International Scholars Journals

African Journal of Agricultural Economics and Rural Development ISSN 2375-0693 Vol. 13 (5), pp. 001-011, May, 2025. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Diversifying Livelihoods in Drought-Prone Areas: Determinants of Rural Household Livelihood Strategies in Ethiopia

Gebrehiwot Weldegebrial Gebru[1]* and Fekadu Beyene[2,3]

[1]School of Environment, Gender and Development Studies (SEGDS), Awassa College of Agriculture, Hawassa University, P.O.Box: 05, Hawassa, Ethiopia.

[2]Department of Rural Development and Agricultural Extension, College of Agriculture and Environmental Science, Haramaya University, Haramaya, Ethiopia.

[3]Pastoral and Agro-pastoral Studies, Haramaya University, Haramaya, Ethiopia.

Accepted 24 February, 2025

Despite the continuing economic centrality of agriculture in the district, farm households engage and pursue diverse non-farm livelihood activities to cope with diverse challenges and risks such as drought. This paper aims to assess the relative importance of existing livelihood strategies adopted by the different socio-economic groups; the link between households' ownership and access to different 'livelihood assets'; and identify determinant factors for households to adopt and choose certain livelihood strategies in the district. A survey of 130 households in six administrative Kebeles and informal discussion with key informants were used to collect data. Results of the multinomial regression to identify determinants of rural household livelihood options indicated that the role of education and productive family, access to credit and receiving regular remittance, membership to formal cooperatives, access to market and business oriented extension service are of poor farm households to diversify their livelihood income into off-farm and non-farm activities. Even though-variations in livelihood strategies exist, the overall picture is still one of considerable and broad-based poverty in the area. So development stakeholders should work together and implement target based interventions that help households to improve their livelihood in a sustainable manner by adopting higher return and sustainable livelihood strategies.

Key words: Ethiopia, livelihood strategies, rural household, assets, determinants, on-farm, off-farm, non-farm, drought-prone areas.

INTRODUCTION

Rural households in Sub-Saharan African countries usually have to cope with both poverty and income variability. Of these, Ethiopia is one among most grounded in poverty due to periodic drought and extremely variable environment making agriculture a risky economic activity. Drought is considered to be a major instrument driving people into chronic poverty and keeping them in the state for many years even after the breaking of the drought (NDMC, 2005). Like other sub-Saharan Africa countries, the nation is characterized by a complex, diverse and risk-prone agricultural production environment (Devereux, 2000; MoFED, 2002). Natural disaster (drought) forced people into alternative livelihood such as the collection and sale of firewood and grasses (Goodrich, 2001). Ensuring households' access to food poses a formidable challenge in view of the fact that chronic food insecure households are predominantly located in drought-prone, moisture deficit, areas and peripheral pastoral areas. These areas are chronically food insecure in several aspects; they do not produce enough food to feed

*Corresponding author. E-mail: gebre2007@gmail.com.

themselves, food production is highly variable, and there are many households with insufficient income to secure enough food through the market (FDRE, 2002). As a consequence, the agricultural production has been deteriorating over time, and has forced people in the region to look for alternative employment option other than agriculture. That means, households engage in diverse livelihood strategies away from purely crop and livestock production towards farm, non-farm and off-farm activities that are undertaken to broaden and generate additional income for survival and cope with this harsh and difficult environment. Despite this, the struggle to reduce poverty at the household level in the rural areas of Ethiopia has remained as a challenging goal. To intervene the problem, there needs to disentangle the interwoven factors which influence poverty and to understand the livelihood strategies of the rural house-holds have got paramount importance to development practitioners and policy makers to find the way out.

On the contrary, rural people on their side partake in a number of strategies including agricultural intensification, migration, and livelihood diversification which enable them to attain a sustainable livelihood. Various empirical studies show that different livelihood diversification strategies exist in the sub-Saharan countries even though the forms and people's participation level may vary. According to Scoones (1998), the combination of livelihood resources (different livelihood asset) are resulting in the ability of people to follow the combination of livelihood strategies. Consistent with the earlier state-ment, in many rural parts of the country, the recurrent drought along with the environmental degradation is becoming a serious threat to the livelihood of the poor. However, some households successfully respond to these events, and exhibit livelihood systems that are able to resilient (Validivia et al., 2005) while others do not. Likewise, the study area is characterized by producing cereal crops which has low economic return and are highly dependent on the rain fed agricultural production system which is highly vulnerable to draught in the absence of sustainable rain fall. Furthermore, the productive agrarian capital which is basically land is becoming scarce mainly due to the high population pressure. Due to the insufficient land resource to absorb the household's full labor force endowment and the rain fall pattern variability in the area, the agricultural sector is becoming a risky economic activity which has low return in income. Thus, the farming people in the area are compelled to seek out off-farm or non-farm income source. In spite of this, as the household's access and returns to the different livelihood diversification strategies are affected by different internal and external factors, their participation is also varied. Similarly, different households adopt different strategies according to their particular asset and asset status (Ellis, 2000b). Thus, it needs location specific information to recommend for practicing sustainable livelihood diversification strategies within the farming community. Assets are the basic building blocks upon which households are able to undertake production, engage in labor markets and participate in reciprocal of exchanges with other households (Bezmere and Lerman, 2003; Brown et al., 2006).

