

Rural Livelihood Strategies and Food Security: The Case of Bensa Woreda, Sidama National Regional State, Ethiopia

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Abstract

Livelihood diversification by rural households is expected to contribute significantly to household living standard and food security. Nevertheless, a livelihood strategy plays a crucial role for household income and food security, and still empirically its contribution is unidentified in Bensa woreda. The study addressed three objectives: these are assessing livelihood strategies pursued by rural households based on their wealth status in achieving food security, determining the status of food security as an outcome of different livelihood strategies pursued by rural households and identifying the determinants of rural households' choice of livelihood strategies. A multistage sampling technique was employed to select 190 household heads. The data were collected through a semi-structured questionnaire, key informant interviews and focus group discussions. To achieve the first and second objectives, descriptive statistics such as percentage, mean, chi-square, t and F-tests were used to analyze the socio-economic characteristics of households by wealth status, livelihood diversification strategies, and food security status. The third objective was achieved by using a multinomial regression model (MNL) using data collected through a semi-structured questionnaire involving 190 respondents. The study found that 12.6% of better of (rich) households had diversify their livelihoods by combining from all sources (on-farm+ off farm+ non-farm), 16.2, 13.8 % and 7.5 % of medium farmers diversify their livelihoods mainly from on-farm, combining on-farm and off farm, and from combining on-farm and non-farm, respectively. The result briefly indicates that, more proportion 32.20 % of food secure households was attaining their food from combining on-farm, off farm and non-farm. The study found that 62.11 % and 37.89 % of households were food secure and food insecure respectively in the study area. Furthermore, the result indicated that the mean Kcal of food secure and insecure households is 1210.75, and 4266.241AE. Based on diet quantity analysis, the mean household calorie consumption was 2655.49kcal per AE. The MNL model of marginal effect reveals that age, access to education, land size, livestock holding, extension contact, credit, distance from market, target for Productive Safety Net Program (PSNP) and dependency ratio of household were significantly affecting choice the of livelihood strategies. The study, therefore recommends that investing in natural assets such as farm land and livestock ownership by networking valuable extension contact and market access, needs consideration in promoting rural livelihood diversification. Local government should intervene help educate and train rural households by supporting credit access for profitable diversification to off farm, and non-farm besides on farm to sustain their livelihood and ensure food security.

Keywords: Livelihood/on farm, off farm, non-farm/: Food security, Multinomial logit models

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1. INTRODUCTION

1.1. Background of the Study

Ethiopia is a country whose economy is largely dependent on smallholder agriculture and where 84% of its total population lives in rural areas, of which 90% depend mainly on crop production for its livelihood (Gecho *et al.*, 2014). Smallholder farming dominates its production. Agriculture contributes to 45% of Gross Domestic Product, more than 80% of employment opportunities and over 90% of the foreign exchange earnings of the country (Yizengaw and Beyene, 2015). Nonetheless, Ethiopian agriculture is less productive even by the SSA standard. Thus, the nation has a large population of the poor and food insecure ones (Gecho *et al.*, 2014).

Rural people with insufficient assets to produce and purchase food constitute a higher proportion of the food insecure (Weldarufael, 2014). Food insecurity is evident even in non-drought years and in surplus producing areas. Approximately, 10% of the Ethiopian population is chronically food insecure (Endalew, Muche and Tadesse, 2015). Landless, oxless, female-headed, elderly, poor nonagricultural households and newly established settlers are largely food insecure. Their chronic food insecurity is mainly attributed to the low return livelihood system (Weldarufael, 2014).

The livelihood of rural population is the outcome of the associations of sophisticated source of income strategies (Tezera, 2010). In the Study area, even though, rural farm households were involved in diverse livelihood strategies, but the choice of off-farm and non-farm livelihood strategies is determined by complex and

yet empirically unidentified factors (BWANRDO, 2017). However, some rural households of the study area allocate their work time between farm and off-farm/non-farm activities to have secure income/food (consumption) for their family members, while others are engaged in farming only. But, it is not clear why some households engage only in farm activities, while others engage in on-farm and non-farm strategies. There were no studies conducted so far concerning livelihood strategies and food security. Therefore, this study was initiated with three specific objectives; i) to assess livelihood strategies pursued by rural households based on their wealth status in achieving food security, ii) to determine the status of food security as an outcome of different livelihood strategies pursued by rural households and iii) identify the determinants of rural households' choice of livelihood strategies in the study area.

2. RESEARCH METHODS

2.1. Description of the Study Area

The study area, Bensa *Woreda* is found in Sidama Regional State and covers a total land area of 32,238.66ha. The *woreda* is located between 6°35' to 6°68'N and 38°74'to 38°98' E (WoFED, 2018). It is found at a distance of about 409 km south of Addis Ababa. The *Woreda* comprises 24 *kebele* administrations. Among these, two of them are urban areas and twenty two of them are rural *kebeles* (BWFEDO, 2019). The administrative center of Bensa *Woreda* is Daye town. Bensa *Woreda* had a total population of 180,249 in 2018 of whom about 51 (91,949) were female and 49 % (88,300) male (WoFED, 2018). The average growth rate of population is estimated to be 2.8 %, while the average total fertility rate is 6 children per a woman (WoFED, 2018). Based on the traditional agro climatic classification of Ethiopia, Bensa *Woreda* is about 66% *moist weyna dega* and 34% *dega* (BWAO,2018).The *Woreda* is also characterized by diversified land forms consisting of mountain peaks, plateaus, plains, valleys and spurs with elevations ranging from 1525-3129 m.a.s.l. The mean annual maximum temperature of the *Woreda* ranges from 23 to 25°C (WoFED, 2018). Annual rainfall ranges between 1,163 and 1,327mm. Soil types constitute Haplic Luvisols (orthic), Chromic Luvisols (nitic), Humic Nitsols (mollic), Eutric Vertisols (chernic) and Eutric Vertisols (ferralic) (BWNRDO, 2019).

The *Woreda* has a bimodal rainfall pattern with two cropping seasons, short rainy season (*Belg*) extending from February to April and the main rainy season (*Meher*) from June to September. The *Belg* rains are mainly used for planting long cycle crops such as maize production and seed bed preparation for *Meher* crops. The *Meher* rains are used for planting of cereal crops like barley, teff, wheat and vegetable crops and are also responsible for the growth and development of perennial crops such as *enset*, coffee and *ch'at*. Based on the data obtained from the *Woreda* agricultural office the average land holding size owned by individual farm household is 0.5 ha. Regarding land distribution by agricultural production, perennial crops (Coffee and *Enset*) cover the highest cultivable land out of which coffee covers a total of 13,913 ha. Coffee is the most valuable cash crop that generates the main livelihood income in the district. It is largely produced by small-scale farmers and has got the best quality in the international market, while *enset* is the main staple food in the *Woreda* (BWoFED, 2018). *Ch'at* is also produced as supplementary cash crop along with coffee in the district (WoFED, 2018).

