



Research Article

Determinants of Livelihood Diversification Among Agro-Pastoral Households in Bero and Gorigesha Woredas, West Omo Zone, Ethiopia

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Abstract

This study investigates the determinants of livelihood diversification among agro-pastoral households in Bero and Gorigesha Woredas, West Omo Zone, Southwest Ethiopia. Primary data for this study was collected from 371 households, complemented by secondary sources. The analysis was carried out using both descriptive and econometric technique of analysis. Descriptive analysis revealed four main livelihood strategies; on-farm, on-farm + non-farm, on-farm + off-farm, and on-farm + off-farm + non-farm with the majority (36.66%) engaged in on-farm + off-farm activities. Further, the econometric analysis was conducted using a multinomial logit model (MNL), and identified age, education, family size, credit access, input use, saving status, distance from main road, cooperative membership, and risk management practices as significant determinants of livelihood diversification in the study area. Except for family size, which negatively influenced livelihood diversification, all factors positively affected engagement beyond solely on-farm activities. Furthermore, the results indicate that both socioeconomic and institutional factors shape households' livelihood strategies. Enhancing diversification requires targeted interventions of concerned bodies which include improved access to credit, provision of agricultural inputs, promotion of saving practices, risk management training, and expanded educational opportunities. These measures are essential for strengthening household resilience, income stability, and sustainable development in the study area.

Keywords

Livelihood Diversification, Agro-pastoral Households, Multinomial Logit Model, Socioeconomic Factors, Institutional Factors, West Omo Zone

1. Introduction

Livelihood refers to the capabilities, assets, and activities required securing a means of living [7]. In rural contexts, livelihoods have historically been dominated by crop cultivation and livestock rearing, shaped by cultural and institutional factors [10]. However, increasing exposure to climatic variability,

market instability, and population pressure has reduced the viability of reliance on a single livelihood source.

Livelihood diversification is the process through which households construct a portfolio of activities and social support mechanisms to reduce risk and improve living standards

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[12, 17]. It is a dynamic and adaptive strategy in which households add, maintain, or abandon activities in response to changing economic and environmental conditions [26]. Diversification may involve reallocating assets across on-farm, off-farm, and non-farm activities to balance expected returns and risks [20], and it is reflected in the coexistence of multiple income sources at a given time [30].

In Ethiopia, rural livelihoods are largely based on small-holder agriculture, with most households cultivating less than 0.5 hectares for subsistence [25]. Given high production risks, households increasingly engage in off-farm and non-farm activities to smooth income, cope with shocks, and reduce vulnerability [4]. These activities include wage labor, petty trade, forest-based income, remittances, and mining, particularly gold mining, which has become an important non-farm income source in several rural areas [15].

West Omo Zone is characterized by pastoral and agro-pastoral livelihood systems, where households in Bero and Gorigesha Woredas depend mainly on rain-fed crop and livestock production with low economic returns. Livestock remains a critical asset, yet productivity is constrained by inadequate veterinary services, feed shortages, and recurrent droughts [11]. Rapid population growth and limited market access further intensify livelihood vulnerability, necessitating diversification as a survival and adaptation strategy. Despite this, empirical evidence on livelihood diversification in agro-pastoral areas of West Omo Zone remains limited, justifying the need for this study.

2. Statement of the Problem

Livelihood diversification plays a vital role in reducing rural poverty, enhancing income stability, and improving household resilience [9]. It may occur through agricultural diversification, structural diversification, or income diversification, including engagement in non-farm activities independent of farm resources. In recent years, agro-pastoral households in Ethiopia have increasingly diversified their livelihoods as a coping response to climatic shocks, market fluctuations, and seasonal food insecurity [16].

