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Research Article

Determinants of Livelihood Diversification among Households in the Sub-Saharan Town of Merawi, Ethiopia

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Livelihood diversification could be determined by complex and diversified factors. Yet, unlike the rural areas, the situation is unexplored in the case of towns of developing economies. The objective of this study was to identify the determinants of households' livelihood diversification in a sub-Saharan town. Data were collected from 151 households and 4 key informants. In addition, secondary data were collected to supplement the primary data. Descriptive statistics were employed to identify the households' livelihood strategies. The level of households' livelihood diversification was estimated by the Herfindahl–Hirschman Index, whereas multinomial logistic regression was employed to investigate the determinants of the households' livelihood diversification. The result of the Herfindahl–Hirschman Index shows the presence of three levels of livelihood diversification among households: no diversification (11.26%), moderately diversified (26.49%), and highly diversified (62.25%). The model analysis revealed that out of eighteen predictor variables, only seven variables, namely, total cattle possession ($B = 0.329$, $p < 0.1$), land ownership ($B = 120.572$, $p < 0.01$), income from irrigation ($B = 2.902$, $p < 0.05$), total annual cash income ($B = 0.000$, $p < 0.01$), price fluctuation problem ($B = 2.899$, $p < 0.05$), market price fluctuation plus total cattle possession ($B = 12.892$, $p < 0.01$), and no price fluctuation plus total cash income ($B = 0.000$, $p < 0.01$) were found significantly influencing households' livelihood diversification. Households in the study town are engaged in different livelihood diversification strategies rather than relying on farm only for improving their wellbeing, and livelihood diversification was gaining a dominant role in households' income. Even if the Ethiopian agricultural policy gives more attention to the agriculture sector, there is evidence that households' income is not limited to agriculture. Therefore, nonfarm livelihood diversification should be strengthened by government initiatives to sustain households' livelihood diversification.

1. Introduction

A livelihood comprises the capabilities, assets (including both material and social resources), and activities used by a household for means of living [1, 2]. Diversification is the single most important means of poverty reduction for small-scale farmers in South and South East Asia [3]. Diversification as a strategy involves the attempt by individuals and households to find new ways to raise income and reduce environmental risks [4, 5]. On-farm diversification means to generate an income from crop production and livestock rearing [4, 5]. Nonfarm diversification refers to generating an income from the nonfarm activities such as wage employment, sale of charcoal and fuel wood, processing of agricultural equipment, craft and rent to supplement earnings from agriculture or income generated from activities in secondary, and tertiary sectors [4, 6]. Prior to studies by Ellis [4] and Barrett [6], nonfarm earnings accounted for a considerable share of farm household incomes in the rural African regions [7, 8]. Off-farm income is a temporary wage or exchange of labor on others' farms within the agricultural sector [2, 4]. In developing countries, like Ethiopia, where agriculture is highly vulnerable to weather shocks, farm income

diversification becomes inevitable so as to balance out income and consumption [9].

Ethiopia's agricultural productivity is considered to be low, despite the presence of various agricultural policies, and it focuses mainly on on-farm agricultural development [9]. Urban farming activities in Addis Ababa have contributed their own part to improving the wellbeing of the livelihoods of the community, for over 65% of household income is derived from urban farming [10]. However, institutional factors of landownership and membership in cooperatives have a significant influence on the probability of farm households' participation in nonagricultural activities [9].

The reports of two studies by Enyew et al. [11] and by Addisu [12], which were conducted on rural household livelihood strategies and their determinants in different spatial areas at different times, show the categories of households as poor, less poor, and better off, and as reported in both studies, more than half of the households also pursued different activities as a means of income and food. The distribution of households with four livelihood categories as on-farm, on-farm + nonfarm, on-farm + off-farm + nonfarm, and nonfarm + off-farm activities were identified in studies conducted by Gecho 3[13] and Addisu [12].

Agriculture has a leading contribution to the total income of the study households, followed by nonfarm and off-farm livelihood activities. The study of the determinants of the rural household livelihood strategies showed that age, education, sex of the household head, access to credit, land size, livestock, and agroecology are the main factors that reduced the likelihood of livelihood diversification. In contrast, family size, dependency ratio, frequency of contact to extension agents, membership to cooperatives, use of inputs, and remittance increased the likelihood of livelihood diversification [11]. Surprisingly, some farmers were found pursuing nonfarm and off-farm activities as the primary livelihood strategies rather than agriculture. In addition, the determinants of the livelihood diversification defined as agroecology, sex, education, farm size, livestock ownership, participation in social leadership, annual cash income, use of fertilizers, use of improved seeds, age, and training were determining the farmers' choice of livelihood strategies at a 10% probability level [13].

