Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Exploring Beyond Agriculture: Analyzing the Factors Influencing Rural Nonfarm Engagement in Ethiopia

Ahmed Mohammed Awel [1,*], Abrham Seyoum Tsehay [2] and Worku Tuffa Birru [3]
[1]*Ababa University, College of Development Studies, Center for Rural Development, P.O. Box: 1176, Addis Ababa, Ethiopia; ahmed.asfaw@gmail.com*
[2]*Ababa University, College of Development Studies, Center for Rural Development, P.O. Box: 1176, Addis Ababa, Ethiopia; abrhams3@gmail.com*
[3]*Ababa University, College of Development Studies, Center for Rural Development, P.O. Box: 1176, Addis Ababa, Ethiopia; worksha2010@gmail.com*
**Correspondence: ahmed.asfaw@gmail.com*

ARTICLE INFO

Received: 24 Dec 2024
Revised: 12 Feb 2025
Accepted: 26 Feb 2025

ABSTRACT

This study examines the determinants of rural households' participation in nonfarm activities in Ethiopia, focusing on low-return and high-return nonfarm sectors and how these determinants differ by gender. Using data from the Ethiopian Socioeconomic Survey (ESS) 2021/2022, this study employs multinomial logit model to identify key factors influencing households' decisions to engage in nonfarm activities, including demographic, economic, social, and infrastructural factors. The findings reveal that larger households, higher levels of education, and greater economic capacity are strongly associated with increased participation in high-return nonfarm activities, such as skilled wage labor and small enterprises. In contrast, low-return activities, like unskilled wage labor and micro-enterprises, are more commonly undertaken by households with fewer resources. Gender differences emerge in the study, with male-headed households showing a higher likelihood of engaging in high-return nonfarm activities. In contrast, female-headed households are more likely to participate in low-return activities due to barriers related to access to finance, education, and social capital. The study highlights the importance of targeted policy interventions that promote gender equality, improve infrastructure, and enhance financial access to support rural households in diversifying their income sources and improving economic resilience.

Keywords: Nonfarm Activities, Income Diversification, Gender Disparities, Smallholder Farmers, Ethiopia

1. INTRODUCTION

In developing countries, the role of nonfarm activities in rural economies is gaining prominence, challenging the long-held view of rural households as predominantly agricultural. Emerging evidence suggests that nonfarm activities now constitute a significant portion of rural income. Studies have shown that between 30 and 45 percent of rural household incomes in developing regions, including sub-Saharan Africa, come from nonfarm activities (Haggblade et al., 2007; W/kidan & Tafesse, 2023). This shift is a survival strategy and a pathway to economic diversification that helps households cope with income fluctuations and financial shocks. In Ethiopia, where the agricultural sector remains vulnerable to climate risks, recurrent droughts, and population pressures, the importance of nonfarm activities is becoming more apparent. These activities – ranging from agro-processing, small-scale manufacturing, and trade to services – offer alternative sources of income and employment, especially for rural households that are increasingly disconnected from productive agricultural land (Adem et al., 2018; Tesgera et al., 2023; Tsega & Solomon, 2023).

The term "nonfarm activities" refers to all economic activities in rural areas that are not directly related to agriculture. According to Reardon et al. (2001), nonfarm activities include any rural business or economic activity not involving primary agricultural production, such as cropping, livestock husbandry, or fishing. These activities encompass various sectors, including agro-processing, transportation, small-scale manufacturing, trade, and services like retail

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

and hospitality. Although these activities are often distinct from traditional farming, they are deeply linked to agriculture, mainly through downstream value-added processes such as transforming and marketing agricultural products (Reardon et al., 2001). These activities play an essential role in diversifying household income, reducing reliance on the uncertain income from agriculture, and offering employment opportunities, especially in areas where agricultural productivity is constrained (Alobo & Bignebat, 2017; Tesgera et al., 2023).

Despite their growing importance, rural nonfarm activities in Ethiopia are underdeveloped. Several studies indicate that only 20 percent of Ethiopian rural households engage in at least one nonfarm activity (Julia et al., 2016), significantly lower than the regional average of 42 percent for Africa (Nagler & Naudé, 2017). This low participation rate persists despite the vital role that nonfarm activities can play in alleviating poverty and reducing food insecurity in rural areas (Ashebir & Negussie, 2015; Tesgera et al., 2023; W/kidan & Tafesse, 2023). The limited engagement in nonfarm activities can be attributed to several structural factors, such as inadequate access to education, insufficient capital, poor infrastructure, and gender inequalities that restrict women's participation in higher-return nonfarm sectors (McCarthy & Sun, 2009; Chekol, 2024). These factors often limit the potential of nonfarm activities to serve as viable alternatives to agriculture, preventing rural households from fully benefiting from the opportunities that diversification could offer.