The livelihood assets available to the household represent the basic platform upon which the household livelihood may be built. In this definition, the conventional meaning of assets is expanded to include besides material and financial resources, also household members' skills and experience (human capital, their relations within wider communities (social capital) and their natural environment (natural capital). People draw on a set of capital assets as a basis for their livelihoods (Soussan et al., 2000). However, - no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek (DFID, 1999). In conformity with this statement, Messer and Townsley (2003) suggested that members of a household should combine their capabilities, skills and knowledge with the different resources at their disposal to create activities that will enable them to achieve the best possible livelihood for themselves and the household as a whole. Hence, in order to create livelihoods, people must combine the assets that they have access to and control over (Chambers, 2003). Everything that goes towards creating that livelihood can be thought of as a livelihood asset. The diversity and amount of the different assets that households have at their disposal, and the balance between them will affect what sort of livelihood they are able to create for themselves at any particular moment and the type of livelihood strategy to pursue. The study area typically exhibits the overall development challenges that Ethiopia is currently struggling with. It is one of the most chronically food insecure area targeted by the Regional Food Security programme, local and international NGOs supporting agencies. The district has been repeatedly hit by drought and the people in the area have been regularly receiving food aid of different forms (emergency relief assistance, food for work, employment generation scheme, safety net etc) since 1985.

The chronic nature of food insecurity leads not only to deprivation of access to immediate food needs but also to the depletion of assets which are expended and distress-sold for procuring food from the market or other sources. For example, in stressful conditions, communities in drought prone areas sell their productive assets such as oxen at low prices which they usually fail to rebuild (restock) after the disasters are over. The losses of productive and reproductive capacity of many rural households thus represent the increasing impoverish-ment process (Yared, 2001). All geographic locations do not have similar resource endowments, do not face similar level of constraints and do not necessarily employ

similar strategies to solve their problem (Barret et al., 2001; Warren, 2002; Wolde-selassie, 2001). The differences in endowments of resources in turn influences rural households' capability and their survival strategy. Similarly, even within similar geographic locations, socio-economic factors pose a wide range of differentials among rural households which include demographic characteristics of households, well-being or economic and social status of households and the gender disparity perspective (Murray, 2001). The reality of diversified rural livelihoods across a number of economic sectors should, therefore, impel the local government and development agencies to devise strategies that will have an effective impact upon the 'different livelihoods of the rural poor' (Murray, 2001). Though local government and NGOs like Relief Society of Tigray (REST) and Catholic Relief Society (CRS) operating in Gulomekeda district had been spending a lot of resources from year to year but they were not able to bring a feasible change on the livelihood of the rural community. This was due to the fact that lack of information on what exactly constitutes the livelihood strategy of different socio-economic groups and the natural factors such as drought. The lack of such information in turn was constraining effective decisions on the type and nature of interventions and the target beneficiaries. In line with this, according to Ellis (2000a) and Tesfaye (2003), different households adopt different strategies according to their particular asset and asset status. But, so far, there was little empirical research which has been conducted in the area concerning this issue.

The objectives of the study were: 1) to assess the relative importance of existing livelihood strategies adopted by the different socio-economic groups; 2) to investigate the link between households' ownership and access to different 'livelihood assets' and the 'livelihood strategies' they pursue; and 3) to identify determinant factors for households to adopt and choose certain livelihood strategies.

METHODOLOGY

Description of the study area

This study has been carried out during the year 2010, in six nominated Kebeles of Gulomekeda district, Eastern Zone of Tigray National Regional State, Ethiopia which is found at about 915 km north of Addis-Ababa. It encompasses a total of 84762 populations and 26580 ha of land. Of the total population, 88.22% lives in the rural area (BoARD; CSA, 2007). The district receives an average annual rainfall ranging from 400 to 500 mm. Farmlands are characterized by high fragmentation which results in continuing decline of agricultural productivity.

Sample and sampling procedure

The study was carried out by selecting six rural Kebeles purposively out of the total of eighteen Kebeles. This was done by selecting representative groups from each Kebeles far and near to main road, potential market and the cash crop they grown. This was made to maintain the representativeness of the district. Of the total of 5307 household heads in the six sample, Kebeles- a total of 130 sample rural households were taken through proportional sampling method. Finally, simple random sampling method was used to select sample respondents within the sample Kebeles.

Type, source and method of data collection

Both primary and secondary data were collected and used which was qualitative and quantitative in nature. Primary data was gathered from 130 households using structured interview schedule. Informal discussion with key informants such as head of district agricultural office, extension experts and Kebele chairman was also conducted to cross-check and enrich the validity of information collected from the sample respondents. Secondary data was reviewed and collected from secondary sources such as similar studies conducted in the area, and from related published books and journals.

Method of data analysis

Data collected through structured interview schedule were processed and coded using SPSS software for further analysis. Quantitative categorical type of data was analyzed using percentage, frequency and chi-square test. While quantitative continuous types of variables were analyzed using one way ANOVA, minimum, maximum, mean and standard deviation. On the other hand, narrative type of analysis was also used to analyze qualitative type of data and to enrich and illustrate a qualitative conclusion. After computing the descriptive statistics, a multinomial logistic regression was (Green, 2003) used to identify determinants of household's choice of livelihood diversification strategies where the dependent variable was multi outcome (Y = 0…..4, if a household choice is relying on on-farm, on-farm + off-farm, on-farm + non-farm, on-farm + off-farm + non-farm; or off-farm + non-farm income generating activities).

RESULTS AND DISCUSSION

Human capital and household livelihood strategies

The sample survey result indicated that, as the mean age of household heads increased their ability to engage in different off-farm and non-farm income generating household, livelihood strategies decreased. For instance, the average mean age of households, their livelihood depended in on-farm income alone and these their mainstay both in on-farm and non-farm together were 56.84 and 45.94 year respectively (Table 2). This indicates that youth household heads are more active and flexible with time to use different non-farm and off-farm income diversification livelihood strategies than the older one due to their access to education, less experience to tolerate bad conditions (like drought and war in the area), goes with the age of information (high social network outside the area) and their physical strength to work wherever. The sample survey result showed in Table 1

Table 1. Summary of categorical variables descriptive analysis results by household's choice of livelihood strategies.