Yizengaw [14] and Dirribsa and Tassew[15] conducted studies on the determinants of households' livelihood diversification strategies in two different regions of Ethiopia. Accordingly, land size, livestock holding size, sex of the household head, mass media, market distance, total annual cash income, and urban linkage were significant determinants, and they determined up to a 10% probability level in the case of Debre Elias district, East Gojjam Zone, Ethiopia [14]. Similarly, agroecology, sex, education, farmland size, family size, livestock ownership, participation in social institutions, membership to cooperatives, contact to extension agents, access to sources of credit, and age were clear as the determinants of livelihood diversification strategies at a 10% probability level in the case of Ambo district, Oromia regional state, Ethiopia [15].

As researchers have investigated from the result of the multinomial logistic regression model of the above researchers, some of the variables in the model were reported to be consistent, while other variables were inconsistently reported in all studies that were examined. Furthermore, access to irrigation as the determinant factor was not reported by the studies directly mentioned above because livelihoods are complex, multimodal, and multidimensional. However, De Haan and Zoomer [16] supported the characteristics of complexity, multimodality, and multidimensionality of livelihood in the previous study.

By considering the inconsistent determinants of livelihood diversification, nonexistence of studies on the study area regarding the determinants of households' livelihood diversification and the area having high agricultural production activities due to the Koga irrigation dam has become a pull factor to the study. The area is also expected to be one of the primary food baskets and to host tourists for excursions in the region in the near future due to the presence of the artificial Koga dam, which is a pull factor. Therefore, it is imperative to investigate the dynamics of the determinants of the households' livelihood diversification, the study of which rationally requires a practical assessment in the realistic context of the participants of the study. The objective of this study is to determine the status and determinants of the household's livelihood diversification in a sub-Saharan town.

2. Description of the Study Area

The study was undertaken at Merawi town administration, West Gojjam Zone, Amhara national regional state, Ethiopia (see Figure 1). The town is located 35,000 meters south of Bahir Dar city and approximately 529,000 meters away from Addis Ababa, which is the capital of Ethiopia. Specifically, the town is located at 7000 meters close to the Koga dam, lying on the latitude and longitude coordinates of 11°24′31″N 37°9′39″E, with an elevation of 1901 meters above sea level. Ethiopia is administratively divided into regional states and chartered cities, zones, districts, and/or town administrations and kebeles. A kebele is the smallest administrative unit of the local government in Ethiopia consisting of at least five hundred households. The Merawi town administration consists of three urban kebeles (namely, Kebele 01, Kebele 02, and Kebele 03) and four rural kebeles (named Enguti kebele, Inashenfalen kebele, Kudmi kebele, and Enamirt kebele). Nevertheless, this study was targeted at one urban kebele (i.e., Kebele 03) and one rural kebele (i.e., Enamirt kebele). The total population of the study area was 35,541, of which 7,108 households were included in the population of the study [17].

The mean annual rainfall that is recorded at the station of Merawi, the main town of Mecha district, is 1480 mm, of which 90% falls in the months ranging from May to October. The mean monthly temperature of the town is 25.8°C, and its slope ranges from nearly flat to 5%.

3. Methodology

3.1. Sources and Methods of Data Collection. A mixed research method, which combines both quantitative and qualitative data-gathering methods, was employed to gather

