



## Livelihood Diversification as a Strategy to Overcome Food Insecurity Challenges in North Central Ethiopia: The Case of Borena District

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Article information	Abstract
<b>History</b>  Received 10/09/2022 Accepted 24/09/2022 Published 02/10/2022	<i>Food insecurity remains a major challenge for millions of rural people in Ethiopia despite the government has given more emphasis to foster agricultural productivity rather than livelihood diversification. Thus, the main purpose of this study was to investigate whether livelihood diversification strategy is an antidote to food insecurity or not in Borena district, north-central Ethiopia. The required data were drawn both from primary and secondary sources. The study used a multistage sampling procedure, involving a combination of purposive and random sampling techniques to select 358 sample household heads. Household sample surveys, key informant interviews, and focus group discussions were the principal means used to acquire primary data. In analyzing and interpreting the primary data, both quantitative and qualitative research techniques were employed. Quantitatively, statistical tools such as chi-square, one-way ANOVA, and binary and multinomial logistic regressions were employed. SPSS version 24 was used to analyze the quantitative data while a narrative technique was used to analyze the qualitative data. The study found that nearly two-thirds (66.2%) of the investigated households diversified their livelihood. Out of this, 39.6%, 16.5%, and 10.1% of the respondents were engaged in on-farm plus non-farm, on-farm plus off-farm, and on-farm plus off-farm plus non-farm activities, respectively. Analyses of food security showed that 71.7% of the respondents were food insecure. The findings of this study confirmed that livelihood diversification is a key made for way out of food insecurity. This suggests that policymakers need to identify and focus on the most suitable strategies for supporting the diversification of livelihoods for food security.</i>
<b>Keywords</b>  Food security, livelihood diversification, Borena, Ethiopia	
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### 1. Introduction

Along with the increasing world population, food insecurity and the adverse impact of climate change on agricultural production remain major global problems for millions of people around the world (IFPRI, 2016). The estimated number of people in the world affected by food insecurity rose to 815 million, in 2016; up from 777 million, in 2015 and 775 million, in 2014 (FAO, IFAD, UNICEF, WFP & WHO, 2017). More than one-fifth (22.7 %) of these live in Sub-Saharan African (SSA) countries where one out of three people is severely food insecure (Pinstrup-Andersen & Pandya-Lorch, 2001). As food insecurity in this region is widespread and common in various pockets of extreme areas, particularly in rural ones, intervention in traditional agriculture alone is unlikely to generate substantial improvements (Burchi et al., 2016). Prior research findings (Reardon et al., 2006; Negler & Naude, 2014; Desalegn & Moges, 2016) in SSA countries portray that little attention was given to farmers' engagement in non-farm activities. Emanuel (2011) argued that in SSA countries, the majority of farmers' livelihood is derived from traditional agriculture alone rather than the diversified means of living. Conversely, achieving the goal of reducing poverty and food insecurity only through increasing agricultural productivity without engaging in non-agricultural activities could not be successful as food insecure people have increased continuously. Concomitant with population growth in SSA countries, the number of food insecure people increased from 175 million in 1990-92 to 220 million in 2014-16 though the prevalence of food insecure

people was estimated to decrease from 33% to 23% in the period of 1990-92 to 2014-16 (FAO, IFAD & WFP, 2015). The failure of the SSA countries to self-sufficiency in food requirements has been attributed to recurrent climatic shocks (like drought and water scarcity), chronic resource degradation, lack of responsible governance and inefficient policies, widespread epidemics, technological stagnation, and violent conflicts (Degefa, 2005).

Scholarly studies on agricultural activities in SSA countries indicated that most of the hungry people live in rural areas where their livelihood is based on traditional subsistence farming alone (WFP, 2014). Unfortunately, farm households in these countries pursued few non-farm livelihood activities (Reardon et al., 2006). For instance, in Ethiopia, although agriculture is the main source of livelihood for the people and the mainstay of the economy by accounting for nearly half (44%) of GDP, 90% of the exports, 85% of total employment, and the base of living for more than 85 % of the population (WFP & CSA, 2014), rural households' participation in the non-farm activities is not as such supported and adapted (Gebrehiwot et al., 2018; Bealu, 2019). This suggests the need for a serious attempt to address the food insecurity problem and livelihood diversification gaps by identifying the centrality and associations of agricultural and non-agricultural activities. Cognizant of this, livelihood diversification has been suggested by scholars and development practitioners alike as an alternative strategy for alleviating poverty, expanding household income sources, and achieving increased food security (Ibekwe et al., 2010; Abduselam, 2011). As noted by Ahmed (2012), rural households with diversified income sources are more likely to have greater resilience and flexibility than households that rely on agricultural activities alone (crop production and herding).

