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Livelihood diversification strategies among the Borana pastoral households of Yabello District, Oromia Region, Ethiopia

Doyo Kena Doyo[1*], Eric Ndemo Okoyo[2] and Tesfaye Lemma[2]

[1]Department of Agri-economics, College of Agriculture, Raya University, P. O. Box 92, Ethiopia
[2]Department of Rural Development, College of Agriculture, Haramaya University, P. O. Box 138, Ethiopia

This study is aimed at identifying and describing the existing livelihood options and the determinants of the choice of the households' livelihood strategies in the pastoral areas of Yabello District. The data for this study were obtained from a survey of 180 household heads selected using simple random sampling technique in the year 2016. The key informants interview and focus group discussion were undertaken to gather data having qualitative nature. The result of the descriptive statistics showed that the majority of the sample respondent households thus, 48.3% allocated all their labor force to pastoral and farming activities alone, while about 29.5% were involved in a combination of pastoral, farming and low return non pastoral nonfarm livelihood strategy and 22% work on pastoral, farming and high return non pastoral nonfarm combination of livelihood strategy. The result of the multinomial logit model revealed that family size, sex of household head, education status, livestock holding, access to credit, dependency ratio, access to extension, age of the household head and distance from the nearest have significant influences on household choice of livelihood strategies. Pastoral households have different access to resources and face different opportunities and challenges and thus choose different livelihood strategies calling for tailor made policy and development practice accordingly in line with their livelihood strategies choice.

Key words: Livelihood strategies, non-pastoral nonfarm activities, multinomial logit, pastoralist.

INTRODUCTION

Millions of inhabitants in developing countries derive their livelihood from pastoralism as the main source. These groups of pastoralist inhabit arid and semi-arid environments where climate is variable and frequency and intensity of droughts and floods are increasing (Berhanu and Beyene, 2015). In East Africa, pastoral dry lands, specifically Arid and Semi-Arid Lands (ASALs)

cover huge areas which account for 60 to 100% (FAO, 2008; Fre and Tesfagergis, 2013). Ethiopia livestock sector, which is largely concentrated pastoralist lowland, contributes 12 to 16% of Ethiopia's gross domestic product (GDP) and 30 to 35% of the agricultural GDP (Birhanu et al., 2015).

Pastoralism represents diverse livelihood option rather

*Corresponding author. E-mail: doyo.kana33@gmail.com.

than single livelihood option: Different livestock, livelihood diversification and market engagement strategies, reflecting differing access to market and resources, pushed by stresses and shocks (Eneyew and Bekele, 2012). Income diversification through livestock trading, petty trade, and wage employment are diversification strategies widely reported among pastoralists in the Horn of Africa (Fratkin, 2013).

Existing trends of livelihood diversification in Ethiopia indicate that traditional livestock-based livelihood strategies (defined as pastoral livelihood strategies) alone is not able to provide for the country's pastoral population due to different threats on pastoralists. It is thus evident that non-livestock based strategies have to supplement or in some cases substitute previously dominant pastoral livelihood strategies. Trends of pastoral livelihood diversification have been noted among the Borana whereby pastoralists are combining livestock production with a variety of non-pastoral activities including agriculture, wage labor and trade (Aberra, 2006; Little, 2016).

The livelihood resources of the Borana pastoralist of Southern Ethiopia mainly depend on natural assets that in turn are affected by climatic impacts. Different climate related risks such as recurrent drought, high temperature, low rainfall and bush encroachment affect the livelihood of the communities. Furthermore, other climate induced risks such as interethnic conflict; shrinkages of rangelands, expansion of farmlands, and dwindling of social supporting systems are the major problem in Borana pastoralists. In Borana pastoralist area, drought becomes recurrent in nature and affects the livelihood assets, particularly natural assets of the community which are sensitive to climatic impacts (Berhanu et al., 2008).

Traditionally, the Borana have been almost totally dependent for their livelihoods on the products of their cattle, using them as food or in trade for grain. In turn, the cattle depend on the stewardship of the Borana people, as well as the regeneration of grazing lands through frequent and intense seasonal rains (Angasse and Oba, 2007). As households cope with changing climate and social structures, many of them are choosing to increase the diversity of their livelihood strategies to pastoral diversities and non-pastoral strategies such as cropping, investments into petty trade, investment in Real Estate, transportation sector and off-Farm employment both local and distant, sales of forest products, seeking urban labor, and education of their children as future source of income (Tache, 2008; Desta et al., 2008; Hurst et al., 2012). Pastoralists in Yabello District are in a transition stage from pastoralism to agro-pastoralism. Nowadays, government policy strategically focuses on the settlement of pastoralists and encourages sedentary farming. Agro-pastoralists are the main recipients of increasing support from the government and other partners in Yabello District, as part of the transition from the former purely pastoral practices to more diversified livelihoods (Beddada et al., 2015). For poorer households that have few or no livestock, cropping provides them with new opportunities to generate much needed income and consumption goods (Gemtessa et al., 2007). Contrary to the general assumption that cultivation is mainly a survival strategy for poor pastoralists who have lost their herd because of drought, different studies show strong involvement in farming by middle-wealth and rich herders (Tache, 2008; Desta et al., 2008).

