliman, 2006; Bhattacherjee, 2012).

Model Specification

Multinomial Logit Model Specification and Hypothesis

When there is a dependent variable with more than two alternatives among which the decision maker has to choose unordered qualitative or polytomous variables; the appropriate econometric model would be either multinomial logit or probit regression model (Greene, 2007; Verbeek, 2004). Moreover, multinomial logit analysis displays has a superior ability to predict and picking up the differences between the livelihoods diversification strategies of rural households, which makes it possible to analyze factors influence households' choices of it in the context of multiple choices. Thus the model is motivated by random utility model. Let denote U_{ij} is the utility that the household i gets from choosing alternative activity j.

So; $U_{ij} = u_{ij}+e_{ij} = X_{ij}\partial_j+e_{ij}$……..(1)

If the respondent makes choice j in particular, then we assume that Uij is the maximum among the j utilities. Prob ($U_{ij} > U_{ik}$) for all other K ≠ j

Where; U_{ij} is the utility to the i^{th} respondent form livelihood strategy diversification j and U_{ik} the utility to the i^{th} respondent from livelihood strategy diversification k. If the household maximizes its utility define over income realizations, and then the household's choice is simply an optimal allocation of its asset endowment to choose livelihood types that maximizes its utility. Thus, the i^{th} household's decision can be modeled as maximizing the expected utility by choosing the jth livelihood strategy among J discrete livelihood strategies is:-

Max j = E (Uij) = f_j (Xi) +$\epsilon_{ij;}$ j =0, ….J

In general, for an outcome variable with J categories, let the j^{th} livelihood strategy that the i^{th} household chooses to maximize its utility could take the value 1; if the i^{th} household choose j^{th} livelihood strategy and 0 otherwise. The probability that a household with characteristics x chooses livelihood strategy j is be given by;

$$\text{pij} = \frac{e^{\text{xiBj}}}{\sum_{j=1}^{j=3} e^{\text{xiBj}}}, \text{j} = 0,1,2,3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$\sum_{j=0}^{j} \text{pij} = 1 \text{ for any i; That is } \mathbf{pi1 = 1 - \sum pij}.$$

Where; *Pij* = probability representing the i^{th} respondent's chance of falling into category *j*;

X = Predictors of response probabilities; e= is the natural base of logarithms; and **B**j= are the parameters to be estimated by maximum likelihood estimator.

The estimated equations provide a set of probabilities for the j + 1 choice for a decision maker with xi characteristics. Appropriate normalization that removes indeterminacy in the model is to assume that B_1=0 (these arise because probabilities sum to 1, so only J parameter vectors are needed to determine the J + 1 probability), so that **exp** $^{(XiB1)}$ implying that the generalized equation above is equivalent to:

$$\ln \frac{\text{pij}}{\text{pik}} = \text{X}'(\text{Bj} - \text{Bk}) = \text{X}'\text{iBj}, \text{if k} = 0.$$

Similar to binary logit model it implies that we can compute J log-odds ratios which are specified as. For identification of the model, we need to conveniently normalize by assuming B0 =0 (Wooldridge M., 2010; Greene, 2007). Therefore, the probabilities are given by:

$$\text{pro}, \left(\text{yi} = \frac{\text{j}}{\text{xi}}\right) = \text{pij} = \text{pr}(\text{Uij} > Uik) = \frac{e^{\text{xiBj}}}{\sum_{j=1}^{j} e^{\text{xiBj}}}, \text{for j} > 1; \text{k} \neq \text{J} \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The marginal effects (δ_{ij}) of the characteristics on the probabilities are specified as

$$\delta ij = \frac{\partial pij}{\partial xi} = pij\left[Bj - \sum_{k=o}^{j} pikBk\right] = pij[Bj - B'] \ldots\ldots\ldots (4)$$

Where, Yi = is unordered categories of livelihood diversification strategies adopted by the respondents: Y0 = adopt farm alone; Y1 = adopt farm + non-farm; Y2 = farm+off-farm; Y3 = farm+ non-farm + off-farm. The coefficients of each variable interpret as logit model with compression being the base category (table 2).

Table 2: Definition and unit of measurement of explanatory variables in multinomial logit.