### 1.1 Statement of the Problem

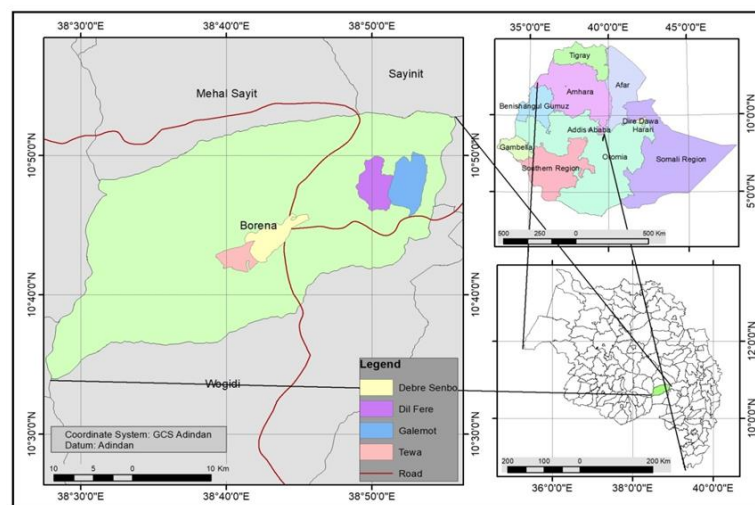
Despite claims of two-digit economic growth over the past two decades, the majority of rural Ethiopians continue to suffer from chronic food insecurity and abject poverty. In this regard, Guyu (2014) stated that the Ethiopian two-digit economic growth rate did not bring economic growth and food security. Thus, almost close to 30% of the population is expected to be food insecure each year, earning less than 1.5 dollars per day (FAO, IFAD & WFP, 2014). This is, partly, due to the fact that the focus of the government on the country, local, and household levels are to augment agricultural production and productivity to attain food self-sufficiency (Amare & Belaineh, 2013) by overlooking the contribution of livelihood diversification to food security (Degefa, 2005; Gebrehiwot et al., 2018; Bealu, 2019). Moreover, although huge resources have been invested in agricultural research and extension packages to alleviate food deficiencies in Ethiopia, they could not ensure food security among the citizens (FAO, 2010) and did not focus adequately on the issues related to off and non-farm employment (Desalegn & Moges, 2016). For example, slightly more than one-fourth (27%) of the rural Ethiopians were engaged in a non-farm activity (Negler & Naude, 2014). On the other hand, international development organizations reported that Ethiopians are frequently affected by food insecurity. For example, UNICEF (2014) reported that, in 2014, about 10% of Ethiopians were chronically food insecure and 2.7 million people required emergency food aid. FAO (2015) also estimated that 32% of Ethiopians were food insecure in 2015 and 10.2 million people were in need of emergency food aid by the end of 2015. Recently, more than half of southern Ethiopia's livelihoods have been reliant on emergency food aid (Cochrane, 2017).

According to the Household Consumption & Expenditure Survey (HCES) carried out in 2011, the proportions of households who are food insecure are about 42.5% in the Amhara region. It is one of the regions of Ethiopia in which most of its rural inhabitants often suffer from food shortages almost every year (Teshome, 2010). Concomitantly, as the Borena district (the study area) is among the drought-prone areas of the Amhara region (ARAB & EARO, 2000), its population might not access a sufficient amount of subsistence food all year round due to natural and human-induced catastrophes. As a result, for a long period of time, most of its dwellers' food requirements have been substantiated by humanitarian aid and NGO interventions. Such persisting food insecurity gaps and the absence of adequate support & adaptability of livelihood diversification were the researcher's main rationale for conducting this study. In particular, it is necessary to ask the question of to what extent livelihood diversification into off/non-farm activities could improve food security in the study area. Through the identification of the contributions of livelihood diversification to food security, it might be possible to design instruments that can enhance food security through non-farm-based interventions. So far there have been so many research works conducted in different parts of Ethiopia on food insecurity and livelihood issues (Abduselam, 2011; Adugna & Wogayehu, 2012; Titay, 2013; Zelalem, 2014; Bogale, 2016; Dereje, 2016, Bealu, 2019). However, prior studies gave little attention to investigating livelihood diversification strategy as a means out of food insecurity. Moreover, to the best of the researcher's knowledge, there were no previous empirical research works that attempt to examine livelihood diversification as a strategy for food insecurity in the study area. Thus, this study is hoped to fill this research gap by giving due attention to the contributions of livelihood diversification to food security.