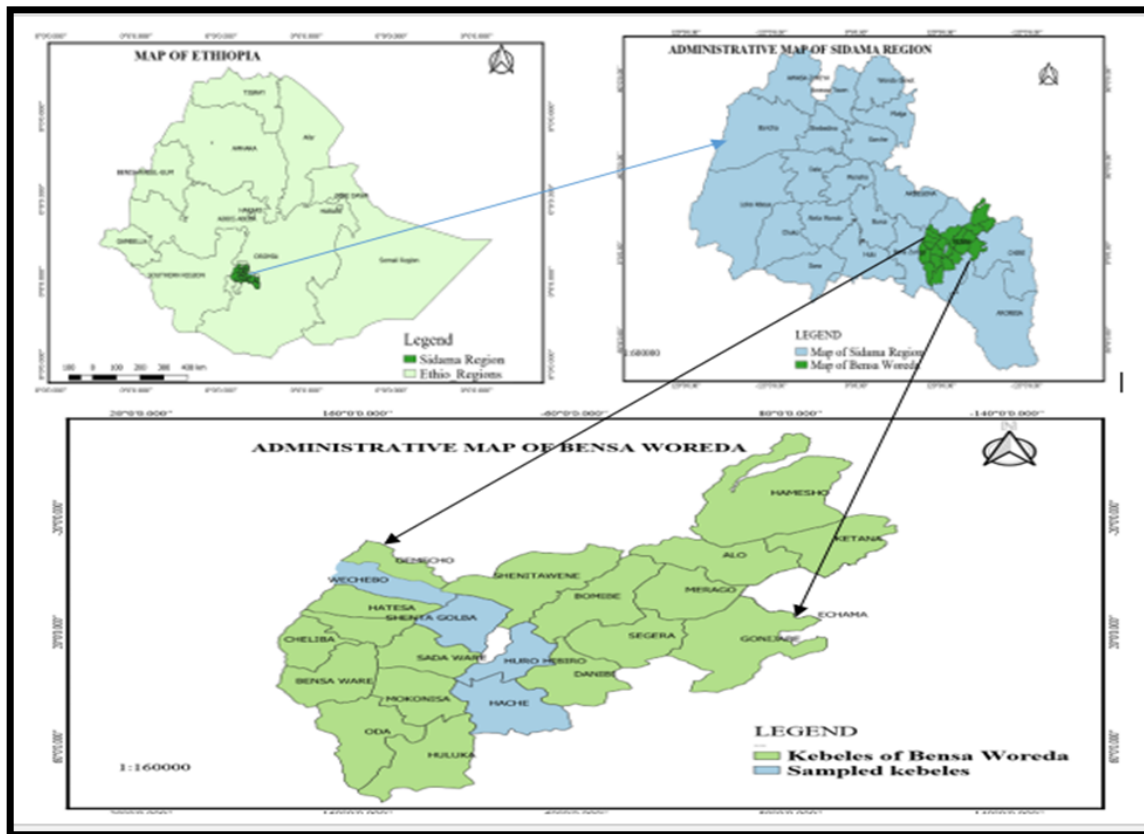


Figure 2: Map of study area
Source: Developed by Arc GIS (2020)

2.2. Research Design

To achieve the main objectives of the study the researcher employed a mixed research approach which incorporated quantitative as well as qualitative nature. Qualitative survey was used to boost up the quantitative results of the study and fills the gaps where quantitative survey missed to touch.

2.3 Sampling Methods and Procedures

In this study in order to capture a representative sample, multistage stratified sampling technique was used to meet the requirements of intended households. Firstly, the study area was selected purposively, since, there is no studies conducted so far and since the researcher know the area very well. Secondly, the *kebeles* in the *woreda* were listed based on their agro-ecological characteristics and grouped/stratified into two agro-ecological zones (*Dega* 34% and *Woina dega* 66%). The *woreda* has a total of 24 *Kebeles*, 2 of them are Urban and 22 are Rural *Kebeles*. From this rural *kebeles*, 14 *Kebeles* are found under *Woina Dega* climatic zone and 8 *Kebeles* are under *Dega* agro-climatic Zone. Three *Kebeles* from *Woina Dega* (Shenta Golba, Huro Tibro, and Hache), because of these agro ecology zone had high proportion of off-farm and non-farm diversification strategies in addition to on-farm (BWANRDO, 2019) and one *Kebele* namely Wochabo from *Dega* was selected. A total of 4 *kebeles* were taken by simple random technique, based on difference in livelihood activity, wealth status and households diversify more livelihoods at mid land than that of highland areas of *woreda*. In the fourth stage, sampling frame (complete village household lists) was obtained from each *kebele*'s administrative office. Then, wealth ranking exercise was conducted with help of participatory rural appraisal (PRA) tools in order to classify households under the different wealth categories. In the fifth stage, the probability proportional to sample size methods were applied to draw the sample household from each wealth category according to the number of household in different category. Finally, a total sample of 190 households was selected by using systematic random sampling techniques, of which 54, 79 and 57 were poor, Medium and better-off households respectively.

To identify sample household from each sampled *Kebeles*, systematic sampling technique was employed. The total households from selected *kebeles* was found important to derive total sample size and individual *kebeles* total household it was tried to determine the sample size using the statistical procedures.

Consequently, the study adopts a simple mathematical formula of Yamane (1967) was used to determine sample size.

The formula for sample determination at 95% confidence level, 5% degree of variability and 7% level of precision are described as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

Where n= is the sample size,

N= is the population size,

e=the acceptable sample error/ the level of precision.

Using the total population of 2815 and error margin of 0.07, the sample size is calculated as follows:

$$n = \frac{2815}{1 + 2815(0.07)^2} = 190.286 \approx 190$$

Table1: Sample kebeles and their sample size based on wealth status of household

Kebeles	Agro-ecology	Total HHs	Poor	Medium	Better off	Sample size
Wochabo	Dega	786	18	20	16	54
Shenta Golba	Woina Dega	560	13	15	10	38
Huro Tibro	Woina Dega	614	12	18	12	42
Hache	Woina Dega	855	15	26	15	56
Total		2,815	58	79	53	190

Source: Author's Own Computation from Data of Bensa Woreda Office of Agriculture and Natural Resource, 2021

2.4 Data Types and Sources

Both primary and secondary data were used for the purposes of this study. Primary data (both qualitative and quantitative) were collected directly from the respondents who were selected from each kebeles. Quantitative data was collected by administering pre-tested structured questionnaires. The questionnaires were used to assess socio-demographic, socio-economic characteristics, institutional aspect, food security status, dietary diversity in both groups of the households. Qualitative method is used to capture data pertaining to local perception and opinions on the effect of livelihood diversification on household food security. This was done by using one focused group discussion in each of the four selected Kebeles and through key informant interviews.

Primary data was collected through respondent interviews, Key informants (KIs) Interviews and Focus Group Discussions (FGD). Semi-structured interview was employed to generate the existing livelihood strategies and food security status at household level. Secondary data were reviewed and organized from various documents both published and unpublished materials which are relevant to the study.

2.5. Method of Data Collection

The various data collection instruments were household survey, Focus Group Discussion and Key Informants.

Household survey is used to generate quantitative and qualitative information at household level. Household survey is undertaken by using structured questionnaire. The household survey covers personal data, household resources, production, food consumption and income, issues related to livelihood strategies, and food security. The questionnaire is first prepared in English and later translated into the local language (Sidaamu Afoo), so that the respondents can easily understand the questions. Four enumerators, one for each kebele, were employed based on their ability of local language and culture, and experiences in data collection. Training was provided to the four enumerators on the procedure to follow while conducting interview with respondents and deep discussion is also held to make the questionnaire clear.

The interview schedule was pre-tested among eight non-sampled respondents of matching characteristics and depending on the results of the pre-test; it is revised in the lights of suggestions received. In conducting the interview, four enumerators who have knowledge about the area and acquainted with the culture and language are recruited and trained before commencing the work.