Variables	Description and measurement	Expected Sign
Sex	Sex is a dummy variable taking value 1 if the household head is male, 0 otherwise	+/-
Age	Age of household head (in year).	+
Edu	Dummy variable if the household head is literate 1 if not 0	+
Dep	Dependent household members measured in number the age less than 14&>64	-
Farize	Total farm size of household (in hectare).	+/-
Tlu	Total livestock number owned by the farm household (TLU).	+
Ext	Dummy variable agent visited/advised an training farmer 1 train, 0 otherwise	+
Crt	Farmers access to credit, dummy variable (=1, if yes; =0, otherwise)	+
Agrzone	It is dummy variable, 1 if a household living in high land, and 0 if residing in low land and middle land agro-ecology	+/-
Dtown	Dummy if household near to surrounding town and market 1, if not 0<5km	+
Sacct	Dummy if household have saving account 1, if not 0	+
Irig	Dummy if household head posses irrigation 1, if not 0	+
Acele	Dummy variable if household head is accesses to electricity 1, if not 0	+
Loc	Dummy variable if household head has had land owner certificate book 1, if not 0	+

RESULT AND DISCUSSIONS

This chapter is presented and discussed using the descriptive statistics, inferential statistics and econometric model results under types of livelihood strategies, livelihood assets and the determinants of the choices of livelihood diversification strategies.

Household Livelihood Strategies

As shown in figure 2 (in the pie chart), 60.67% (182) of the study area households entirely depend on farm alone, 16.33% (49) household heads on farm+non-farm, 11.33%(34) on farm+off-farm and the remaining 11.67%(35) of the household head respondents on farm+non-farm+off-farm livelihood diversification strategies.

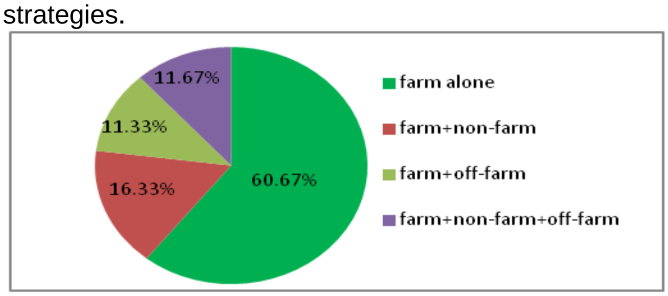

Figure 2: the proportion of livelihood sources of study participants
Source: researcher survey data

Agriculture Activities

Crop Production and Livestock Production/Rearing Activities

The survey result indicates that, the rural household heads in the study area all of heads were participated in crop production activities. Majority of are participated in cultivation of barely, bean, wheat, maize, potato, teff, chick pea and finger-millet. The second important activity is livestock rearing for consumption and income generating source. 94.7% of households were participated in animal rearing activities.

Off- Farm Activities

In this research off-farm activities are takes place outside the household farm within the agriculture sector in daily wage labor, natural resource based activities (fire wood selling, charcoal selling, hey selling, casual working, rent of land and rent of animals). The research data result revealed that, from the total 300 sampled respondent households 11.33% were participated in these types of activities. From these the majority of the rural households were participated in sale of charcoal, fire wood and daily wage labor activity by accounts 53%

of the respondents. The main reason for the participation of off-farm activities in the high land and middle agro-ecological zone were by pulling and pushing factors, but in the low land agro-ecological zone pushing factors (drought, reductions of land quantity and productivity) were the main reason to be participated.

Non-Farm Activities

These types of activities in the study area includes; Petty trading, hand crafts, milling service, selling local beverages and food, trading of small ruminants & cattle, remittances, tanning, black smith, priesthood, masonry and carpentry, small mining activities, hair cutting, dressing, income from pension and migration. From the study result the majorities are participated by pushing factor, but the minorities are participated in tanning and black smith, hair cutting, dressing and migration by pulling factors. 49(16.33%) of sampled rural household are participated in non-farm activity, while 251(83.7%) of the sampled rural household did not participated in these types activities. The other thing Muslim and Awurmba community are more participated in non-farm activities than orthodox religious follower like the men who attend in a religious school participated in non-farm activities by employed in church, traditional medicines preparing activities.

The Contribution of Livelihood Activities to the Rural Household Total Income

In this research the net total income of rural household includes: the total household income gain from different income source minus the total costs of production. The research result revealed that, the rural households' almost all net income were obtained from agricultural activities, which accounts 89.5%. The remaining 10.5% net annual incomes were obtained from off-farm and non-farm income activities 1% and 9.5% respectively and contradicts and very low with the national data which accounts 20-25% (WB, 2009; Adugna & Wegayehu, 2012 and WFP and CSA, 2015).