## 2. Materials and Methods

### 2.1 Descriptions of the Study Area

The study area, Borena district, is located in the South Wollo zone, in Amhara National Regional State (Figure 1). It is about 467 kilometers North of Addis Ababa and 284 kilometers South-East of Bahir Dar town (Regional Capital). The district is found between  $10^{\circ}34'2''$  to  $10^{\circ}53'16''$  N and  $38^{\circ}27'39''$  to  $38^{\circ}55'49''$  E (CSA, 2008). The area is bordered by the Mehal Sayint district at the north, the Wogidi district at the south, the Legambo district at the east, and the Abay River at the west. The district is characterized by different landscape features: mountains (10%), rugged land (40%), flat land (20%), and valley (30%). Its altitude extends from 500 meters above sea level at the bottom of the canyon of Abay to 3200 meters above sea level at the northeast corner of the district. As a result, it is characterized by four agro-climatic conditions: Woinadega (47%), Dega (20%), Qolla (32%), and Wurch (1%). The area receives an average annual rainfall of 600-850 millimeters. Its mean monthly temperature is  $22^{\circ}\text{C}$ , with a minimum of  $13^{\circ}\text{C}$  and a maximum of  $27.2^{\circ}\text{C}$  (BDAO, 2016).



**Figure 1:** Location Map of the Study Area (Source: Produced Based on CSA data)

### 2.2 Methods

This study follows the pragmatism worldview in which the researcher collected and analyzed both qualitative and quantitative data at a time. The quantitative data were analyzed using SPSS version 24 software and the qualitative data were analyzed thematically. Moreover, the researcher employs a cross-sectional survey research design as the survey research design is particularly useful for non-experimental descriptive statistics that seek to describe reality (Mathers et al., 2007).

### 2.3 Sampling Procedures and Sample Size Determination

A multistage sampling method involving purposive and random sampling techniques was employed to select 358 sample households. In the first stage, the Borena district was purposively selected as the district is one of the drought-prone districts of the South Wollo zone of ANRS (ARAB & EARO, 2000) in which most of the rural households faced persistent food shortages. In the second stage, based on the concentration or high prevalence of livelihood diversification, four rural kebeles out of 35 were selected purposefully. Then, in the third stage, since the total household head in the selected kebeles was 5082, the representative sample size was determined based on the table provided by Krejcie & Morgan (1970) for determining sample size from a given population and the Raosoft online sample size calculator within 5% marginal error and 95% confidence level. Both the table and online sample size calculator indicated that on average 358 household heads represent 5082 total household heads (those who reside in four selected kebeles). Then, the number of samples derived from each selected kebeles which could be included in the sample was determined by probability proportional to the size principle. Hence, the amounts of samples drawn from each selected kebeles were determined. In the fourth stage, using simple random sampling techniques, by taking kebele records as a sampling frame, the required sample size was selected randomly from each selected kebeles. The distribution of total household heads and the sample size by kebeles are given in Table 1 below.

**Table 1:** Distribution of total and sample households in selected kebeles

Selected kebeles	Total Number of Household Heads	Selected Sample Household Heads
Debr Senbo	1249	88
Dilfrie	1164	82
Tewa	1363	96
Galemot	1306	92
Total	5082	358

*Source:* Author's construction (2018)

#### 2.4 Source of Data and Data Collection Tools

Quantitative data are primarily collected from sample respondents and a structured questionnaire is used as the main instrument. Almost all of the items used in the structured questionnaire were close-ended items. To investigate the precision and understandability of the questions as well as whether the questionnaires are able to collect the intended information or not, the Amharic version of the questionnaire was piloted with 30 subjects. The final version was prepared after incorporating the necessary modifications. The study used eight development experts who were regular agricultural workers and who are familiar with the study kebeles as data collectors. The development experts were recommended by the district livelihood diversification expert and have the necessary experience and knowledge. The data collectors were given a one-day training on the questionnaire and possible issues that can be raised in the field data collection process. The Amharic version of the questionnaire was used for training in order to avoid language confusion. While data had been collected from the samples in each selected kebeles, supervision was made two times by the main researcher to ensure the reliability of data collection. Moreover, a total of 8 FGD discussants and 14 Key informants were purposefully selected and participated in the study. Semi-structured questionnaires were provided to the FGD discussants and KII, and recorded voluntarily.