Yabello District is one among the most vulnerable districts in the zone to the aforesaid problems especially the recurrent droughts and shrinking grazing land. The population pressure, the droughts and famine have exceeded the ability of traditional livelihood strategies to cope with increasing challenges, resulting in widespread animal death, food insecurity and conflicts. The district is chronically food insecure, particularly in the months of January and February. Poor road conditions affect the communities' access to marketplaces to sell their agricultural and livestock products (Beddada et al., 2015). Therefore, this research is aimed at generating location specific information on the livelihood strategies pursued by pastoral household and the factors that affect the choice of livelihood strategies in the study area.

METHODOLOGY

Description of the study area

Yabello District is one of the districts in the Borana zone which lies 570 km south of Addis Ababa. It is bordered on the South by Dire, on the West by Teltele, on the North by DugdaDawa, and on the East by Arero Districts. The altitude of this district ranges from 350 to 1800 m above sea level at the latitude and longitudes of 4°53′N 38°5′E4.883°N 38.083°E respectively and at an elevation of 1857 m above sea level. The map of the study site is depicted on the figure 1 below

Sampling procedure and sample size determination

This research was conducted in Yabello District of Borana zone of Oromia region. To conduct this research multi stage sampling technique was used to select sample *kebeles* (peasant association) and household from the district. The *kebeles* were stratified in two livelihood systems: Pastoralist dominated and agro pastoralist dominated *kebeles*. The reason for classifying kebeles based on their livelihood zone was to attain the most representative sample from the district. The households in one livelihood zone were relatively assumed to be more homogenous because they share common livelihood activities than others. The second reason was that both pastoral dominated and agro pastoral dominated *kebeles* are vulnerable to drought risk as far as both dry land farming and pastoralism are natural resource based, therefore, it is important to know the factors that affect diversification of the livelihood strategies into non-pastoral nonfarm (NPNF) activities in each category. Another reason is that there is no formally recognized farmer even in agro pastoralist dominated *kebeles*; although the destitute farmers centered on farming as main source of their livelihood, it is important to consider both categories. Once stratified based on their livelihood systems, then 2 *kebeles* from pastoralist dominated and 1 *kebele* from agro pastoralist dominated were

selected randomly. Then the sample households were selected randomly from the *kebeles*. The sample size was determined based on simplified formula provided by Yemane (1967), at 95% confidence level, 0.5 degree of variability and 7% level of precision.

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

$$n = \frac{1734}{1 + 1734(0.07^2)} = 180$$

Where n is the sample size, N is the population size (total households in the three *kebeles* which is 1734) and e is the level of precision. After calculating by formula, 180 households will be selected. See proportion of sample respondent from each sample kebele (Table 1).

Methods of data collection

To conduct this particular research, both primary and secondary sources were used. The primary data were collected from the households, key informants such as Kebele administrators, communities' elders, development agents (DAs), and rural and pastoral development experts in the district. Different methods such as structured household survey, key informant interview and focus group discussion were used to collect primary data.

Method of data analysis

In order to achieve the stated objectives of the study, the survey data were sorted out, edited, coded, organized, summarized and analyzed using descriptive and multinomial logit model using STATA version 13. Narration and conceptual explanation was employed to analyze data having qualitative nature. Descriptive statistical tools like percentage, mean values and standard deviation were employed on livelihood strategies pursued by pastoral households. Multinomial logit model was also used to identify the determinants of the pastoral households' choice of livelihood strategies.

Specification of multinomial logit model

A multinomial logit model was used to examine the determinants of alternative household activity-mix strategies. Multinomial logit analysis is a widely used technique in applications that analyse polytomous response categories in different areas of economic and social studies. The central concern here is to explain the factors that determine the probabilities of household engagement in alternative non-pastoral activity categories. Before running the model the variance inflation factor (VIF) and contingency coefficients were used to test the degree of multicollinearity and association among explanatory variables, respectively. Moreover, the model was tested for the validity of the independence of the irrelevant alternatives (IIA) assumptions by using Hausman test for IIA.

The behavioral notion of the model may be invoked here by considering pastoral households as rational decision makers. Households are assumed to adopt an activity portfolio choice that maximizes their utility from the expected earnings gains from these activities. The utility that can be obtained by a household i from a choice category j_s fundamentally associated with: (a) the attributes of the activity categories such as their capital and skill intensity, the nature of their local demand and rate of return to factor inputs; and (b) the characteristics of the individual household decision maker: the household's demographic characteristics, asset endowments,

tastes, risk preference, and location factors. The observed pattern of household's activity engagement is then considered to be a reflection of its revealed rational choice subject to these conditions (Barrett et al., 2001).

