

Determinants of Household Choice of Livelihood Diversification Strategies in Selected Drought Prone Areas of the Southern Nations Nationalities and Peoples' Region, Ethiopia

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Abstract

The study aimed at identifying the determinants of household's choice of livelihood diversification strategies. The result of the study based on a total of 384 sample respondents selected using multistage sampling procedures. Furthermore the study employed bivariate Probit econometric model to identify factors affecting household's choice of livelihood diversification strategies. The result of the descriptive statistics showed that households in the study area were engaged in four types of combination of livelihood diversification strategies: on-farm only, on-farm plus off-farm, on-farm plus non-farm, and on-farm plus off-farm plus non-farm with their respective share of 34.9, 11.5, 47.9 and 5.7 percent respectively. The econometric model result showed that wealth, sex, education level, livestock holding, and training were negatively and significantly determined households choice of off-farm livelihood strategies; whereas past erosion hazard and distance to market were positively and significantly determined their choice of off-farm livelihood strategies. On the other hand, wealth, dependency ratio, past erosion hazard, market availability, yield loss/reduction due to drought, distance to credit source, distance to market, frequency of extension contact, and ICT ownership (Radio, TV and/or Mobile phone) positively determine household's choice of non-farm

livelihood strategies whereas access to irrigation and distance to credit negatively determined their choice of non-farm livelihood strategies.

Keywords

Determinants, Drought, Livelihood Diversification, Non-Farm, Off-Farm, On-Farm

1. Introduction

Livelihood diversification refers to the process by which households construct a diverse portfolio of activities and social support capabilities to survive and improve their standards of living [1]. A livelihood comprises a combination of activities that people choose and undertake in order to achieve their life goals. Diversification as a strategy involves the attempt by individuals and households to find new ways to raise income and reduce environmental risks [2] [3]. Livelihood diversification helps rural inhabitants to combine activities that add to accumulation of wealth at household level and to minimize their vulnerability to seasonality shocks [1]. According to [2] [3], livelihood diversification is an income generation approach that involves a series of attempts by farm households to generate more cash or income and reduce environmental shocks associated with agriculture. Income generated through livelihood diversification activities increases farmers' purchasing power for farm inputs to boost agricultural productivity and thereby enhance their food or nutritional security [4].

Individuals and households may diversify their assets, incomes and activities in response to push and pull factors [5]. Pull factors are positive and may attract farm households to accumulate capital and then improve their living standards [5]. This opportunity-led diversification occurs when wealthier rural households engage in high-return non-farm activities with the objective of increasing their income through maximizing returns from their business [5] [6]. Pull factors include commercialization of agriculture and the emergence of improved non-farm labour market opportunities linked to better market access, improved infrastructure, and proximity to urban areas. Other pull drivers of diversification are supply factors, such as improved technology, expansion of education, and increased demand for non-food goods and services driven by higher per capita incomes [6]. Push factors are negative factors that may force farm households to seek additional livelihood activities within or outside the farm. They tend to dominate in high-risk and low-potential agricultural environments, subject to drought, flooding and environmental degradation [7]. According to [5] [6], push factors are survival-led diversifications that occur when poorer rural households engage in low-return non-farm activities by necessity to ensure survival and to reduce vulnerability to poverty. Push factors are driven by circumstances or necessities in which the poor are pushed towards diversifying their income sources

to manage risks or cope with shocks, such as seasonality and climatic uncertainty, land constraints due to population pressure and fragmented land holdings, incomplete factor markets, and market access problems arising from poor infrastructure and high transaction costs [4] [5].

Several empirical evidence showed that households in rural Ethiopia have participated in different types of livelihood diversification strategies including on-farm only, on-farm plus off-farm, on-farm plus non-farm and on-farm plus off-farm plus non-farm activities that are undertaken to earn additional income for survival and cope with shocks, trends, and seasonality associated with agricultural production [8] [9] and against a high susceptibility to disasters and shocks particularly in areas where agricultural production and productivity is highly affected by adverse environmental conditions like drought, erratic rainfall and low level of soil fertility [10]. On-farm income is income generated from crop and livestock production on owner's own occupied or rented land. Off-farm income is temporary wage or exchange labour on others' farms within the agricultural sector. Non-farm income is income generated from activities in secondary and tertiary sectors or income from non-agricultural activities such as rents, food and drink processing, remittance and trade [11] [12] [13]. Off-farm and Non-farm activities in such drought prone areas played significant role in raising households' income and reducing their vulnerability to environmental, economic and social risks [13] [14] [15]. Furthermore, [16] also noted that, in rural Ethiopia if there had not been other sources of income apart from agricultural production, the land scarcity coupled with other agricultural risks would limit the ability of smallholder farmers to generate enough income from the agriculture to feed household members and fulfill their basic needs.