Independent variables	Response of sample households	Household livelihood strategies (%)						χ^2
		Y=0 [1]	Y=1 [2]	Y=2 [3]	Y=3 [4]	Y=4 [5]	Total (N=130)	
Sex	Male	24.6	6.9	32.3	10.0	6.2	80.0	14.696***
	Female	13.8	0.0	5.4	0.8	0.0	20.0	
Use of farm input	Yes	26.9	3.8	23.1	6.2	3.8	63.8	1.13
	No	11.5	3.1	14.6	4.6	2.3	36.2	
Member to cooperative	Yes	10.0	3.1	21.5	7.7	5.4	47.7	19.467***
	No	28.5	3.8	16.2	3.1	0.8	52.3	
Credit use	Yes	11.5	4.6	26.2	8.5	4.6	55.4	21.683***
	No	26.9	2.3	11.5	2.3	1.5	44.6	
Frequency of extension contact	≤12	19.3	4.6	16.9	5.3	3.9	51.1	9.608
	24	14.6	0.8	15.4	4.6	1.5	36.9	
	52	4.6	1.5	5.4	0.8	0.8	13.1	
Food aid/FFW	Yes	38.5	6.9	33.8	9.2	6.2	94.6	8.224*
	No	0	0	3.8	1.5	0	5.4	

***, **, * indicates significant at 1, 5 and 10% probability level respectively. Keys: 10 = on-farm, 21 = on-farm + off-farm, 32 = on-farm + non-farm, 43 = on-farm + off-farm + non-farm', 54 = off-farm + non-farm.

that out of the total 80% male headed households, only 24.6% of them were their livelihood depends in on-farm income while out of the total 20% female headed households, 13.8% of them were dominantly relied on their livelihood from on-farm income alone. This briefly indicates that, more than 69.25% of male headed households were able to participate in different non-farm and off-farm income generating livelihood strategies while only 31% were true for the female headed sample households in the study area. The probable reasons were that female households have less chance to participate in off/non-farm activities since they invest much time in domestic roles such as childcare, cooking, washing cloth, gathering fire wood, fetching water with high participation in low economic value and time consuming agricultural activities like weeding and harvesting.

At the time of the study, the average mean household family size was 6.5 (Table 2). The main thing here is having more family size without consideration to their productive labor force, physical disability and health status fosters reproductive care giver's burden while giving focus to both the family size and their productive age plays a crucial role in improving the livelihood situation of the household through engaging in different income generating livelihood strategies. The result of the sample survey also showed that, the number of dependent family members below the age of 15 and above 64 ratios to the active labor force (15 to 64 ages) is high with the average mean of 1.027. In line with this, the average mean of dependency ratio across households choice of household livelihood strategies decrease from Y = 0 to Y=4 and significant at less than 5% probability level (Table 2). These clearly showed us one active productive labor force member of the household in the study covers all the food and non-food necessities expense of 1.027 dependent household members of his/her family lonely that is high care givers' reproductive burden. Table 2 briefly indicates that households with the average high level of education leads relatively better life by diversifying their income enhancing livelihood activities such as working on off-farm and non-farm (often in better remunerated occupations) than the other.

Here, the output survey data indicates there is a direct correlation between education and wealth which mostly explains greater access to resources and able to create strong social network within and outside the society.

Natural capital and household livelihood strategies

Land is one among the most fundamental and important means of production. It is a crucial productive resource particularly for the rural community that is why the stake-holders in the area put land as one among the main

Table 2. Summary of continuous variables descriptive analysis results by household's choice of livelihood strategies.

Independent variable	Y=0	Y=1	Y=2	Y=3	Y=4	Total	F	Min.	Max.
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)			
Age	56.84(10.267)	49.78(14.763)	45.94(10.381)	54.57 (10.95)	50.13 (14.53)	51.58(11.87)	4.516***	29	74
Household size	7.34(1.722)	6.67 (1.225)	3.65(2.847)	5.36 (1.082)	5.63(0.744)	6.48 (1.566)	4.501***	4	12
Dependent ratio	1.345 (0.667)	1.041 (0.583)	0.832 (0.307)	0.671 (0.275)	0.836 (0.367)	1.027(0.557)	5.046**	0	3
Education	0.54(1.568)	2.11 (1.764)	3.65(2.847)	6.86 (3.134)	4.0 (3.546)	2.97 (3.268)	12.273***	0	10
Land size (hectare)	0.34(0.150)	0.333 (0.177)	0.219 (0.188)	0.268 (0.119)	0.219 (0.160)	0.279(0.173)	1.982	0	0.75
Livestock (TLU)	1.583 (0.962)	1.513 (0.952)	1.801 (1.273)	1.786 (0.917)	1.331 (0.851)	1.667(1.075)	1.075	0	5
Income from cactus	611.60(507.287)	827.78(686.072)	695.71(614.956)	622.86 (585.208)	589.38(758.356)	658.12(580.68)	2.472***	0	2500
Remittance income	30.0 (212.132)	455.556(769.921)	998.98(880.488)	871.429(930.201)	681.25(708.085)	555.39(806.83)	1.538*	0	3500
Distance to market	24.66 (9.162)	24.44 (7.002)	17.14 (8.784)	20.43 (9.304)	22.25 (6.798)	21.21(9.308)	5.527***	5	38

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

criterion in setting community based relative wealth ranking. The result of the survey depicted that, as the size of the cultivable land owned by the household increases, their interest to engage in non-crop income generating livelihood strategies decreased (Table 2). However, the result of the sample survey was in contrary to the community wealth ranking since out of the total sample household heads who own farm land 94.4, 70.5 and 75% were the poor, middle and better off respectively. Here, the core reasons highlighted by the respondents for why households who own farm land become poor than the other as the survey result indicated in Table 2 are: due to successive occurrence of drought (erratic rainfall) leads to crop failure, the land by itself is very small (less than 0.279 ha per household head), high soil erosion and deforestation, steep slope, thin and high soil infertility. Not only thus, but also low crop production and productivity both in terms of quality and quality even at good season. Within this situation, giving more time on crop production makes the poor to become poor than the other.