Livelihood Resources/Assets/Capital

Human Capital

In this study human capital includes household head age, sex, level of education and dependency ratio. The research result revealed that, educated household heads were more participated in non-farm and off-farm activities than uneducated head. From the total respondents of the rural household head 90.16% of are uneducated and participated in agriculture alone, but 87.5% of the educated respondents were participated in at least one of livelihood diversification strategies activities and 75% of religious educated household were participated consistent with Hatlebakk, 2009:6. Sex of the household head had significant effect on household livelihood diversification strategy. From the sampled households of male headed 108(40.45%) were participated in non and/off-farm activities, while from the total female headed households only 10 (30.3%) are participated in selling local bear, Katikala, bread, tea selling activities. The basic reason for female participation constraints are culture, infrastructure problem and information problem. Female headed were more participated in non-farm activities than off-farm activities.

Natural Capitals

Land is the natural resource stock. It is the basic and necessity livelihood asset for all activities of the rural households. As stated on the above clarification almost all of household livelihood and income are depends on land. The average land size of study area household head is less 0.75ha. The research result also revealed that, size of land holding by the rural household had significant and negative effect on non-farm and off-farm activities up to less than 1% significance level.

Social Capital

It refers to networks and connectedness. In the study area Debo, Idir, religious association (Mahiber and Senbete), neighborhood and friendship are organized by rural households themselves without any interference for their social values. These capitals are enabled as the households to help each other and solve their social problems in their own means of rule and regulation. The research result revealed that, almost all of the respondents are members of religious association and Idir for religious purpose and mutual support in sharing of job, social values, cultures and making social negotiations. The other formal social asset is membership of farmers cooperatives; among the member only 11(11.5%) are participated in non/off-farm activities and from non-membership 51.4% of are participated in non-farm activities. The key informants discussion result revealed that, the rural household having relatives/children in the urban area are advised them on agricultural activities, non-farm, off-farm and other employment opportunities and help them to obtain initial capital and credit services through remittance and/or awareness creation. This is line with (Adugna and Wegayehu, 2012).

Financial Capital

According to this study, farming income (forest income, livestock income, and crop production income), off-farm and non-farm income, remittances income, formal and informal credit and saving income were the major indictors of financial capital. The average annual income of the rural household is 20,426.57ETB (i.e. average income of agricultural is 18,284.45(89.5%), off-farm income is 202.63(1%) and the non-farm income is 1936.48(9.5%)). From the total agricultural annual household income; crop production income covers 86.43%, livestock rearing income 8.07% and forest income 5.5%. The high land agro-ecological zone household can gain high crop production than the low land rural households. The numbers of livestock had negatively affected the head livelihoods diversities strategy, but not significant. It is consistent with Keptymer, (2015) and inconsistent with (Yishak et al, 2014). As key informant interviewers result, most of the creditors in the rural area especially in high land agro-ecological zone use their credit for constructing of corrugated iron roof house and they return annually by lending from usurer.

Physical Capital

It comprises the basic infrastructure and the producer goods needed to support livelihoods. In this study physical capitals for rural household are access to electricity, road, media (radio or television), near market and town (≤5km) and irrigation facilities. The research finding revealed that, among the sampled rural households 5.7%, 41.06%, 41.7%, 49% and 28% were access to the electricity, gravel road, media, near market and town (at≤5km) and irrigation facilities respectively. The household, who participate in irrigation activity, had negatively diversified his household livelihood strategies and devotes more time to agricultural activities. From the total sampled households who had access to media, electricity, market and main road 123(52.8%), 17(73.7%), and 128(62.5%) were participated in off and/non-farm activities respectively and it is consistent with Gebrehiwot and Fekadu, 2012.

Policy and Institutions

In this context the study data revealed that extension training and frequency of contact by agriculture office professional had negatively affect the non-farm activities of rural household at 5% levels of significance. The development agents training and service with the rural households usually focus on agricultural intensification activities.

Vulnerability of the Study Area Households

Shocks: According to the key group discussion crop pests and diseases like locust, rust, corn smut, late blight, powdery mildew, Temchi (insect diseases), grazing land, livestock diseases with low veterinary service coverage were the common shocks in the study area.