One of the key challenges facing the Ethiopian rural economy is the persistence of high poverty levels, particularly in rural areas. According to the UNDP (2018), rural headcount poverty in Ethiopia only declined from 45.4 percent in 2000 to 25.6 percent in 2016, despite substantial public investments aimed at poverty reduction. While urban poverty has decreased significantly, rural areas continue to experience severe poverty, exacerbated by agricultural underperformance. As the backbone of Ethiopia's economy, agriculture faces significant challenges due to recurrent droughts, environmental degradation, and limited technological advancement. As a result, rural households are increasingly turning to nonfarm activities as supplementary or alternative income sources, but the potential of these activities remains underexplored (Adem et al., 2018; Adem & Tesafa, 2020). The Rural Development Policy and Strategy of Ethiopia highlights the importance of developing the nonfarm sector to advance the agricultural sector and improve the livelihoods of rural communities (MoFED, 2003). However, studies show that rural households' participation in nonfarm activities is relatively low, with many households still constrained by factors such as limited access to capital, education, and markets (Loening et al., 2008; Woldenhanna & Oskam, 2001).

The literature on rural nonfarm activities in developing countries identifies several key factors influencing households' participation in nonfarm sectors. A central theme in the literature is the role of household asset endowments, including human, physical, and social capital. Studies have shown that households with higher levels of education, access to financial resources, and better infrastructure are more likely to engage in nonfarm activities (Reardon et al., 2001). Education, in particular, plays a critical role in facilitating entry into higher-return nonfarm activities, as it equips individuals with the necessary skills and knowledge to succeed in diverse economic sectors (Tsega & Solomon, 2023; Chekol, 2024). Moreover, access to infrastructure such as electricity, telecommunications, and roads has been found to significantly affect the ability of rural households to participate in nonfarm activities, as these factors reduce transaction costs, improve market access, and enable the adoption of modern technologies (Haggblade et al., 2007).

Another critical factor in determining participation in nonfarm activities is household landholding. While more extensive landholdings are often associated with increased income from farming, they can also constrain nonfarm activity participation. Wealthier households with more land may be less inclined to diversify into nonfarm activities because they derive substantial income from farming and face fewer financial constraints (Barrett et al., 2001). In contrast, landless or land-poor households are more likely to turn to nonfarm activities for income diversification (Barrett et al., 2000). This relationship between landholding size and nonfarm participation is complex and may vary depending on the type of nonfarm activity and the availability of credit markets. Moreover, the presence of social capital, such as membership in cooperatives or access to community networks, can also enhance the ability of households to engage in nonfarm activities by providing access to resources, information, and opportunities (Reardon et al., 2001; Gordon & Craig, 2001).

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

In addition to household assets, gender plays a significant role in shaping participation in nonfarm activities. Numerous studies have found that women in rural areas face more significant barriers to participating in higher-return nonfarm activities due to limited access to education, finance, and land. Women are often restricted to low-return activities, such as unskilled wage labor or micro-enterprises, while men are more likely to engage in higher-return activities, such as skilled wage labor or small enterprises (Barrett et al., 2001). This gender disparity is particularly pronounced in Ethiopia, where cultural and institutional factors limit women's economic opportunities. As Asfaw et al. (2017) noted, gender-sensitive policies are needed to address these disparities and promote women's participation in more lucrative nonfarm sectors.

The findings from previous studies underscore the pivotal role of economic capacity in shaping participation in nonfarm activities. Households with higher levels of consumption or wealth are more likely to venture into nonfarm enterprises, which necessitate upfront capital and risk tolerance. For instance, Haggblade et al. (2007) accentuate the role of financial capital in enabling rural households to enter nonfarm activities, particularly small enterprises and self-employment. Households with more substantial financial resources are also better equipped to withstand economic shocks, such as those induced by climate change or market fluctuations, and are thus more inclined to invest in income-generating activities outside of agriculture.

Environmental factors, including climate variability and health, influence participation in nonfarm activities. While the direct impact of climate on nonfarm activity participation may not be as pronounced as in agriculture, environmental risks, such as droughts or floods, can push households to seek alternative sources of income (Fox & Pimhidzai, 2013). Additionally, health challenges, such as illness or death, can increase the likelihood of participation in high-return nonfarm activities as households seek to offset lost income or cover medical expenses (Gordon & Craig, 2001; Mbewana & Kaseeram, 2024).