Physical capital and household livelihood strategies

Unlike in agro-pastoral farming systems, livestock keeping in Gulomekeda district is the secondary important complement activity to cropping. It is considered as the most vital physical asset that plays a crucial role in securing households from any crisis during crop failure in the study area. Beside, to this farmers, owning more livestock are considered as wealthier and have high social status in the eye of the community. Inline to this, the result of the study indicates that, the mean total livestock unit (TLU) across household's choice of livelihood strategies of the sample households is 1.667 and has no significant difference (Table 2). Here, almost all households in the area own quite low average herd sizes of livestock reflecting the scarcity of available grazing land, food shortage, adequate veterinary services, lack of improved breeds and adequate water were the main problems in mind to the high occurrence of drought in the area leading to both poor quality and quantity of livestock production. Cultivation of cactus is one among the rural household livelihood strategies that helps people to sustain their living standard starting from the mid June to September for these who cultivate and use it properly in the study area. It is the main source of food both for human beings (3 to 4 months) and yearly for animals besides of its importance as source of cash income by selling its fruits.

The study result as in Table 4 depicted that, farm households who cultivate cactus and use properly earn a maximum of 2500 ETB while those that did not cultivate and use it properly were unable to gain any income. The mean annual income gained from cactus was 658.12 Ethiopian birr per household.

Thus, households who cultivate and use cactus properly can earn more cash income directly by selling its fruit and indirectly from livestock and livestock product sales, able to develop their potential in diversifying their household livelihood strategies into off and non-farm activities.

Social capital and household livelihood strategies

Membership to cooperatives is a means of building strong social net-work that enable households to obtain updated information in sharing pooled labor, farm equipments, cash credit usage and other non farm income generating activities. The result of the survey reveals that, out of the total of 130 sample respondents, 47.7 and 52.3% were members and non-members respectively to formal and informal cooperative institutions (Table 1). Here, most of the farm household's memberships to cooperatives were able to diversify their livelihood strategies into off-farm and non-farm income generating activities beside to the income gained from on-farm. On the other hand, most of the farm household's non-memberships to cooperatives were unable to diversify their livelihood strategies that is most dominantly remain on agricultural income alone. Among various social services, access to market plays a crucial role in determining access to assets and livelihood strategies, terms of exchange for assets, and returns to an investment. So, households who are closer to the market center gets several key advantages including access to larger agricultural markets, save their substantial time, much lower transport costs and better and more remunerative non and off-farm activities. Similarly, as the survey result showed the mean distance between the main market centre (Adigrat town) and the sample respondents is 21.21 km with a minimum of 5 km and a maximum of 35 km (Table 1).

Households closer to the market centre were able to use combined non-farm and off-farm livelihood activities, so that could improve and secure their livelihood by minimizing risks due to drought and other factors occurred in the area.

Financial capital and household livelihood strategies

Credit is an important source of earning future income which plays a vital role in supporting the production and income generating activities of farmers. However, the result of the survey indicates that out of the total 55.4 and 44.6% of credit user and nonuser households, 11.5 and 26.9% of them were remained unable to diversify their livelihood strategies out of farm income generating activities respectively (Table 1). This clearly indicates that, lack of access to credit remains the key problem in the district to potential diversification into non-farm and off-farm activities. On the other hand, it clarifies access to formal sources of credit was found to be weak in the district despite the number of organization such as Relief Society of Tigray (REST), Catholic Relief Society (CRS) and World Bank (WB) engaged in this activity. Beside to this, credit is male dominated. Even if women have some access to credit, they have less chances of using it since they are enforced to give their credit to their husbands as the decision making power is on his hand. Here, some of the main reasons for households failure to use credit were: lack of knowledge about credit providers, ascribed tight repayment schedules, fear of repayment back due to crop failure because of drought and disasters, high interest rate (18%), limitation of loans availability, short duration, lack of information and entrance criteria are not suitable to households who have different needs and capabilities. While households engaged in on-farm and non-farm activities together receive the highest annual mean income of 998.98 ETB per household from remittance, households remain their livelihood in on-farm income alone earns 30.0 ETB per household that is the lowest of the other (Table 2). Households earn a total mean annual income of 555.39 Ethiopian birr per house-hold head from remittance.

The probable reasons for why households engaged in diversified livelihood strategies gain, relatively more remittance than on-farm alone are: due to their high social net work with their relatives living in cities, earn money from their sons and daughters employed on skilled non-farm wage labor since they invest to educate them and because of their financial capability in sending their family abroad like Saudi-Arabia and Sudan in finding job.