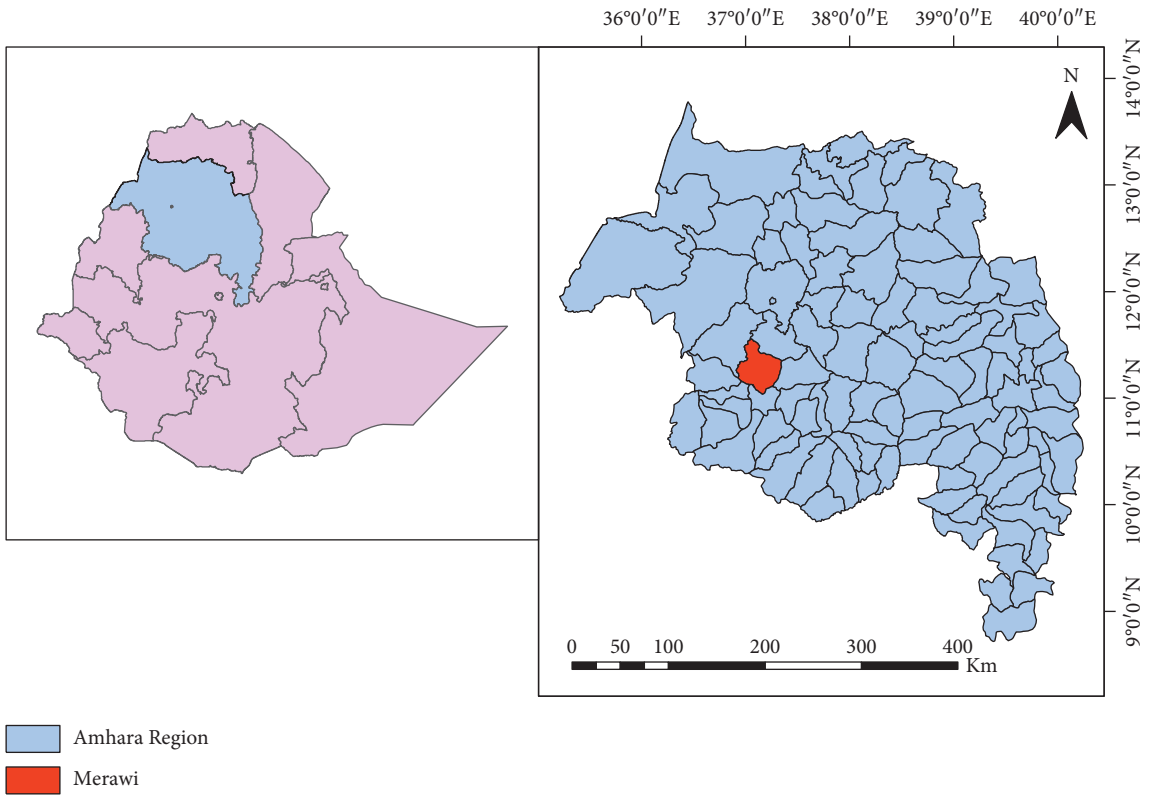

Figure 1: Map of the study area. Source: authors' own compilation, 2019.

both primary and secondary data, but the quantitative approach was predominant. The primary data were collected using survey questionnaires and interviews with key informants, whereas secondary data were obtained from both published and unpublished documents. The research council experts of the Institute of Disaster Risk Management and Food Security Studies, Bahir Dar University checked the ethical and scientific issues of this study, and permission was granted to conduct the study. Oral consent was obtained from the respondents ahead of the household survey.

3.2. Sampling Design and Procedures. A multistage sampling procedure was employed to select sample households. In the first stage, out of the three urban kebeles and four rural kebeles, one urban kebele (Kebele 03) and one rural kebele (Enamirt kebele) were selected purposely to capture different livelihood activities existing in the study area and thereby to identify the determinants of the sample households' livelihood diversification. In the second stage, two villages in each sampled kebeles were selected randomly. Accordingly, a total of four sample villages were selected by using the simple random sampling technique.

In the third stage, the probability proportional to the sample size was applied to draw the sample households. Finally, a total sample of 151 households was selected by using the simple random sampling technique. The sample size was determined by using the Kothari [18] formula and its proportion to population size (PPS). Also, four key informants are the community leaders of each sampled kebele: the town's trade and industry office and the town's job creation and food security office.

3.3. Methods of Data Analysis and Interpretation. Descriptive statistics, the Herfindahl–Hirschman Index (HHI) and multinomial logistic regression were used to analyze the data collected from the sample households. Quantitative categorical/dummy types of data were analyzed using percentage, frequency, and the chi-square test to see whether there is a statistically significant association between the household's livelihood diversification strategies and their determinants. 'On the other hand, the quantitative continuous variables of the study were analyzed using an independent sample *t*-test. The interpretation and tabulation of data were done in order to analyze the qualitative data that is used for a better understanding of the analysis and interpretation of the quantitative data. The Herfindahl–Hirschman Index was used to identify the status of livelihood diversification among the households. The multinomial logistic regression was used to identify the determinants of the households' choice of livelihood diversification because the dependent variable was more than two outcomes. ata analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 20.0.