Trends: The trends of the study area is highly dependent on natural resources for their livelihood combined with high rate of population growth, high degree of subsistence nature farming, natural resources degradation and mostly producing basic staples crop. In some districts of the study area rural households are participated in safety net program. This trend makes the household to less their participation in livelihood diversification strategies. Among the total destitute 27 participants in safety net program only 3(11.11%) are participated in non-farm activities while relief waiter and in line with the finding of Arega et al, 2012. Key informants discussion stated and observation took indicates that, all rural households used natural and manmade forests for cooking, construction of houses, heating and charcoal production purpose. This trend and natural resource gradation causes highly vulnerability on rural households.

Seasonal Ties: The highly dependency of rural household on subsistence nature agriculture and limited irrigation activity makes the rural household to deteriorate the vulnerability of drought/climate change. South Gondar agricultural department annual report indicates that, by the production year of 2015/16 from the total 551383.5ha rain fed cultivated land only 107910(19.6%) were irrigated. In this crop year from the expected production 17536868.5quintal 578683 quintal crop were destroyed by natural disasters by drought, pest, diseases, which can be feed 47186 household heads or 206673 person/annum. This data revealed that, almost the whole farmers were participated in rain fed agricultural practice during summer season. Despite, the farmer who participated in irrigation practice is live in better way and got high income. The main cropping season is from April to October.

The Challenge of the Rural Households' On Choices of Livelihood Diversification Strategy

Some researchers found different constraints of livelihood diversification strategies. In this study area the surveyed data result revealed that, among the total respondents of rural households 78(26%), 66(22%), and 49(16.3%) were faced the challenges of working capital and credit, infrastructure market access and lack of experience, awareness and culture respectively. For instance, the non-farm activities; blacksmith, weaving,

Table 3: Multinomial logit regression estimation of the choice of rural household livelihood diversification strategies

Independent variables	Farm+non-farm			farm+off-farm			farm+non-farm+off-farm		
	Coeff	Std. Err.	Margi. effect	Coeff	Std. Err.	Margi. effect	Coeff	Std. Err.	Margi. effect
Age	-.306	.173	-0.14(***)	-.180	.095	-0.073(***)	-.158	.104	-0.073(**)
Sex	1.855	1.952	0.25	3.74	1.54	0.070(*)	2.17	1.22	0.14(**)
Educ	2.765	1.244	0.20(**)	1.489	.651	0.13(**)	1.61	.617	0.07(*)
Dep	3.627	2.042	0.08(***)	2.70	1.85	0.06(***)	-.556	.625	0.0018
Farm size	-5.63	2.225	-0.06(*)	-6.80	2.23	-0.142(*)	-4.17	1.84	-0.153(**)
Crt	3.573	1.714	0.027(**)	2.50	1.58	0.109(***)	.921	.68	0.094(*)
Tlu	-.358	.317	0.001	-.38	.415	-0.15	-.283	.427	-0.0015
Ext	-1.55	.795	-0.043(**)	-.15	1.56	0.001	.952	1.59	0.0002
Dtown	4.895	1.874	0.10(*)	6.82	2.06	0.116(*)	1.72	.642	0.20(*)
Agrzone	2.077	.961	0.032(**)	2.83	1.03	0.017(*)	.851	1.07	0.0003
Sacct	5.453	2.145	0.07(*)	4.36	1.76	0.043(*)	3.27	1.77	0.134(***)
Irg	-1.63	1.913	-0.013	-.38	1.59	0.002	1.35	1.63	0.0007
Acele	2.961	1.796	0.024(***)	1.71	1.89	0.002	3.58	1.93	0.18(***)
loc	.6551	1.421	0.011	-1.023	1.49	0.001	.704	1.75	0.0003

Source: the researcher surveyed, 2016;

poetry making and tannery are left for some societies which come from their ancestors'. Weaving left for Muslims. Their work is only transfer from their father to their children. The other things the researcher found that the governmental and non governmental institutions and organization were not giving now extension, awareness and training about non/off-farm activities. In the study area without Awuramba community female does not participating in weaving, carpentry, cattle trading, house mudding and men didn't participate in spinning, poetry and local brewery making activities. This finding indicates that, gender division of works affect female household headed total income, their livelihoods and living standards than men.

Econometric Model Results on the Determinants of Livelihood Diversification Strategies

Before conducting multinomial logit regression model it was necessary to conduct multicollinearity test among predicted variable. Therefore, VIF was used to test the degree of multicollinearity problem among the continuous variables and contingency coefficient to test the degree of association among categorical variables. If VIF values high or exceeds 10 indicates highly multicollinearity problem. The value of contingency coefficient ranges between 0 and one. A value close to zero indicates weak co-linearity and a value close to 1 indicates presence of strong correlation among categorical explanatory variables (Guajarati, 2008). But, VIF value is below 2 and contingency coefficient is below the recommended i.e. near to zero. More over the model was run and tested for the validity of the irrelevant alternatives assumptions by using Housman test for IIA. Thus, multinomial logit specification is appropriate to model of the determinants of rural household livelihood diversification strategy. This means that there is no difference in odds ratios of one alternative choice remove or add one of the alternative outcome choices from the model (See Appendix table below).