Institutional supports and household livelihood strategies

Development agents are assigned in the rural areas to promote modern agricultural practices with close technical guidance and convincing the farmer's outlook in using location specific modern agricultural inputs throughout the nation in general and the study area in particular though they are not necessarily sufficient. Accordingly, the statistical analysis result of the survey showed that 51.1, 36.9 and 13.1% of the household heads get extension contact less than or equal to 12, 24 and 52 times per year respectively (Table 1). Since extension contact fosters and strengthens the linkage between farmers, GO and NGO development stake-holders, those farmers who have more contact were able to access time oriented information and able to update their knowledge, skill and experience through training, demonstration, visiting another farmer's field and so on. However, as the response from group desiccants showed, the focus of development agents and kebele administrators in the area was agriculture, and they did not allow and give them training on how to run business and earn income from non-farm activities especially outside the area. Beside to the aforementioned, the poor in general and female headed households in particular were marginalizing from development interventions and have limited access to skill training and extension service.

Table 3. Choice of household livelihood strategies by wealth category.

Choice of households' livelihood strategies	Wealth category of HH (%), N = 130			Total
	Poor (0), n = 54	Middle(1), n = 44	Better off (2) n = 32	
On-farm alone	50.0	43.2	12.5	38.5
On-farm + off-farm	9.3	2.3	9.4	6.9
On-farm + non-farm	20.4	43.2	59.4	37.7
On-farm + off-farm + non-farm	16.7	11.4	12.5	13.8
Non-farm + off-farm	3.7	0.0	6.3	3.1
χ^2				21.470
p-value				0.006***

*** indicates significant at 1% probability level.

Proper application of fertilizer and utilization of drought resistant high yielding varieties supported by close technical assistance can enhance the production and productivity of crops. However, supply of such inputs in the district are very much limited/did not reach on the marginalized group of farmers due to weak extension service, lack of credit availability, high price of inputs, transportation problem and some extension workers do not attempt to involve married women in such programs.

The survey result revealed that 63.8 and 36.2% of the sample households were user and nonuser of agricultural inputs respectively and has no significant difference across household's choice of livelihood diversification strategies (Table 1). Sample respondents also inter-viewed to give their response on their dependence on food aid, accordingly, out of the total sample respondents 94.6% of them were receivers of food aid in either as food for work (FFW) or direct support while the rest 5.4 did not. Here, all farm households engaging in public work activities were receivers of direct food support and/or food-for-work. However, almost all households pursue non-farm and off-farm and non-farm with on-farm activities did not get direct support and/or FFW since much of their time invests on these activities outside the area and could not fulfill the legible requirements to be beneficiary. The food aid received through FFW which amounts 12.5 kg wheat with 0.50 L of cooking oil and 50 Ethiopian birr per person successively for three months (total six month), is not enough for specific households. The legible criteria to become beneficiary of such food are selection made by kebele administrators based on their wealth status (first poor), free labor participation of the farmer in any rural development projects organized by Board of the district administration office in collaboration to the donors of the project fund and based on the needs and interest of the farmer to work on.

Household livelihood strategies

At village or community level, a single livelihood strategy could not apply, since different households will adapt different strategies according to their particular asset and asset status (Ellis, 2000). Accordingly, sample households in the district engage in a variety of on-farm, off-farm and non-farm income generating livelihood activities. The result of the sample survey depicted that, above 50% of the poor were unable to diversify their livelihoods, often lacking the means to engage in any form of income generating activity aside from agriculture. In contrast, those relatively with the highest standard of living (the middle and better off) sample respondents were able to engage in the widest range of income - generating activities predominantly non-farm and combining the on-farm with non-farm or altogether the three livelihood strategies (Table 3). The statistical analysis also indicated that, there is significant difference across the wealth category of the sample households to engage in diverse household livelihood strategies at less than 1% probability level.

Income portfolio analysis

Rural households in the area earn income from diverse allocation of their natural, physical, financial and human capital assets among various income generating activities. Since households in the area are vulnerable to risks due to different impediments like drought, shortage of rain-fall, shortage of farm and grazing land, high soil erosion and infertility, war, lack of infrastructural facilities, they are enforced to pursue diverse income generating livelihood strategies that helps them to cope with those challenges on the one hand and to accumulate their way of living standard on the other hand. The mean annual income per household head earned by the sample respondents was about 3747.23 Ethiopian birr with mini-mum and maximum earnings of 700 and 10850 Ethiopian birr per household head respectively. This revealed that one household member of the sample respondents earns mean annual income of birr 576.50 per year since the average household size was 6.5. The average total income

Table 4. Income composition of sample households by their household livelihood strategies in ETB.

Income composition	Y=0	Y=1	Y=2	Y=3	Y=4	Total
	Mean (SD)	Mean (SD)	Mean(SD)	Mean (SD)	Mean(SD)	Mean (SD)
Livestock	729.70 (610.157)	516.667 (214.826)	712.959 (559.948)	521.667 (930.594)	0.00 (0.00)	657.385 (542.663)
Crop	2062.40 (822.673)	2133.333 (959.166)	1294.694 (942.804)	1656.944 (908.928)	590.00 (955.196)	1676.50 (969.163)
On-farm subtotal	2792.10 (1061.441)	2650.0(1058.253)	2007.65 (1243.264)	2178.61 (1030.071)	590.0 (955.196)	2333.89 (1208.321) (61.37%)
Remittance	30.0 (212.132)	455.556 (769.920)	998.980 (880.488)	772.222 (868.945)	937.50 (819.934)	555.39 (806.83)
Petty trade	0(0)	0(0)	1190.816 (1235.865)	838.889 (652.497)	1250.0 (645.497)	603.46 (975.92)
Non-farm subtotal	30.0(212.132)	455.556 (769.920)	2189.796 (1454.733)	1611.111(887.587)	2187.50 (854.766)	1158.85 (1398.428) (30.47%)
Agricultural wage labour	17.80 (125.865)	1166.67 (1067.708)	142.86 (620.819)	809.44 (930.594)	1850.0 (435.890)	310.46 (736.152)
Off-farm subtotal	17.80 (125.865)	1166.67 (1067.708)	142.857 (620.819)	809.444 (930.594)	1850.0 (435.890)	310.46 (736.152) (8.16%)
Overall	3330.0 (1505.502)	4262.22 (2875.689)	4020.0 (1430.792)	3557.78 (1460.490)	5315.0 (2587.579)	3747.23 (1663.665) (100%)
Mini.	700.0	1375.0	1400.0	950.0	2450.0	700.00
Maxi.	7150.0	10850.0	7450.0	5650.0	8550.0	10850.00
χ^2(P-value)					390.907*	

