Determinants of Rural Households Livelihood Strategies: Evidence from Western Ethiopia

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Abstract
This study identified rural household livelihood strategies and their determinants in the Assosa district of BGRS, western Ethiopia. Both primary and secondary data sources were used for the study. Primary data were collected from 180 sample households through interview and focus group discussions. Relevant secondary data were also obtained from Assosa bureau of agriculture and rural development, other governmental offices, internet and reports. Descriptive statistics (mean, percentage and frequency) and inferential statistics (ANOVA and chi-square) were used. MNL model was estimated to identify the determinants of households' choice of livelihood strategies. Descriptive statistics result pointed out that about 66.7% of rural households combined on-farm activities with non-farm and/or off-farm activities, whereas about 33.3% were relying only on on-farm activities to achieve their livelihood goal(s). ANOVA and Chi-square tests showed that there was a significant difference between household falling in different livelihood strategies in terms of total annual cash income, frequency of extension contact, literacy status of the household heads, leadership, access to training and participation in cooperative membership. MNL model results confirm that age of household head, settlement, family size, frequency of extension contact, livestock holding, access to credit, access to training, total annual cash income, membership in cooperatives and access to fertilizer have a statistically significant impact on the choice of livelihood diversification strategies. Therefore, future policy should focus on awareness creation on livelihood diversification through different sources such as training and extension on off-farm and non-farm opportunities and on the role of participating in cooperatives, facilitating the availability of credit and fertilizer, enhancing elder farmers' knowledge, etc.
Keywords: Livelihood, Livelihood strategies, Multinomial logit model, Rural households, Western Ethiopia

1. INTRODUCTION

Agriculture is still the backbone of the Ethiopian economy as it contributes 43% of GDP, creates more than 80% of employment opportunities and generates over 83% of foreign exchange earnings of the country (UNDP, 2014). Generally, it is the primary means of livelihood for the community. As depicted by FAO (2012), despite its contribution to the livelihood of the society, the increasing population growth in developing countries, including Ethiopia forced households to cultivate and make their living on the small size of land. Due to the decline in land holding per individuals as well as fragmentation of their holding and low income obtained from farming activity the majority of rural households are exposed to food insecurity and chronic poverty. In addition, due to periodic drought and extremely variable environment, making farming risky economic activity farmers face fluctuation in their income. As for Amsalu *et al.* (2014) finding, rural households diversify their activities into off-farm and non-farm activities to off-set the diverse forms of risks and uncertainties associated with agriculture; create a way of smoothing their income over the years and seasons; and reduce their vulnerability to different kinds of shocks, seasonality and trends.

The livelihood of the rural households in the study area is primarily based on subsistence agriculture. This subsistence agriculture has been and is facing challenges such as insects, pests; land degradation which results in poor quality of land and animal diseases which cause the food deficit in the area (Yilma, 2005). Rural households in the area engage in diverse livelihood strategies away from purely crop & livestock production towards non-farm & off-farm activities which are undertaken to generate additional income for survival and cope with harsh conditions. But, there was no empirical data that substantiate or supports the existing livelihood strategies practiced by the farmers in the area. To intervene the problem, there needs to untie the interwoven factors which can motivate rural households to diversify their livelihood strategies and improve their participation in different off-farm and /or non-farm activities have got paramount importance to development practitioners and policy makers to find the way out (Gebrehiwot and Fekadu, 2012). Therefore, a thorough understanding of factors determining choice of livelihood strategies is important to improve the response mechanisms related to poverty, food security and livelihood improvement. This study aimed at investigating the livelihood strategies practiced by rural households and analyzing determinants of rural household's choice of livelihood strategies.