Discussion of the Econometric Model of Multinomial Logit Regression Model

The model was used to identify the determinants of rural household livelihood diversification strategy. The independent variables (continuous and dummy) and results of logistic regression analysis conducted to identify and estimate the determinants of livelihood diversification strategy choice by rural households in the study area. The model shows that, the determinant of variables for each category with the base category the household head that choose farm alone as a livelihood strategy. The maximum likelihood method was employed to estimate the relative importance of predictor variables on the rural household decision to choose livelihood strategies. The parameter estimates of the multinomial logit model give only the direction of the effect of independent variables on the exploratory variable. But, the marginal effect measures the expected change in the probability of a given choice that has been made in relation to the unit change in the explanatory variable. Therefore, the predicted probabilities were better interpreted using the marginal effects of the multinomial model (Greene, 2012; Wooldridge, 2010). The multinomial logit model analysis result shows that, out of the total fourteen explanatory variables entered into the model eleven variables were significantly determine the livelihood diversification strategies from less than 1% to 10% significance level. Whereas, the remaining explanatory variables household head land holding certificate, total livestock holding and irrigation use were insignificant (table 3).

Multinomial logistic regression Number of obs = 300
LR chi2 (54) = 407.04
Prob > chi2 = 0.0000****over all model significance
Log likelihood = -127.62315
Pseudo R2 = 0.6146
*, ** and *** means the variables significant at 1%, 5% and 10% significance level.

A**ge of household head (Age)**: as expected, it is found significant and negatively influence farmers decision to diversify their livelihood diversifications at (P<0.1 for farm+off-farm and farm+non-farm, and for farm+ non-farm+off-farm at p<0.05). This implies that, the likelihood of a rural household choice of farm+off-farm, farm+non-farm and farm+non-farm+off-farm activities are decreased by 7.3%, 14% and 7.3% respectively with increasing head age. The possible one reason is rural households whose age is relatively youth, keeping other factors constant, it could be pushed to engage more in off-farm and non-farm activities than agriculture alone, because younger rural households can't get enough farm land to support their families. This study is consistent with Adugna, 2006 and Bekalu & Abdi, 2013 and contradicts with Gagabo, 2014.

Sex of household head (Sex): As expected sex of head is found to positively and significantly influences the diversification into farm+off-farm and activities at p=1% and p<5%, but not significantly affect farm+non-farm activities. Thus, keeping the influence of others variables constant, the probability of rural male household heads choice of farm+off-farm and farm+non-farm+off-farm strategy are increased by 7% and 14% than female household head respectively. This indicates that, male household heads are more participated in than female household head, because in developing countries females are constrained by cultural challenges and they engaged themselves in house activities. Additionally, in the study area majority of non-farm and off-farm activities is done far from the village area. In the opposite side, this study is in line with Amare and Belayneh, 2013 and contradicts with Gagabo, 2014 and Adugna and Wegayehu, 2012.

Distance to town (Dtown): This variable as expected has positive correlation with the dependent variable at p<1%. Thus, the rural household head participation into off-farm, non-farm and non-farm+off-farm besides agriculture are determined by the existing of infrastructure facilities of road, market and urban/town positively. The odds-ratio for the household heads is near the town, road and market indicates that, other things being constant the probabilities of the respondents to choose livelihood diversifications strategies are increased by a factor of 11.6%, 10% and 20% in distance less than five km respectively. This study result is in line with Beyene, 2008; Little et al, 2010; and Gebrehiwot and Fekadu, 2012 and contradicts with Nasai et al, 2010 and Yenesew, 2014.