*, indicates significance at less than 10% probability level.
USD = 9.96 ETB (Ethiopian birr).

of sample households rely their livelihood in on-farm, on-farm + off-farm, on-farm + non-farm, on-farm + off-farm + non-farm, and non-farm + off-farm comprises 3330.0, 4262.22, 4020.0, 3557.78 and 5315.0 birr per household respectively of the total mean annual income birr 3747.23. In addition to this, the annual income of households by income share of the broad livelihood strategies comprise birr 2333.89 (61.37%), 1158.85 (30.47%) and 310.46 (8.16%) of on-farm, non-farm and off-farm respectively (Table 4). This briefly showed us that agriculture is still the leading economic sector in the district in spite of high drought occurrence, shortage of rain fall, lack of farm and grazing land, poor soil fertility, underground water scarcity, and lack of infrastructural facilities are dominating the area. Here, the main possible reasons for peoples not working more on off-farm employment are no employment opportunity nearby, if their wages are too low for the kind of work and some rare do not want to work on off-farm.

Of note is the fact if one combines off-farm and non-farm with on-farm activities, a majority of respondents believe income derived outside of cropping as important to their livelihood and survival. Here, poorest households are not different from the wealthier households in their perception of the security benefits of income derived outside of farming (either from off-farm seasonal wage labour or non-farm income generating activities). As income of the household rises, there is greater diversification away from crops (towards other alternative income generating activities). For instance, thus households with relatively greater income in the immediate post drought and war of Ethio-Eritrean period (1999/2000) in the district were diversified, their livelihood strategies away from farm while those with no/lower income depend on food aid. Depending on the event and the wealth in capitals, the family may be able to build only an agricultural portfolio or a combined one –on-farm, off-farm and non-farm during times of stress or shock. The key point is that the wealthy have greater freedom to choose among a wider range of options than the poor. Meanwhile, the poor have little choices but to diversify out of farming in to unskilled off-farm labor whether in agriculture or not.

Model results

The result of the multinomial logit analysis of the hypothesized independent variables which were expected to affect the choice of rural households' livelihood strategies are provided in Table 5. The output of the multinomial regression model

Table 5. Multinomial logit regression of household livelihood strategies.

Variable	On-farm + off-farm		On-farm + non-farm		On + off + non-farm		Non-farm + off-farm	
	Coeff. (Std. Err)	Odds-ratio	Coeff. (Std. Err)	Odds-ratio	Coeff. (Std. Err)	Odds-ratio	Coeff. (Std. Err)	Odds-ratio
Intercept sex	11620(7892) -22.53(0.00)	0.000	23242(8248)*** -3.728**(1.885)	0.024	21287(9087)** -4.810**(2.392)	0.008	24304(9189)*** -23.150(0.00)	0.000
Age	-0.053 (0.057)	0.948	-0.040* (0.053)	0.961	0.046 (0.072)	1.047	-0.017* (0.068)	0.983
Education	1.016** (1.116)	2.763	1.386*** (0.426)	4.000	1.792*** (0.448)	6.001	1.432*** (0.447)	4.185
Hhsiz	-0.624 (0.584)	0.536	-1.268** (0.625)	0.281	-2.052***(0.761)	0.128	-1.742** (0.752)	0.175
Depratio	-1.331(1.116)	0.264	-5.14***(1.324)	0.026	-5.726***(1.899)	0.003	-4.227**(1.770)	0.015
Land use	0.314(5.724)	1.369	-5.130(5.605)	0.006	-6.827(6.411)	0.001	-6.833(6.483)	0.001
Livestock	-8.05(0.872)	0.447	-0.514(0.783)	0.598	-0.357(0.892)	0.700	-.891(0.935)	0.410
Input	0.005(1.374)	1.005	-3.46(1.380)	0.707	1.238(1.514)	3.447	-0.834(1.603)	0.434
Cactus in	0.001(0.002)	1.001	0.000(0.002)	1.000	-0.001(0.001)	0.999	-0.000(0.002)	1.000
Daconta	-0.093(0.061)	0.911	-0.127(0.057)	0.881	-0.081(0.050)	0.922	-0.146(0.064)	0.864
Memcoop	1.460**(1.861)	1.232	2.443**(1.755)	1.087	4.797**(2.042)	1.008	4.675**(2.121)	1.009
Credit	2.485(1.836)	1.083	2.915*(1.712)	0.054	1.141*(1.471)	1.869	3.265*(1.938)	1.038
Remitain	0.005**(0.002)	1.005	0.006***(0.002)	1.006	0.007***(0.002)	1.007	0.005***(0.002)	1.005
Mktdista	-0.063(0.094)	0.938	-0.189**(0.086)	0.827	-0.121(0.086)	0.886	-0.114(0.097)	0.892