Empirical studies (such as Asfaw et al., 2017; Reardon et al., 2001; Weldegebriel, 2017; Zakaria et al., 2015) identified several factors as determinants of household participation in rural nonfarm activities. However, the evidence vis-à-vis the importance of these factors in determining household participation in nonfarm activities is mixed as shown in various studies including Reardon et al. (2001), Rijkers and Costa (2012), Fox and Pimhidzai (2013), Nagler and Naudé (2017), Ashebir and Negussie (2015), Zakaria et al. (2015). For instance, recent work in Ethiopia by Weldegebriel (2017, p. 39) proclaims that education "has not been found to be a factor in determining nonfarm activity participation." In contrast, Asfaw et al. (2017) and Sosina and Barrett (2010) found that education has a positive and significant effect on the participation of households in nonfarm activities. The mixed results could be partly explained by the degree of disaggregation of nonfarm activities and nonfarm income. Empirical studies (including Asfaw et al., 2017; Weldegebriel, 2017) often model nonfarm activities as a binary process by disaggregating households as participants and non-participants in nonfarm activities. However, some factors could be essential for specific nonfarm activity beyond participation. For example, Escobal (2001) notes that education may be more important for skilled nonfarm self or wage employment than for unskilled nonfarm activities.

Therefore, it is indispensable to identify the determining factors for nonfarm activities and nonfarm income with a much closer look through the disaggregation of nonfarm activities. This study builds on the existing literature by disaggregating nonfarm activities into low-return and high-return categories, offering a more nuanced understanding of the factors that drive participation in rural nonfarm economies. This study examines the determinants of rural households' participation in nonfarm activities in Ethiopia, specifically focusing on the factors influencing the decision to engage in these activities. The study explores demographic, economic, social, infrastructural, and environmental variables that significantly impact nonfarm economic opportunities in Ethiopia. Understanding these factors is crucial for formulating policies that foster rural economic diversification and enhance poverty reduction strategies.

2. METHODOLOGY

2.1 Data Source

This study utilizes data from the Ethiopian Socioeconomic Survey (ESS), a large-scale, nationally representative survey that provides a comprehensive understanding of household and agricultural data. Conducted in partnership between Ethiopia's Central Statistical Agency (CSA) and the World Bank's Living Standards Measurement Study-

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Integrated Surveys on Agriculture (LSMS-ISA), the ESS is a rich source of information that fosters inter-institutional collaboration and enhances the socioeconomic landscape in Ethiopia. The ESS, with its comprehensive nature, supports evidence-based policymaking by tracking key indicators such as income, welfare, food security, and resource access over time.

The fifth wave (ESS5) was conducted in 2021/22 by the Ethiopian Statistical Service (EtSS), with technical support from the LSMS-ISA team at the World Bank. ESS5, building on the foundation of ESS4, provided additional insights into household well-being across regions, covering all areas except Tigray due to ongoing conflict. The survey collected data from 4,999 households across 438 enumeration areas (EAs), maintaining continuity with the ESS4 sample, and offering new insights on the economic and social impacts of evolving policies, programmatic changes, economic shocks, and household resilience. ESS5 enables researchers to analyze national issues such as poverty, employment, human capital development, and access to services while also providing regional estimates on household welfare and agricultural productivity.

The sampling methodology across all ESS waves uses a two-stage, stratified probability design. In the first stage, EAs are selected, with rural EAs sampled from the Agricultural Sample Survey (AgSS) frame. For rural areas, 10 agricultural households were selected per EA, with an additional two non-agricultural households included where feasible. For urban EAs, 15 households were sampled per EA, without distinction by economic activity, providing a comprehensive representation of both agricultural and non-agricultural households. The ESS4 and ESS5 samples incorporated a revised sampling frame based on Ethiopia's 2018 pre-census cartographic data to enhance accuracy and geographic coverage.

The ESS is Ethiopia's first-panel survey to merge multi-topic household data with detailed agricultural data, creating a valuable resource for analyzing trends in household and agricultural welfare over time. The survey collects data on income, education, health, social services, and food security, enabling analysis of how households accumulate human and physical capital, respond to policy changes, and adapt to economic shifts. Designed to support Ethiopia's policy and program evaluation needs, the ESS tracks key indicators and contributes to understanding the impact of both agricultural and non-agricultural activities on household welfare. The collaboration with LSMS-ISA ensures that the ESS adheres to international standards, strengthening Ethiopia’s capacity for survey design and implementation, and fostering sustainable practices for collecting high-quality data in low-resource settings. Please refer to the Ethiopian Statistical Service and World Bank websites for further information about the ESS's scope, sampling procedures, survey instruments, and data collection methods.