There were some studies conducted in Ethiopia that attempted to assess the types and contributions of livelihood diversification strategies to household income and food security status as well as determinates of smallholders participation on livelihood diversification strategies [17]-[21]. Most of them, however, focused on areas with adequate precipitation and failed to consider the effect of socio-demographic and institutional factors on household's choice of livelihood diversification strategies in the context of drought prone areas. Hence, a thorough understanding of factors determining choice of livelihood strategies in case of drought prone areas is important for policymakers and development practitioners to formulate and implement appropriate interventions related to food security, poverty reduction and livelihood improvement. This study, therefore, attempted to investigate the types and determinants household's choice of livelihood diversification strategies in the context of drought prone areas of Amaro and Burji Special Woredas of the SNNPR.

2. Data and Methods

2.1. Description of the Study Area

This study was conducted in Amaro and Burji Special *Woredas* of the Southern

Nations Nationalities and Peoples' Region (**Figure 1**) where the local rainfall pattern is erratic, short in its duration, unevenly distributed and known by its spatial and temporal variability in terms of amount and intensity. Amaro *Woreda* covers 170,980 ha of land that is divided into thirty-three rural and two urban *kebeles*. The altitude ranges from 900 to 3600 meters above sea level and the mean annual rain fall varies between 650 mm and 1400 mm per annum. Burji *Woreda* covers 134,600 ha of land that is divided into 24 rural and 2 urban *kebeles*. According to the information from Amaro and Burji *woredas'* Finance and economic Development Offices, the current population of Amaro and Burji special *woredas* is estimated to reach 390,860 and 118,028 respectively. Amaro *Woreda* is situated within an altitudinal range of 800 m to 2600 m.a.s.l having rugged landscape which is predominantly composed of many hills and plain topography. Based on the mean precipitation and elevation above sea level, Amaro is classified into three agro-climatic zones namely *Dega* (temperate climate), *Woina-dega* (sub-tropical) and *Kolla* (tropical climate) with their share of 30, 38 and 32 percent of the total land respectively. The agro-ecology of Burji *Woreda*