2. METHODOLOGY

2.1. Description of the Study Area

Asosa district, the study area, is one of the 20 districts of BGRS of Ethiopia. The estimated land area of the district is 2330 square kilometers. The district has 74 rural PAs out of which 38 are occupied by settlers and 36 are

occupied by natives. The total population of the district was 92,687, of whom about 73.98% live in rural set-ups while the remaining 26.01% were urban dwellers. Mixed farming (crop production and livestock rearing) is the predominant sources of livelihood for the majority of the population in the area (BGRDGA, 2010).
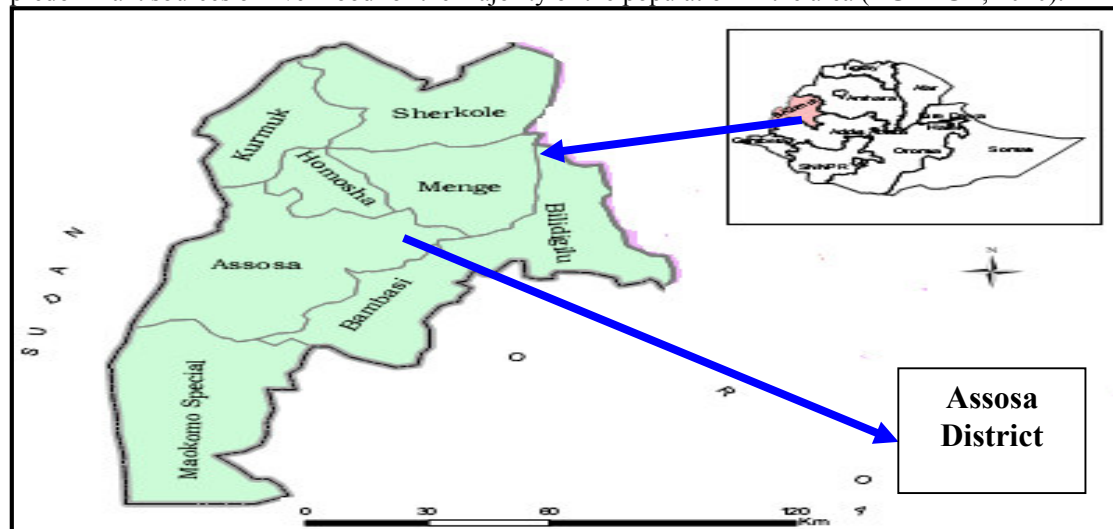

Figure1: Map of the study area

2.2. Sampling Design
Multistage stratified random sampling technique was used to select sample households. In the first stage, the 74 Peasant Associations (PAs) in the district were stratified into two: as natives (36 PAs) and settlers (38 PAs). In the second stage, a total of 6 PAs (3 from natives and 3 from settlers) were randomly selected. In the third stage, a total of 180 sample household heads were randomly selected based on probability proportional to size of the households in the selected PAs.

2.3. Data Sources and Method of Collection
Both primary and secondary data were used for this study. Primary data were collected from sample households using interview schedule. Primary data were collected by enumerators and the researchers. The enumerators were trained on how to conduct the interview questions and how to approach farmers during the interview. In addition to this, FGD and key informant interview were employed to supplement the research with qualitative information. Secondary data were also gathered from various sources such as Assosa district office of agriculture and rural development, finance and economic office, regional offices, *etc*.

2.4. Methods of Data Analysis
The study employed descriptive and inferential statistics along with a Multinomial logit model to analyze the data. Descriptive statistics such as mean, percentage, standard deviations and frequency were used. In addition, ANOVA and chi-square tests were used to compare and contrast households in different livelihood categories with respect to the desired characteristics.

Econometric Model
MNL econometric model was employed as it enables to analyze the determinants of households' choices of livelihood strategies in the context of multiple choices. The household decision of whether or not to undertake livelihood strategies will be considered under the general framework of utility or profit maximization (Norris and Batie, 1987). It is assumed that households use livelihood strategies only when the perceived utility or net benefit of using a particular strategy is significantly greater than in the base category. In this context, the utility of the households is not observable, but the actions of the economic agents could be observed through the choices they made. To describe the MNL model, let Y_i be a random variable representing the livelihood strategy chosen by any sample household. The MNL model for a livelihood choice specifies the following relationship between the probability of choosing option Y_i and the set of explanatory variables X as (Greene, 2003):

$$Pro\left(Y_i = \frac{j}{x}\right) = \frac{e^{\beta'_j X_i}}{1 + \sum_{k=0}^{j} e^{\beta'_j X_i}}, j = 1,2 \dots J \tag{1}$$