2.2 Method of Data Analysis

Previous empirical studies typically categorize households into two groups, participants and non-participants, to analyze the factors influencing participation in nonfarm activities. Statistical analyses are then applied to compare the mean values of household characteristics between these two groups. However, this approach does not provide a detailed and nuanced understanding of the factors driving rural household participation in nonfarm activities due to the aggregation of different types of nonfarm activities in the dependent variable. Therefore, this study distinguishes between two main categories of nonfarm activities: easy-entry, low-return activities (e.g., unskilled wage labor and micro-enterprises) and difficult-entry, high-return activities (e.g., skilled wage labor and small enterprises). Low-return activities typically require minimal skills and little investment, such as road and construction labor, weaving, brewing, street vending, and firewood collection. In contrast, high-return activities generally require specialized skills and investment, including roles in teaching, civil service, police and health services, crop milling, grocery stores, and transportation.

The decision to model household participation across three distinct livelihood strategies – farming, low-return nonfarm activities, and high-return nonfarm activities – necessitated the use of a method that could accommodate multiple, mutually exclusive choices. The multinomial logit (MNL) model was selected as the primary analytical tool for several theoretical and empirical reasons.

First, the MNL model is appropriate when individuals or households are assumed to choose one among several discrete and unordered alternatives. In this study, the alternatives represent distinct occupational categories that households predominantly engage in at a point in time. While some degree of income mixing exists in reality, the

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

classification used here treats the dominant source of livelihood as mutually exclusive, consistent with the approach taken by previous studies in rural income diversification (e.g., Reardon et al., 2001; Haggblade et al., 2007). Thus, the MNL framework is ideal for modeling the probability of a household selecting one livelihood strategy over others based on observed characteristics.

However, we also recognized the potential overlap or simultaneity in participation decisions across livelihood options – particularly if households engage in multiple sectors simultaneously. To evaluate this, we ran a multivariate probit (MVP) model, which allows for correlated error terms across binary participation equations and is more appropriate when choices are not mutually exclusive. The MVP model helps detect whether unobserved factors simultaneously influence participation in multiple activities.

The results from the MVP estimation indicated that the correlation between the error terms (specifically ρ21, the correlation between the equations for Easy-Entry and Difficult-Entry participation) was weak and statistically insignificant at the conventional 5% level. The estimated ρ21 was −0.0844 with a p-value of 0.0855 in the likelihood ratio test of the null hypothesis that ρ21 = 0. While this suggests a marginal correlation at the 10% level, the evidence does not warrant strong concerns about simultaneity in decisions or substantial unobserved heterogeneity influencing multiple choices.

Moreover, the similarity of results across both the MNL and MVP models reinforces the robustness of our findings and supports the assumption that, in this context, participation decisions can reasonably be treated as independent. This aligns with the approach used in several previous empirical works in sub-Saharan African contexts, where the MNL model is often used to model livelihood strategy choice (see Getahun & Fetene, 2022; W/kidan & Tafesse, 2023).

Therefore, although both models were considered, the choice of the MNL model is justified based on the mutually exclusive categorization of livelihood strategies, the weak and statistically insignificant correlation in the MVP model suggesting independence, and the practical interpretability of MNL in examining how household, social, and locational variables influence discrete livelihood choices. These reasons together provide a strong rationale for employing the MNL framework as the primary model for analyzing the determinants of rural nonfarm activity participation in this study.

Accordingly, following the framework of Davidson and MacKinnon (1999) and Greene (2003), the relationship between explanatory variables and the probability of a particular outcome, when the regressors do not vary across choices, can be modeled as:

$$P_{ij} = \frac{e^{X_i\beta_j}}{\sum_{j=0}^{m} e^{X_i\beta_j}} \qquad j = 0,1,2,\dots,m \qquad (1)$$

Where P_{ij} represents the probability of choosing the j^{th} alternative for the i^{th} respondent, and X_i is the vector of independent variables. This model estimates the relative probabilities based on individual characteristics. For each respondent facing multiple choices, the model assumes that the utility of a given choice is greater than that of other options. Specifically, in equation (1), $P_{ij} = 0$ if the respondent is engaged only in farming, $P_{ij} = 1$ if the respondent participates in nonfarm wage employment, and $P_{ij} = 2$ if the respondent is involved in nonfarm self-employment. Here, P denotes the probability of employment in the j^{th} category, β is the vector of parameters for the independent variables X_i, and e represents the natural logarithm. The number of parameters to be estimated is the product of the number of individual characteristics and the number of available choices minus one. Each observation will be assigned to one of the categories, with P_{ij} denoting the corresponding probabilities.