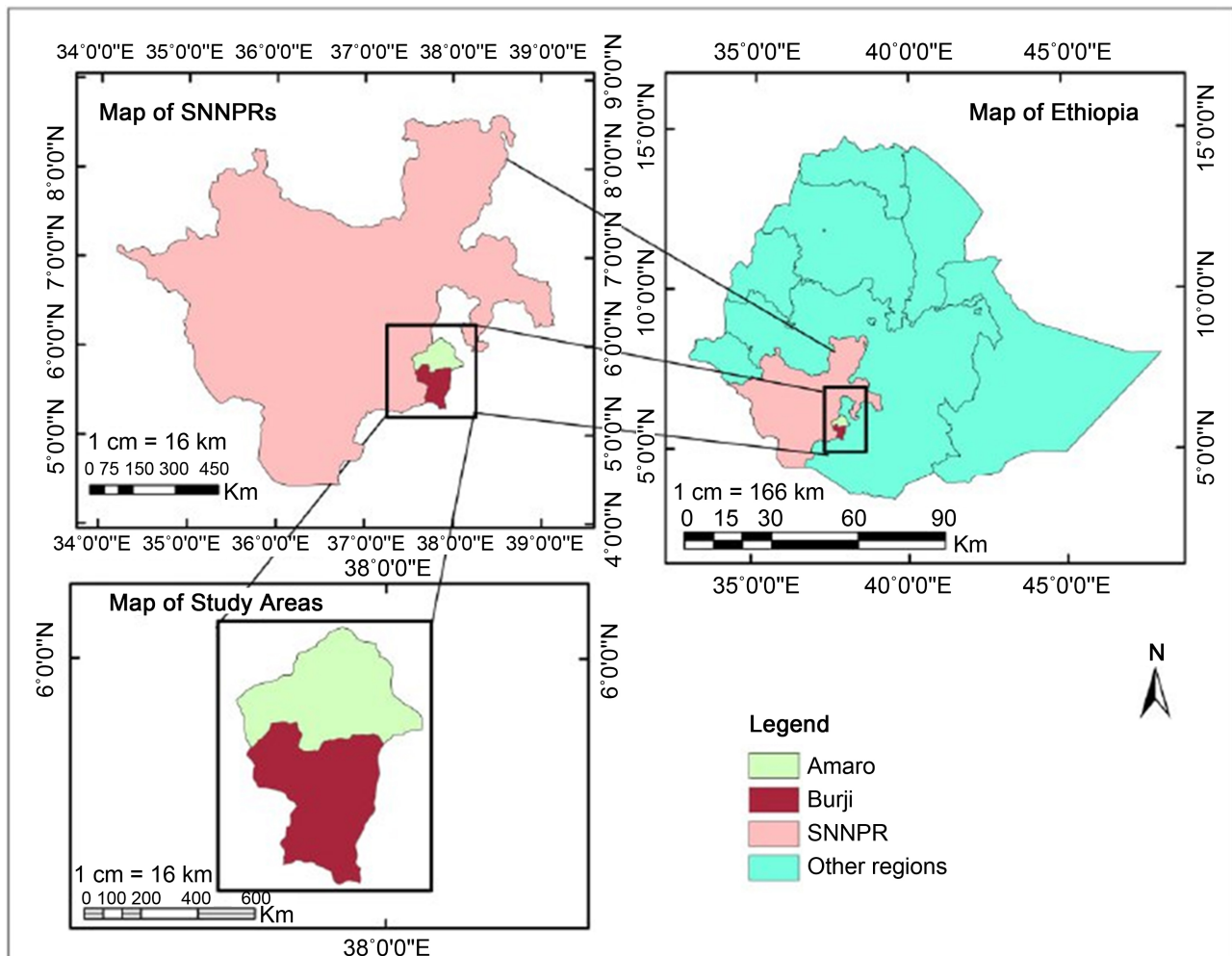


Figure 1. Map of the study area. Source: Amaro woreda, ANRDO, Land Use and Administration Directorate, 2022.

comprised 48 percent *Kolla* (tropical) and 52 percent fall under *Woina-dega* or sub-tropical. The *Dega* part of Amaro *Woreda* is mainly characterized by steep slopes and mountainous land features where excessive run off, soil erosion, land slide and soil nutrient depletion are major constraints of agriculture. Besides, agriculture is practiced on small and very fragmented land plots due to ever-increasing population pressure on land where household heads are obliged to subdivide their land holding to each of their sons when they got married. The *Woina-dega* part consists of plane to undulating land features whereas the *Kolla* part is dominated by plain to gentle slope topography. These two agro-climatic zones (*i.e.* the *Woina-dega* and *kolla* parts) are prone to recurrent drought. The rainfall pattern in these localities is bimodal and erratic in nature and frequent crop failure due to recurrent drought is common. This situation coupled with soil erosion, nutrient depletion, backward farming practices, pests, invasive weeds, low input and technology use adversely affected agricultural production and productivity and hence several households have been exposed to food insecurity problems. As a response to these natural and manmade adversities, several households in these localities have been involved in various types of off-farm and non-farm activities such as wage labour, trade, transport service provision, selling of fuel wood and charcoal, petty trade, woodwork, pottery, black smith, sale of local beverage, and seasonal out migration to other localities.

2.2. Sampling Procedures and Methods of Data Collection

For this study, a multistage sampling technique was employed. Accordingly, the two drought prone special *woredas* of the SNNPR, *i.e.* Amaro and Burji were selected purposively. After stratifying the *kebeles* into their respective agro-climatic zones namely *Dega*, *woina-dega* and *kola*, a total of eight *kebeles* (*i.e.* five from Amaro and three from Burji) were selected using stratified sampling and Probability Proportional to Size (PPS) sampling technique. Using Cochran (1963) formula, a total of 384 households (*i.e.* 250 households from Amaro and 134 households from Burji) was selected as respondents through stratified and systematic random sampling method, *i.e.*

$$n_0 = \frac{z^2 pq}{e^2} \quad (1)$$

where n_0 = sample size

z^2 = square of confidence interval in standard error unit = 1.96

p = estimated Proportion success = 0.5

q = (1 - p) or estimated proportion of failure = 0.5

e^2 = square of maximum allowance for error between true proportion and sample proportion = ± 5 OR (0.05).