Following Greene (2003), suppose for the ith respondent faced with j choices, the utility choice j can be specified as:

$$\text{Uij} = \text{Zij } \beta + \epsilon\text{ij} \tag{1}$$

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

$$\text{Prob (Uij>Uik) for all others K} \neq j \tag{2}$$

Where; Uij is the utility to the ith respondent from livelihood strategy j; and Uik is the utility to the ith respondent from livelihood strategy k. Thus, the ith household's decision can be modeled as maximizing the expected utility by choosing the jth livelihood strategy among J discrete livelihood strategies, that is:

$$\text{Maxj} = E(\text{Uij}) = f\,j\,(\text{xi}) + \epsilon\text{ij, j=0 ....J} \tag{3}$$

In general, for an outcome variable with J categories, let the jth livelihood strategy that the ith household chooses to maximize its utility could take the value 1 if the ith household choose j^{th} livelihood strategy and 0 otherwise. The probability that a household with characteristics x chooses livelihood strategy j, Pij is modeled as:

$$P_{ij} = \frac{\exp(X_i^{'}\beta_j)}{\sum_{j=0}^{J} \exp(X_i^{'}\beta_j)}, \quad \text{J=0... 4} \tag{4}$$

With the requirement that $\sum_{j=0}^{J} P_{ij} = 1$ for any *i*. Where: P_{ij} = probability representing the ith respondent's chance of falling into category *j*. X = Predictors of response probabilities; β_j = covariate effects specific to j^{th} response category with the first category as the reference.

Appropriate normalization that removes an indeterminacy in the model is to assume that $\beta_1 = 0$ (this arise because probabilities sum to 1, so only J parameter vectors are needed to determine the J + 1 probabilities) (Greene, 2003) so that $\exp(X_i\beta_1) = 1$, implying that the generalized equation (4) above is equivalent to

$$\Pr(y_i = j / X_i) = P_{ij} = \frac{\exp(X_i\beta_j)}{1 + \sum_{j=1}^{J} \exp(X_i^{'}\beta_j)}, \quad \text{For } j = 0,$$

2------J and

$$\Pr(y_i = 1 / X_i) = P_{i1} = \frac{1}{1 + \sum_{j=1}^{J} \exp(X_i^{'}\beta_j)}, \tag{5}$$

Where: y = A polytomous outcome variable with categories coded from 0 to J. The probability of P_{i1} is derived from the constraint that the J probabilities sum to 1. That is, $p_{i1} = 1 - \sum p_{ij}$. Similar to binary logit model it implies that J log-odds ratios can be computed which are specified as:

$$\ln\left\lfloor \frac{p_{ij}}{p_{iJ}} \right\rfloor = x^{'}(\beta_j - \beta_J) = x^{'}\beta_j, if, J = 0 \tag{6}$$

Table 1. The total number of sample households and population of the sample.

Name of the *kebeles*	Total numbers of the household	Sample household
Dambalasaden	509	53
Abunnu	514	53
Cholkasa	711	74
Total	1734	180

Source: own computation, 2016 from Yabello District Administration Office.

Definition of variables and working hypotheses

Pastoral household income sources were classified into three main categories. These are: Pastoralism (livestock rearing), dry land farming, and NPNF activities. All other non-pastoral activities outside the former two activities are classified as NPNF activities. Based on this dependent variable was defined as follow: The dependent variable in this study was the selection of different livelihood activities by pastoral households, that is, it was identified by categorizing the sample households into livelihood strategy groups based on their choice of livelihood activities.

Therefore, the polytomous dependent variable for multinomial logit was hypothesized to have the following values: Y= 1, if the choice lies in pastoral + farming activities alone; Y=2, if the choice lies in pastoral + farming +high return NPNF activities such as livestock trade, wage employment, house renting and other relatively more capital-intensive engagements; Y= 3, if the choice lies in pastoral + farming + low return NPNF activities such as casual labor, dairy marketing, crafts, various petty trading activities and natural resource based activities such as forest wood selling, charcoal making, and firewood collection. Combination of pastoral + farming activities alone was used as the base category and deliberately chosen by the researcher because it is widely practiced in the study area. Its vulnerability to drought risk makes it to be base category in which nonfarm non-pastoral activities compared with.

Independent variables

These are the variables which determine the choice of household to the specific livelihood choice. and Table 2 depicts the expected relationship between dependent variable and independent variables.