FGD was employed to generate data that complements survey and it is more useful to tackle objective that focuses on challenges facing smallholders. Accordingly, livelihood activities, assets and their trends, social service provision and household food security status were assessed through cross sectional data. Four general checklists with sub focal areas coinciding specific objectives were used.

Four FGDs (one for each Selected *Kebele*) was undertaken. Discussants were selected based on their age, sex, wealth rank, main livelihood and development groups to which they belong. The ages of all participants were greater than 18 years. Extension workers are the main role players in selecting discussants from poor, medium and better off households. The numbers of participants per discussion group were 5-8 (3 are females) in each kebeles. The proportions of male and female participants were based on their availability during the

schedule of discussion and enumerators were oriented and took the duty of moderating discussions while the researcher shouldered the role of keeping consistencies with the objective. All FGDs was conducted at the convenient time of discussants based on appointment negotiated with facilitators: *kebele* chairperson and extension workers. Chairpersons and agricultural extension workers convinced participants to present on time and discuss. On average, FGDs was last for 1 hour.

Key informant interviews were conducted with different individuals at different administrative levels. At Kebele level, Four-kebele chairperson and four agricultural extension workers were interviewed. At the Woreda level, officials from Agricultural and Natural Resource Development Office, and Woreda food security office were considered in interview.

2.6 Data analysis

2.6.1. Descriptive Analysis

Both qualitative and quantitative data analysis methods are used. In order to analyze the qualitative data collected through PRA; wealth ranking, and key informant interview; interpretation and tabulation of data is done. The descriptive and multinomial logit model was used to analyze data of objectives by using Statistical Package for Social Sciences (SPSS) version 21 and STATA version 14.2. The specific descriptive statistics data analysis methods used for quantitative data are Chi square test, frequency, F-test, mean, percentage, T-test, and diversity indices to analyze whether there were significant differences among different livelihood strategies chosen based on household wealth status, and food security status, respectively. Multinomial logit model was used to analyze determinants of livelihood diversification strategies. Moreover the qualitative data obtained from KIs and FGDs are stated in narrative and descriptive form.

2.6. 1. Econometric model and Specification of multinomial logit model

In order to determine factors that affect choice of livelihood strategies by rural household's multinomial logit model was used. When there are more than two alternatives among which the decision maker has to choose (i.e. unordered qualitative or polytomous variables), the appropriate econometric model would be either multinomial logit or multinomial probit regression model. However, the later, is rarely used in empirical studies due to estimation difficulties imposed by the need to solve multiple integrations related to multivariate normal distributions (Greene, 2003; Senait, 2005; Chilot and Hassan, 2008). The dependent variable in this specific case, choice of livelihood strategy is a polytomous variable. Thus, a multinomial logit model when the categorical dependent outcome has more than two levels need to be employed for such study (Alwang *et al.*, 2005; Brown *et al.*, 2006; Jansen *et al.*, 2004). Moreover, multinomial logit model is selected not only because of the computational ease but also multinomial logit analysis exhibits a superior ability to predict livelihood diversification and picking up the differences between the livelihoods strategies of rural households (Chan, 2005; Jansen *et al.*, 2004).

Rural households make a number of decisions in their daily activities. When there are alternatives to choose from, economic theory tells that agents choose what maximizes their expected utility given the existing situation (Moti and Gardebroek, 2008). To identify the determinants behind rural household decision to engage in various livelihood strategies the assumption is that in a given period at the disposal of its asset endowment, a rational household head choose among the four mutually exclusive livelihood strategy alternatives that offers the maximum utility. Following Greene (2003), suppose for the i^{th} respondent faced with j choices, we specify the utility choice j as:

$$U_{ij} = Z_{ij} \beta + \varepsilon_{ij} \dots \dots \dots (1)$$

If the respondent makes choice j in particular, then we assume that U_{ij} is the maximum among the j utilities. So the statistical model is derived by the probability that choice j is made, which is:

$$Prob(U_{ij} > U_{ik}) \text{ for all other } K \neq j \dots \dots \dots (2)$$

Where, U_{ij} is the utility to the i^{th} respondent form livelihood strategy j U_{ik} the utility to the i^{th} respondent from livelihood strategy k

If the household maximizes its utility defined over income realizations, then the household's choice is simply an optimal allocation of its asset endowment to choose livelihood that maximizes its utility (Brown *et al.*, 2006). Thus, the i^{th} household's decision can, therefore, be modeled as maximizing the expected utility by choosing the j^{th} livelihood strategy among J discrete livelihood strategies, i.e.,

$$max_j = E(U_{ij}) = f_j(x_i) + \varepsilon_{ij}; j = 0 \dots J \dots \dots \dots (3)$$

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 , P_{ij} is modelled as:

$$P_{ij} = \frac{\exp(X'_{i}B_j)}{\sum_{j=0}^J \exp(X'_{i}B_j)}, J = 0 \dots \dots \dots (3)$$

With the requirement that $\sum_{j=0}^J \exp(X'_{i}B_j) = 1$ for any i

Where: P_{ij} = probability representing the i^{th} respondent's chance of falling into category j X = Predictors of response probabilities

B_j = Covariate effects specific to j^{th} response category with the first category as the reference.

A convenient normalization that removes an indeterminacy in the model is to assume that $B_0 = 0$ (this arises because probabilities sum to 1, so only J parameter vectors are needed to determine the $J + 1$ probabilities), (Greene, 2003) so that $\exp(X'_{i} B_0) = 1$, implying that the generalized equation (4) above is equivalent to

$$\Pr\left(y_i = \frac{j}{x_i}\right) = P_{ij} = \frac{\exp(X'_{i}B_j)}{1 + \sum_{j=0}^J \exp(X'_{i}B_j)} \text{ for } J=0, 2, \dots, J \text{ and}$$

$$\Pr\left(y_i = \frac{1}{x_i}\right) = P_{i1} = \frac{1}{1 + \sum_{j=1}^J \exp(X'_{i}B_j)} \dots \dots \dots (5)$$

Where: y = A polychromous outcome variable with categories coded from $0 \dots J$.

Note: The probability of P_{ij} is derived from the constraint that the J probabilities sum to 1. That is, $p_{i1} = 1 - \sum_{j=2}^J p_{ij}$. Similar to binary logit model it implies that we can compute J log-odds ratios which are specified as;

$$\ln\left(\frac{p_{ij}}{p_{i1}}\right) = x_i(\beta_j - \beta_1) = x'_i \beta_j, \text{ if } j = 0 \dots \dots \dots (6)$$

Since multinomial logit model is the extension of the binary logit models, the interpretations resemble that of binary logit models (Gujarati, 2003). The major difference is that the reference category now no longer the other choice as in binary logit. Probability in a multinomial logit model can be calculated similarly to that in a binary logit model, with the only modification being accounting for multiple sets of β estimates. The meaning of logit (log-odds) and odds term is identical in both models. In the binary case, the comparison is between category 1 and category 2 (or the first versus the last category). In multinomial case the comparison is between category j and J (or any category versus the last). The predicted probabilities are better interpreted using the marginal effects of the multinomial model (Greene, 2003). Therefore, every sub vector of β enters every marginal effect both through probabilities and through weighted averages that appears in δ_{ij} . By differentiating equation (5) above with respect to the covariates we can find the marginal effect of the individual characteristics on the probabilities (Greene, 2003). The marginal effects (δ_{ij}) of the characteristics on the probabilities are specified as

$$\delta_{ij} = \frac{\sigma p_{ij}}{\sigma x_i} p_{ij} \left[\beta_j - \sum_{j=0}^J p_{ij} \beta_j \right] = p_{ij} [\beta_j - \bar{\beta}] \dots \dots \dots 7$$

Where, δ_{ij} denotes the marginal effect (the coefficient), of the explanatory variable on the probability that alternative j is chosen.