However, diversification opportunities are uneven and constrained by limited access to education, credit, infrastructure, extension services, and markets, particularly in peripheral regions such as West Omo Zone. Although several studies in Ethiopia identify factors such as education, age, household size, market access, and credit as key determinants of livelihood diversification [5, 19, 13], most focus on crop-based farming systems. Evidence from agro-pastoral settings remains scarce, and determinants vary across locations and over time. To date, no empirical study has examined livelihood diversification in Bero and Gorigesha Woredas, creating a critical knowledge gap that this study seeks to address.

Objectives of the Study; the general objective of this study was examining the determinants of livelihood diversification among agro-pastoral households in Bero and Gorigesha

Woredas of West Omo Zone; and specifically;

- 1) To identify demographic and institutional determinants of livelihood diversification.
- 2) To examine major livelihood strategies practiced by agro-pastoral households.
- 3) To assess factors influencing households' livelihood strategy choices.

Significance of the Study: This study provides empirical evidence from an under-researched agro-pastoral region of Ethiopia, contributing to the livelihood diversification literature. The findings will inform policymakers, development practitioners, and non-governmental organizations in designing context-specific interventions aimed at enhancing sustainable livelihoods, reducing poverty, and strengthening household resilience in West Omo Zone and similar agro-pastoral settings.

3. Theoretical Literature Review

Livelihood Theory: The concept of livelihood is central to contemporary discussions on poverty and rural development. [7] define livelihood as the capabilities, assets (material and social), and activities required for a means of living. A livelihood is considered sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its assets over time, and avoid undermining the natural resource base.

Livelihoods are shaped within broader social, economic, political, and environmental contexts. Institutions, policies, markets, and social norms influence access to assets and determine livelihood outcomes [12]. Environmental conditions such as climate variability, soil quality, and natural hazards further affect livelihood decisions, particularly in agro-pastoral settings. The Sustainable Livelihoods Approach (SLA) provides a useful framework for understanding how assets, institutions, and vulnerability contexts interact to shape livelihood strategies and outcomes [31].

Several theories explain why households diversify their livelihoods. Household Economic Theory views households as production and consumption units that allocate labor and resources to maximize utility under constraints [32]. The Livelihood Approach Theory emphasizes diversification as a risk-reduction and income-stabilization strategy that improves food security and well-being [7]. The Theory of Choice highlights diversification as a deliberate decision to pursue multiple livelihood options rather than relying on a single activity [1]. Together, these theories suggest that livelihood diversification is a rational response to risk, uncertainty, and resource constraints.

Livelihood Diversification: Livelihood diversification refers to the process by which households construct a diverse portfolio of income-generating activities and social support mechanisms to improve living standards and reduce vulnerability [12, 13]. It is a dynamic process involving the continuous addition, modification, or abandonment of activities in response to economic and environmental changes [26].

Diversification may serve as a coping, adaptation, or accumulation strategy [6]. For poorer households, diversification is often driven by survival needs, whereas wealthier households may diversify to accumulate assets. Empirical evidence indicates that diversified livelihoods are generally less vulnerable to shocks and income variability than undiversified ones [12]. However, diversification is highly context-specific and influenced by household characteristics, asset endowments, and institutional settings.

In Ethiopia, livelihoods remain largely agriculture-based, though recent trends show increasing engagement in off-farm and non-farm activities such as wage labor, petty trade, and mining [14, 35].

Livelihood Strategies: Livelihood strategies in agro-pastoral areas are commonly classified into on-farm, off-farm, and non-farm activities. On-farm activities include crop production and livestock rearing undertaken on the household's own land [23]. Off-farm activities are agriculture-related income-generating activities conducted outside the household's farm, such as agricultural wage labor [24]. Non-farm activities include all income sources outside agriculture, such as trade, mining, construction, services, remittances, and small-scale manufacturing.

Agro-pastoral households typically rely on mixed crop-livestock systems but face constraints such as limited assets, low income, weak market access, and inadequate institutional support, which influence their ability to diversify [27].