Accordingly,

$$n_0 = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

$$n_0 \approx \text{H384}$$

Before conducting the survey, a total of eight enumerators who have college diploma and a capacity of speaking the local languages (*Korete* and *Bambala*) were recruited and provided with a two days training on how to fill the questionnaire. One additional day was added for pre-testing the questionnaires prior to conducting the survey. The respondents for the pre-testing were non-sample households. The sample households were interviewed using a semi-structured questionnaire, which was designed and pretested before conducting the actual survey. The questionnaire comprised demographic and socio-economic characteristics of sample households and other questions related to determinants of household's choice of livelihood diversification strategies. In addition Focus Group Discussions (FGD) and Key Informants' Interview (KII) were held to substantiate data collected by the survey questionnaire. Participants of the FGD include *Kebele* administrators, *kebele* managers, agricultural extension agents and health extension workers and their number not exceeds five. Community criteria based wealth ranking method was employed to categorize sample households to their wealth stratum. The criteria set by participants of the FGD in each of the sample *kebele* were found very alike and comparable with the exception of few and slight differences that were believed not to bring about significant bias for the categorization process. The most important wealth ranking criteria found common across the eight *kebeles* were land holding size, type of residence, number of livestock owned by a household, size of coffee farm, number of oxen, number and size of plots covered by perennial crops like *enset*, crops produced mainly for sale (*tef* and haricot bean), dependence on food aid or Productive Safety Net Programs, and secondary occupation.

2.3. Methods of Data Analysis

The quantitative and qualitative data collected from the sample households were edited, coded and entered into SPSS software version 26 and STATA-14 for analysis. Quantitative data were analyzed through descriptive statistics (mean, frequency, and percentage), inferential statistics (t-test), and econometric model (*i.e.* the bivariate Probit model). The livelihood diversifications that households choose are not mutually exclusive or are interdependent of each other and hence farmers can choose only a single or more than one livelihood diversification strategy among a set of independent alternatives. However most econometric models that have been employed to analyze household's choice of livelihood diversification strategies failed to capture the interdependence and relationship between them as well as the potential correlation between unobserved disturbances (error term). For instance, binary logit/probit models are only able to estimate a household's choice of a single livelihood diversification strategy with only two binary outcomes. Multinomial models are useful when more than two possible outcomes are considered. In other words, the multinomial models are

useful when the outcome variables are unordered and mutually exclusive, and the household can choose only a single livelihood diversification strategy from the set of independent alternatives. This means that the model should pass the Independence of Irrelevant Alternatives (IIA) test. Hence, this study employed the bivariate probit model to analyze the determinants of the household choice of off-farm and non-farm livelihood diversification strategies. The analysis is based on the expected utility maximization theory which suggests that the “household first determines the available alternatives; it then assesses the attribute of each choice and finally uses a decision rule of maximizing utility to select a livelihood activity from the available ones”. The utility function states that individual chooses an alternative that has a utility greater than all utilities in the individual’s choice set. The dependent variable in this study “household choice of livelihood diversification strategy” is a categorical variable that include.

1) Off-farm activity that took value 1 if the household engaged in off-farm activities and 0 otherwise

2) Non-farm activity that took value 1 if the household engaged in non-farm activities and 0 otherwise

Hence the bivariate model was chosen for the analysis. The standard bivariate probit model with additive errors, can be specified as

$$Y_1^* = X_i\beta_i + \varepsilon_i, Y_1 = 1 \text{ if } Y_1 > 0 \text{ and } 0 \text{ otherwise} \quad (2)$$

$$Y_2^* = X_2\beta_2 + \varepsilon_2, Y_2 = 1 \text{ if } Y_2 > 0 \text{ and } 0 \text{ otherwise} \quad (3)$$

$$E[\varepsilon_1 / X_1, X_2] = E[\varepsilon_2 / X_1, X_2] = 0 \quad (4)$$

where X and β are vectors of explanatory variables and coefficients to be estimated, respectively. Estimation by maximum likelihood is straightforward given the additional assumption that the correlated errors are jointly normally distributed and homoscedastic (Cameron and Trivedi, 2005), with the following further assumption

$$\text{Var}[\varepsilon_1 / X_1, X_2] = \text{Var}[\varepsilon_2 / X_1, X_2] = 1 \quad (5)$$

$$\text{Cov}[\varepsilon_1, \varepsilon_2 / X_1, X_2] = P \quad (6)$$

Accordingly, three types of observations and associated probabilities can be specified:

$$Y = 0: \text{Prob}(Y = 0) = \Phi(X_i\beta_1) \quad (7)$$

$$Y = 1, Y = 0: \text{prob}(y = 1) = \Phi(X_1\beta_1) - \Phi(X_1\beta_1, X_1\beta_2, P) \quad (8)$$

$$y = 1, Y = 1: \text{prob}(Y = 1, Y = 1) = \Phi(x_1\beta_1, x_2\beta_2, P) \quad (9)$$

The log likelihood function to be maximized is based on these probabilities and can be specified as:

$$\ln L = \sum \{Y_{i1}, Y_{i2} \ln \phi_2(X_1\beta_1, X_2\beta_2 : p) + y_{i1}(1 - Y_{i2}) \ln [\phi(x_1\beta_1) - \phi_2(x_1\beta_1, x_2\beta_2 : p)] + (1 - Y_{i1}) \ln \phi(-x_1\beta_1)\} \quad (10)$$

i = number of observations.