3. RESULTS AND DISCUSSIONS

3.1. Characteristics of Sample Households

3.1.1 Human Capital

This study employed wealth categorization and the asset approach to livelihood strategy analysis and under this section the livelihood assets that affect the wealth status and livelihood strategies pursued by rural households and its outcome was described.

Sex: Sex of household head is an important factor in determining household livelihood diversification. Among the interviewed households based on wealth category 94.14 percent were male-headed while 5.86 percent were female-headed. As indicated in Table 6 female households' participation in livelihood activities was less than male households' participation due to their triple domestic roles. A male headed household was higher than that of female headed households, but there is no significant difference between sex of studied households by wealth category (Table 4).

Age: In the survey, the average age of the respondents was 45.8 years with standard deviation of 16.11. The average age of the sample respondents for poor, medium and better off households are 52.04, 40.65 and 44.71 years, with their standard deviations of 17.18, 12.09, 19.08 years respectively (Table 2). The F-test result indicates that there was a significant age difference between a poor, medium and better off households. This study implies that those households with different age groups might attain different experience in life time, and it might result in different livelihood diversification.

Education: The mean number of years of formal education for the household heads by wealth category was 5.1 years, ranging from 0-13 years of formal education. Household heads with better off wealth category had a higher mean number of years of education which was 7.1 years as compared to medium and poor household heads who

had a mean of 4.51 and 3.69 years of formal education, respectively. The F-test result of 6.02 (Table2) indicates that there is statistically a significant ($p=0.091$) difference between household engaged in a diverse livelihood activities by schooling years. Education as a human capital increases livelihood knowledge and capabilities possessed by individuals.

Family size: The average family size of studied households in the area was 5.73 persons, where the size of the household ranged from a household of two to a household of 12 persons. Poor-headed households had more household members with a mean of 6.2 persons as compared to medium and better off headed households which was 5.8 and 5.2 persons. The F-test result indicates the difference of means of average family size was not statistically significant between households participated in rural livelihood strategies by wealth status.

Dependency ratio: The mean number of dependency ratio was 1.54 persons. This briefly indicates that, one productive labour force of household member covers up all the expenses of 1.54 unproductive members of household. The dependents ranged from 0-5 persons in the households. Better off-headed households had more dependents with a mean of 1.70 dependents as compared to medium and poor-headed households that had a mean of 1.58 and 1.53 dependents. The difference in means with dependent ration among wealth status was not statistically significant.

3.1.2 Natural Capital

Farm land: Access to farm land can have effect on the livelihood strategies of rural households through the type of crops grown. Some households may grow crops that are mainly used for household consumption such as cereals, while others may grow horticultural crops which can be used for marketing purpose. The latter group can have linkage to the market than the former which have further implication on their livelihood. Those who have good linkage with the market can generate adequate income/livelihood. At the time of the survey, each household had on average farm landholding of 1.32ha. The cultivated land ranged from 0.21ha to 2.3ha. Much of the land was under better off households which is 1.41ha, than that of middle class (1.27ha) and poor households (0.94ha). The size of land cultivated was not statistically different by wealth status because the difference of means was not statistically significant (Table2).

Livestock ownership: In rural household livestock ownership is considered as Proxy measure of wealth and status. In the study area mixed farming is practiced. That means households engage both in growing crops and raising livestock. Households which own large number of livestock, can benefit a lot besides direct consumption they can generate income from the sale of milk, egg, by products, and direct sale of animals. This implies that livestock ownership has an effect on livelihood. As presented in the below Table 5, there is a significant ($p=0.047$) difference in livestock ownership, measured in Tropical Livestock Unit (TLU), among poor, medium and better off households. Due to this reason their farm income would be varied. The mean livestock number for poor, medium, rich farmers, and their average 2.84,5.6,7.1, and5.18TLU(Table 3). This shows that majority of the households residing in Bensa district own large herd sizes due to the availability of grazing land and ample animal health services. Therefore, to supplement their limited farm livelihood/income they might help engage in non-farm activities has effect on rural livelihood.

Income: Besides farming activities, various income generating non-farm and off-farm activities were identified among the households. These activities were categorized into three groups: on-farm (agriculture - crop production, livestock production and sales of animal products), nonfarm and off-farm activities. The households' incomes from these sources have direct relationship with livelihood strategies. The mean incomes of poor, medium and better off was 3,507, 8,619 and 20,535the average of these are10, 887 ETB (Table 3). The F-test result found that there is a significant ($P=0.017$) difference among households with respect to income.

3.1.3 Social Capital

Distance from market: Publicly owned assets particularly market, which are not directly controlled by households, seem to show some association with livelihood diversification. The mean distance of the households to the nearest town was 1.943Km, where this distance ranged from 0.4Km to 4 Km and this was the same for distance to the nearest market. In relative terms, those households who have better access to the nearby market place would be engaged in an income generation livelihood sources. There was no significant difference between household by distance from market (Table 3).

Table2: Continuous Variables of Socio Economic Characteristics of Sample Respondents in Bensa woreda

Variables	Wealth category of the household (%)			Total
	Poor(1) (N=58)	Medium(2) (N=79)	Better off(3) (N=53)	
Age category				
18-30	1.24	13.82	7.65	22.71
31-40	7.05	18.63	14.02	39.7
41-50	5.86	2.80	6.94	15.6
>51	16.9	3.70	1.39	21.99
Mean	52.04	40.65	44.71	45.8
SD	17.18	12.09	19.08	16.11
F-test				9.2433,
P-value				0.087*
Family size				
<3	8.1	5.0	7	20.1
4-5	5.0	9.1	10.2	24.3
6-8	15.4	13.6	7.7	36.7
>8	3.0	11.2	5.1	19.3
Mean	6.2	5.8	5.2	5.73
SD	3.1	2.9	2.2	2.73
F-test				4.2561,
P-value				0.105
Dependent ratio				
<1	7.16	13.02	11.07	31.25
1-2	11.38	14.46	10.2	36.04
>2	12.51	11.42	8.73	32.66
Mean	1.53	1.58	1.70	1.54
SD	0.49	0.52	0.39	0.46
F-test				5.097,
p-value				0.311
Education				
Illiterates	19.6	10.3	8.92	38.82
1-4	6.4	12.1	6.75	25.25
5-8	4.8	7.5	5.0	17.3
9-12	0.3	6	5.13	11.43
Certificate and above	0	3	4.2	7.2
Mean	3.69	4.51	7.1	5.1
SD	1.24	2.13	2.94	2.10
F-test				6.0252
p-value				0.091*
Farm size				
<0.5ha	17.18	8.81	1.54	27.53
0.6-1ha	11.92	11.35	6.22	29.49
1.1-2ha	2.5	10.75	13.19	26.44
>2ha	0	7.99	9.05	17.04
Mean	0.94ha	1.27	1.41	1.32
SD	0.22ha	0.58	0.69	0.63
F-test				4.731,
p-value				0.806

Source: Computed from household survey (2020); ** stands for significant at 5%probability level

Table 3: Description of Household Livestock Ownership, Income and Distance from Market