4. Empirical Literature Review

Empirical studies from developing countries show that livelihood diversification is influenced by socioeconomic, institutional, and environmental factors. [12] identifies seasonality, risk, labor markets, credit access, and asset ownership as major drivers of diversification. Studies from Nigeria, Kenya, South Africa, Ghana, Bangladesh, China, and Zimbabwe report that education, age, household size, skills, market access, infrastructure, credit availability, livestock ownership, and political stability significantly affect diversification decisions [2, 28, 29, 34].

In Ethiopia, numerous studies confirm that livelihood diversification is shaped by demographic, economic, and institutional factors. Education, age, household size, landholding, livestock ownership, credit access, extension services, cooperative membership, market access, and training consistently emerge as significant determinants [5, 13, 19, 22].

Most studies employ multinomial logit models to analyze livelihood strategy choices, reflecting the categorical nature of diversification outcomes. However, the majority focus on crop-based farming systems, with limited attention to agro-pastoral areas. Moreover, findings vary across locations and time, indicating the importance of area-specific analysis.

This study adopts a conceptual framework grounded in the Sustainable Livelihoods Approach, linking household demo-

graphic characteristics, asset endowments, institutional factors, and vulnerability contexts to livelihood diversification outcomes. Agro-pastoral households' livelihood choices are shaped by their access to human, physical, financial, social, and natural capital, as well as by external shocks and institutional environments. This framework guides variable selection and empirical analysis in the study.

5. Methodology and Data

Study Area: The study was conducted in West Omo Zone, specifically in Bero and Gorigesha Woredas, located in the newly established South West Regional State of Ethiopia. The administrative center of West Omo Zone is Jemu, situated approximately 671 km southwest of Addis Ababa and 213 km from Bonga, the regional capital. West Omo Zone comprises six woredas: Menit Shasha, Menit Goldia, Gorigesha, Surma, Bero, and Maji. Geographically, the zone lies around 35.78° East longitude and 6.64° North latitude. The annual rainfall ranges from 400 mm to 2,000 mm, while the average annual temperature varies between 15.1°C and 27.5°C.

The zone covers a total area of approximately 1,458,400 hectares, of which 17.7% is under crop cultivation, 23.5% is used for livestock production, 15.1% is covered by forest, 28.7% is fertile but uncultivated land, and the remaining 15% is non-fertile. According to the [8], the total population of the zone is 291,809, comprising 49.4% males and 50.6% females.

Bero Woreda has an estimated population of 19,076, while Gorigesha Woreda has a population of 61,672. The local economy is predominantly based on agriculture, livestock production, trade, and small-scale mining. Gold mining activities are practiced in selected kebeles, while the majority of households engage in agro-pastoral livelihood systems, combining crop production, livestock rearing, and supplementary income activities.

Research Design: The study employed a cross-sectional research design, whereby primary data were collected from sample households at a single point in time. This design was deemed appropriate given the objective of identifying the determinants of livelihood diversification among agro-pastoral households in the study area.

Moreover, both primary and secondary data were used in this study. Primary data were collected from agro-pastoral households in Bero and Gorigesha Woredas using a structured questionnaire. Primary data were collected using a structured household questionnaire. This method was selected due to its suitability for collecting standardized data, minimizing interviewer bias, and allowing flexibility for respondents. Secondary data were obtained from published and unpublished sources, including CSA reports, government documents, journals, books, and previous empirical studies. Further, both quantitative and qualitative data were utilized to enrich the analysis.

Sampling Technique: The target population of the study comprised agro-pastoral households residing in Bero and

Gorigesha Woredas of West Omo Zone. A three-stage sampling procedure was employed to select sample respondents for this study. At first stage, two woredas are purposely selected from the zone. At second stage, six kebeles were randomly selected from the two woredas. These include Donta, Bero Bolte, and Gabissa from Bero Woreda, and Kuji, Marsigori, and Tuwee from Gorigesha Woreda. Finally at second stage, sample households were selected from each kebele using systematic random sampling, proportional to kebele population size. The sample size was determined using [21] formula;

$$n = \frac{Z^2 \cdot p \cdot q \cdot N}{e^2(N-1) + Z^2 \cdot p \cdot q}$$

Where: n = sample size, N = total households (50,232), p=0.5, q=0.5, e=0.05, and Z=1.96 (95% confidence level)

This yields a total sample size of 382 households, and the sample was proportionally allocated as: 152 households for Bero Woreda, and 230 households for Gorigesha Woreda.