### 3. Results and Discussions

#### 3.1 Livelihood Diversification Strategies

Engagement in numerous livelihood diversification strategies is multifaceted and often influenced by a wide variety of factors that may differ in contexts and settings. From the concept of SLF, a livelihood diversification strategy is an output of the interaction between vulnerability contexts; livelihood capitals, transforming structures and processes prevailing around farm communities. Likewise, the choice of livelihood diversification strategies is the result of the interplay between vulnerability contexts, livelihood capitals, organization, and institutional factors. This is because multiple motives prompt households and individuals to diversify assets, incomes, and activities (Barrett et al., 2001). However, various kinds of literature indicated that diversifications of livelihood activities were more dependent on the number of livelihood capitals or assets a household owned (Siti, 2013; Muhammad et al., 2018). These capitals become more meaningful when manifested and interpreted within the economic status of farm households. Thus, it is possible to argue that farm households who have relatively abundant livelihood capitals, particularly natural (cultivated land size in hectare per household) and financial capital (livestock possession per household) are more likely to engage in various livelihood diversification strategies, and achieve food security than their counterparts.

**Table 2:** Cross-tabulation of farm households' wealth status with diversification status

Wealth status	Diversification status				X <sup>2</sup> -value	P-value
	Not diversified		Diversified			
	No.	%	No.	%		
Poor	84	39.3	130	60.7	8.632	0.013**
Medium	28	29.2	68	70.8		
Better-off	9	18.7	39	81.3		
Total	121		237			

*Source:* Computed based on survey data (2016); Note: \*\* Significant at  $\alpha < 95\%$

As shown in Table 2, the Pearson chi-square test revealed that there is a statistically significant ( $X^2=8.632$ ,  $df=2$ ,  $p < 0.05$ ) association between the wealth status of farm households and their livelihood diversification status. This might be due to the fact that large livelihood capitals, particularly livestock and cultivated farmland per

household, open opportunities for diversifying livelihood. In other words, under the citrus paribus assumption, those farm households with large farm sizes could produce surplus yield and sell some of it to have cash in hand and participate in non-agricultural activities. Similarly, those households with large livestock wealth could afford to sell a few, either to fill their subsistent gaps or to participate in non-agricultural activities. This implies that accesses to productive assets (capitals), particularly large livestock possession and cultivated land size in a hectare, are a base for livelihood diversification in rural areas of developing countries like Ethiopia. Moreover, a closer examination of the cross-tabulation of the wealth status of respondents and their livelihood diversification in which access to productive capital is at the center of the opportunities disclosed that the majority of the respondents who are in the better off (81.3%) and medium (70.8%) wealth group diversified their livelihood. This indicates that access to resource endowments (like large livestock possession and cultivated land size in hectares) resulted in occupational diversification. Consistent with this finding, Gebrehiwot et al., (2018) acknowledged that poor households are less likely to diversify their means of living than medium and better-off households. Conversely, Bereket & Degefa (2016) confirmed that the poor and the destitute households diversified their livelihood more than the better-off and medium-wealth groups. On the other hand, Mewal (2016) showed that poor households did not show significant differences from that better-off households in diversifying their livelihoods. In addition to the above quantitative findings where the centrality of livelihood diversifications is evident, the information collected from one of the experts in district livelihood diversification core processing units, as a key informant, reported the following:

*“Rural households’ who diversify their means of living show improvements in living style, dressing fashion, feeding habits, well-being and have cash in hand than their counterparts. This is directly attributed to access to cash at hand or income from various livelihood diversification opportunities available in their surroundings, remittances, and access to livelihood capitals.”*

The key informant further explained that “rural households live in those kebeles who practice diversification have better awareness about welfare in general and gave critical comments in meetings”. Therefore, in light of the above quantitative and qualitative findings, it seems fair to suggest that livelihood diversification is a means to address farm households’ and their families’ life necessities.