Variable	Wealth category of the household (%)				Total
	Poor(1) (N=58)	Medium(2) (N=79)	Better off(3) (N=53)		
Livestock ownership	-	-	-		-
<2TLU	10.25	8.61	0		18.86
3-4TLU	9.58	14.35	11.1		35.03
5-7TLU	7.	10.51	12.9		30.41
>7TLU	3	5.4	6		14.4
Mean	2.84	5.6	7.1		5.18
SD	1.01	1.4	1.92		1.44
F-test					8.861,
P-value					0.047**
Income in ETB					
<1000	19.75	9.5	0		29.25
2000-5000	10.25	12.3	8.5		31.05
5100-7000	1.5	15	10.0		26.5
>7000	0	2.1	11.5		13.6
Mean	3,507	8,619	20,535		10, 887
SD	352.04	870.3	1000.25		2222.59
F-test					14.092
P-value					0.017**
Distance from market in km					
0.5-1	9.5	6.46	10.3		26.26
1.1-2	12.2	10.89	6.5		29.59
2.1-5	2.35	13.25	11.8		27.4
>5	7	8.2	1.4		16.6
Mean	1.86	2.03	1.94		1.943
SD	0.47	0.59	0.38		0.48
F-test					3.819,
P-value					0.164

Source: Computed from household survey (2020); ** stands for significant at 5%probability level

3.1.4 Institutional Supports and financial capital

Extension service: According to Table6 of households headed who did not get extension service, 23.5, 21.86 and 4.09% are poor, medium and better off and get extension services 7.55, 17.04, and 25.015% are poor, medium and better off, respectively. As indicated in the tables below, the three wealth groups differ significantly ($p=0.084$) in getting extension services (Table 4).

The percentage of household who have no access to credit among the poor, medium and better-off households was 29.69, 29.67and13.8 %, respectively (Table 4). The chi²square result indicates that there is no a significance difference among household in attaining credit access with respect to wealth status. The non-governmental organizations particularly productive safety net program helps as insurance for poor income group in Bensa woreda. The survey result indicates about 10.4% of poor income group more than medium and better off households gets benefited from productive safety net program. The chi²square result indicates that there is a significance ($p=0.019$) difference among household by participating and not participating in PSNP and with respect to wealth status. Even if all household groups reside in midland agro ecology than low land, the study found that there is no significant difference among wealth group (Table4).

Table 4: Discrete variables of sample respondents in Bensa woreda

Variables (%)	Wealth categories			Total (N=190)	χ^2 , P-value
	Poor (N= 58)	Medium (N=79)	Better off (N=53)		
Sex					
Male	26.97	37.92	29.25	94.14	5.0428, 0.124
Female	4.08	1.03	0.75	5.86	
Extension service					
Yes	7.55	17.04	25.01	49.6	14.736, 0.084*
No	23.5	21.86	4.09	49.45	
Credit access					
Yes	1.36	9.23	16.2	26.79	10.294, 0.032**
No	29.69	29.67	13.8	73.16	
Safety net program participation (SNPP)					
Yes	10.04	1.5	0	11.54	16.015, 0.019**
No	21.01	37.4	30.0	88.41	
Agro-ecology					
High land	12.5	9.42	6.48	28.4	4.1859, 0.618
Mid land	18.55	29.64	23.41	71.6	

Source: Household survey (2020)

3.2 Livelihood Strategies and Diversification Used by Sample Respondents in Study area

3.2.1. Specialization of livelihood Activities in Bensa Woreda

Even if, agricultural land is declining from time to time, a significant part of the sample respondents still engaged in farming activities. As observed from the survey result about 38.9% of the total sample households depend mainly on crop, and coffee production, and 37.8% depend mainly on livestock and their product for their livelihood activities (Table5). Even if these activities are operated by all wealth groups of households, more proportions of better off and medium households than poor survived by crop/ coffee production, livestock and their product in Bensa woreda. Furthermore, the study indicated that contrary to better off households the most proportions of poor and medium households follow non-farm and off farm activities for their survival.

Table5: sources of livelihood used by studied households in Bensa woreda

Parameters	Wealth category of HH (%)			Total (N=190)
	Poor (N=58)	Medium(N=79)	Better-off (N=53)	
On-farm				
Crop, and coffee production	22.15	40.4	55.25	38.9
Livestock and their product	30.2	39.1	43.6	37.8
Non-farm				
Petty trade	17.4	10.4	1.1	10
Handcrafts	10.3	3.2	0	4.7
Remittance	1.5	2.8	4.2	2.6
Rent pack animal	0.2	0.2	0	0.14
Off-farm				
Daily labor in local area	9.5	1.2	0	3.7
Daily labor near unban	5.7	0.5	0	1.9
Wage labor in other area	2.7	1.2	0	1.3
Fire wood/grass sale	0.6	0.1	0	0.2

Source:

Sample households in the study area pursue diverse livelihood activities (Table 6). Based on engagement of household in study area, now it is possible to draw on the broad classification of livelihood strategies. The livelihood strategies in Bensa woreda operating by rural households are on farm (including crop, livestock rearing, and forestry), on farm +off farm, on farm+ nonfarm, and on farm + off farm+ nonfarm, activities. Even if agriculture dominate the livelihood and economic activities of rural households in the study area, the caring

capacity of the sector shifting from time to time due to increase in family size, decrease in farm size and climatic shocks such as droughts, floods and climate induced diseases. The situation has forced people to look for alternative employment option. Today, a significant number of rural households engage in diverse livelihood strategies away from purely crop and livestock production towards non-farm and off-farm activities that are undertaken to generate additional income to ensure food security.

The result indicated that livelihood diversification strategies choice by farmers in the study area depends on the level of wealth they possess. Accordingly, that most of better off (rich) (12.6%) out of 27.8% households diversify their livelihoods by combining from all sources (on-farm+ off farm+ non-farm) Table 6.

About 16.2, 13.8% and 7.5 % of medium farmers diversify their livelihoods mainly from on-farm, on-farm+ off farm, and from on-farm+ non-farm, respectively. As they indicated the non-farm and off-farm activities help to fulfill income and food gap that agriculture (crop and animal production) unable to do. In this regard, various types of non-farm activities pursued by respondents include petty trade, handicrafts, sale of local drink, rent of pack animal and remittance.

The study also asserted that about 14.3, 8.5% and 6.2 % of poor wealth group households attain their livelihoods from, only on-farm, combining on farm and off farm, and combining on farm with non-farm activities respectively (Table 6). The chi-square test result shows there is a significant difference between household groups regarding to the livelihood strategy choice at 5% significance level. This difference in choice of livelihood strategies implies that there would be the existence of barriers in selection of the most remunerative livelihood strategies (Table 6).

Table 6: Share of Livelihood Diversification by Sample Respondents in Study Area

Livelihood strategies	Wealth category of the household (%)			total
	Poor (N=58)	Medium (N=79)	Better off(N=53)	
On-farm	8.5	16.2	9.4	
On-farm+ off farm	14.3	13.8	2.8	
On-farm+ non-farm	6.2	7.5	3.0	
On-farm+ off farm+ non-farm	2.5	4.0	12.6	
Total	30.5	41.5	27.8	100
χ^2 ,				11.3590,
P-value				0.078

Source: Computed from survey result (2020)

The results are consistent with several studies (Gebrehiwot *et al.*, 2016; Gecho *et al.*, 2014; Yizengaw, Okoyo, & Beyene, 2015) where wealth influences livelihood diversification. But here in this study the beneficial effects of diversification of livelihood depend upon the level of natural assets (farm size and livestock ownership) and financial assets (savings and credit access) and climatic condition as well as on the ease of engaging in spatially diverse transactions.