Methods of Data Analysis: Both descriptive and econometric methods were employed. Data were analyzed using STATA version 14. Descriptive statistics such as means, frequencies, and percentages were used to summarize household characteristics and livelihood patterns.

Econometric Model Specification: Given the multinomial nature of livelihood choices, a Multinomial Logistic Regression (MNL) model was employed. The dependent variable represents four mutually exclusive livelihood strategies:

$$Y = \begin{cases} 0; & \text{On farm only} \\ 1; & \text{On farm + non farm} \\ 2; & \text{On farm + off farm} \\ 3; & \text{On farm + off farm + non farm} \end{cases}$$

Let P_{ij} represent the probability that the i^{th} household chooses livelihood strategy j , X_i denote the set of explanatory variables influencing livelihood strategy choice, and β_j be the parameters (coefficients) to be estimated.

Since the coefficients of a logit model are in log-odds units, they are not directly interpretable. To make them meaningful, they are typically expressed in terms of odds ratios. The odds ratio represents the probability that a household chooses a particular livelihood strategy relative to the probability that it does not:

$$Z_{ij} = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Sex} + \beta_3 \text{Edu} + \beta_4 \text{FamSi} + \beta_5 \text{MigS} + \beta_6 \text{CoPM} + \beta_7 \text{RoD} + \beta_8 \text{SaS} + \beta_9 \text{Ls} + \beta_{10} \text{Inp} + \beta_{11} \text{Cr} + \beta_{12} \text{RisM} + \epsilon_i$$

This model was employed to analyze the association between livelihood diversification strategy choices and their determinants among agro-pastoral households in Bero and Gorigesha Woredas, West Omo Zone.

6. Description of Variables

Dependent Variable: Livelihood Diversification Strategy

$$\text{Odds}_{ij} = \frac{P_{ij}}{1 - P_{ij}}$$

The probability of household i choosing strategy j is specified as:

$$P_{ij} = \frac{e^{X_i \beta_j}}{1 + \sum_{k=1}^J e^{X_i \beta_k}} = j, = 1,2,3$$

Where,

P_i represents the probability that i^{th} HH strategy falls in j category

X_i is sets of explanatory variables that influences livelihood strategy choice

β_s are parameters (coefficients) to be estimated

The utility maximization framework assumes that households choose the livelihood strategy that yields the highest expected utility.

Consequently, the complementary probability is;

$$1 - P_{ij} = 1 - \frac{e^{X_i \beta_j}}{1 + \sum_{k=1}^J e^{X_i \beta_k}} = \frac{1}{1 + e^{Z_{ij}}}$$

Where $Z_{ij} = X_i \beta_j$ is the stimulus index, also called the log-odds in favor of the given livelihood strategy. Therefore, the odds ratio can be simplified as;

$$\frac{P_{ij}}{1 - P_{ij}} = e^{Z_{ij}}$$

Taking the natural logarithm of both sides yields the log-odds (logit) form;

$$\ln\left(\frac{P_{ij}}{1 - P_{ij}}\right) = Z_{ij} = \beta_0 + \sum_{p=1}^m \beta_{pj} X_{ij}$$

By incorporating the disturbance term ϵ_i to account for unobserved factors, the model can be expressed as:

$$\text{Prob}(Y_i = j | X_i) = Z_{ij} = \beta_0 + \sum_{p=1}^m \beta_{pj} X_{ij} + \epsilon_i$$

Finally, for this study, the multinomial logistic regression model is specified as:

(LDAS); a categorical variable representing household livelihood choice.