### 3.2 Food security/insecurity

Comprehending the food security status of farm households as an outcome of livelihood strategies is crucial to improve the response mechanisms related to food security and livelihood improvement in rural areas (Yishak et al., 2014). Moreover, in order to determine whether households are successful in pursuing their livelihood strategies or not, it is important to look at outcome measures that capture need or well-being satisfaction. Thus, food security is often considered to be one of the best and most positive outcome indicators for the overall livelihood strategies as it captures most of the positive results of livelihood diversification strategies (CARE, 2002). On the other hand, food insecurity is the result of unsatisfactory livelihood strategies and in the long run, it may cause irreversible destruction of the means of living of the poor, thereby reducing self-sufficiency.

In fact, it is true that respondents’ food security status is identified based on various indicators, and each indicator is supposed to measure particular aspects of food security. However, in this study, the author prefers Dietary Energy Supply (DES) indicator as a potential food security measure and used it for further analysis. This was due to the fact that DES took into account the kilocalorie content of the food consumed and it is considered the principal measure of the food security status of farm households. Similarly, contemporary researchers such as Messay (2012), Guyu (2014 & 2016), Tesfahun et al. (2015), Alem-meta & Singh (2018), and Ermias (2018) took into account the DES of food security for their analyses. Consequently, the findings of this study confirmed that 70.7% of the respondents were found to be food insecure.

The computation of DES requires four steps: firstly, calculate the Net Grain Available (NGA) per household per year using the HFBM formula as presented below:

$$NGA = (GP + Gpu + GBR + GA/RM + MP + DP) - (GS + PHL + GR + GGO)$$

Where,

NGA: Net grain available/year/household; GP: Total grain produced/year/household; GPU: Total grain purchase/year/household; GBR: Total grain borrow/year/household; GA/RM: Quantity of food aid/remitted/year/household; MP: Meat, meat-based products and poultry (kilogram/household/year); DP: Dairy and dairy based products (little/household/year); PHL: Post-harvest losses in quintal/year/household; GR: Quantity of grain reserved for seed in next harvest in quintal/year/household; GS: Amount of grain sold in quintal/year/household; GGO: Grain is given to others in quintal per year

Secondly, the amount of NGA for each food grain or item is changed into kilocalories using the Food Composition Table (see Appendix II). For instance, the amount of kilocalories in a certain household  $x$  who have 4.25 quintals of teff per year is computed as  $4.25 * 161.2$  (the number of kilocalories of 100 grams of teff) divided by 0.001. Thirdly, the result is divided by the total household size as measured in adult equivalent. Fourthly, by dividing the result that we get in step three by the number of days in a year (365) and comparing the available dietary supply of each household with 2100 kilocalori/ADE/day. If the calculated value is greater or equal to the WHO's recommended kilocalorie intake (2100 kilocalori/day/ADE), the household will be categorized as food secure otherwise labeled as food insecure with respect to the utilization component or dimension of food security. Consequently, as shown in table 7.8, the analysis using kilocalories revealed that 70.7 and 29.3% of the sample households were found to be food insecure and secure, respectively. This might be attributed, in part, to the frequent environmental catastrophe and drought occurrence, and in part due to human-induced problems like small and fragmented land, population pressure, inadequate farm inputs, poor infrastructures and administration, and fewer opportunities for participating in non-agricultural activities. Regarding the classification of food security/insecurity, Devereux (2006) classified households' food security/insecurity status based on kilo caloric consumption per day per person as follows: households who consumed on average more than 2100 kilocalorie per day per person are classified as a food secured whereas those who consumed less than 2100 kilocalories were classified as food insecure. Among the food, insecure groups, those households who consumed between 1800-2100 kcal per day are mildly food insecure, between 1500-1800 kcal are moderately food insecure, and less than 1500 kcal are severely food insecure.

**Table 3:** Rural households' food security status and severity of food insecurity

Available Kilocalorie/Day/ADE	Food security status			
	Status	No.	%	
$\geq 2100$	Food Secure	105	29.3	
$< 2100$	Food Insecure	253	70.7	
Kilocalorie/Day/ADE	The severity of food insecurity			
	1800- 2100	Mildly Food insecure	13	3.6
	1500- 1800	Moderately Food insecure	32	9.0
	$< 1500$	Severely Food insecure	208	58.1

*Source:* Classification based on Devereux (2006) & Computed from the survey data (2018)

### 3.3 Livelihood Diversification and Food Security Linkage

As noted in the introduction section of this study, there is an association between rural households' livelihood diversification strategies and their food security status in different settings. However, researchers came up with varying findings on the possible association between livelihood diversification strategies and food security. Below the researcher investigates the possible association between livelihood diversification strategies and food security at the household level using Pearson chi-square test statistics.