3. Results and Discussion

3.1. Major Livelihood Diversification Strategies in the Study Area

Table 1 indicated that, the 384 sample households were categorized under four types of combination of the livelihood strategies as on-farm only (34.9%), on-farm plus off-farm (11.5%), on-farm plus non-farm (47.9%), and on-farm plus off-farm plus non-farm (5.7%).

3.2. Demographic and Socio-Economic Characteristics of Sample Households

Table 2 presents a summary statistics of the variables related to socio economic and demographic characteristics of the sample households expected to influence household's choice of off-farm and non-farm livelihood diversification strategies in the study area. The descriptive statistics result showed that from the 384 households, 312 (81.3%) were males, of whom 26 (8.3%) and 155 (49.7%) engaged in on-farm plus off-farm, on-farm plus non-farm, livelihood strategies respectively. From the 381 households, 142 (37%) are irrigation users and 225 (58.6%) recognized that past erosion hazard affected their production and productivity. Only 32 (8.3%) of the 384 respondents agreed that market is available for their produces. From the total respondents 184 (47.9%) faced reduction or loss of yield due to drought over the last two years of whom 5 (2.7%) and 131 (71.2%) engaged in on-farm plus off-farm and on-farm plus non-farm, livelihood diversification strategies respectively. From the total respondents 245 (63.8%) owned or have access to ICTs, of whom 10 (4.1%) and 176 (71.8%) engaged in on-farm plus off-farm and on-farm plus non-farm livelihood diversification strategies respectively. From the total respondents 179 (46.6%) have training on input use and water shed development activities over the last two cropping seasons and 50 (13%) respondents borrowed money from formal credit institutes of whom 9 (18%) and 26 (52%) diversified their income source through engaging in on-farm plus off-farm and on-farm plus non-farm livelihood

Table 1. Major livelihood diversification strategies in the study area.

Livelihood strategies	Participants (n = 384)	
	Frequency	Percent
On-farm only	134	34.9
On-farm plus Off-farm	44	11.5
On-farm plus Non-farm	184	47.9
On-farm plus Off-farm plus Non-farm	22	5.7

Source: Own survey result, 2022.

Table 2. Demographic and socio-economic characteristics of sample households.

Categorical variables		Total samples (n = 384)	Off-farm (N = 44)		Non-farm (N = 184)		
			Freq	%	Freq	%	
Sex	Male = 1	312 (81.3%)	26	8.3	155	49.7	
Irrigation	User = 1	142 (37%)	8	5.6	75	52.8	
Erosion	Yes = 1	227 (59.1)	24	10.6	128	56.4	
Fertilizer	User = 1	117 (30.5%)	70	59.8	4	3.4	
Market av.	Yes = 1	32 (8.3)	30	93.8	0	0	
Drought	Yes = 1	184 (47.9%)	5	2.7	131	71.2	
ICT	Yes = 1	245 (63.8)	10	4.1	176	71.8	
Training	Yes = 1	179 (46.6)	19	1.6	98	79.9	
Credit	Yes = 1	52 (13.5)	1	1.9	39	75	
Extension contact	Never = 0	97 (25.3%)	19	19.6	15	15.5	
	Rarely = 1	146 (38%)	21	14.4	67	45.9	
	Often = 2	138 (35.9%)	4	2.9	102	73.9	

Continuous variables	Total samples N = 384		Off-farm		Non-farm		Independent Sample t-test
	Mean	Std.dev	Mean	Std. dev	Mean	Std.dev	
Age	43.29	8.518	45.86	6.190	39.87	8.414	6.875
Education	4.58	3.353	2.11	2.738	6.26	3.215	-6.487***
Dep. Ratio	1.34	0.182	2.36	1.88	1.35	0.205	8.721***
Land	1.07	0.541	0.95	0.284	0.99	0.479	4.635***
Livestock	2.06	2.473	1.47	1.987	1.65	2.350	5.613**
Total income	110,475.86	42,570.610	79,291.59	17,913.150	136,712.97	35,745.127	7.341***

Source: Own survey result, 2022, *, ** and ***, indicate Significant levels AT 10%, 5% and 1% respectively.