3.4. Herfindahl–Hirschman Index. Various predictors and indices are there to measure livelihood diversification like the number of income sources and their share,

Herfindahl–Hirschman Index, Simpson index, Ogive index, Entropy index, Modified Entropy index, and Composite Entropy index [19]. In this study, the Herfindahl–Hirschman Index was used because of its commonly accepted measure of market concentration and wider applicability to firms. Therefore, this model was used to determine the level of household livelihood diversification in the study area. The Herfindahl–Hirschman Index is defined as the inverse of the level of income diversification (D), which was adopted in [20–22]. Thus,

$$D = \frac{1}{\sum Si^2}, \tag{1}$$

where D = level of income diversification and

$$\sum Si^2 = \text{HHI}, \tag{2}$$

where $\text{HHI} = S1^2 + S2^2 + S3^2 + S4^2 \ldots$, N and Si = share of income source i in household's total income.

$$Si = \frac{Yi}{Y}, \qquad Y = \sum Yi, \tag{3}$$

where Yi = total income from source i. Y = total household income from all sources.

The Herfindahl–Hirschman Index ranges from 1/N to 1, where N is the number of income sources in the household. The value of the HHI that lies between 0.15 and 0.25 (or 1,500 to 2,500) shows moderate concentration, while the HHI above 0.25 (above 2,500) indicates high concentration [23]. The levels of livelihood diversification and the Herfindahl–Hirschman Index (HHI) were identified as no diversification ($D = 1$), moderately diversified ($1 < D < 2$), and highly diversified ($D \geq 2$) [20].

3.5. Multinomial Logistic Regression (MLR) Model Specification. When there is a dependent variable with more than two alternatives among which the researcher has to choose (i.e., unordered qualitative or polychromatic variables), the appropriate econometric model would be either the multinomial logit or multinomial probit regression model. The multinomial logit model is selected not only because of the computational ease but also because multinomial logit analysis shows a superior ability to predict livelihood diversification and to pick up the differences between the livelihood diversification among households. It is a simple extension of the binary logistic regression model and is the most frequently used model for nominal outcomes that are often used when a dependent variable has more than two choices. Enyew and Bekele [11], Dirribsa and Tassew [15], Eshetu and Mekonnen [24], Paudel et al. [25], Tizazu et al. [26], and Jilito et al. [27] also adopted the model.

The dependent variable that has a polychromous outcome can be modeled by multinomial logistic regression. The response variable Y can take on any of m qualitative values, for convenience, we number 1, 2, 3, . . ., m (using the numbers only as category labels). In this case of livelihood diversification status, households can choose or prefer no livelihood diversification/complete specialization (0), moderately diversified (1), and highly diversified (2).

For an outcome variable with J categories, let the jth livelihood diversification that the ith household chooses to exploit its value as moderately diversify and highly diversify take the values 1 and 2, respectively, if the ith household choose jth livelihood diversification and 0 otherwise. The probability that a household with characteristics X chooses livelihood diversification j, πij modeled as

$$\pi ij = \frac{e\alpha j + \beta 1 jXi1 + \cdots + \beta k jXik}{1 + \sum_{1=2}^{m} e(\alpha j + \beta 1 jXi1 + \cdots + \beta k jXik)}, \qquad j = 2, \ldots, m, \tag{4}$$

where $\pi i1 = 1 - \sum_{j=2}^{m} \pi ij$ and

$$\sum_{j=0}^{J} \pi ij = 1. \tag{5}$$

Thus, the fitted α and β can then be used to assess the log-odds of the household choose each livelihood diversification, relative to the reference livelihood diversification. That is, it estimates that the chance that, instead of choosing no livelihood diversification/complete specialization, the household chooses the other livelihood diversification. The log-odds are computed as

$$\log\left(\frac{\pi ij}{\pi i1}\right) = \alpha j + \beta 1 jXi1 + \cdots + \beta k jXik, \tag{6}$$

where j = 2, . . ., m.

Therefore, once we fit the model, we can predict the odds of a specific livelihood diversification relative to the reference livelihood diversification. The regression coefficients affect the log-odds of choosing j livelihood diversification versus the reference category. Generally, the j subscript on both the intercept, αj, and slope, βj, indicates that there is an intercept and a slope for the comparison of each category to the referent category. α = intercept of the category, β = slope of the category, j = each category, and X = predictor variables of the study. The summary of variables with their measurement is shown in Table 1.