**Table 4:** Cross-tabulation of farm households' livelihood diversification choices and their food security status

Livelihood diversification choices	Food security status						X <sup>2</sup> -value	P-value
	Food secure		Food insecure		Total			
	No.	%	No.	%	No.	%		
On-farm only	3	2.9	118	46.6	121	33.8	98.804	0.00***
On-farm +off-farm	17	16.2	42	16.6	59	16.5		
On-farm +non-farm	55	52.4	87	34.4	142	39.6		
On-farm +off-farm + non-farm	30	28.6	6	2.4	36	10.1		
Total	105	100	253	100	358	100		

*Source:* Computing based on survey data (2016): \*\*\* Significant at  $\alpha < 0.01\%$

The analysis based on cross-tabulations of farm households' livelihood diversification choices with their food security status using the Pearson chi-square test revealed that a statistically significant ( $X^2=98.804$ ,  $df=3$ ,  $p<0.01$ ) association was observed between livelihood diversification strategies and food security. This indicates that livelihood diversification strategies and food security are linked in ways that are relevant to the development and human well-being. A similar finding was reported by Mensah (2014) in his study in Ghana. This implies that rural households' livelihood diversification strategies have a positive relationship with food security in a visible

manner. As seen in Table 3 above, out of the total sample households, about 33.8% of the respondents pursued agricultural activities alone as a livelihood strategy. These households may not be well off in their productive resources or livelihood capitals as compared to those who are engaged in various off/non-farm activities in addition to agriculture. Among those who pursued farming only strategy, a higher proportion (46.6%) were food insecure households as opposed to only 2.9% who are food secure. This indicates that the majority of the rural households who pursued agricultural activities alone as their main means of living are more food insecure than their counterparts. A similar result was reported by Mensah (2014) and Dereje (2016). However, Yishak *et al.*, (2014) opposed this view in their research findings. Livelihood strategies that combine agricultural activities with various off-farm activities are common in the rural areas of Ethiopia, particularly in areas where land is too small to generate life necessities. In this regard, among those who pursued farming with off-farm activities, significant numbers of the sample respondents were food insecure (16.6%) and secure (16.2%). Although close to the same proportion of people are food secure and insecure among those pursuing “on-farm plus off-farm”, most of the time off-farm activities serve as a survival strategy, specifically for the poor or the food insecure households. This was because, as outlined in the previous section, most poor households engage in off-farm activities since their piece of land is not enough to supply the required livelihood. A similar result was reported by Guyu (2016). The findings of this study also revealed that farm households who pursued the “on-farm plus non-farm” strategy have a higher proportion of food secure (52.4%) group than the rest strategies. This might be attributed to the fact that better economic return of the activity than the on-farm and on-farm plus off-farm strategies. In addition, the finding using Pearson chi-square test showed that, among those who pursued a combination of the “on-farm plus off-farm plus non-farm” strategy, a higher proportion (28.6%) are food secure and only 2.4% are food insecure. This implies that *citrus paribus*, as farm households diversify their means of living by combining agriculture with off and non-farm activities; the probability of securing their food needs become more likely than their counterparts. It is, therefore, noteworthy to note that the rural households who diversified their livelihood have a more stable income and are more food secure than those households who didn't. The finding of this study goes in line with the livelihood approach or theory that dictates engagement in various livelihood diversification strategies bringing increment in income; improving food security and well-being, and better ways of managing the natural resource system. This finding was in harmony with some contemporary research findings. For instance, scholars such as Alexander (2014); Echibiri *et al.* (2017); Mohammed *et al.* (2018); Bealu (2019) confirmed that livelihood diversification prompts food security as the level of livelihood sources or livelihood activity increases, the food security of the rural households improved. However, a different result was reported in a study by Yishak *et al.* (2014). Their study exhibited that the relationship between rural household livelihood strategies and their food security status was statistically negative. On the other hand, a statistically insignificant association between the rural households' livelihood strategies and their food security status was reported by Dev *et al.* (2016). The possible reason for the deviation from this study finding could be due to the nature of the study area which is characterized by limited cultivated land and recurrent environmental problem. Under this physical environment, farming alone strategy cannot ensure food security and households need to support themselves by diversifying their income source in order to attain food security.