RESULTS AND DISCUSSION

Pastoral livelihood diversification pattern

Pattern of the existing livelihood options in the study area

The pastoralists of the study area participate in a range of activities including pastoral adjustment which comprise different livestock rearing as well as to complete or partial transformation into non pastoral activities. The finding of this study witnesses the existence of diverse livelihood activities in the study area. The forms of livelihood diversification identified in this study focus on non-pastoral livelihood activities. According to the survey result all the sampled households participate in crop production and livestock rearing. Although currently widely being practiced, crop cultivation similar to charcoal/firewood production is being seen as the most commonly identified livelihood activities that are competitive with pastoralism (Little, 2009; Little et al., 2001).

Household livelihood activity types in Table 3 above illustrate that Borana households are opting for another livelihood alternative besides livestock rearing to meet their basic need and improve their wellbeing. Non pastoral nonfarm activities are practiced by significant proportion (51.7%) of the sample population. These activities further classified into high return and low return NPNF categories. According to the result depicted in Table 3, 29.5% of total household participate in low return NPNF activities beside pastoral and farming activities. Petty trading activities, hand craft like blacksmith; forest wood selling, charcoal making and firewood sale and casual labor are major low return NPNF activities practiced by the sample household. About 3.90% of the households receive remittances as a source of cash income. This remittance is largely from those who are most likely literate urban resident and employed in different organization.

About 6.11% of the households mentioned that they earn income from charcoal and firewood sales. As population increases in extremely changing climate nature, increment of livelihoods based on non-sustainable exploitation of natural resources especially the cutting down of woody species for charcoal production is being a worse for future of pastoral livelihoods in pastoral area leading to range land degradation. Various petty trades like small shop in the village relatively pursued by the large proportion of people. The survey result depicted that, among low return NPNF activities petty trading activities are practiced by large proportion of the respondent which account for 18.33% of the total household. The results of the FGDs reveal that women groups (*waldaa*) are involved in NGO-supported petty trade activities. Community members confirmed importance of petty trade activities for several reasons, including the increased local access to non-pastoral consumer goods, price stability in local area, and ability to access food items on a loan basis from trader groups, especially during droughts.

High return NPNF activities are relatively capital intensive. The proportion of the households who

Table 2. Independent variables and dependent variables relationship.

No.	Determinants	Type of the variable	Unit of measurement	Expected sign
1	Age of household head (AGEHH)	Continuous	Year	+/-
2	Sex of household head (SEXHH)	Dummy	1=female, 0=male	-
3	Education level of household head (EDUHH):	Dummy	1=literate, 0=illiterate	+
4	Family size (FAMSIZ)	Continuous	Numbers	+/-
5	Dependency ratio(DERAT)	Continuous	Numbers	+/-
6	Livestock holding (TLU)	Continuous	TLU	+/-
7	Distance from nearest market center:(DISMAR)	Continuous	Hour	-
8	Access to participatory safety net program (ACPSNP):	Dummy	1=beneficiary of PSNP, 0=otherwise	+
9	Credit use (ACCRED):	Dummy	1= credit user, 0= otherwise	+
10	Access to extension contact (ACCEXT):	Dummy	1= extension contact, 0= otherwise	+
11	Exposure to shock:(EXSHO)	Dummy	1= shocks victims, 0= otherwise	+
12	Household perceived benefit of non-pastoral activities(PEBNPA)	Categorical	0=not advisable,1= neutral, 2= advisable	+
13	Membership of the local leadership(MELOLED)	Dummy	1= members, 0= otherwise	+
14	Access training:(ACCTRA)	Dummy	1= who participated, 0= otherwise	+

Table 3. The level of participation in diverse livelihood activities.

Different livelihood activities	Frequency	Percentage
Pastoral and dry land farming	**180**	**100**
Livestock rearing and cereal crop production	159	88.3
Livestock rearing, cereal crop production and vegetable production	21	11.7
High return non pastoral nonfarm activities	**40**	**22.2**
Livestock trade	22	12.22
Open bar for food and drink sale	4	2.32
Rent house at the town	10	5.60
Work by vehicles for transportation	9	5.00
Low return non pastoral nonfarm activities	**53**	**29.5**
Various petty trade like small shop in the village	33	18.33
Hand craft like blacksmith	5	2.80
Remittance from relative	7	3.90
Forest wood selling charcoal making and firewood sale	11	6.11
Casual labor	9	5.00

Source: Own survey, 2016.

Table 4. The level of participation and non-pastoral income shares by category of livelihood strategies.

Livelihood strategies	Percent of households in the activity category	Income share (percent)	
		Non pastoral	Non pastoral nonfarm
Pastoral and farming alone	48.3	41.41	NA
Pastoral and farming with high return NPNF activities	22.2	63.07	46.75
Pastoral and farming with low return NPNF activities	29.5	64.96	27.99

NA indicates "not applicable"; Source: Own survey, 2016.

participate in high return NPNF activities is 22.2% of the total sampled household. Activities such as livestock trade, opening bar for food and drink at local town, renting house at the town and working vehicles for transportation are the listed activities categorized under this category. Participation in livestock trade is reported by most of the household who participated in this activities category. Participation in food and drink sales was elicited by 2.32% of total sampled households, undertaken in local town and market centers. This indicated that pastoralist of study area have still weak connection with town. These isolate pastoralists from different public service and access to information directly related to their life such as market information due to its concentration in or around urban center.