4. Results and Discussion

4.1. Livelihood Strategies of Households. The results of the study showed five livelihood strategies, which the sample of 151 households undertakes to get their food and income: farm only (16.5%), nonfarm only (27.2%), farm + nonfarm (45.7%), nonfarm + off-farm (5.3%), and farm + nonfarm + off-farm (5.3%). Similar results were reported in previous studies, for example, the studies by Gebru et al. [28], Gecho [13], Tizazu [26], and Jilito et al. [27] reported farm only, farm + nonfarm, farm + off-farm, and farm + nonfarm + off-farm livelihood strategies; the studies by Dirribsa and Tassew [15] and Abera et al. [29] reported agricultural alone, agriculture + nonfarm, and agriculture + nonfarm + off-farm livelihood strategies. However, the study by Seraje [30] found clearly a different classification system and

Table 1: Study variables, multinomial logit model, and hypothesis.

Variable name	Variable type	Definition and unit of measurement	Expected outcome
Dependent variables			
No diversification	Categorical	Study reference category and $D = 1$	
Moderately diversified	Categorical	Level of livelihood diversification lies between 1 and 2	
Highly diversified	Categorical	Level of livelihood diversification is greater than 2	
Independent variables			
Age of the household head	Categorical	Age of the household head in years by range 1, 2, 3, ...	+
Educational level of the household head	Categorical	Number of years of formal schooling the household head attended	+
Total family size	Continuous	Total number of household members takes the value of 1, 2, 3, ...	+
Dependency ratio	Continuous	(˂15+ >64)/(15–64) age differences	−
Sex of the household head	Dummy	Sex was assigned as 1 if the head is male and 2 otherwise.	−
Total livestock possession/ ownership	Continuous	It was measured by tropical livestock unit (TLU size of livestock owned by HHHs)	+
Access to agricultural extension	Dummy	1, if a household has access, and 2, otherwise	+
Access to credit	Dummy	1, if a household has access, and 2, otherwise	+
Land owned	Continuous	Total land size owned by the household in hectares	−
Membership to cooperatives	Dummy	1, if a household participates in cooperatives, and 2, otherwise	+
Income from irrigation	Continuous	It was measured by numbers as total income	+
Religion of the household head	Categorical	1 for orthodox Christian, 2 for Muslim, and 3 otherwise	−
Access to improved seeds	Dummy	1, if a household used improved seeds, and 2, otherwise	+
Access to improved fertilizers	Dummy	1, if a household used fertilizers, and 2, otherwise	+
Annual cash income	Continuous	Total amount of annual cash income the household had received	+
Training	Dummy	1, if the household has taken livelihood skills development training, and 2, otherwise	+
Distance to markets	Continuous	Measured by hours	−
Price fluctuation problem	Dummy	1, if the household had faced price fluctuation problem, and 2, otherwise	−

Source: authors' compilation based on the studies by Enyew and Bekele [11], Dirribsa and Tassew [15], Yizengaw [14], and Gebru et al. [28].

number of livelihood strategies, including factors/indicators of livelihood strategies, namely, farming, occupational diversification, and migration. Moreover, Paudel et al. [25] reported nonfarm wage, business/enterprise, commercial farming, and remittance-oriented and diversified subsistence as livelihood strategy clusters.

4.2. Livelihood Diversification Status of the Households. The results of the Herfindahl–Hirschman Index showed that most of the households (62.25%) are high diversifiers while no diversifiers and moderate diversifiers cover 11.26% and 26.49%, respectively. Similar results were reported in the previous studies conducted by Adekunle and Shittu [31], Sharma and Singh [22], and Roy and Basu [21] using this index. Besides, other recent studies by Khatun and Roy [32], Saha and Bahal [33], Addisu [12], and Roy and Basu [21] found similar results by using the Simpson diversity index. This study showed that households acquired their income from diverse agricultural activities. The major ones were crop production (teff, millet, maize, barley, and wheat), livestock production (cows, oxen, sheep, goats, and chicken, but cows and oxen were dominant), irrigation practice (maize, barley, tomato, cabbage, and potato were dominant), and planting cash crops or cash plants/trees (eucalyptus, Rhamnus prinoides/gesho, coffee, and mango). Besides, households have developed their additional income from nonfarm and off-farm sources such as employment (permanent, temporary, daily, and casual work), trade (petty trade, trade in crop products, cattle or livestock products, selling foods/drinks, producing/selling traditional home-brewed alcoholic drinks), remittance/gift, rental cars and houses, gharry, mills, handicrafts, service delivery (as a driver/chauffeur), agricultural land rent, and agricultural laborer.