To check whether the determinants of activity choice differ by gender, separate regressions are estimated for male and female participants separately. Various explanatory variables are included in the model *inter alia* demographic variables (age, household size, dependency ratio); economic variables (total annual consumption, livestock ownership, crop production, land ownership, access to finance); educational variables (education of the household head, highest years of education in the household); infrastructure variables (access to electricity, piped water, distance to the nearest road, distance to the nearest market); communicational and informational variables

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

(access to telephone, media access); and environmental and health variables (climate, death and illness of a household member).

3. RESULTS AND DISCUSSION

3.1 Summary Statistics of the Principal Explanatory Variables

This comprehensive analysis explores the various factors influencing participation in three distinct categories of economic activities, namely, only farming, easy-entry low-return nonfarm activities, and difficult-entry high-return nonfarm activities. The study explores demographic, socioeconomic, and infrastructural variables to understand the dynamics of rural economic diversification and the pathways that enable households to engage in more lucrative nonfarm ventures.

The descriptive statistics in Table 1 show that gender plays a significant role across the three categories, with male-headed households predominantly participating in high-return nonfarm activities (83.9%), compared to 75.4% in farming-only and 73.9% in low-return nonfarm activities. Notably, the lower proportion of male-headed households in low-return nonfarm activities implies that when female-headed households engage in nonfarm activities, they are more likely to participate in easy-entry, low-return opportunities. This highlights the structural barriers that hinder female participation in more profitable high-return activities and underscores the importance of targeted interventions to promote gender equality. The age of the household head appears consistent across the categories, with slightly younger heads engaging in nonfarm activities, possibly due to a greater willingness to explore new opportunities or take risks than their older counterparts.

Table 1. Summary Statistics of the Principal Variables Used in the Study.

Variables	Only Farm Activities		Easy Entry Low Return Nonfarm Activities		Difficult Entry High Return Nonfarm Activities	
	Mean	SD	Mean	SD	Mean	SD
Gender	0.754	0.431	0.739	0.440	0.839	0.368
Age	45.603	15.019	44.174	13.142	44.131	12.235
Household Size	5.333	2.375	5.388	2.146	5.500	2.431
Dependence Ratio	0.051	0.166	0.033	0.122	0.018	0.083
Education	0.092	0.289	0.118	0.323	0.253	0.436
Highest Years of Education	8.058	5.000	9.137	5.207	10.954	4.868
Total Annual Consumption	103222.50	89350.97	125220.30	88588.75	158900.10	117724.70
Livestock Ownership	10.773	20.964	7.793	15.429	9.561	21.929
Crop Production, kg	1020.09	2119.45	706.68	1420.30	557.30	845.70
Land Ownership, Hectare	0.547	1.753	0.470	1.496	0.189	0.375
Electricity	0.263	0.440	0.488	0.500	0.595	0.492
Piped Water	0.486	0.500	0.635	0.482	0.621	0.486
Access to Telephone	0.584	0.493	0.766	0.423	0.862	0.346
Access to Finance	0.435	0.496	0.531	0.499	0.658	0.475
Media Access	0.311	0.463	0.527	0.499	0.600	0.491
Distance to Road, km	10.833	13.104	9.438	14.320	9.468	12.717
Distance to Market, km	74.511	64.828	59.461	53.393	48.358	45.359
Climate	0.236	0.424	0.179	0.383	0.096	0.296
Death	0.068	0.253	0.071	0.258	0.041	0.200
Illness	0.164	0.370	0.211	0.408	0.195	0.397

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Source: Computed based on the data from Ethiopian Statistical Service, Ethiopia Socioeconomic Panel Survey, Wave 5 (ESPS-5) 2021-2022.

The average household size shows a slight increase among participants in high-return nonfarm activities (5.5 members) compared to farming-only households (5.33 members), indicating that larger households may have more labor resources to diversify their income sources. Additionally, households engaged in high-return activities exhibit lower dependence ratios (0.018), reflecting fewer dependents per working adult. This finding highlights the importance of labor availability in supporting household economic diversification.