Where j stands for livelihood strategies, x stands for explanatory variables and β_j stands for parameters to be estimated. The parameter estimates of the MNL model provide only the direction of the effect of the explanatory variables on the dependent variable (livelihood strategies), but do not represent either the actual magnitude of

change or probabilities. To interpret the effects of explanatory variables on the probabilities, marginal effects are usually derived as (Greene, 2003):

$$\frac{\partial p_j}{\partial X_i} = P_j\left(\beta_j - \sum_{k=0}^{j} P_k\,\beta_k\right) = P_j\left(\beta_j - \overline{\beta}\right) \qquad (2)$$

2.5. Definition of variables

Dependent variable	Measurement	Hypothesis
Livelihood strategy	**Unordered categorical variable** (takes a value 0 if the HH relies on only on-farm activity, 1 if the HH relies on on-farm+off-farm activity, 2 if the HH relies on on-farm + non-farm activity and 3 if the HH relies on on-farm+off-farm+non-farm activity.	
Independent variables		
Nature of settlement	Dummy (1= settler, 0= native)	+
Sex of HH head	Dummy (0= female, 1= male)	-
Livestock holding	Continuous (TLU)	-
Farm size	Continuous (hectares)	-
Literacy status of HH head	Dummy (1= literate, 0= no formal education)	+
Total annual cash income	continuous (Birr)	+
Access to training	Dummy(1= access to training, 0=otherwise)	-
Fertilizer use	Dummy(1= if used, 0=otherwise)	-
Improved seed	Dummy(1= if used, 0=otherwise)	-
Age of HH head	Continuous (years)	-
Family size	Continuous (number)	+ or -
Frequency of extension contact	Continuous (number of visit per year)	+
Credit use	Dummy(1= if the HH get credit, 0=otherwise)	-
Membership in cooperatives	Dummy(1= if a member, 0=otherwise)	+
Distance to market	Continuous (km)	-
Dependency ratio	Continuous (ratio)	+
Leadership	Dummy(1= if leader in the community, 0=otherwise)	+

3. RESULTS AND DISCUSSION
3.1. Rural Households Livelihood Strategies
In the study area, farmers have adopted different strategies to achieve their livelihood outcomes. About four different patterns of livelihood strategies emerge from the analysis of activity portfolios of households. Figure 2 gives a breakdown of the different livelihood strategies that households pursue in the study area.
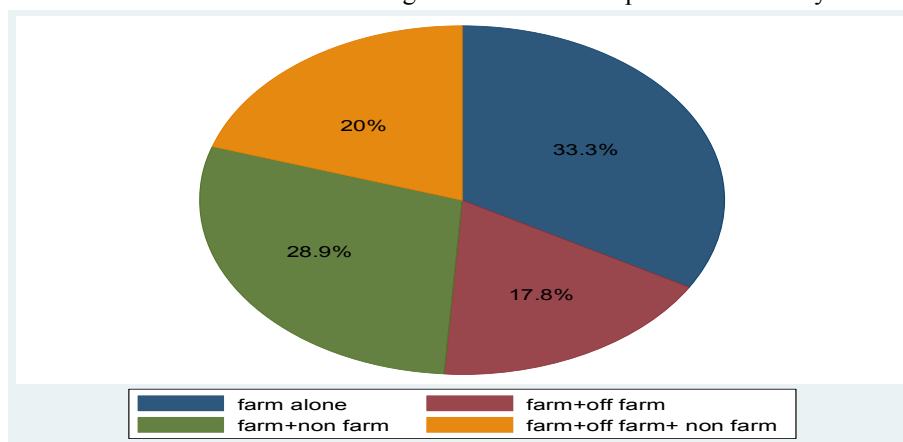