The mean income of the households by livelihood strategies has been established as farm only (121,010.00 ETB), nonfarm only (80,857.22 ETB), farm + nonfarm (167,550.67 ETB), nonfarm + off-farm (125,590.00 ETB), and farm + nonfarm + off-farm (138,282.5 ETB). Thus, this study shows the types of agricultural activities pursued by the households and other diversified sources to drive their household income. The mean income of the households by diverse income sources in terms of Ethiopian Birr (ETB) was estimated as raising livestock production (28,930.19), crop production (17,726.49), planting of trees (17,640.17), car and house rental (14,208.61), employment (13,453.08), irrigation (7,582.78), trade in livestock (4,708.61), trade in foods/drinks (3,392.05), selling charcoal/firewood (3,373.51), petty trade (3,155.43), mill (2,913.91), trade in crop products (2,463.53), gharry drivers or horse/mule cart drivers (2,033.11), service delivery (1456.95), producing/selling local drink (1,126.76), remittance/gift (978.15), casual work (852.98), agricultural land rent (740.07), making and selling handicrafts (254.30), agricultural laborer (231.79), and carpentry (198.66). Therefore, households have used widely diverse income sources or activities to increase their income and thereby to improve their wellbeing and food security situations.

4.3. Model Results. Under this part of the study, important variables that were hypothesized to influence the household's choice of livelihood diversification were identified and analyzed by using a multinomial logistic regression model.

The goodness-of-fit measures were checked, and the results validate that the model adequately fits the data as the significance level is reasonably greater than 0.1 in which both values of Pearson and deviance are greater than 1% probability level, and it means that the predicted value is not significantly different from the observed value. The output also shows us the two measures of R^2, out of which the first is the Cox and Snell measure, which SPSS reports as .570, and the second measure is the Nagelkerke adjusted value, which SPSS reports as .685. They are reasonably similar values and represent relatively decent-sized effects. The overall goodness-of-fit measured by the significance of chi-square statistics is $\chi^2 = 127.581$, $\underline{df} = 10$, and sig = 1.000. As can be seen from this figure, the likelihood ratio test statistics exceed the chi-square final value at less than 1% probability level. This means that the null hypothesis that all effects of the independent variables are zero can be rejected. The value of the Pearson chi-square test shows the overall goodness-of-fit of the model at less than 1% probability level. The Pseudo R-square that measures the percentage of variation in the dependent variables explained by the model is good (Cox and Snell = 0.570 and Nagelkerke = 0.685).

The results of the likelihood ratio test validated the significance of the predictor variables to the model. The results of the analysis show that land ownership of the households had a significant main effect on the increments of their livelihood diversification, $\chi2(2) = 12.377$, $p < 0.005$; total livestock possession, $\chi2(2) = 15.393$, $p < 0.001$; total cash income, $\chi2(2) = 17.562$, $p < 0.001$; income from irrigation, $\chi2(2) = .012$, $p < 0.05$; and also, the price fluctuation problem had a significant main effect on livelihood diversification, $\chi2(2) = 7.165$, $p < 0.05$. The interaction of these predictor variables also had a significant main effect on the model as described herewith: the interaction of price fluctuation problem with total annual cash income had a significant main effect to increase the households' livelihood diversification, $\chi2\ (2) = 22.625$, $p < 0.001$; and also, the interaction of price fluctuation problem with total livestock possession had a strong significant effect, $\chi2\ (2) = 35.002$, $p < 0.001$. These likelihood statistics can be seen as sorts of overall statistics that tell us which predictors significantly enable us to predict the outcome category, but they do not really tell us specifically what the effect is.