The level of participation and non-pastoral income shares by category of livelihood strategies

The level of sample household participation in each category of livelihood activities, and non-pastoral income share of households in each category is shown in Table 4. The most popular and recent pastoral household livelihood strategy, adopted by 48.3% of respondent, in the study area is pastoral activities combined with farming alone. Result of FGDs also confirmed that, although Borana traditionally known by single activity which is livestock rearing or pastoralism, due to different pressure which the households are exposed to such as: drought, conflict raised by competition of grazing land, population pressure both human and livestock, decreasing productivity of land and poor livestock markets, it is difficult to find household who only rely on livestock for their livelihood. The share of dry land farming to the total income of household in the category was 41.41%. These indicated that contribution of crop production is increasing probably because of recurrent drought and limited mobility of livestock for grazing due to decreasing grazing land. Furthermore the current government encourages dry land farming by giving more incentive to those who participated in it and initiate sedentarization which served as inducing force for dry land farming.

The second livelihood strategy is adopted by a considerable portion (29.5 per cent) of the households

that, in addition to pastoralism, do allocate their labour to farming plus one or more of those diverse low return activities such as various petty trading activities casual labour, crafts and natural-resource-based activities such as forest wood selling, charcoal making, and firewood collection. A few of the households that adopt this activity category have had their pastoral income earning power severely decreased and they are on the way to drop out from pastoralism. Proportion of the non-pastoral income including farming and NPNF activities were 64.96 and 27.99% of total household gross income in the category respectively. Crop production has great role in the income of the household in the category.

Another livelihood strategies pursued by household were pastoralism, farming and high return NPNF activities such as livestock trade, investment in transportation and other relatively more capital-intensive engagements. The adoption of these capital intensive and commercial based household livelihood strategies is of paramount importance due to their significance to the livestock economy and having positive implications on reducing vulnerability to risk. Lind et al. (2016) noted, those households that combined livestock-based livelihoods with cash income generated in towns had the highest level of well-being and the least vulnerability to drought shocks. The share of NPNF activities to the household income within the categories have huge role having 46.75 percent contribution. Farming contributes less to the total gross income of the household pursuing this livelihood strategy.

Determinants of livelihood diversification strategies choice

Multinomial Logistic regression model was used to analyze the determinants of choice of livelihood strategies among pastoralist households. The model was selected based on the theoretical background and review of literature on related studies and earlier justifications illustrated in the methodology part. Before selection of the model for the data, it was checked whether it violates the assumption of IIA test for the choice of the livelihood strategies of the pastoralists to show that the choice of each strategy is independent from other strategies using Hausman test. Therefore, the test failed to reject the null

Table 5. Multinomial logit model.

Variable	Household livelihood strategies					
	Pastoral, farming and high return NPNF activities			Pastoral, farming and low return NPNF activities		
	Coefficient	Std. Err.	Marginal effect	Coefficient	Std. Err.	Marginal effect
SEXHH	-0.936	0.982	-0. 111	1.117**	0. 547	0.156
AGEHH	-0.067	0.045	-0.002	-0. 110**	0. 045	-0. 011
FAMSIZ	0. 758*	0.387	0. 037	0. 868**	0. 350	0.076
DEPRAT	-2. 025***	0.754	-0. 178	0. 307	0. 551	0. 095
EDUSTHH	1.620**	0.694	0. 125	0. 359	0. 587	-0.007
TLU	0.057**	0.026	0.005	0.002	0.035	-0.002
DISMAR	-0. 155	0. 387	-0. 013	-0. 893*	0. 503	-0. 097
ACPSNP	-0. 037	1.014	-0. 034	1.050	0. 644	0. 121
ACCEXT	-0. 334	0. 606	-0. 054	0. 888*	0. 520	0.115
ACCRED	1.643**	0. 669	0. 135	0. 064	0. 581	0. 041
ACCTRA	-1.130	0. 721	-0. 080	-0. 471	0. 570	-0. 020
MELOLE	0. 303	0. 660	0. 017	0. 266	0. 663	0. 021
EXPSHO	0. 443	0. 705	0. 030	0. 224	0. 529	0. 013
PEBNPNF						
Neutral [1]	0.811	1.345	0. 030	1.158	1.006	0. 108
Advisable [2]	0.219	0. 824	0. 011	0. 262	0. 691	0. 023
_Cons	-1. 116	2.624		-0. 266	2.227	

, ** and * indicates significant at <1, 5 and 10% probability level, respectively. No. of obs. = 180; Log likelihood = -105.443; LR chi2 (45) = 165.55; Prob> chi2=0.000; Pseudo R^2 = 0.440. Source: Model output from survey data, 2016.

hypothesis of independence of the livelihood strategies.