Figure 2: livelihood strategies used by rural households in the study area

      The descriptive statistics (pie chart) result indicated that relying only on farm activities as a livelihood strategy is the most commonly used strategy by the farmers in the study area. About 33.3% of sampled households were engaged only on-farm activity (crop and livestock production) as their livelihood strategy. Moreover, about 28.9% of the households combined on-farm activity with non-farm activity as their livelihood strategy. They

combined crop and livestock production with non-farm activities like petty trade, mining, handicraft, casual labor, *etc.,* to achieve their livelihood goals. The combination of farm and off-farm activities was among the strategies practiced by rural household heads. The descriptive statistics result also indicated that about 17.8% of the households were practicing crop and livestock in combination with off-farm activities like beekeeping, poultry farming, working on others farm, wild fruit gathering, *etc.,* to draw their livelihood. Finally, about 20% of the sampled households were engaged in the combination of farm, off-farm and non-farm activities to drive their livelihood.

3.2. Comparison of Livelihood Strategies

The study employed ANOVA (F-test) and chi-square test to make comparisons (to make sure the presence or absence of difference) between the livelihood groups of the households. The mean values of continuous variables in all livelihood categories were compared using ANOVA (F-test). The analysis of variance (ANOVA) showed the presence of a significant mean difference between rural households falling in the four livelihood strategies in terms of total annual cash income and frequency of extension contacts. The study showed that those farmers who were using the combination of on-farm, off-farm and non-farm activities as their livelihood had relatively better total annual cash income than the others. The mean value of total annual cash income earned by those farmers relying on combination of farm, off-farm and non-farm activities for their livelihood strategies was Birr 23200, while it was Birr 17900, 8554 and 7712.6 for those households relying on farm and non-farm, farm and off-farm and farm alone to drive their livelihood respectively. It also indicated that those households depending on farm alone for their livelihood had more frequency of contact than the rest categories. The mean value of extension contact received by those farmers relying only on farm activities for their livelihood strategies was 17.4 contacts, while it was 12.85, 12.4 and 12.08 contacts, respectively, for those households relying on farm and non-farm, farm and off-farm and a combination of farm, off-farm and non-farm activities as their livelihood strategies (table 1).

Table 1: Summary statistics for continuous variables by the choice of livelihood strategies.

Independent variables	Livelihood strategies					F-value
	Y=0	Y=1	Y=2	Y=3	Total	
	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	
Total income	7712.6(8248)	8554(7313)	17900(17295)	23200(21634)	13900(15758.1)	11.22***
Extension contact	17.4(5.05)	12.4(5.98)	12.58(4.32)	12.08(5.93)	14.06(5.69)	12.37***

Source: own survey, 2016. *** indicates significant at 1% probability level. Y=0, Y=1, Y=2, and Y=3 represents on-farm only, on-farm plus off-farm, on-farm plus non-farm, and on-farm plus off-farm plus non-farm respectively.

On the other hand, a chi-square test indicated the existence of statistically significant difference between the four strategies in terms of 4 discrete variables. More specifically, the test revealed that there was a significant difference between the livelihood groups in terms of the literacy status of HH heads, leadership, access to training and participation in cooperatives at less than 10% significance level (table 2).

Table 2: Summary of statistics for dummy variables by choice of livelihood strategies.

Independent variables	Response	Livelihood strategies of households (%)					χ2 value
		Y= 0	Y= 1	Y= 2	Y= 3	Total	
Literacy status of HHs	Literate	35	46.9	46.2	63.9	46.1	7.57*
	no formal education	65	53.1	53.8	36.1	53.9	
Leadership	Yes	23.3	28.1	26.9	47.2	30	6.64*
	No	76.7	71.9	73.1	52.8	70	
Access to training	Yes	53.3	28.1	26.9	50	40.6	11.45**
	No	46.7	71.9	73.1	50	59.4	
Membership in cooperatives	Yes	40	56.2	71.2	69.4	57.8	13.63***
	No	60	43.8	28.8	30.6	42.2	

Source: own survey, 2016. *, **, and *** indicates significant at 10, 5, and 1% probability level respectively. Y=0, Y=1, Y=2, and Y=3 represents on-farm only, on-farm plus off-farm, on-farm plus non-farm, and on-farm plus off-farm plus non-farm respectively.