Education status of the head (Edu): In study area paid local jobs require some education level of person in youth education and development program and safety net facilitator programs. Therefore, formal and informal education in the study area helps the rural household to diversify their livelihoods. However, most of the study area rural households are uneducated and the absence of education hinders the employments of the household even in unskilled required non-farm and off-farm income generating activities. The variable as expected has a positive significant correlation with to farm+off-farm, farm+non-farm and farm+non-farm+off-farm at (p<5%, P<5% and P<1%) significance level respectively. These indicated that, with increases in the levels of education of the household head the probability of diversifying livelihood highly increased keeping the other factors constant. The marginal effect for education conforms that a one year increase in education level of household head will increase the likelihood of being in diversifying livelihood strategies of farm+off-farm, farm+non-farm and farm+off-farm+non-farm activities by 13%, 20% and 7% respectively. This is in line with Metasebia, 2009; Adugna, 2012; Gebrehiywot &Fekadu, 2012; Amare and Belayneh, (2013); and inconsistent with Adugna, 2006.

Agro-ecological zone (Agrzone): as not expected earlier, this variable has a positive correlation and significant at (p<5% and p<1%) significance level with the likelihood of choosing farm+non-farm and farm+off-farm activities respectively. This shows that, the livelihood diversifications of rural households are increases as we go from low lands to high lands agro-ecological zone due to access to town, access to education, infrastructure opportunities and low land size. Hence, the probability of diversifying livelihood strategies of farm+off-farm and farm+non-farm increases by 1.7% and 3.2 % respectively. It is consistent with Adugna and Wegayehu, 2012 and Hettlebakk, 2009:6 and contradicts with Amare & Belayneh, 2013.

Cultivated land size in Hectare (Farsize): it is not as hypothesized earlier. It is significant at less than 1% and 5% levels of significance and negatively correlated with household livelihoods diversification strategies with farm alone as base category. This means that, keeping the other factors constant the probability of rural household's participation and get their livelihoods within farm+off-farm, farm+non-farm and farm+off-farm+non-farm livelihood diversification strategies are decreases as land size increased by 14.2%, 6% and 15.3%. On the contrary more land tends to follow and devote more time to agricultural intensification rather than diversification. The land owner and rural dwellers considered off-farm activities as last job opportunities and low paying activities. The result is inconsistent with, Adugna, 2006; Gebrehiwot & Fekadu, 2012; Amare & Belayneh, 2013

and inconsistent with Adugna and Fekadu, 2012; Bekalu & Abdi, 2013; Gagabo, 2014 and Yishak, 2014.

Credit use/access (Crt): in line with the expectation, credit access is found have a positive impact on likelihood of choosing livelihood diversification strategies. It is significant at< 5% for farm+non-farm, at < 1% for farm+non-farm+off-farm and at< 10% for farm+off-farm livelihood diversification strategies. This implies that, the likelihood of participations of rural household in livelihood diversification strategies increases by 2.7%, 9.4% and 11% as credit use or access increases by one unit respectively. Formal and informal credit access helps to participated in non-farm activities; in local activities like cattle trading, grain, trading of fire wood, etc. The result is in line with Bezabih et al, 2010; Ibekwe, 2012 and Kaptymer, 2015 and contradicted with Adugna and Wegayehu, 2012 and Bekalu &Abdi, 2013.

Saving account (Sacct): As expected, this variable is found significant and positively affect the alternative choose of different livelihood diversification strategies of farm+non-farm, farm+off-farm and farm+non-farm+off-farm at < 1%, at1% and at <10% significance level respectively. This indicates that a 1% of increasing in saving rate of head, on the average leads to the probability of rural household head choosing on farm+non-farm, off-farm and farm+non-farm+off-farm livelihood diversifications strategies are increased by 7%, 4.3% and 13.4% respectively. This revealed that, household head could saved in account book had better understanding and forecasting ability in the future and it is in line with Gagabo, 2014.

Extension agent training and contact (Ext): as not expected earlier, this variable has a negative and significant correlation with the likelihood of diversifying to farm+non-farm livelihood strategies. If the other determined factors constant, the likelihood of choosing in farm+ non-farm activities are decreased by 4.3% for those who gained extension contact and agricultural training by development agent than the contrary. In the study area the rural household gained extension training and contact, had more participated in agriculture intensification activities than the counterparts and it is in line with Yishak, 2014 and contradicts with Gebrehiwot & Fekadu, 2012; Bekalu &Abdi, 2013.

Dependency ratio (Dep): as expected earlier, it is found to has a significant and positive relationships with the choice of farm+non-farm and farm+off-farm livelihood diversification strategies at < 10% significance level. It indicates that, keeping the other factors constant the likelihoods of diversifying strategies to farm+non-farm and farm+off-farm increased by 8% and 6% as the dependency ratio increased by 1%. This means that, when the dependency ratio increase, the ability of rural heads to meet basic needs decrease, the chance of choosing farm+non-farm and farm+off-farm activities increases.