diversification strategies respectively. From the total respondents 97 (25.3%) never visited by the extension agents over the last two cropping seasons, 146 (38%) were visited by the DAs at almost once per month, and 138 (35.9%) have been visited by the *Kebele* extension workers at fortnight basis (at least once every two weeks) over the last two cropping seasons. The average age of the total 384 respondents was 43.29 years and the t-test result also showed significant difference between off-farm and non-farm participants in terms of their age. The average education level of the sample respondents is 4.58 and the t-test result also showed significant variation among households who engaged in off-farm and non-farm activities in terms of their education level. The mean dependency ration of respondents is 1.34. The mean land holding size and livestock holding is of respondents is 1.07 ha and 2.06 TLU respectively. The average distance of

respondents' residence from credit sources is 3.05 km and the t-test result also showed significant difference between off-farm and non-farm participants in terms of distance between their residences to the nearest formal credit sources.

3.3. Determinants of Household Choice of Livelihood Diversification Strategies

After deciding on the appropriate type of econometrics model, a total of seventeen explanatory variables were selected to be included for analysis. A multicollinearity test was conducted before the analysis in order to detect and avoid the problem of collinearity between the selected independent variables. The VIF values for all explanatory variables included in the logit model were much less than 10 implying that the problem of multicollinearity was not serious among all the explanatory variables (Annex, **Table A1**). The log likelihood was -184.43805 indicating that there was no heteroscedasticity problem and Wald $\chi^2(34) = 1384.5$ indicated that the model fitted the data reasonably well.

The result of the bivariate model in **Table 3** revealed that, many of the explanatory variables including: household income of the household, sex of the household head, education level, past erosion hazard, livestock holding, distance to market, and training significantly determined household's choice of off-farm livelihood diversification strategies. On the other hand, 10 of the 17 explanatory variables including: income of the household, dependency ratio, past erosion hazard, irrigation, market availability/access for non-agricultural outputs or services, yield loss/reduction due to drought over the last two years, distance to credit source, distance to market, frequency of extension contact, and ICT ownership (Radio, TV and Mobile phone), significantly determined household's choice of non-farm livelihood diversification strategies in the study area.

Accordingly, the household's choice of off-farm activities was found to be decrease with an increase in the income of the household in the study area and the relationship is significant at 10% level. This is because wealthier households prefer to engage in a high return activity with the objective of profit maximization than engaging in low return off-farm activities like sell of fuel wood and charcoal [5] [6]. On the other hand, income determined the household's choice of non-farm activities positively. This is because; wealthier households have the financial capability to invest their capital on their own private non-farm activities than being hired as a wage laborer on others' farms. This result coincides with the finding of [5] who reported "wealthier households have the capacity to purchase the required types of agricultural inputs and technologies to pursue on-farm activities as well as to invest the income that they earned on different types of non-farm businesses like shop, hotel and transportation services".

Household's choice of off-farm activities negatively influenced by sex of the household head at 5% significant level. This is because; men have better access to information to engage in high return activities than women. This result also coincides with the findings of [17] [22]-[27] who pointed out that male household

Table 3. Result of the Bivariate Probit Model to identify determinants of choice of livelihood strategy.

Variables	bivariate probit result			Number of observation = 384 Wald chi ² (34) = 1384.50 Prob > chi ² = 0.0000		
	Off-farm			Non-farm		
	Coef.	Std. error	P-value	Coef.	Std. Error	P-value
Total Annual Income	-0.3364572	0.1978456	0.089*	1.495933	0.3905245	0.000***
AGE	0.0128569	0.0151347	0.396	-0.0074736	0.0223702	0.738
SEX	-0.6072374	0.243136	0.013*	-0.8187816	0.5537737	0.139
EDUCN	-0.0679372	0.0374569	0.070*	-0.0549736	0.0626859	0.381
DEPEND	0.2540057	0.6209895	0.683	4.164456	0.9205764	0.000***
LAND	-0.3253319	0.2699513	0.228	0.662018	0.4814871	0.169
EROSIN	0.4818243	0.2386105	0.043*	0.6750146	0.3256339	0.038*
LSTOCK	-0.2751799	0.0536048	0.000***	-0.0992463	0.068179	0.145
IRRIGN	-0.1592845	0.2623719	0.544	-0.7588567	0.3772119	0.044*
MKTAVL	-0.4504255	0.4690356	0.337	8.558913	0.7225402	0.000***
DRTLOSS	-0.0912116	0.2099996	0.664	3.09831	0.4778341	0.000***
DISCRDT	-0.1214879	0.0779578	0.119	-0.7276589	0.1136443	0.000***
DISMKT	0.1134186	0.0313826	0.000***	0.1667467	0.0476813	0.000***
EXTCNT	-0.124966	0.1696051	0.461	1.18843	0.232561	0.000***
ICT	-0.069895	0.253848	0.783	2.012742	0.4892354	0.000***
TRAING	-1.14359	0.253887	0.000***	-0.2204537	0.385126	0.567
CRDT	0.1261852	0.3955728	0.750	1.142646	0.780697	0.143
_cons	0.4748128	0.8093194	0.557	-6.087631	1.39491	0.000