3.2.2 Income Portfolio Analysis of Livelihood Strategies

Besides farming activities, various income generating non-farm and off-farm activities were identified among the woreda of the rural households. These activities were categorized into three groups: on-farm (agriculture – crop, and coffee production, livestock production and sales of animal products), nonfarm and off-farm activities.

Non-farm activities refer to nonagricultural activities in which households work as casual labourers in activities outside agriculture. Moreover, non-farm income aggregates a range of activities that span from regular salaried work to self-employed. Accordingly, non-farm income sources are self-employment formal employment/pension, remittances gained from both foreign and home countries, renting out land, house and draft animals. In line to this study, off-farm activities refer to sale of labour for agricultural and nonagricultural activities in which households engaged outside their own farmlands. Accordingly, wage work, and cattle herder were identified as major instances of off farm activities practiced by rural households of the study area.

In each income source category, a number of specific income sources were identified. Self-employment includes shop keeping, petty trade (grain, livestock, coffee, spices, salt, etc.), fuel wood/or charcoal sale, and rural crafts (pottery, bamboo work, carpentry, blacksmiths, weaving). Furthermore, sales of grass and crop residues and sharecropping would generate income in the area. These results were also supported by participants of group discussion. Moreover, the result obtained from group discussion revealed that honey, dairy and beef cattle production were practiced by some households as an alternative source of income.

From the income portfolio analysis, the percentage share of the broad livelihood activities indicates that the share of rural household on farm livelihood *i.e.* crops, livestock and their products alone covers about 36.3 and 37.7%, petty trade 8.92%, and remittance 5.07% in decreasing orders (see Table 9). Further analysis of the study revealed that off-farm activities (daily wage, market brokering and environmental gathering) are survival mechanisms pursued mainly by the lower-income (poor) groups. Thus the mean cash income composition of poor, medium and better-off is 3,507, 8,619 and 20,535 ETB per a year (see Table 7). The F-test results indicated

that there is a significant difference of income between households by wealth groups at 5% significance level.

Table 7: Income Composition of Sample Households

Cash income composition (%)	Poor (N=58)	Medium (N=79)	Better-off (N=53)	Total (N=190)
Crop and coffee production	30.15	36.1	41.01	36.3
Livestock and their product	18.4	40.3	54.4	37.7
Petty trade	16.5	9	4.12	8.92
Handcrafts	7.2	5.1	0	4.32
Remittance	5.1	7.3	1.2	5.07
Rent pack animal	3.5	0	0	1.06
Daily labor in local area	5.0	0	0	1.53
Daily labor near urban	1.2	2.5	0	1.41
Wage labor in other area	11.1	0	0	3.39
Fire wood/grass sale	2.4	0	0	0.73
Mean annual income per year in ETB	3,507	8,619	20,535	-
F-value				14.092
P-value				0.017**

Source: - computed from survey result (2020) **, Significant at 5% level

3.3. Food Security Status as an Outcome of Livelihood Diversification

Food security as an outcome of a diverse livelihood activity in rural households of Bensa District depicted in Table 8. The result briefly indicates that, about (32.20%) of food secure households were attaining their food from combination of on-farm, off-farm and non-farm. Moreover, 28.81, 24.58 % and least number of food secure households (14.41%) get their food from on-farm diversification, combination of on-farm and non-farm, and from combination of off-farm + On farm, respectively.

Whereas 27.78, 25 and 19.44 % of food-insecure households generate their food items from the combination of off farm and on farm (on farm and non-farm), combining on-farm, off farm and non farm, and the least number of food insecure households get their their food items from the on farm diversification only, respectively. The chi square result of 6.6229 indicates that there was a significant ($Pr=0.085$) difference among food secure and food insecure households by livelihood diversification in Bensa woreda (Table 8). However, food-insecure households were tried to diversify livelihood in all perspectives (Table 8): poor and variable rainfall, including the constant threat of drought, small partitioned land holdings, environmental degradation combined with demographic problems (high child mortality, low adult life expectancy and limited ability to reproduce labour) have increased uncertainty and risk for Bensa woreda farmers in Sidama region. This resulted in low food supply and thus created food insecure households. This result is contrary with the finding by Gemechu, Zemedu & Yousuf (2016) who attributed food insecurity in Ethiopia directly to dependence on undiversified livelihoods based on low-input, low output rain-fed agriculture.

However, since non-farm activities (trading, African ethno-medical practice, bricklaying, food hawking, blacksmithing, charcoal burning, fuel selling, vulcanizing and carpentry) were found to support food security strategies, diversification into such non-farm activities is key to tackling food insecurity problems (Tantu, *et al.*, 2017; Khatiwada, *et al.*, 2017; Asfaw *et al.*, 2017).

Table 8: Food Security Status by Livelihood Diversification Strategies

Livelihood strategies	Food Security Status of the Sample Respondent				Total	
	Food insecure		Food secure		Count	%
	Count	%	Count	%		
On farm diversification	14	19.44	34	28.81	48	25.26
Off farm + On farm	20	27.78	17	14.41	37	19.47
On farm+ non-farm	20	27.78	29	24.58	49	25.79
On-farm+off farm+ Non farm	18	25	28	32.20	56	29.47
Total	72	100	118	100	190	100

Pearson $\chi^2(3) = 6.6229$, $Pr = 0.085$

Source: Computed from household survey (2020)

3.3.1 Household Expenditure Surveys (HES)

For examining the food security status of sample households, calorie acquisition was taken as an indicator, for computing calorie acquisition; methodology suggested by (MOFED, 2002) was followed. The total quantities of product, which used for meals, prepared for the sample households that known in a monthly such as flour of teff, wheat, etc and that brought from the market within the seven days like vegetable were computed and converted

into calorie terms and divided by thirty (30) and seven (7) respectively. The food and drink, which used daily like coffee, milk, bread etc. had converted into calorie terms and added on them. Based on the summation of total calories for monthly, seven days and daily, average calorie acquisition per day for each household was computed. Finally, calorie per day per adult equivalent was computing by dividing the average per day calorie acquisition by adult equivalent units of the family. As per standard sets by the Ethiopian government, 2200 kcal per adult equivalent per day was taken as a cutoff value between food secure and insecure households. The result indicates that 118 (62.11 percent) and 72 (37.89 percent) households were food secure and food insecure respectively in Bensa woreda (Table 9). Furthermore, the result indicated that the mean Kcal of food insecure and secure households is 1210.75, and 4266.241AE. The t-test result of 32.581 indicates that there is a significant ($p=0.029$) difference between household average per day calorie acquisition among food insecure and food secure household in Bensa woreda.

Table9: Energy Available per Adult Equivalent per day

Energy available per AE /Kcal/	Food security status (N=190)					
	Food insecure		Food secure		Total	
	Count	%	Count	%	Count	%
HHs consume <2200kcal	72	37.89	-	-	72	37.89
HHs consume >2200kcal	-	-	118	62.11	118	62.11
Total	72	38.89	118	62.11	190	100
Minimum /Kcal/	1,002.4		-	2,270		
Maximum/Kcal/	2,130.5		-	9,456.2		
Mean /Kcal/	1,210.75		-	4,266.241		
Standard Deviation	204.83		-	128.65		
t-test				32.581		
P-value				0.029**		

Source: Household survey (2020)

The result also introduced the main food security indicators obtainable from typical household expenditure survey (HES). Taken together, the right combination of HES-derived indicators can provide sufficient information to underpin a comprehensive food security assessment.