Access to electricity (Acele): As hypothesized it is found to have a positive and significant relationship with the choice decision of farm+non-farm and farm+non-farm+off-farm livelihood diversification strategies at 10% significance level. Keeping the other factors constant, the accessibility of electricity increase by 1% the probability of the household head livelihood diversification strategies of farm+non-farm and farm+non-farm+off-farm are increased by 2.4% and 18% respectively.

CONCLUSION AND RECOMMENDATION

Conclusion

Agriculture is the dominant economic activity and the primary source of livelihoods for the rural households of the study area with its problems of high population growth, diminishing farm land size, erratic nature of drought, deteriorating production of agriculture through over time. The income contributions and the participation of non-farm and off-farm activities were determined and constrained by unexamined factors. Based on these, the primary and secondary sources of data were collected from 300 rural household heads by using multistage randomly sampled techniques for structured question interviewed and assessing and interviewing published data and unpublished data.

Thus, descriptive statistics result revealed that, from the sampled respondents the majority 60.67% of households were participated in agricultural activities alone, while 16.33%, 11.33% and 11.67% were participated in farm+non-farm, farm+off-farm and farm+non-farm+off-farm respectively. From the total sampled respondents almost all were got their livelihoods from agricultural activities, which account 89.5% of the total annual income. The remaining 10.5% of incomes of the rural household head were from non-farm and off-farm activities. The result of multinomial logit model regression also indicates that, out of fourteen variables included in the model eleven independent variables were found to be significant from <1% to 10% significance levels. Household head age, farming land size, and extension agent frequency of contact and training were found out significantly and negatively affect the rural livelihood diversification strategies, while, credit access, saving account use, distance to infrastructure, sex, education status, agro-ecological zone and dependency ratio were found out positive and significant factors. Whereas, household head land certificate holding, total livestock holding and irrigation use were insignificant.

According to the research result, the challenges of the rural households in the study area in livelihood diversifying strategies which help them to achieve food security and change livelihood improvement should not left aside to farm alone. The sector alone agricultural intensification without non and/off-farm activities should not be relied upon as a means of the core activity for rural households' livelihood improving, achieving food security and reducing poverty. So, inter-sectored issues in farm+off-farm and farm+non-farm livelihoods need to be must address well.

Recommendation and Policy Implications

Based on the findings of this study the following recommendations and policy implications are possible area of interventions which might assist to choose the best alternatives livelihood strategies by improving the given attention to agricultural intensification and in order to avoid the one size of fit prescription of policy makers that not fit the rural households.

❖ The concerned organizations and institutions should give skilled training for rural households in non-farm activities, give encouragement and incentives for exemplars and must established formal organization/departments to attend and controlled non-farm and/off-farm activities at each level,

❖ The significant and negative determinants of variables on livelihood alternatives; governments and other concerned bodies must design awareness creation system to rural communities to participate women like Awuramba community which have in the study area,

❖ Major attention should be given to build infrastructures like road networks, market centers that help to promote non-farm enterprise employment, to overcome the entry barrier and make it accessible for rural farm households,

❖ Non-farm and/off-farm activities need to be incorporated in governmental plans and policies for balanced growth between urban and rural households,

❖ Programs that encourage the rural women to be participated in non/off-farm activities should be in place in order to overcome the gender bias and improve rural women educational status to enhance livelihood diversifications in the study area,

❖ Education level of rural household in the study area was found to be one of the important determinants of livelihood diversification strategy. Thus, government should focus and investing on educations of Adult and youth farmers,

❖ The government and the related organizations give attention and motivation to rural credit and saving programs in order to be function according to the plan of credit taking,

❖ There must be policy and program intervention to facilitate and stimulate rural non-farm and/ off-farm employment,

❖ Government must be measuring the involvement of local government bodies, NGOs, cooperatives and provision of infrastructure (market, credit, road and etc) for promoting diversified non-farm and off-farm employment and,

❖ Finally the author of this study recommends further detail analytic investigations need on; why some non-farm activities like blacksmith, poetry making, tannery production and weaving activities; we left for some communities and not diversify to the other rural communities?