3.3. Determinants of Farmers' Choice of Livelihood Strategies

MNL was used to identify the determinants of rural households' choice of livelihood strategies. The model analysis used relying on farm alone as the base category for no diversification and evaluates the other choices as alternatives to this option (see Appendix table 1). The overall model is significant at 1%. Therefore, in this study, only those variables, whose coefficients were statistically significant at less than or equal to 10% probability levels were discussed. Settlement of HH head, age of HH head, household's family Size, livestock holding, total annual income, frequency of extension contact, participation in cooperative, access to credit, fertilizer usage and access to training were significant variables determining household's choice of livelihood strategies (see Appendix table 1). But the

rest were insignificant variables.

Nature of Settlement: settlement of the HH head positively affects the combined usage of on-farm, off-farm and non-farm strategy as a livelihood diversification strategy. Holding other factors constant, being a settler HH head increases the likelihood of adopting a combination of farm, off-farm and non-farm as a livelihood strategy by 27.6% as compared to the base category relying only on farm activity (appendix table 1). This could be due to fragmentation and small size of holding of settler farmers, these in turn forces them to divert part of their labor force to off-farm and non-farm activities.

Age of household head: It affected farmers' decision to diversify livelihood strategy negatively and significantly at 5%. Holding other variables constant, the likelihood of household head simultaneous choice of farm plus non-farm strategy and farm, off- farm plus non-farm strategy decreases by 0.11% and 0.66%, respectively, when age increase by one year relative to the base category relying on farm alone (Appendix table 1). The possible reason is that elder farmers are well established and more experienced in agricultural production, more resistant to new ideas and information; they are more likely to be set in their ways and may not venture into new diversification activities. This finding is similar to that of Fikru (2008).

Family size: It was found to have a positive and significant effect on the use of farm plus off-farm strategy and farm, off- farm plus non-farm strategies at 5% probability level. Ceteris paribus, one extra person in the household increases the likelihood of using farm plus off-farm, and farm, off- farm plus non-farm strategies by 2.1% and 1.65% respectively (appendix table 1). This could be due to the relation between larger family size and household labor in order to meet basic needs of the family relative to the benchmark alternative farm alone. Furthermore, large families are able to practice multiple activities, whereas smaller ones tend to practice only crop production with a livestock activity. This finding is similar to that of Bezemer and Lerman (2002).

Total annual household income: As expected, this variable found to have a positive and significant influence on household's choice of on-farm plus non-farm, and a combination of on-farm, non-farm and off-farm livelihood diversification strategies at less than 1 % probability level. From the model result, other things being constant, the marginal effect reveals that the probability of a household using on-farm plus non-farm and combination of on-farm, non-farm and off-farm activities increased by 29.9% and 12.34%, respectively, for those farm households whose income increased by 2.7 Birr (appendix table 1). This is because households with large total income can easily meet their consumption as well as other family requirements and beyond that they go for demand pull livelihood outcomes (such as accumulation of assets, more income, *etc.*). Thus, they can easily overcome financial constraints to engage in alternative non/off-farm activities. This finding is in line with the finding of Yizengaw *et al.* (2015).

Livestock holding: It positively and significantly influenced the use of farm plus non-farm livelihood strategy at 5% significance level. That means, Ceteris paribus, an increase in livestock holding by 1 TLU increases the likelihood of using farm plus non-farm strategy as a means of their livelihood by 0.8% relative to the benchmark alternative on-farm only (appendix table 1). This is explained by the fact that herd size is a proxy for wealth status of farmers. Those farmers with large herd size can easily meet their family food and other requirements and have a better chance to earn more money to invest in non-farm income generating activities with an intention of accumulating assets for the future. This result is consistent with the findings of Amare and Belaineh (2012).