Independent Variables: The independent variables include household demographic, economic, institutional, and infrastructural factors such as age, sex, education, family size, migration status, cooperative membership, road distance, saving habit, land size, input use, credit access, and risk management

strategies, with expected signs grounded in theory and empirical literature.

Table 1. Description of variables with their expected signs.

| Variables | Definition | Nature of var. | Values (Measurement) | Exp. Sign |
|-----------|---|----------------|---|-----------|
| | Dependent variable | | | |
| LDAS | Livelihood Diversification alternative strategies | Categorical | 0= on-farm 1= on-farm +non-farm 2= on-farm + off-farm 3= on-farm + off-farm + non-farm | |
| | Independent variables | | | |
| Age | Age of Household Head | Continuous | Age of HH measured in year | - |
| Sex | Sex of Household Head | Dummy | 0 if male, and 1 = female | + |
| Edu | Educational level of HH | Categorical | 0=if high school & above 1= primary school (1-8) 2=if never attend formal education | + |
| FamSi | Family size | Continuous | Number of members in family | + |
| MigS | Migration status of HH | Dummy | 0 if native, 1 if migrant | - |
| HCopM | Membership in cooperatives | Dummy | 0, if HH is member in local cooperatives, and 1 otherwise | ++ |
| RoD | Road Distance | Continuous | Distant to road in walking hour | - |
| SaS | Saving Status of HH | Dummy | 0 if yes, 1 otherwise | + |
| Inp | Households Input usage | Dummy | 0 if HH has access to any inputs and 1 otherwise | + |
| Cr | Households Credit Access | Dummy | 0 if yes, 1 otherwise | + |
| Ls | Land size of HH | Continuous | Measured in hectare | + |
| RisM | Risk minimization strategies of households | Dummy | 0 if HH has more than one risk minimization strategies, 1 if no | + |

7. Results and Discussion

This study is based on cross-sectional data collected from 371 agro-pastoral households in Bero and Gorigesha Woredas, West Omo Zone, Ethiopia. The analysis proceeds in two stages. First, descriptive statistics summarize key demographic, socioeconomic, and institutional characteristics of the sample households and their livelihood strategies. Second, a multinomial logistic regression model is employed to identify the determinants of livelihood diversification, using *on-farm only* livelihood strategy as the reference category.

8. Descriptive Results

Household Characteristics: The average age of household heads was 41.26 years, indicating that most respondents were

within the economically active age group. Male-headed households constituted 65.77% of the sample, reflecting the dominant role of men in household headship in the study area. The mean household size was 4.23 persons, suggesting moderate labor availability for both farm and non-farm activities.

Educational attainment was generally low. While 53.10% of household heads had completed primary education, 33.42% had no formal education, and only 13.48% attained secondary education or above. This limited human capital base may constrain households' ability to engage in remunerative non-farm activities.

The average landholding size was 4.1 hectares, with substantial variation across households. Although land size is often considered a key asset for livelihood diversification, its role in agro-pastoral settings remains context-specific. Approximately 42.59% of households were migrants, indicating significant population mobility within the study area.

Institutional and Infrastructure Factors: Institutional access

among sample households was limited. Only 25.34% reported access to credit services, highlighting a major constraint to livelihood expansion and investment. In contrast, 59.03% were members of cooperatives, and 63.61% reported having some form of saving practice. About 63.07% of households used agricultural or livestock inputs, suggesting partial integration into formal support systems.

Market access remained weak. The average walking distance to the nearest main road was 1.42 hours, reflecting poor rural infrastructure. Such remoteness is expected to influence both transaction costs and households' livelihood choices. Risk management practices were relatively uncommon: only 36.93% of households reported using at least one formal or informal risk-coping strategy, underscoring the vulnerability of agro-pastoral livelihoods to shocks.