The maximum likelihood method was employed to estimate the parameter estimation of the multinomial logit model and statistically significant variables were identified in order to measure their relative importance on the pastoralists' decision to choose livelihood strategies. The STATA version 13 was used to generate the parameter estimates. The results of the maximum likelihood estimates are presented in the Table 5. The value of Pearson chi-square indicated the goodness of fit for the fitted model. The likelihood ratio test statistics indicated by the chi-square statistics is highly significant (significance = 0.0000) suggesting strong explanatory power of the model and implies that at least one of the variables in the model has a significant influence on households' choice of livelihood strategies.

For this study, the factors that affect pastoralist to diversify their livelihood strategies at household level were analyzed by multinomial logit model. The dependent variable for this study is the choice of livelihood strategies which include category 1= pastoral and farming alone; 2= pastoral, farming and high return NPNF activities and 3= pastoral, farming and low return NPNF activities category.

Households' livelihood strategies were hypothesized to be influenced by fourteen explanatory variables. Those variables were hypothesized to have significant effect on households' choice of the best livelihood strategies. Among the hypothesized variables nine variables were found to influence the choice of the household livelihood strategies significantly at different significant levels having different dimension of effect (Table 5).

Interpretation of the significant variables

Sex of household head

The result of the multinomial logistic regression model analysis shows that sex of the household head was significant at 5% significance level and it was positively related with the households' engagement in pastoral, farming and low return NPNF activities choice compared to the base category which is pastoral and dry farming activities alone. The possible reason is that the households headed by female have more responsibilities in activities undertaken around the home. As far as those low return activities are undertaken around the homes which have ties with women responsibilities, female household heads have more tendency of engaging in these activities than their male counterpart. Another possible reason is that these activities are less capital intensive, which induces women to participate in it because they have less control over more productive resources. The marginal effect shows other things kept constant, the likelihood of a household diversifying into pastoral, farming and low return NPNF activities increases by 15.6% when the household is headed by female. In other words, female headed households tend
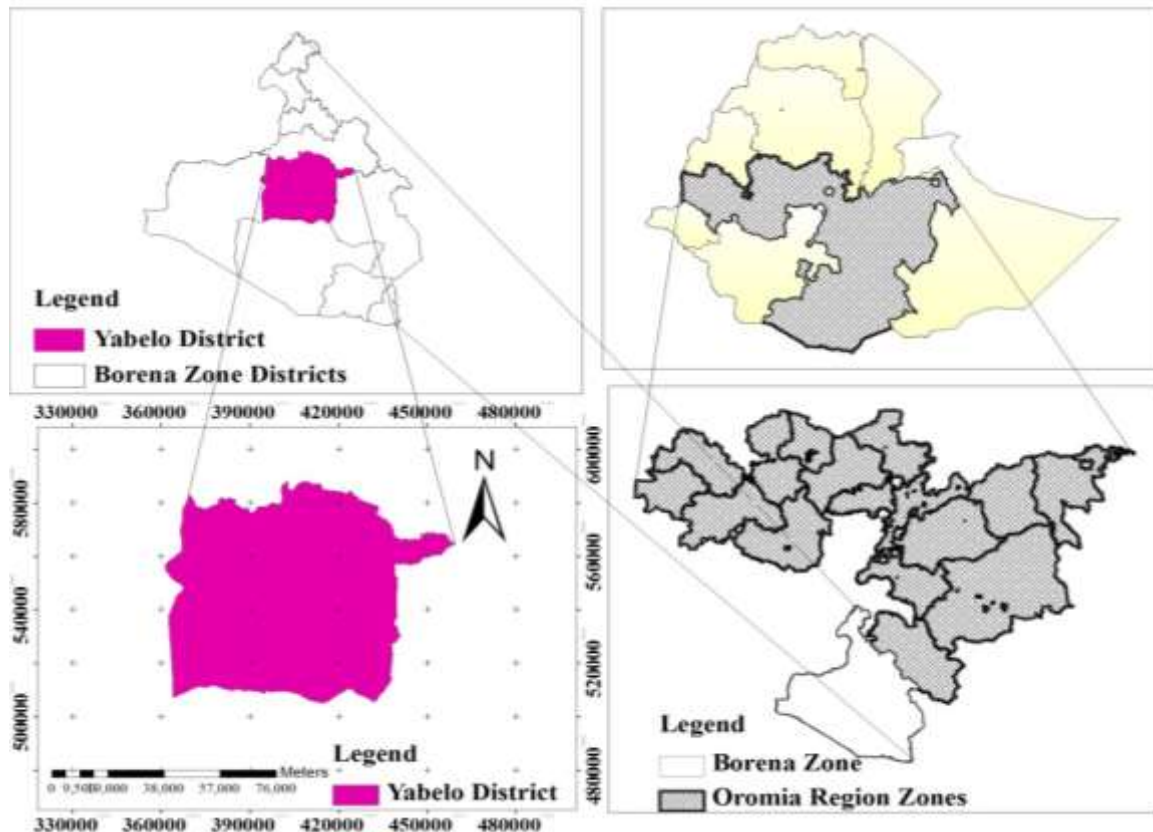
Figure 1. Map of the study area.

to involve in low return NPNF activities compared to the male headed households.