Extension contact: It has a negative and significant impact on diversification of livelihood strategies at 1% significance level. From the model result, other things being constant, the marginal effect reveals that the probability of a household using on-farm plus off-farm, on-farm plus non-farm, and a combination of on-farm, non-farm and off-farm activities decreased by 0.93%, 2.57% and 1.71%, respectively, for a unit increase in the frequency of extension contact relative to the base category (appendix table 1). The possible justification is that extension services are an important source of information on agronomic practices. The availability of better agricultural information and technical assistance on agricultural activities helps farmers to produce alternative crops; and to obtain higher production and income. This finding is in line with the findings of Seid *et al*. (2016).

Access to credit: It has a negative and significant impact on likelihood of using the combination of on-farm and non-farm activities at 5% significance level. From model result, other things being constant, the marginal effect reveals that having access to credit decreases the probability of a household using on-farm plus non-farm activities by 25.52% (appendix table 1). This is because farmers take credit from lenders to use it for purchasing different types of inputs such as fertilizer, improved crop varieties, irrigation facilities, *etc.,* to improve their agricultural production and productivity. These in turn help them to satisfy family consumption requirements and improve their income rather than using a combination of on-farm and non-farm activities.

Membership to cooperatives: As expected, this variable found to have a positive and significant influence on household's choice of on-farm plus non-farm, and a combination of on-farm, non-farm and off-farm strategies at less than 1 % and 5% significance level, respectively. The marginal effect reveals that, holding other things constant, being a member of a cooperative increase the probability of a household using on-farm plus non-farm, and a combination of on-farm, non-farm and off-farm activities by 25.77% and 5.15%, respectively (appendix table 1). This is because cooperatives are a social capital that promotes sharing of knowledge, information,

experience, *etc.,* regarding the value of off and non- farm activities that helps them to improve their livelihood. In addition, cooperatives serve as a means of gaining off-farm and non- farm employment opportunities. This finding is consistent with the findings of Adugna and Wagayehu (2012).

Access to training: It is found to have a negative and significant effect on the combined use of on-farm and non-farm as a livelihood strategy at 5% significance level as compared with relying only on-farm activities to drive their livelihood. The marginal effect reveals that, holding other things constant, having access to training decreases the likelihood of a household using combination of on-farm and non-farm activities by 27.02% (appendix table 1). This is because most of the trainings provided to the farmers were on ways of improving agricultural production and productivity. This in turn helps them to get better production, and then this most likely leads to obtain more income to fulfill their family requirements by enhancing their agricultural production skills, knowledge and experiences. The result of the study is consistent with findings of Yishak *et al*. (2014).

Fertilizer use: the model result showed that access to fertilizer negatively and significantly affected using a combination of on-farm, off-farm and non-farm activities as a livelihood strategy at 1% significance level as compared with the base category. The marginal effect of the model reveals that, holding other things constant, using fertilizer in agricultural production decreases the likelihood of a household using a combination of on-farm, off-farm and non-farm activities by 43.56 % (appendix table 1). The possible reason could be fertilizer usage most likely increase the production and productivity of crops produced by the farmer, and this can help a farmer to get access to more food and generate more income so that they satisfy their family requirements. This finding is consistent with the finding of Woinishet (2010).

4. CONCLUSIONS AND RECOMMENDATIONS

The study examined determinants of rural household's livelihood strategies using a data collected from 180 household heads. The finding of the study indicated that about 33.3%, 28.9%, 20% and 17.8% of the rural households were relying on on-farm only, on-farm plus non-farm, on-farm plus off-farm plus non-farm and on-farm plus off-farm strategies, respectively, to draw their livelihood. Generally, the majorities (67.7%) of the households were combining on-farm activities with off-farm and non-farm activities to achieve their livelihood goals. Moreover, the ANOVA and chi-square tests indicated the existence of significant difference between households falling in the four livelihood categories in terms of total annual cash income, frequency of extension contact, literacy status of household heads, leadership role, access to training and membership in cooperatives.