Livelihood Strategies: Households pursued diverse livelihood combinations. The most common strategy was on-farm combined with off-farm activities (36.66%), followed by on-farm plus non-farm activities (28.03%). About 25.07% relied

exclusively on on-farm activities, while only 10.24% engaged simultaneously in on-farm, off-farm, and non-farm activities. This distribution indicates that while partial diversification is widespread, full diversification remains limited.

9. Econometric Results

The multinomial logistic regression model passed key diagnostic tests. Variance Inflation Factor (VIF) values averaged 1.17, indicating no multicollinearity. Specification and goodness-of-fit tests, including the Hosmer–Lemeshow test, confirmed that the model was correctly specified and adequately fitted to the data. These results support the robustness of the estimated coefficients.

Determinants of Livelihood Diversification: The multinomial logit results reveal that human capital, institutional access, and risk-related factors play a central role in shaping livelihood diversification decisions.

Table 2. Multinomial regression output.

| Variables | On-farm + non-farm | | On-farm + off-farm | | On-farm+ off-farm+non-farm | |
|-------------|--------------------|-------|--------------------|-------|----------------------------|-------|
| | Coeff | P> z | Coeff | P> z | Coeff | P> z |
| Age | .0480** | 0.033 | .0571** | 0.026 | .0401 | 0.152 |
| Sex | .4088 | 0.451 | .8269 | 0.152 | .4172 | 0.528 |
| Family size | -.4459*** | 0.007 | -.2218 | 0.209 | -.2990 | 0.143 |
| Education | 1.383*** | 0.000 | .7267* | 0.092 | 1.587*** | 0.002 |
| Migration | 17.909 | 0.983 | 18.482 | 0.982 | 18.226 | 0.982 |
| Credit | 2.336*** | 0.000 | 2.189*** | 0.001 | 2.108** | 0.010 |
| Saving | 1.285** | 0.014 | 2.047*** | 0.000 | 1.007 | 0.149 |
| Land size | -.0462 | 0.698 | -.0080 | 0.952 | -.0685 | 0.637 |
| Road dist. | -.0290 | 0.939 | -.5513 | 0.178 | 2.163*** | 0.000 |
| Input use | 2.378*** | 0.000 | 2.306*** | 0.000 | 2.572*** | 0.000 |
| Risk mngt | 1.234** | 0.032 | 4.383*** | 0.000 | .7638 | 0.266 |
| Cooperati. | .4787 | 0.362 | 1.559*** | 0.007 | .1273 | 0.857 |
| _cons | -6.140 | 0.000 | -10.560 | 0.000 | -11.402 | 0.000 |

- 1) Number of obs. = 371
- 2) LR chi2(36) = 455.37
- 3) Prob > chi2 = 0.0000
- 4) Log likelihood = -256.32753
- 5) Pseudo R2 = 0.4707

- 1) VIF = 1.17
- 2) *** shows significant at 1%
- 3) ** shows significant at 5%
- 4) * shows significant at 10%

Source; own survey, 2024/25

The study found that nine of the twelve explanatory variables significantly influenced agro-pastoral household livelihood strategies in Bero and Gorigesha Woredas, West Omo Zone. Significant determinants included age, family size, education, credit access, saving status, distance from the main road, input use, risk management, and cooperative membership, while sex, land size, and migration status were not significant. Age positively affected engagement in on-farm + non-farm and on-farm + off-farm strategies, suggesting that older households may leverage accumulated experience to diversify, although it was not significant for on-farm + non-farm + off-farm, contrasting with findings by [19]. Conversely, family size negatively influenced diversification from only on-farm to on-farm + non-farm, likely because larger households have sufficient labor for farm production.

Education, credit access, input use, and saving status were strong positive determinants across multiple livelihood strategies. Higher education increased awareness of diversification benefits, consistent with [13], while access to formal credit enabled households to invest in agricultural and non-agricultural activities, aligning with [33]. Similarly, households practicing savings were more likely to engage in multiple livelihood strategies, reflecting understanding of income management and risk mitigation, as noted by [3]. Risk management practices also encouraged diversification, as households employing at least one strategy were more likely to adopt on-farm + non-farm or on-farm + off-farm livelihoods, supporting the link between risk coping and livelihood diversification [1].