The maximum likelihood estimates of the multinomial logit model are: Dependent variable (HH livelihood strategies), number of observations (130), -2 Log likelihood function (143.744), X^2 (202.500), degrees of freedom (56) and significance level (0.000) and ***, **, * Significant at 1, 5 and 10% probability level respectively, Source: Own survey (2010).

revealed that, keeping other factors constant, the odds-ratio in favour of the probability of female respondent's participation in on-farm and non-farm, and combination of the three (on-farm + off-farm + non-farm) activities decrease by factors of 0.024 and 0.008 respectively as the number of female respondents increase by one. The opposite is true for male counterparts. In line to this, the interpretation of the odds-ratio implies that, if other factors are held constant, the odds-ratio in favor of the probability of the respondents to choose on-farm + non-farm, and/or non-farm + off-farm income generating livelihood strategies decreases by a factor of 0.961 and 0.983 respectively as the age of the household head increases by one year. The probable reason behind this is that, households whose age relatively found in the range of productive labour need to have more access to information, flexible with situation, relatively active and more likely to diversify their livelihood strategies to off and non-farm activities than the older one. The result of the regression also revealed that, if other factors held constant, as education level of the household increases by one year, the odds-ratio in favor of the probability of the household to choose on-farm + off-farm, on-farm + non-farm, combination of the three (on-farm + off-farm + non-farm); and non-farm + off-farm income generating livelihood strategies increases by a factor of 2.763, 4.000, 6.001; and 4.185 respectively. This is because their knowledge, skill and attitude are shaped through education with how to cope challenges and make better living.

The result also reveals that family size was another constraint for small holders who need to diversify their livelihood income generation into off-farm and non-farm activities. However, in the area, it was found having significantly negative relationship with using off-farm and non-farm livelihood options. It was worthy having more family size without consideration to their productive

labour force, disability and their health situation fosters reproductive care giver's burden; while giving focus to both the family size and their productive age plays a crucial role in improving the livelihood situation of the household. This is due to high population fertility rate (more household members under the age of fifteen); existence of some old aged members and high physically disabled household members as a result of war and diseases in the area. In addition to this, the odds-ratio for the number of dependants in the household indicates that, the probability of farm households to diversify their livelihood strategies into on-farm and non-farm, combination of the three (on-farm, off-farm and non-farm); and non-farm with off-farm together decreases by a factor of 0.026, 0.003 and 0.015 respectively as the dependency ratio increases by one. This enhances the consumer to the producer ratio and undermines the economic potential of the farmer to participate in another income generating activities like petty trading, agricultural wage labour and weaken to cover the food and nonfood expense of the dependent members. Furthermore, the result of the regression depicts being membership to cooperatives and access to credit plays a pivot role in strengthening smallholders potential to diversify their livelihood strategies and cope with stresses like drought in the area. Thus, who were member and have access to credit able to obtain labour share, reduce individual transport cost, provided with different updated information such as farm inputs, equipments and tools. The inverse is also true for these did not get access.

Another constraint ahead that can affect smallholder farmers' engagement into off-farm and non-farm income generating activities is determined by the existing infrastructural facilities to link the urban and rural people like access to market centre. The interpretation of the odds-ratio for the distance from market centre indicates that, other things being constant, the probability of the respondents to choose on-farm and non-farm livelihood strategies together decreases by a factor of 0.827 as the distance increases by 1 km. This is because households nearby to market center gets several key advantages such as access to different information, terms of exchange for assets, save their substantial time, much lower transport costs and better and more remunerative non-farm and off-farm activities. In connection with this, having relative economic support from abroad and within the country is positively related to the improvement of livelihood by participating in more remunerative activities such as local trading for which financial capital is required (Brown et al., 2006). Likewise, in the area farmers who receive remittance were able to strengthen their economic potential that helps them to participate in different income generating activities within and away from on-farm depending on the amount of the support. The interpretation of the odds-ratio for respondents receiving remittance indicates that, other things keeping constant, the probability of the respondents to choose on-farm and off-farm, on-farm + non-farm, combination of the three; and non-farm with off-farm livelihood strategies increases by a factor of 1.005, 1.006, 1.007 and 1.005 respectively as the income of the household from remittance increases by 1 birr.

CONCLUSIONS AND RECOMMENDATIONS

The result of the study revealed that, while traditional agriculture is still the dominant livelihood strategy for large poor households in the area, due to the recurrent occurrence of drought, erratic rain fall, too small farm and grazing land, high soil infertility, less access to agricultural extension service and high population pressure that leads to poor agricultural production and productivity in terms of quality and quantity, farmers were living in a worse livelihood situation. Diversification of household's livelihood into off-farm and non-farm in general and non-farm livelihood strategy in particular was pinpointed by almost all the respondents as best livelihood strategy to cope from different challenges and to improve their livelihood in this drought prone area. In with this, households engaged in more income diversification strategies and have densities of networks build relations in and outside of agriculture. Depending on the event and wealth in capitals, households also able to build only agriculture or a combined one: - on-farm, off-farm and non-farm during times of stress (for example drought) or shock (for example death in the family). This is because higher income opens the door to attractive non-farm opportunities that cause greater improvement in household income for survival and/or wellbeing. Those households endowed with the education, financial capital, or market access necessary to take advantage of relatively remunerative opportunities in the non-farm economy were able to take better advantage of policy reforms or to recover from aggregate shocks – for example, drought and Ethio-Eritrean war of the 1998 in the area. In addition to this, non-farm earnings indeed lead to more rapid growth in earnings and consumption of the household. Furthermore, the poor, youth, un-educated, women and others lacking social ties rarely enjoy the same access to remunerative opportunities as do educated males with strong social networks in the community. The key point is that the wealthy have greater freedom to choose among a wider range of options than the poor. The poor, mean while, has little choice but to diversify out of farming into unskilled off-farm labor whether in agriculture or not.