Age of the household head

As it was hypothesized, the model result indicates that the variable age had negatively and significantly affected the household choices of pastoral, farming and low return NPNF activities at 5% probability level of significance compared to the base category of pastoralism and farming alone. All other things being kept constant, the marginal effect of the multinomial logistic regression model shows that as the age of the household head increases by one year, the probability of involving in pastoral, farming and low return NPNF activities decreases by 1.1%. In the study area, participation in low return NPNF activities is higher for the younger household heads than for elder household heads. The possible justification for this may be that the current younger headed household of Borana pastoralists shows a higher interest to look for alternatives outside traditional

pastoralism both for survival and for wealth accumulation. This may be because of decreasing amount of per capita livestock share of inheritance from the family in relation to decreasing productivity. Another reason may be that the older people stick to their conservative feelings about the activities outside pastoralism considering it as disgraceful activity and their fear about handling multiple activities due to their physical weakness. Key informant interview result also indicated the strong link between elder pastoralist and livestock rearing due to livestock contribution to their livelihood and culture of the society, which inhibit them easily adopting other activities. This finding is similar with that of Eneyew and Bekele (2012).

Family size

Family size was measured in adult equivalent. The number of economically active family members in the household is found to be among the most influential variables in the model. It has a positive significant effect on the livelihood diversification into combination of

pastoral, farming and low return NPNF activities and a combination of pastoral, farming and high return NPNF activities at 5% and 10% significance level respectively, relative to the base category which is pastoral and dry land farming alone. The possible reason may be that households with abundant economically active and working age members could diversify their livelihood strategies with a view to generate more income by absorbing the available extra labor force. If other factors are being kept constant, the marginal effect of the model indicates that, as the number of economically active family members' increases by one person, the probability for the household to engage in pastoral, farming and low return NPNF activities and pastoral, farming and high return NPNF activities increases by 7.6 percent and 3.7 percent respectively. This finding is consistent with finding of Muse (2011) and Fufa (2015).

Dependency ratio

The result of the model shows that the variable dependency ratio had negatively and significantly influenced the household choices of pastoral, farming and high return NPNF activities at 1% probability level of significance compared to the base category of pastoral and farming alone. Holding other variables constant, the marginal effect shows that when the dependency ratio increases by one person, the probability of the household's engaging in pastoral, farming and high return NPNF activities decreases by 17.8%. This means that when the dependency ratio decreases, the ability of pastoralists households to diversify their livelihood strategies into high return NPNF activities increase. The possible justification for the result is that consumption level of household with large number of inactive labor force is greater than their income which generated by a few active members. This inhibit household from participating in capital intensive high return NPNF activities which needs initial investment. This finding is similar to that of Saha and Bahal (2010).

Education status of the household head

The result of the multinomial logistic regression model analysis shows that education had positively and significantly influenced the household choices of the pastoral, farming and high return NPNF activities at 5% probability level of significance. This is because, most probably literate person are better at recording their income and expenditure in order to ascertain their gain and loss in the business to maximize their profit. But according to the result from Focus Group Discussions, rising education as main driver of livelihood diversification, they also mention many constraint on the education in the study area such as far distance from the

formal school due to remoteness of the area, less applicability of vocational education and mismatch of education curriculum with the lifestyle of the community etc. From the model result, the marginal effect reveals the likelihood of a household diversifying into pastoral, farming and high return NPNF activities increase by 12.5%, as the household become literate. This is similar with the finding of Birhanu et al. (2008), Eneyew (2012), Dilrub and Roy (2012) and Gecho et al. (2014).

Livestock holding

The number of livestock held by a household is expressed in terms of tropical livestock units (TLUs). The model result reveals that, this variable is significant at 5% probability level and influences positively the choice pastoral, farming and high return NPNF activities. The positive relationship is explained by the fact that livestock size being a proxy for the pastoralists resource endowment, those sample respondents with large livestock size have better chance to earn more income. This, in turn, enables them to invest in high return NPNF activities such as building and renting house at the town, livestock trade, and investment on transportation which being difficult for poor household with lower livestock. This demonstrated that as the livestock resources increases, the probability of the household to participate in high return NPNF activities also increases. Other things remain constant; the marginal effect of the model shows, having large size of livestock increases the household's tendency to engage into pastoral, farming and high return NPNF activities by 0.5 percent. The result is in line with the result reported by Birhanu et al. (2008).