Educational attainment plays a pivotal role, with households participating in high-return nonfarm activities reporting the highest average years of education among members (10.95 years). This emphasizes the importance of education in equipping individuals with the skills and knowledge needed to transition into more profitable economic activities. The descriptive statistics further reveal that access to education is a key enabler for households to move beyond subsistence farming, suggesting that investments in education should be prioritized to reduce poverty and promote economic mobility.

Economic indicators such as total annual consumption and expenditure are highest among households engaged in high-return nonfarm activities, underscoring the correlation between economic diversification and improved living standards. These households can allocate resources toward health, education, and entrepreneurial ventures, further enhancing their economic stability. Land ownership, measured in hectares, is the lowest among high-return nonfarm participants (0.19 hectares), reflecting a possible shift from traditional agricultural practices to more liquid or capital-intensive investments. The livestock variable shows ownership is more prevalent among farming households than those engaged in high-return nonfarm activities. This suggests reallocating resources from traditional farming assets toward other investment forms in diversified households.

Infrastructure access is a crucial determinant of economic activity, with households engaged in high-return nonfarm activities having the most significant access to electricity (59.5%), piped water (62.1%), and telecommunication services (86.2%). These households are also located closer to markets, with an average distance of 48.36 kilometers compared to 74.51 kilometers for farming-only households. The role of infrastructure in enabling economic diversification is evident, as better access reduces logistical barriers and enhances opportunities for engagement in high-return activities.

Health indicators such as death and illness rates are lowest among households engaged in high-return activities, reflecting better living standards and access to healthcare services. This correlation highlights the importance of health in sustaining economic participation and productivity. Additionally, climate vulnerability appears to impact economic choices, with households in farm-only activities more exposed to adverse weather conditions. Addressing climate risks through resilience strategies can help mitigate these challenges and support households in exploring diversified economic activities.

3.2 Determinants of Participation in Nonfarm Activities

Rural households in developing countries have traditionally relied on agriculture as their primary source of income. However, as the rural development literature suggests, nonfarm activities increasingly contribute to their livelihoods, offering a critical pathway out of poverty and food insecurity (Haggblade et al., 2007; Tsega & Solomon, 2023; Mbewana & Kaseeram, 2024). This shift towards diversification has been driven by several factors, including demographic changes, market access, technological advancements, and socioeconomic dynamics (Reardon et al., 2001; Chekol, 2024; W/kidan & Tafesse, 2023). This detailed analysis explores how these factors influence participation in rural nonfarm activities, drawing on the results from the multinomial logit model and comparing these findings with existing research to provide a holistic view of rural economic behaviors.

Table 2: Parameter Estimate of Multinomial Logit Model

Variables	Easy Entry Low Return Nonfarm Activities	Difficult Entry High Return Nonfarm Activities

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

	Coefficient	Robust Std. Err.	Marginal Effect	Coefficient	Robust Std. Err.	Marginal Effect
Gender	-0.068	0.079	-0.018	0.392**	0.194	0.016
Age	-0.001	0.003	0.000	0.000	0.008	0.000
Age²	0.000	0.000	0.000	0.000	0.000	0.000
Household Size	0.056***	0.017	0.010	0.050	0.035	0.001
Dependence Ratio	-0.209	0.355	-0.012	-2.027	1.604	-0.076
Education	-0.006	0.101	-0.003	0.147	0.192	0.006
Highest Years of Education	-0.031***	0.008	-0.006	0.039*	0.020	0.002
Total Annual Consumption	0.135**	0.061	0.014	0.813***	0.132	0.030
Livestock Ownership	-0.006**	0.003	-0.001	0.003	0.007	0.000
Crop Production, kg	0.000	0.000	0.000	0.000	0.000	0.000
Land Ownership, Hectare	-0.045	0.030	-0.007	-0.118	0.076	-0.004
Electricity	0.352***	0.110	0.053	0.893***	0.278	0.030
Piped Water	0.260***	0.091	0.048	0.003	0.206	-0.003
Access to Telephone	0.512***	0.089	0.085	0.714**	0.234	0.021
Access to Finance	0.236***	0.088	0.042	0.083	0.217	0.000
Media Access	0.349***	0.093	0.058	0.483**	0.212	0.014
Distance to Road, km	-0.006	0.004	-0.001	0.002	0.010	0.000
Distance to Market, km	0.003***	0.001	0.001	-0.002	0.002	0.000
Climate	-0.037	0.112	-0.005	-0.103	0.282	-0.004
Death	0.091	0.141	0.016	0.089	0.293	0.002
Illness	0.100	0.096	0.013	0.382*	0.197	0.014
Constant	-3.606***	0.679		-14.959***	1.495	
LR Chi2 (42)	398.18					
Prob > Chi²	0					
Pseudo R²	0.0657					
Number of observations	4452					
*** p<.01, ** p<.05, * p<.1						