3.4. Determinants of Rural Households' Choice of Livelihood Strategies

Multinomial logistic regression model was employed to identify determinants of rural household livelihood diversification. But before analyzing the data, multicollinearity effect of continuous and dummy independent variables was checked by the help of contingency coefficient and variance inflation factor respectively. Contingency coefficient value of 0.75 or above indicates a stronger relationship between explanatory variables and shows presence of multicollinearity (Gujirati, 2003) and the larger value of variance inflation factor (usually values equal to 10 or above) indicates a serious multicollinearity problem. Accordingly, there is no multicollinearity problem in dummy/categorical independent variables. So there was no explanatory variable dropped from the estimation model since no problem of multicollinearity. Accordingly, the dependent variable livelihood strategy was regressed against the various explanatory variables. The maximum likelihood method was employed to estimate the parameter estimation of multinomial logit model. The value of Pearson chi-square shows goodness of the fit for the fitted model. Accordingly, the chi-square value showed that the model fitted to analyze the data. Multinomial logit model shows the determinant variables of the choice of diversified livelihood strategies versus the reference category which is farm only. But the parameter estimates of the multinomial logit model give only the direction of the effect of explanatory variables on the dependent variable, but the estimates neither stand for the actual size of change nor the probabilities (Chilot, 2008). However marginal effect was calculated to show the expected change in the probability of a given livelihood choice in relation to a unit change in explanatory independent variables. Therefore, the predicted probabilities were better interpreted using the marginal effects of the multinomial model (Wooldridge, 2010). The result of the Multinomial Logistic regression Model is summarized below.

Table10: Multinomial Logit Model Result on Determinants of Livelihood Strategies

Explanatory variables	Livelihood diversification strategies		
	On farm activity	On farm+ non-farm Activity	On farm +Off farm +Nonfarm activity
	Coefficient	Coefficient	Coefficient
Sex	.55	2.43**	1.23
Age	-.27	-.77**	-.56
Family size	-.20	.11	.65
Education	-.201	.18	-.29**
Farmsize	.05	-.69*	-.59
Livestock	.12	.015	.41
Extension	.78	-.65	-1.1*
Credit	.52	.02	19.3
Markek	.05	.050	.45
Agroec	.92*	.54	2.08***
Prspr	-.94*	-.59	-.70
Depndrt	-.42	-.19	-.83**
Number of obs	190		
LR chi2(36)	163.55		
Prob > chi2	0.0000		
Pseudo R2	-179.61798		
Pseudo R2	0.3128		

Source: Own computed from survey result (2020); *, ** and *** stands for significant at 10, 5 and 1% probability level

Table11: Marginal Effect from MNL Diversification Model

Explanatory variables	Livelihood diversification strategies			
	On farm_divsn	On farm +off farm	on farm+ non-farm	On farm +Off farm +Nonfarm
	Marginal Effect (dy/dx)	Marginal Effect (dy/dx)	Marginal Effect (dy/dx)	Marginal Effect (dy/dx)
Sex	-.11	-.17	.28	.006
Age	.0254216	.07**	-.08**	-.02
Family size	-.032	.009	.051	-.028
Education	-.064**	-.007	.004	.067***
Farmsize	.074*	.044	-.084*	-.034
Livestock	.061*	-.016	-.021	.035
Extension	.208***	.011	-.102*	-.118**
Credit	-.65	-.44	-.76	.873*
Market	-.011	-.015	-.013	-.040*
Agroec	.032	-.125**	-.055	.148***
Prspr	-.084	.099*	-.003	-.010
Depndrt	-.023	.052	.028	-.057*

Note that:*, ** and *** stands for significant at 10, 5 and 1% probability level

Source: Own computed from survey result (2020)

The MNL model of marginal effect reveals that out of twelve variables ten variables i.e. Age, access to education, land size, livestock holding, extension contact, credit, distance from market, target for productive safety net program and dependency ratio, were significant determinants of livelihood diversification strategies choice at different level of significance. But the rest were insignificant variables. The significance level of each variable is different or equal in each livelihood diversification strategies.

Age: age of the household head significantly increase and decrease the combining on farm and off farm, and combining on farm and nonfarm activity. The effect of age in terms of magnitude as each additional year increases and decreases the probability of combining on farm and off farm by 7%, and combining on farm and nonfarm activity by the level of 8 % (Table11) and at 5% significant level. The results on age as a factor for combining on farm and off farm diversification may indicate that those households with more experienced heads are likely to participate more, but with declining rate for combining on farm and nonfarm activity. These findings were inconsistent with what Zerai and Gebreegziabher (2011) and Moepeng (2013) found. They found

that as household heads get older; their ability to generate income is considered to be ineffective. Basket weaving would be a challenge with increased age because it needs virtuous eyesight and focus which reduces with age increase. Similarly Babatunde and Qaim (2009) found that age negatively impacts diversification to non-farm activities, which is explained by physical capability required and time needed. This can be explained by the diverse livelihood activities that involved all age groups like crafting and traditional performance.

Education: The household head education was a significant determinant of livelihood diversification at 5% and 1% probability level. As the result indicates (Table11) the relationship between education and livelihood diversification was negative, and positive. The result implies that if the number of schooling years increased, the household choice of on farm activity and diversifying all likelihood activities (on farm, off farm and nonfarm activities) decreases and increases by 6.4 and 6.7% at 5 and 1% significant level, respectively, holding another variable remain constant. The studied household indicated that got educated helped them to be engaged in diversified livelihood activities. They also boldly depicted that getting education encouraged us to get incomes from agriculture, off farm activities and non-farm activities. This result is in line with the result reported by Adugna and Wagayehu (2012), and Gecho *et al.* (2014).

Farm size: As hypothesized this variable was positively and negatively, and significantly affected the use of on farm, and on farm plus non-farm. Keeping the influence of other variables constant, an increase in one plot Ha of land result in the increase and decrease probability of choice of on farm by 7.4%, on farm plus non-farm livelihood strategies by 8.4% at 10%(Table11) significance level. This implies that households who have large land size can more likely choose on-farm, but less likely choice combining on farm and non-farm livelihood diversification strategies. In the other way, farmers having less land size can more likely choose diversified livelihood activities. The possible reason is that large land size enables the farmers to get income for sufficient living by engaging in crop and livestock production as a result they do not look towards on farm plus non-farm livelihood strategies.

Livestock ownership (TLU): The ownership of livestock has positive and significant impact on use of on farm practice as a livelihood strategy; meaning that a unit increase in livestock number (TLU) increases the probability of engaging on agricultural (on farm activity) practices by 6.1% at 10% of significance level. The studied households reported that livestock plays a very important role by providing traction (especially oxen) and manure required for soil fertility maintenance for crop production. This is also explained by the fact that the many more herd size is a proxy for wealth status of farmers. Those farmers with large herd size have better chance to earn more money to invest on tools required for agricultural activities. This result agreed with the works of Temesgen *et al.* (2008), Aemro *et al.* (2012) and Seid, (2014).