Institutional and geographic factors further shaped livelihood choices. Cooperative membership significantly increased participation in on-farm + off-farm activities, likely due to access to training and social networks, consistent with [20]. Unexpectedly, distance from the main road positively influenced engagement in on-farm + off-farm + non-farm strategies, suggesting that households farther from markets diversify to reduce potential losses during product transport, contrasting with [18].

Overall, these findings indicate that both socioeconomic factors (age, family size, education, saving) and institutional factors (credit access, input use, cooperative membership, risk management, road accessibility) jointly determine livelihood diversification among agro-pastoral households in the study area. Moreover, the positive role of remoteness in driving diversification further suggests that households adapt strategically to structural constraints, albeit often through low-return activities. Therefore, diversification observed in the study area may reflect both opportunity-driven and distress-driven responses.

This study contributes to the livelihood diversification literature by providing empirical evidence from a relatively under-researched agro-pastoral context in southwestern Ethiopia. By jointly analyzing demographic, institutional, and in-

frastructural factors using a multinomial framework, it highlights the multidimensional drivers of livelihood choice and the limits of land-based explanations in agro-pastoral economies.

10. Conclusion

This study investigated the determinants of livelihood diversification among agro-pastoral households in Bero and Gorigesha Woredas, West Omo Zone, Ethiopia, using household-level data and a multinomial logistic regression framework. The descriptive analysis indicates that households mainly pursue partial diversification, especially combinations of on-farm and off-farm activities, while full diversification into on-farm, off-farm, and non-farm activities is limited. Household choices are shaped by constraints such as low educational attainment, limited access to credit, weak risk management practices, and inadequate infrastructure, which restrict the adoption of more diversified livelihood strategies.

Econometric results show that livelihood diversification is significantly influenced by both socioeconomic and institutional factors. Age, education level, family size, access to credit, saving behavior, input use, cooperative membership, distance from the main road, and engagement in risk management strategies were all significant determinants of diversification beyond on-farm activities. Except for family size, these factors positively affect the likelihood of adopting diversified livelihood strategies. The positive association between remoteness and diversification suggests that households diversify not only to exploit opportunities but also to cope with structural constraints such as limited market access. Overall, the findings underscore that human capital, financial inclusion, institutional support, and risk-coping capacity are more critical than land endowment or demographic characteristics in determining livelihood diversification among agro-pastoral households in the study area.

11. Recommendations

To enhance livelihood diversification among agro-pastoral households in Bero and Gorigesha Woredas, policies should focus on strengthening access to agricultural and livestock inputs, expanding formal and adult education, and promoting financial inclusion through tailored credit and savings initiatives. In addition, improving cooperative capacity, governance, and market linkages can facilitate access to resources and information, while training in risk management strategies including income diversification planning and climate-adaptive practices can increase households' confidence in pursuing diversified livelihood portfolios. Together, these interventions target the key socioeconomic and institutional factors driving diversification in the study area.

12. Directions for Future Research

Future studies should expand the analysis to additional woredas in West Omo Zone and similar agro-pastoral regions to improve generalizability. Longitudinal or panel data approaches are recommended to capture the dynamic effects of livelihood diversification over time. Further research should assess its welfare impacts, including effects on household income, consumption stability, savings, and resilience to shocks, and explore potential bidirectional relationships between diversification and key outcomes such as income and asset accumulation.

Abbreviations

| | |
|-----|---------------------------------|
| SLA | Sustainable Livelihood Approach |
| MN | Multinomial Logit |
| KM | Kilometer |
| CSA | Central Statistics Agency |

Author Contributions

Mathiwos Kifle: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – original draft

Netsanet Gizaw: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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