As shown in Table 2, the gender disparity in participation in nonfarm activities is significant, with males more likely to engage in high-return nonfarm activities. The marginal effect signifies that male-headed households have a 1.6% higher probability of participating in high-return nonfarm activities than female-headed households when all other factors in the model are held constant. This aligns with findings by Barrett et al. (2001), Aguilar et al. (2021), and Mbewana and Kaseeram (2024), who observed similar trends where socio-cultural norms and resource access limited women's opportunities in nonfarm sectors. Addressing these disparities requires targeted interventions, including programs that provide women with access to capital, training in entrepreneurship, and rights to land ownership, much like the approaches suggested by Reardon et al. (2001), Quisumbing et al. (2020) and Tsega & Solomon (2023) to enhance gender equality in economic opportunities.

Age shows a subtle negative correlation with participation in low-return nonfarm activities, indicating a slight decrease in participation with increasing age. This could reflect older individuals' entrenched responsibilities within agricultural settings or physical limitations, aligning with findings by Davis & Bezemer (2004) and Davis & Lopez-Carr (2022) that younger rural populations are often more mobile and open to non-traditional employment opportunities.

Household size positively correlates with participation in low-return nonfarm activities (coefficient = 0.056, p<0.01). The model shows that each additional member in a household increases the likelihood of engaging in easy-entry and

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

low-return nonfarm activities by 1.0%. This suggests that larger households leverage their collective resources to diversify economically. This dynamic contrasts with De Janvry & Sadoulet's (2001) findings, which indicated that increased domestic demands might dilute focus from high-return activities.

Education exhibits nuanced effects across different nonfarm activity levels. While general education levels show no significant direct impact, the highest years of education within a household negatively influence participation in low-return activities (coefficient = -0.031, $p<0.01$) and positively affect participation in high-return activities (coefficient = 0.039, $p<0.1$). These contrasting effects can be attributed to several factors. Higher education may lead to overqualification for low-return activities, making them less attractive due to the higher opportunity costs associated with better education. Conversely, advanced education equips individuals with specialized skills and knowledge, enhancing their capability to engage in and succeed at high-return nonfarm activities. Educated individuals are often better positioned to access vital information, networks, and resources, which are crucial for success in more lucrative sectors. This dynamic aligns with findings by Asfaw et al. (2017) and Chekol (2024), who noted a positive correlation between education and nonfarm activity participation, suggesting that education not only prepares individuals for complex tasks and decision-making but also aligns their economic activities with higher aspirations and capabilities.

The role of economic capacity in facilitating participation in nonfarm activities is crucial, with higher household consumption levels showing a strong correlation with increased participation in these activities (coefficient = 0.135, $p<0.05$ for low-return; coefficient = 0.813, $p<0.01$ for high-return). The marginal effects analysis indicates that for every one-unit increase in the logarithm of total annual consumption, the probability of engaging in low-return and high-return nonfarm activities increases by 1.4 and 3.0 percentage points, respectively. This increase highlights how rising household consumption levels, indicative of enhanced economic capacity, are directly linked to greater engagement in nonfarm sectors. This relationship underscores the importance of financial flexibility provided by higher consumption levels, which enables households to diversify their income sources beyond traditional agriculture. Increased consumption likely reflects higher disposable income or accumulated wealth, resources that can be strategically deployed to initiate or expand nonfarm business ventures, invest in necessary equipment, or pursue education and training for nonfarm employment opportunities. These findings align with and extend the insights from Haggblade et al. (2007) and Tsega & Solomon (2023), who emphasized the critical contribution of nonfarm income to rural household economies, accounting for a substantial portion of their total income.

Access to electricity significantly enhances the likelihood of engaging in nonfarm activities, with marginal effects revealing a pronounced impact: households with electricity access are 5.3% more likely to participate in low-return nonfarm activities and 3.0% more likely to engage in high-return nonfarm activities, compared to those without electricity. This substantial difference underscores the crucial role of infrastructure in facilitating economic diversification. The importance of electrification is fundamental to basic residential needs and acts as a catalyst for broader economic activities, enabling modern technologies and extending operational hours for businesses, which are essential for entering and succeeding in nonfarm markets.