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APPENDIX TABLE LIST

Table 4: Descriptive statistics of categorical variable with the choice of livelihoods in number

Categorical Variables	Response of HH	Livelihood diversification strategy choice (%)				Total no.	Chi^2 value
		Lds=0	Lds=1	Lds=2	Lds=3		
Edu	Illiterate	90.16	3.28	4.10	2.46	122	107.5789
	Read and write	64.44	8.89	17.78	8.89	45	
	First primary sch(1-4)	43.75	25.00	14.06	17.19	64	
	First primary sch(4-8)	29.27	31.71	14.63	24.39	41	
	Secondary sch (>9)	0	47.06	23.53	29.41	17	
	Religious sch.	27.27	36.36	18.18	18.18	11	
Sex	Male	64	19	13	4.2	262	6.836
	Female	69.7	33.33	3	3	33	
Distance to near town	No	84.3	8.7	6.4	0.5	172	72.2
	Yes	37.5	36	18	8.6	128	
Credit use	No	84.4	11	4.2	5.7	192	96.76
	yes	28.7	26	24	22.2	108	
Land certificate	No	16.47	37.65	32.94	12.94	85	114.823
	Yes	77.21	9.30	2.79	10.70	215	
Irrigation use	No	55.35	19.49	14.36	10.77	95	8.1259
	Yes	68.57	13.33	5.71	12.38	105	
Saving account	No	74.4	12.6	6.8	6.3	191	105.91
	Yes	36.7	22.9	19.3	21.00	109	
Access to electric	No	69.14	12.35	9.05	9.47	281	44.83
	Yes	15.8	47.4	5.2	31.5	19	
Agro-ecological zone	High land	47.87	11.70	26.60	13.83	98	43.6715
	Medium land	67.52	17.20	2.55	12.74	157	
	Low land	59.18	28.57	10.20	2.04	45	
Membership to Farmers' cooperative ass.	No	43.16	26.84	16.32	26	204	65.4051
	Yes	89.09	1	2.73	7.27	96	
Extension contact and training	No	37.76	33.67	20.41	8.16	98	46.2893
	yes	70.79	9.41	6.93	12.87	202	
Remittance	No	68.14	13.72	9.73	8.41	226	29.6239
	Yes	35.14	28.38	16.22	20.27	74	

(**Source:** own survey, 2016); Lds=0; farm alone, Lds=1; farm+non-farm, Lds=2; farm+off-farm and Lds=3; farm+non-farm+off-farm.

Appendix **Table 5:** Conversion factor of man equivalent and adult equivalent

Age group (years)	Man Equivalent		Adult Equivalent	
	Male	Female	Male	Female
<10	0	0	0.6	0.6
10-13	0.2	0.2	0.9	0.8
14-16	0.5	0.4	1	0.75
17-50	10	0.8	1	0.75
>50	0.7	0.5	1	0.75

Source: Storck, et al. (1991 as cited in Arega and Rashid, 2005).

Appendix **Table 6:** Tropical Livestock Unit (TLU) equivalent conversion factors

Livestock Type	Conversion factors
Cattle	0.7
Sheep	0.1
Goats	0.1
Donkeys	0.5
Camels	1.0
Horse	0.8
Chicken	0.01

Source: Janke (1982)

Table 7: the variance inflation factors of continuous variables Variable

	VIF	1/VIF (tolerance)
Dep	2.26	0.443195
Farize	1.98	0.505435
Age	1.72	0.581438
Tlu	1.47	0.679829
Mean VIF	1.92	

Table 8: contingency coefficient for categorical independent variables

. corr Sex Edu Crt Ext Dtown Agrzone Sacct Irg Acele Com Rim loc (obs=300)

	Sex	Edu	Crt	Ext	Dtown	Agrzone	Sacct	Irg	Acele	loc
Sex	1.0000									
Edu	0.1016	1.0000								
Crt	-0.0611	0.2255	1.0000							
Ext	0.1251	-0.0571	-0.1129	1.0000						
Dtown	-0.0874	0.2297	0.2797	-0.1108	1.0000					
Agrzone	-0.1007	-0.1072	-0.0392	0.0444	0.0420	1.0000				
Sacct	0.0277	0.3829	0.3748	-0.1876	0.3173	-0.2215	1.0000			
Irg	0.0966	-0.0072	-0.1864	0.0258	-0.0961	0.0285	-0.0156	1.0000		
Acele	-0.0402	0.2765	0.2032	-0.1938	0.3209	-0.0309	0.4314	0.1078	1.0000	
Loc	-0.0451	-0.2146	-0.4068	0.2350	-0.2204	-0.0082	-0.3642	0.0737	-0.3177	1.0000