Distance to the market center

As hypothesized, distance from the nearest market was significantly and negatively related to livelihood diversification into the pastoral, farming and low return NPNF activities at 10% level of significance with respect to pastoral and farming activities alone as a reference category. This negative relationship indicates that the households who lived further away from the market are less likely to be involved in low return NPNF activities. The possible justification could be that the households who are closer to the market centers incur fewer costs to access market incentive for diversification of livelihood income source. Therefore, a long distance to the nearest market reduces the probability of participating low return NPNF activities. The results of the model indicates that the probability of livelihood diversification into pastoral, farming and low return NPNF activities decreases by 9.7% for the households further away from the market center by one hour, provided that the other factors remain constant. This finding is consistent with that of Dilruba

and Roy (2012).

Credit use

The model result indicates that, the credit use had positively and significantly affected the household choices of pastoral, farming and high return NPNF activities at 5% probability level of significance compared to the base category of pastoral and farming activities alone. The result implies that as household get credit access the possibility of engaging in high return NPNF activities increases. This may be due to fact that still some pastoralists do not want to sell livestock for investment in non-pastoral sector because of the social prestige associated by owning large number of livestock. The utilization of credit may help them to invest in high return NPNF activities because credit service providers give them technical knowhow in investing that money into productive activities but not only money. The likelihood of participating in high return NPNF activities increase by 13.5 % for a household using credit. The result is consistent with the finding of Asnake (2010).

Access to extension services

As the model result indicates, access to extension services was found to positively and significantly affect the pastoral household's choice of the combination of pastoral, dry land farming and low return NPNF activities at 10% level of significance in reference to pastoral and dry land farming activities. This result indicates that, the households who have access to extension services are more likely to diversify to pastoral and dry land farming and low return NPNF activities may be due to the fact that the services delivered by extension agent touch the area outside agriculture such as trade, health and education. This may help the household by providing awareness about the non-pastoral activities. The marginal effect indicates that if the other factors remain constant, the probability of the household's choice of pastoral and dry land farming and low return NPNF activities is increased by 11.5% as the households get access to extension services. This is in agreement with the findings of Eneyew and Bekele (2012) which indicates that frequency of extension contact was positively related to livelihood diversification.

CONCLUSION AND RECOMMENDATIONS

Diverse livelihood activities in the Borana community, being driven by different factors, are showing increasing pattern than ever before. Pastoral households have different access to resources and face different opportunities and challenges and thus choose different livelihood strategies which mean that some of them choose intensification of their former livelihood, other choose to shift their livelihood to trade and more mixed livelihood activities, calling for tailor made policy and development practice accordingly in line with their livelihood strategies choices. Livelihood activities that only meant for survival, like charcoal making or cultivation of potential grazing area, which may yield short-term benefits but have long-term influence on environmental and economy of the community should be put into consideration by different development practitioners, governing body as well as local community. For pastoralist the area with low grass potential should be settled for farming by supplementing it with excess livestock manure.

Development interventions which initiate participation in NPNF activities should mainly focus on younger and female headed pastoral household who have great interest to look for non-pastoral activities due to reduction of livestock productivities. Furthermore awareness creation for aged household head is of paramount importance to reduce their conservative behavior on participation in the activities outside pastoralism.

Larger family member are longing additional income source besides investing in livestock and farming activities while high dependency ratio is constraining household from participating into high return non pastoral nonfarm activities. Therefore local government and other development partner should develop labor employments in NPNF sector to create the job opportunities for active labor available in communities and future development intervention should be designed to support household with large family size and poor households must be taken in to account as well family planning programs should be focused.

As far as education is concerned, it is one of potential variable that support livelihood diversification, improvement of pastoralist education and training both vocational as adult learning and regular schooling are of paramount importance. Therefore, regional government and other development partner at zonal and district level need to work on the improvement of pastoralist education in various dimensions using informal education and expansion of formal education in the area. Existing education curriculum for pastoralist communities should be reassessed for pastoralist that remain labor intensive especially for child labor which needed for watching livestock being opposite to current educational curriculum with respect to time.

Livestock holding have positive influence on livelihood diversification thus; boost household participation in high return non pastoral nonfarm activities. Hence, necessary effort should be made to improve the production and productivity of the livestock. Proper awareness should be given for pastoralist to keep their livestock to manageable level by converting parts of their livestock to non-pastoral investments but not keeping their livestock for prestige

purpose. This can be done through the provision of proper information about non pastoral activities, adequate veterinary services, improved water supply points, launching sustainable and effective marketing development program.

Pastoral households in the study area are more likely to have a diversified livelihood activity when they are closer to market, have access to credit and extension service. Thus, it is recommended that the concerned bodies should improve marketing and proper credit access and extension service to pastoralists. This includes not only the usual physical infrastructures road building and maintenance, efficient and reliable market information and improving communications are also required.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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