Extension contact: The result (Table11) indicates that the frequency of extension visit has positive, negative and significant influence on livelihood strategies such as on farm, on farm plus non-farm and combining activities (on farm plus off farm plus non-farm), which could in turn helps to reduce the negative impact of climate change. The result showed that a unit increase in extension contact is likely to increase and decrease the probability of diversifying livelihood strategy by 20.8, 10.2 and 11.8%at 1, 10 and 5% significance level, respectively. Sample households indicated that those of us who have extension services create access to advanced information as well as improved agricultural production system and management practices in the area, contrary to those who have poor extension contact whose livelihood strategies are shifted to on farm plus non-farm, and combining activities (on farm plus off farm plus non-farm). In line with this, most authors have documented positive correlation between extension contact and adoption decision of farmers regarding livelihood diversification (Maponya and Mpandeli, 2013; Obayelu, *et al.*, 2014, Shongwe *et al.*, 2014). In fact, agricultural extension is an important source of information, knowledge and advice to smallholder farmers in Ethiopia. Subsequent provision of technical supports (extension services) will increase farmers' knowledge, life skills and awareness towards new innovations to diversify incomes.

Credit access: It was found to be positively related and significantly affected livelihood strategies. Those households who have better access to credit are more likely to diversify on farm plus off farm and non-farm activities 87.3% at 10 % significant level than their counterparts. Access to credit service is an important factor to narrow the financial gap of the farmers so that they could purchase the required farm inputs and technologies that are useful for improving agricultural production and also to carry out income generating activities other than farming (Komba and Muchapondwa, 2015).

Market distance: Distance to input and output markets Distance to input and outputs markets was found to have a strong negative influence on the livelihood diversification of the households; i.e., increase in distance from input and output markets decreases the probability of on farm plus off farm plus non-farm livelihood activities by 4% . The studied households highlighted that market centers should be expanded so that distance could be shortened and we will easily get inputs which help them improve their production and productivity and also enable them sell their products to generate more income that will be used for consumption smoothing and diversify their income sources from all dimensions. Nearness to market center motivates rural households to engage in agriculture plus non-farm (Daniel *et al.*, 2016). As the farmer is nearer to a market, the higher will be

the chance of increasing the household's income from different outlet, access to purchase food from market and to sell his/her outputs.

Agro ecology (agroec)

Unlike the prior expectations, farmers living in dega (highlands) perceived more change in climate than farmers in Kolla (low land) when compared with Woinadega (midland). For instance, a unit change from farming in dega to farming in kolla significantly decreases and increases the probability diversifying on farm plus off farm, and on farm plus off farm plus non-farm livelihood activities by 12.5 and 14.8% at 5% and 1% significant level respectively (Table11). In line with this study, the study of Gebrehiwot *et al.*, (2016) reported that the livelihood of household living in midland differs from that of highland due to different opportunity. This might be due to differences in the quality and size of land, the amount and distribution of rainfall and population densities that influence between highlands and midlands. For instance, climatically the latter is warmer than the former.

Targeting in PSNP participation

In addition, results (Table11) analyzed by marginal effect from MNL shows there was positive relationship between participating in PSNP and livelihood strategies. This association indicates that being beneficiary of productive safety net program increases the probability of diversifying on farm and off farm by 9.9% at 10% significant level. The beneficiaries indicated that PSNP helps us to diversify our livelihood by securing food besides to subsistence livelihood. In line with this it is a transfer of resources to rural households and/or individuals with the objective of enabling the community generate additional income and also build common asset thereby protect their asset depletion (Nigusie, 2011)

Dependency ratio: As was hypothesized earlier, it affects livelihood diversification positively. As hypothesized, dependency ratio is found to have a significant positive correlation with choice diversifying livelihood activity by combining on farm, off farm and non-farm livelihood strategy. This indicates that with increase in dependency ratio the ability to meet subsistence needs declines and the dependency problems make it necessary in the household to diversify their income source (Khan, 2007. Households with higher dependency ratios follow less remunerative non-farm livelihood strategies (Jansen *et al.*, 2004). This means when the dependency ratio increase, the ability of farmers to meet family needs decrease and chance of diversifying livelihood to non-farm activities increases. If the dependency ratio increases by one the probability of the household's falling into on farm, off farm and non-farm livelihood strategy increases by 5.7%. The policy implications of this pattern seem clear, a need to address rapid population growth as well as the provision of job opportunities for adult labour. This result is inconsistent with that of Warren (2002); and Rao *et al.*, (2004).

4. CONCLUSION AND RECOMMENDATION

4.1. CONCLUSION

Households in the study area pursue diverse livelihood activities. In this study, the various livelihood activities of the respondents were categorized in to four livelihood categories: on farm, on-farm + off-farm, on-farm+ non-farm, and on-farm+ off-farm+ non-farm. The majority of better of (rich) households diversify their livelihoods by combining from all sources (on-farm+ off farm+ non-farm), medium farmers diversify their livelihoods mainly from on-farm, on-farm+ off farm, and from on-farm+ non-farm, respectively. Poor wealth group households attain their livelihoods from only on-farm, combining on farm and off farm, and combining on farm with non-farm activities respectively. Therefore, it is possible to conclude that the agriculture sector (on farm only) alone cannot be considered as the core sources of livelihood promotion for rural farmers to improve their living standard, achieving food and nutritional security and eradicating/declining poverty in the study area. This means that inter-sectoral issues such as non-farm and off-farm activities are essential to enhance the quality of life of the rural household, particularly poor people practicing agriculture and allied activities.

The study found that 118 (62.11 percent) and 72 (32.89 percent) households were food secure and food insecure respectively in Bensa woreda. The result also introduced the main food security indicators obtainable from a typical household expenditure survey (HES). Furthermore, the study has shown the determinants of rural households' choice of livelihood strategies. The MNL model of marginal effect reveals that out of twelve variables ten variables i.e. Age, access to education, land size, livestock holding, extension contact, credit, distance from market, target for productive safety net program and dependency ratio, were significantly affected household livelihood diversification strategies. Identifying this factors that affect livelihood strategies are crucial pillars to support rural households by government and non-government organizations through building livelihood resilience.

4.2. RECOMMENDATIONS

Based on study findings a general recommendation is that policies for lucrative and sustainable livelihood diversification of activities should be implemented.

- Rural household livelihoods are highly diverse in the case of Bensa woreda. Policy-makers need to reflect on the most suitable ways of supporting this diversity. Only with more appropriate policies that recognize

the importance of diversity will it be possible for more people to make positive exits from food security risk through diversity.

- More proportion (32.20%) of food secure households was attaining their food from combining on-farm, off farm and non-farm source. Thus, agriculture and rural development strategies and policies should give attention to enhance nonfarm and off-farm sectors in the rural areas in addition to rising agricultural production.
- Natural assets such as land and livestock ownership are crucial for intensification of agriculture based-livelihood. Thus, the Minister of agriculture, researchers, planners and non-governmental organization should support rural households challenge proof improved technology in order to increase production potential and thus realize food security.
- The finding indicated that several households 75% of household exploit expenditures to food other than non-food costs in study area. Thus, to help recover these households from economic vulnerability and fall below poverty line, the local government and non-governmental organization that programmed to support poor should build capacity of rural households through providing financial management and feasibility study to start new business.
- The study indicated institutional arrangement facilitates the livelihood diversification. Therefore, providing practical support; skill training and connecting rural farm households with rural financial institutions is needed to commence an entrepreneurial culture.
- Households of the study area are more probable to have a diversified livelihood when they have access to market. Thus, concerned bodies have to improve market access to rural farmers through building and maintaining physical infrastructures as well as by providing efficient and reliable market information.

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