Source: Own survey result, 2022. *, **, and *** indicate significant levels at 10%, 5% and 1% respectively.

heads participated more in Non-farm livelihood activities than female headed households due to culture related and socio-economic barriers. There is a positive relationship between dependency ratio and household's choice of non-farm livelihood diversification strategies at 5% significance level. This is because; the quantity of their produce may not be adequate to meet their family needs. Hence, households with larger dependency ratio should diversify their livelihood strategy so as to earn additional income for fulfilling their family felt needs. This result coincides with the findings of [22] who reported that families with larger dependency ratio have idler and non-productive family members with larger demand for food and other obligatory family needs. However, this result contradicts with the finding of [9] which reported "household with larger dependency ratio faced shortage of working hands to earn from diversified activities for meeting their family needs".

Education negatively determined the household's choice of off-farm activities in the study area at 10% probability level. This is because more educated household heads are capable of calculating the costs and benefits of income generating activities and hence preferred to run more profitable own businesses than being hired in others' firms and engaging in less profitable and low return activities like selling fuel wood and charcoal. This result coincides with the findings of [28] [29] [30]. Past erosion hazard determined household's choice of off-farm activities positively at 5% significant level. This is because, erosion obviously resulted in loss of soil nutrients that led to yield reduction and food insecurity problem. Thus, households who faced past erosion hazard on their farm land will be pushed towards different type of off-farm livelihood diversification strategies as an alternative source of income.

Household choice of off-farm livelihood diversification strategies was found to decrease with an increase in livestock holding in the study area at 1% significant level. This is because, livestock holding relates to the wealth status of a household and hence farmers with large number of tropical livestock unit (TLU) can earn more income from sale of live animals and their products and less likely engage in less return Off-farm activities [7] [13] [16] [29] [31] [32]. Access to irrigation negatively determined household's choice of non-farm activities at 5% significant level. This is because, irrigation helps farmers to produce high value cash crop such as vegetables and coffee to enhance their income. This increment in income will enable them to acquire variety of food items through own production and purchasing from local markets and hence make them to rely only on on-farm activities than engaging in Non-farm activities [7] [12] [15] [33]. Market availability is a pull factor for households to diversify their livelihood strategies and has been found to positively determined households' choice of non-farm activities in the study area at 1% level. This is because according to [20] being close to the market places may create conducive situation for farm households to engage in non-farm activities like daily labour and trade.

The study area is a drought prone locality where farmers have experienced frequent crops failure and loss of yield due to its adverse impacts. Reduction or loss of yield due to drought occurrence was found to increases household's choice of non-farm livelihood diversification strategies. This is because, households who have suffered risks and shocks associated with drought and pushed towards non-farm activities like wage labour, putty trade (retails), sale of local foods and beverages [10] [14] [16] [24]. Distance to credit sources was found to decreases household's choice of non-farm activities. This is because, as the distance to the credit sources increases, households lack the opportunity of borrowing money (start-up capital) to engage in different types of non-farm activities. This finding however contradicts with [15] [28] [33] which states "an increase in distance to credit source will increase transaction cost for purchase of agricultural inputs and farmers will harvest low yield which will be inadequate domestic consumption or to be sold at markets and hence farmers will be

pushed towards non-farm livelihood diversification strategies”.

On the other hand, distance to market positively determined household's choice of both off-farm and non-farm livelihood diversification strategies. This is because, as the distance from household's residence to the nearest market increases transaction cost for purchase of agricultural inputs also increases and hence pushed farmers towards off-farm and non-farm livelihood diversification strategies [1] [10]. Frequency of extension contact and households choice of non-farm livelihood diversification strategies relate positively. This is because, farmers who were frequently visited by DAs have better access to information on non-farm livelihood diversification strategies than those who never or less frequently visited by Das [28]. Household's ownership to ICTs (Radio, TV and/or Mobile phone) positively relate with its choice of non-farm activities in the study area because, ICTs (Radio, TV and/or mobile phone) will create better access to new concepts and information for households on importance of livelihood strategies [12] [14] [31] [32]. There is negative relationship between training and household's choice of off-farm activities in the study. This is because, the trainings provided for farmers mainly focused on use of agricultural inputs and watershed development programs none of them emphasized on the importance of off-farm livelihood diversification strategies [13].