To sum up, at village or community level, a single livelihood strategy could not apply, since different households adopt different strategies according to their particular asset and asset status (Ellis, 2000a). In line with this, different households pursue different livelihood

strategies according to the circumstance of the area, households and individual family member's goals and objectives. Similarly, of the livelihood assets discussed in this paper, the role of human capital (education and productive family size/labour), financial capital (access to credit and receiving regular remittance, income from cultivation of cactus), social capital (membership to formal cooperatives) and institutional supports (access to market and business oriented extension service) are the most building block livelihood assets that can help poor farm households to diversify their livelihood income into off-farm and non-farm activities in this drought prone-area. The findings of the study imply that any projects undertaken by GOs and NGOs aiming at sustainable improvement of poor rural households livelihood should give attention to:

1) Non-farm and off-farm target based livelihood strategies should have to be developed, strengthened and farm households should have to gain training on how they can run business and engage on that activities to cope with drought,
2) Strengthening both formal and informal education and vocational training should have to be promoted to increase rural household's participation in more viable livelihood options and offer better prospects for improving their livelihood;
3) All GOs and NGOs providing credit in the area should have to reach the marginalized groups by constantly expanding the availability and accessibility of credit through promoting and strengthening cooperatives and the loan should also have flexible entrance criteria, duration and interest rates suitable to households who have different needs and capabilities;
4) The role of government in acquiring and sharing information and making assets as well as improved infrastructure (like expansion of rural road, telecommunication, electrification, education, health centers etc) available to poor households is still essential in promoting different income generating livelihood strategies. Therefore, development of infrastructure is most essential to link the rural dwellers with market; and;
5) It is pertinent to train and recruit additional qualified development agents in general and female fieldworkers in particular in mind to the geographical coverage, gender disparity and numbers of farmers need agricultural extension services.

ACKNOWLEDGMENTS

The authors would like to thank Ethiopian Ministry of Education (MoE) for providing financial support and farmers of the area furnishing us with ample information.

REFERENCES

Barret CB, Reardon T, Webb P (2001). Non-farm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics, and Policy Implication. Food Policy. 33(26): 315 – 331.
Bezmere DJ, Lerman Z (2003). Rural Livelihoods in America: Discussion Paper No.4.03.
Brown DR, Stephens EC, Okuro MJ, Murithi FM, Barrette CB (2006). Livelihood Strategies in the Rural Kenyan Highlands. AfJARE. 1(1): 21-30.
Chambers R (2003). Whose Reality Counts? Putting the first Last. London: Intermediate Technology Publication.
CSA (2007). Central statistical authority population estimates (Volume I), CSA, Addis Ababa, Ethiopia.
DFID Department for International Development (1999). Sustainable Rural Livelihoods Guidance Sheet. London: DFID.
Devereux S (2000). Food Insecurity in Ethiopia: A Discussion Paper for Department for International Development. Sussex: Institute of Development.
Ellis F (2000a). The Determinants of Rural Livelihood Diversification in Developing Countries. J. Agric. Econ. 51(2): 289-302.
Ellis F (2000b). Rural Livelihoods and Diversity in Developing Countries. Oxford and New York: Oxford University Press.
FDRE Federal Democratic Republic of Ethiopia (2002). Food Security Strategy, Addis Ababa: Government of Ethiopia.
Goodrich R (2001). Sustainable Rural Livelihoods: A Summary of Research in Mali and Ethiopia.
Green HW (2003). Econometric Analysis: Fourth Edition. New York University Macmillan Publishing Campany.
Messer & Townsley (2003). Local Institutions and Livelihoods: Guidance for Analysis.
MoFED (2002). Ethiopia: Sustainable Development and Poverty Reduction Program, Ministry of Finance and Economic Development, Addis Ababa, Ethiopia.
Murray C (2001). Livelihood research: some conceptual and methodological issues, Department of Sociology, University of Manchester. Background Paper 5, Chronic Poverty Research Centre.
NDMC (National Drought Monitor Center) (2005). Understanding and defining drought: U.S., Drought Monitor. London, UK.
Scoones I (1998). Sustainable Rural Livelihood: A framework For Analysis. IDS working paper 73. Bringhton: Institute of Development studies University of Sussex.
Soussan J, Blaikie P, Springate-Baginski O, Chadwick M (2000). Understanding Livelihood Processes and Dynamics: Livelihood-Policy Relationships in South Asia, Working Paper 7.
Tesfaye L (2003). Livelihood Strategies in the Context of Population Pressure: A case Study in the Harerghe Highlands, Eastern Ethiopia. PhD Dissertation.
Validiva CG, Jere L, Jette C, Quiroz R, Espejo R (2005). Coping and Adapting to Climate Variability: The Role of Assets, Networks, Knowledge and Institutions.
Warren P (2002). Livelihoods Diversification and Enterprise Development: An Initial Exploration of Concepts and Issues. FAO: Rome.
Wolde-Selassie A (2001). "Rural Local Institutions and Livelihood Security" In Yared (ed.) Food Security and Sustainable Livelihoods in Ethiopia. Proceedings of the symposium of the Forum for Social Studies. Addis Ababa. p.180.
Yared A (2001). "Livelihood Strategies and Food Security Policy in Ethiopia." In Yared (ed.) Food Security and Sustainable Livelihoods in Ethiopia. Proceedings of the symposium of the Forum for Social Studies. Addis Ababa.