4.4. Parameter Estimations and Interpretations for Model Results. As indicated in Table 2, for dependent variables, moderately diversified vs. no diversification, highly diversified vs. no diversification, and independent variables (i.e., income from irrigation, land ownership, total annual cash income, total livestock possession, price fluctuation problem, the interaction of price fluctuation problem with total annual cash income, and the interaction of price fluctuation problem with total livestock possession) were statistically significant at 1%, 5%, and 10% probability levels, respectively. Therefore, the variables of the study were found to be statistically significant factors for identifying households' choice to be involved in no diversification, moderate diversification, and high diversification of livelihood strategies.

Odds ratio (Exp (B)) greater than 1 indicates more/greater likelihood of the event of interest. Since independent variables, such as total cattle possession, land ownership, income from irrigation, total annual cash income, price fluctuation problem, interaction of price fluctuation problem with total annual cash income, and interaction of price fluctuation problem with total livestock possession, have Exp (B) or odds ratio greater than 1, they influence households to choose moderately and highly diversified livelihood strategies rather than relying on complete specialization of livelihood (i.e., no livelihood diversification).

Table 2 shows the results of the individual parameter estimates and the table is split into two parts because the parameters compare pairs of outcome categories. Therefore, we can specify the first category (no livelihood diversification) as a reference category against moderately/highly diversified livelihood:

Income from irrigation (Irrgatin): for this study, income from irrigation was hypothesized to have either a positive or a negative relationship with the household's livelihood diversification. Income from irrigation activities and households' livelihood diversification in the study area had a significant and positive correlation, which was at $b = 2.902$, Wald $\chi2\ (2) = .012$, and $p < 0.05$. In short, households were significantly more likely to be involved in livelihood diversification than relying on complete specialization of livelihood, if households had more participation in irrigation activities as revealed by model analysis (see Table 2), and the result was in line with that of the studies by Gebru et al. and Khatun and Roy [28, 32].

Land ownership (Laown): land ownership in this study was found to positively significantly predict the household's choice of livelihood diversification at $b = 120.572$, Wald $\chi2\ (1) = 87900.538$, and $p < 0.001$. If the household owned 1 more hectare of land, they are more likely to be involved in livelihood diversification practice as shown by the model analysis (see Table 2), and this result is consistent with the results reported by previous studies [11, 14, 15, 28, 30, 34, 29]. Conversely, the studies by Teshome et al. [35] and LE et al. [36] reported that land size has a negative significant influence on the decision of the household's livelihood diversification.

Total annual cash income (Totincome): total annual cash income has a positive influence on the households' livelihood diversification status, which was significant at Wald $\chi2\ (1) = 8.439$ and $p < 0.005$. But, there is no relationship between dependent categorical variables of either moderate livelihood diversification and no livelihood diversification or high livelihood diversification and no livelihood diversification because the

Table 2: Summary of multinomial logistic regression model analysis.

Variables	Moderate livelihood diversification (1) vs. no livelihood diversification (0)			High livelihood diversification (2) vs. no livelihood diversification (0)		
	Coef	SE	Wald	Coef	SE	Wald
Intercept	−5.006	1.601	9.777	−4.542	1.557	8.504
Irrgatin = income from irrigation	2.902**	0.317	0.012	2.902**	0.317	0.012
Laown = land ownership	120.572***	0.407	87900.538	121.122	0.000	
Totincome = total annual cash income	0.000***	0.000	8.439	0.000***	0.000	7.862
Tocaposs = total cattle possession	0.329*	2.902	0.000	3.626*	12.902	1.031
[Priflu = 1(yes)] = price fluctuation problem	2.899**	1.310	4.896	1.629	1.275	1.633
Laown * irrgatin	0.002	0.260	0.000	0.002	0.260	0.000
[Priflu = 1(yes)] * totincome	0.000***	0.000	9.210	0.000***	0.000	8.924
[Priflu = 2(no)] * totincome	0.000	0.000	20.320	0.000	0.000	0.075
[Priflu = 1(yes)]*tocaposs = total cattle possession	12.892***	0.097	17697.086	13.215	0.000	
[Priflu = 2(no)] * tocaposs	1.534	5936.183	0.000	19.113	4439.262	0.000

Note: pseudo-R^2 = .570 (Cox and Snell), .685 (Nagelkerke). Model χ^2 (22) = 278.53, $p < .001$. *, $p < 0.1$, **, $p < 0.05$, and ***, $p < .01$, respectively. Source: own survey, 2019.

Table 3: Classification table of the multinomial logistic regression model.