4. Conclusion and Recommendations

4.1. Conclusion

Although agriculture is the mainstay of rural households in the study area, several households have been engaged in on-farm plus off-farm, on-farm plus non-farm, and on-farm plus off-farm plus non-farm livelihood diversification strategies. Household's choice and engagement in the different types of livelihood diversification strategies in the study area vary by total annual income, age category, education level and sex and contributed a lot to the livelihood of those who frequently faced crops failure and lost their livelihood assets due to the combined adverse impacts of recurrent drought and frequently arising ethnically motivated conflicts in the study area. Households in the study area diversify their livelihood due to several push and pull factors. Accordingly, crops failure or yield loss due to moisture stress, loss of livelihood assets due to ethnic conflict, low level of harvest due to soil erosion, nutrient depletion and prevalence of pests like army worms and desert locusts, small land holding size and landlessness were identified as a push factor. On the other hand, better income from non-farm/off-farm activities and availability of market (e.g an increase in demand for rural transportation) were identified as pull factors for the rural households to diversify their income sources. Besides, factors that determine households' choice of off-farm and non-farm livelihood diversification strategies were identified using bivariate model and the result showed that six of the seventeen explanatory variables: wealth status of the household, sex of the household head, education level, past erosion hazard, distance to market and training

were found to be statistically significant in determining households choice of off-farm activities in the study area. Likewise, wealth status, dependency ratio, market availability, loss or reduction of yield due to drought, distance to market, distance to credit source, extension contact and access to ICT significantly determined household's choice of and engagement in non-farm activities in the study area. Hence, households' livelihood improvement can only be realized if the government and its development partners give due attention and put in place right policy measures to encourage smallholder farmers to diversify their income sources and thereby enhance their wellbeing.

4.2. Recommendations

Any development intervention implemented by Government Organizations (GOs) and NGOs to achieve sustainable improvement in the livelihood of smallholder farmers in drought prone areas like Amaro and Burji Special *Woredas* should consider the following key recommendations. The locally functioning GOs and NGOs needs to design inclusive household asset building programs to improve the wealth status of drought or conflict affected households landless and the poor to involve in different types of off-farm and/or non-farm livelihood diversification strategies through the provision of loan at reasonable interest rate (as a start-up capital), capacity-building training and working place. The existing credit providing institutions should be strengthened to make credit more accessible to smallholders to engage in high return non-farm activities. Development of small-scale irrigation schemes, upgrading the existing traditional irrigation structures in the study area are of paramount important in order to minimize the adverse impact of recurrent and prolonged drought on the livelihood of the local farmers. The agricultural extension service should be inclusive enough to reach those who engage in off-farm and non-farm livelihood strategies through provision of successive training, behavior change communication, demonstrations and field days. Due attention should also be given for the livestock sector to improve their productivity through promotion of artificial insemination services, improving their genetic breeds, introduction of nutrition rich livestock feeds and provision of adequate veterinary services. Furthermore, the locally functioning GOs and NGOs should give due emphasis to the expansion of informal education and awareness creation training programs. Households ownership of or access to ICTs alone may not be adequate for households to enable them engage in different types of livelihood diversification strategies, but the content of the message as well as the time spent and willingness of the households to access that information also matters. Thus, information broadcasted through ICTs should be designed with impressive, enjoyable and attractive ideas related to household's choice of livelihood diversification strategies. Therefore, GOs and NGOs should strive to create better access to information on markets, loan or credit services, on-farm and non-farm related concerns through strengthening of the locally existing information sources like the Koore

FM 92.3 radio station and establishing new ICT infrastructure in the study area.

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Conflicts of Interest

There is no conflict of interest among the authors.

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Annex

Table A1. Multicollinearity checked variables.

Variable	VIF	1/VIF
TOTINCM	3.37	0.296666
IRRIGN	2.46	0.405850
DISDA	2.42	0.413986
FERTLZ	2.26	0.442240
EDUCN	2.20	0.453617
WEALTH	2.13	0.470446
AGE	2.08	0.481920
LAND	1.96	0.510500
DRTLOSS	1.84	0.543538
DISCRDT	1.80	0.554857
EXTCONT	1.72	0.582593
FAMSIZ	1.71	0.585578
DEPND	1.38	0.722098
EROSNN	1.38	0.722109
MKTACCES	1.31	0.765425
SEX	1.31	0.765584
BETINCOM	1.33	0.751014
DIMRKT	1.29	0.776593