It is, therefore, important to note that in the study area addressing food security requires the consideration of a livelihood diversification strategy. The quantitative result showing the relation between livelihood diversification and food security is supported by qualitative analysis as presented in the description below by a key informant from one of the officers in district livelihood diversification core processing units:

*“Many farmers in the study district are living with very small plots of land, which cannot enable them to produce even adequate subsistence food. To this effect, diversifying their livelihood becomes undoubtedly their best choice, if they have the resources and opportunities, either to supplement their precarious livelihood strategies (agriculture) or offset their food gaps. Thus, a positive relationship can be observed between rural people's livelihood diversification strategies and their food security status.”*

Moreover, one of the Development Agents (DAs), as a key informant, describes the threats in the farming sector as follows:

*“In Borena district, due to environmental degradation, traditional farming, erratic rainfall, population pressure, land fragmentation, and pest infestations, the marginal productivity of land is gradually declining. Farmers do not have the purchasing power to make use of new technologies such as commercial fertilizers, improved seeds, and insecticides. Even, the livestock sub-sector of the district is threatened by animal diseases such as Blackleg, Small box, and Anthrax.”*

In addition to the above analysis of the synergy between rural households' livelihood diversification strategies and their food security status, it is important to assess the nexus between rural households' livelihood diversification strategies and the severity of food insecurity. This is due to the fact that not all rural households faced food insecurity to the same degree of severity and intensity. The severities may differ in accordance with their livelihood diversification strategies. The severity of food insecurity is classified based on the classification made by Devereux (2006). Therefore, a brief account of livelihood diversification choices against the severity of food insecurity is presented below.

**Table 5:** Cross-tabulation of farm households' diversification choices and severity of food insecurity

Livelihood diversification choices	The severity of food insecurity								X <sup>2</sup> -value
	Mildly food insecure		Moderately food insecure		Severely food insecure		Total		
	No	%	No.	%	No.	%	No.	%	
On-farm only	0	0	10	4	96	37.9	106	41.9	18.63***
On-farm + off-farm	6	2.4	8	3.2	28	11.1	42	16.7	
On-farm + non-farm	6	2.4	13	5.1	80	31.6	99	39.1	
On-farm + off-farm + non-farm	1	0.4	1	0.4	4	1.6	6	2.4	
Total	13	5.2	32	12.7	208	82.1	253	100	

Source: Computed based on survey data (2016); Note: \*\*\* Significant at  $\alpha < 0.01\%$

A Pearson chi-square test for association ( $X^2=18.63$ ) indicated the existence of synergy between rural households' livelihood diversification strategies and the severity of food insecurity. The association was statistically significant at a 99% confident level. Moreover, table 5 displays that among the total food insecure respondents (253 household heads), 41.9%, 16.7%, 39.1%, and 2.4% of them were engaged in "on-farm", "on-farm plus off-farm", "on-farm plus non-farm" and "on-farm plus off-farm plus non-farm" livelihood strategies, respectively. This implies that the majority of the food insecure households (41.9%) earned their living from on farm only strategy than the other strategies. On the contrary, relatively a small proportion (2.4%) of the sample households derived their livelihood from the combination of on-farm, non-farm and off-farm activities. This clearly showed that, in the study area, the possibilities and capabilities of engaging in the three livelihoods diversification strategies simultaneously are not adequately adapted among food insecure households.

#### 4. Conclusion

This study investigated the contributions of a livelihood diversification strategy to food security in Borena district, north-central Ethiopia. A range of food security and livelihood theories were used to highlight the problem and explain the empirical observation. Based on the findings, the following concluding remarks are forwarded. Livelihood diversification is another key made for a way out of food insecurity: Based on quantitative and qualitative analyses of livelihood diversification in response to food security, it can be concluded that engagement in diverse livelihood activities can lead to a better food security status. The results indicate that engagement in multiple livelihood diversification strategies has a statistically significant positive association with food security. Moreover, these findings provided additional information about the importance of engaging in multiple livelihood diversification strategies. That is, rural households who engaged in a combination of on-farm, off-farm and non-farm activities were more food secured than their counterparts. The upshot is that engaging in multiple livelihood diversification activities simultaneously may be a solution to the existing food insecurity problem that devastates rural people.

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