Observed	Predicted			
	No diversification	Moderately diversified	Highly diversified	Percent correct
No diversification	13	4	0	76.5
Moderately diversified	7	21	12	52.5
Highly diversified	1	11	82	87.2
Overall percentage	13.9%	23.8%	62.3%	76.8

Source: own survey, 2019.

odds ratio or Exp (B) = 1.000 (see Table 2), and this result is found to be similar to that of the studies by [14, 28, 37–39, 29].

Total cattle possession (Tocaposs): total cattle possession has positively influenced the livelihood diversification status of the households in the study area at $b1 = 0.329$ and Wald $\chi2$ (1) =0 .000 and $b2 = 3.626$, Wald $\chi2$ (2) = 1.031, and $p < 0.1$. The odds ratio Exp (B) of the model analysis shows that those households which owned 1 more unit of cattle are more likely to be involved in livelihood diversification than relying on completely specialized livelihood (see Table 2). This result is also consistent with the results of previous studies [11, 14, 34, and 15]. On the other hand, the study conducted by Dai et al. [38] reported the negative influence of livestock size on a household's livelihood diversification.

Price fluctuation problem (Priflu): this variable has a positive influence on the choice of households' livelihood diversification status in the study area and the result was significant at $b1 = 2.899$, Wald $\chi2$ (1) = 4.896, and $p < 0.05$. The odds ratio Exp (B) of the model analysis shows that households having price fluctuation problem are involved in livelihood diversification practice as compared to households who had not faced price fluctuation problem (Table 2).

Price fluctuation problem with annual cash income ([Priflu = 1] plus Totincome): the combined effect of these two independent variables, as the model result had determined, significantly predicted both moderate and high livelihood diversification status of the households at $b = .000$, Wald $\chi2$ (1) = 9.210, and $p < 0.005$ and $b = .000$, Wald $\chi2$ (2) = 8.924, and $p < 0.005$, respectively (see Table 2).

Price fluctuation problem with livestock possession ([priflu = 1] plus tocaposs): the combined effect of price fluctuation with livestock possession on the households' livelihood diversification is significant at $b = 12.892$, Wald $\chi2$ (1) = 17697.086, and $p < .001$. The odds ratio Exp (B) of the model analysis shows that those households who owned 1 more unit of livestock with price fluctuation problem are more likely to be involved in livelihood diversification than relying on completely specialized livelihood (see Table 2).

As indicated in the classification table output (Table 3), the multinomial logistic regression model was able to correctly classify about 76.8% of the cases.

5. Conclusions and Recommendations

Most of the households in Merawi town are found to be engaged in farm only, nonfarm only, farm + nonfarm, nonfarm + off-farm, and farm + nonfarm + off-farm livelihood strategies. No diversification, moderate diversification, and high diversification are identified as the three levels of livelihood diversification in the study site. Most of the households relied upon high livelihood diversification. The households are more likely to have a diversified livelihood when they have more experience in irrigation activities and have a large size of land, enough annual cash income,

ownership/possession of cattle or livestock, and price fluctuation problems. The combinations of price fluctuation problems with total cattle or livestock possession as well as the interaction of price fluctuation problem with total annual cash income have a positive significant influence on the households' livelihood diversification. Accordingly, taking into account the country's development policy growth and transformation plan of Ethiopia as an opportunity, farmers in the study site need to maximize their income and enhance their livelihood diversification to improve their wellbeing. Since the livelihood diversification promotion strategies (i.e., land capability-based irrigation and agricultural intensification, raising livestock technology, developing and strengthening microfinancial institutions, and making improved market chains) are part of the policy, the local farmers together with the local development agents should enhance the process of diversifying income-generating activities. The government and private sectors together with nongovernment agencies and civic societies need to play a role in a coordinated manner to endorse accessibility of essential services of microfinancial institutions and livestock rearing extension services. Land registration and certification has to be strengthened in the town to maximize sense of belongingness and appropriate alternative investment. In order to expand farmers' choice of economic activity in the town, the government's policy needs to focus on designing a mechanism on how to utilize the comparative advantage of various corners of urban land and urban-rural linkage.

Data Availability

The datasets supporting the conclusions and recommendations of the study are included in the article.

Ethical Approval

The ethical committee of Bahir Dar University has given permission to conduct the study. Oral approval was obtained from the study respondents.

Consent

The authors provide consent for publication of this manuscript in this journal.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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