The MNL model results confirm that family size and frequency of extension contact have a significant effect on the use of combination of farm and off-farm strategy as compared with the base category farm alone. The result also shows that age of household head, livestock holding, access to credit, access to training, total income, frequency of extension contact and membership in cooperatives significantly affect the combined use of farm and non-farm strategy as a livelihood strategy. In addition, age of household head, settlement, family size, frequency of extension contact, total annual cash income, membership in cooperatives and access to fertilizer significantly affect combined use of farm, off-farm and non-farm strategies as compared with the base category relying farm alone as a livelihood strategy.

Therefore, based on the findings of the study policies as well as actions directed towards improving the livelihood of the rural population in the study area should focus on:

➢ Enhancing settler households' knowledge and access to off-farm and non-farm employment opportunities;

➢ Improving rural households' livestock holding by giving due attention new livestock breeds, animal forage and emphasizing on disease problems;

➢ Enhancing rural households' awareness about the role of participation in cooperatives as it promotes access to social capital from which they can gain off/non-farm employment opportunities;

➢ Improving frequency of extension visit, access to training, access to fertilizer and access to credit to increase farmers' intensification in farming (diversification within farming) to improve their livelihood. Because more extension visit and training ensures that farmers have the information on different agronomic practices for decision making; and fertilizer use and access to credit enhances their agricultural production and productivity.

➢ Enhancing elder households' awareness to ensure availability and dissemination of accurate information as it helps them to intensify farming rather than diversifying their activity into off-farm and non-farm activities.

➢ Finally, intervention should focus on improving access to off-farm and non-farm opportunities, awareness creation, *etc.*, for those households who have large family size.

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Appendix table 1: Parameter estimates of the multinomial logit model for determinants of choice of livelihood strategies

| | Livelihood strategies | | | | | |
| | Farm + off-farm | | Farm + non-farm | | Farm + off-farm + non-farm | |
Explanatory variables	Coefficients	Marginal effect	Coefficients	Marginal effect	Coefficients	Marginal effect
Sex of household head	0.394	.0606985	0.051	-.0209626	0.009	-.0098428
Settlement of household head	1.093	.0339209	0.72	-.0730196	3.277**	.2765279
Age of household head	-0.028	-.0000684	-0.011**	-.0011664	-0.093**	-.006599
Literacy status of household head	0.109	-.010982	0.234	.0299997	0.399	.0247026
Family size	0.223**	.021055	0.129	-.0008986	0.294**	.0164946
Dependency ratio	-1.531	-.2116955	-0.721	-.045376	0.267	.0882512
Distance to market	0.197	.0498211	-0.121	-.0394304	-0.179	-.0161041
Livestock holding	-0.159	-.0173453	0.043**	.0086651	-0.056	.0027668
ln of Total income	0.383	-.1422619	1.769***	.2990939	2.225***	.1234189
Improved seed use	0.511	.055459	0.166	-.0376382	0.837	.0563758
Frequency of extension contact	-0.227***	-.0093029	-0.252***	-.0257013	-0.356***	-.0171019
Cooperative membership	1.003	-.0053503	1.755***	.2577276	1.588**	.0515142
Access to credit	-0.555	.0396524	-1.516**	-.2551876	-0.937	-.0194397
Leadership	0.034	-.0320994	0.111	-.0265451	1.049	.1067766
Fertilizer use	0.033	.1607579	-0.105	.0843897	-3.146***	-.4356301
Access to training	-0.974	-.0586863	-1.465**	-.2702292	0.472	.1308089
Land holding	-0.233	-.0322914	-0.048	.0171507	-0.196	-.010542

Diagnostics	
Base category	on-farm alone
Number of observation	180
LR chi^2	174.94
Log likelihood	-156.22
Prob > chi^2	0.000
Pseudo R^2	0.359

***, ** and * significant at 1%, 5% and 10% probability level, respectively.