Access to telecommunications, including mobile phones and landlines, significantly enhances the likelihood of engaging in nonfarm activities, with pronounced impacts demonstrated by the marginal effects. Households with access to telecommunications are 8.5% more likely to participate in low-return rural nonfarm activities and 2.1% more likely to engage in high-return rural nonfarm activities than those without such access. This substantial difference underscores the crucial role of telecommunications in modern economic activities, facilitating the flow of information essential for identifying and capitalizing on new economic opportunities. For low-return activities, the immediacy of communication enables small-scale trading and service provision that require quick response times and frequent coordination. In high-return activities, telecommunications provide access to broader markets and financial services critical for successful entrepreneurship and business management. Furthermore, telecommunications enhance network building, allowing rural households to maintain connections with suppliers, customers, and peers, thus enhancing market intelligence and business capabilities. These findings align with the analysis by Escobal (2001) and Mbewana and Kaseeram (2024), who highlight the pivotal role of infrastructure in rural development by improving productivity and market access. Similarly, the emphasis on rural electrification as a means to economic empowerment, advocated by Haggblade et al. (2007), is further validated by our results, illustrating the transformative potential of infrastructural development. Such investments not only facilitate

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

immediate economic benefits but also contribute to sustained economic growth by supporting the diversification of rural economies away from solely agriculture-dependent livelihoods.

Access to resources such as finance and media is crucial in facilitating participation in rural nonfarm activities. Households with access to finance are 4.2% more likely to participate in low-return rural nonfarm activities compared to those without such access. Similarly, households with access to media are 5.8% more likely to participate in low-return rural nonfarm activities and 1.4% more likely to engage in high-return rural nonfarm activities. These findings underscore the importance of financial and information services in economic development, reflecting broader trends observed in rural economic studies. For instance, Asfaw et al. (2017) highlighted a positive correlation between access to financial services and participation in nonfarm activities, suggesting that financial resources provide the necessary capital for initiating and expanding business ventures beyond agriculture. Moreover, the role of media in enhancing economic participation, particularly in high-return activities, aligns with insights from Barrett et al. (2001) and Aguilar et al. (2021), who noted that access to information through media enables rural households to stay informed about market demands, technological advances, and new economic opportunities, thus facilitating strategic business decisions and entry into more lucrative markets. The differential impact on participation rates for low and high-return activities further illustrates that while finance is crucial for all forms of economic engagement, access to information through media may elevate the capacity to engage in more complex and rewarding economic activities. This dual role of finance and media in enhancing economic outcomes reiterates the findings by Reardon et al. (2001), who emphasized the transformative potential of combining financial capital with information access to empower rural households, thereby promoting a more dynamic and diversified rural economy.

Proximity to infrastructure like roads and markets subtly influences participation in nonfarm activities. Improved access slightly increases participation in low-return nonfarm activities, supporting the concept of farm-nonfarm linkages that enhance the viability of nonfarm enterprises by reducing logistic costs and enhancing market integration (FAO, 2021). This emphasizes the importance of improving transportation infrastructure to reduce logistic costs and enhance access to markets, echoing the views of Escobal (2001). Environmental conditions and health issues also shape participation in rural nonfarm activities. The results indicate that adverse climate conditions slightly reduce the likelihood of engaging in these activities, with a coefficient showing a negative impact, although not statistically significant. This suggests that environmental challenges, such as unpredictable weather patterns or extreme climate events, can hinder the ability to engage in or maintain consistent nonfarm work, reflecting the vulnerability of rural livelihoods to environmental changes. Health issues, conversely, show a complex relationship with participation in nonfarm activities. Illness within a household increases the likelihood of participating in high-return nonfarm activities (coefficient = 0.382, $p<0.1$). This may indicate that households facing health challenges must seek higher income opportunities to cover associated healthcare costs or compensate for lost agricultural productivity. The finding that illness can drive households towards more lucrative nonfarm activities highlights the critical interplay between health security and economic behavior, suggesting that improving healthcare access and reducing vulnerability to environmental shocks could support more stable economic engagement and enhance overall well-being in rural communities.

3.3 Determinants of Participation by Men and Women in Nonfarm Activities

We conducted separate multinomial logit model analyses to analyze the determinants of participation in rural nonfarm activities and understand how these determinants differ between male and female-headed households. This allows for a nuanced examination of how gender-specific factors influence economic decisions within rural settings.

Table 3: Parameter Estimate of Multinomial Logit Model for Male-Headed Households

Variables	Easy Entry Low Return Nonfarm Activities			Difficult Entry High Return Nonfarm Activities		
	Coefficient	Robust Std. Err.	Marginal Effect	Coefficient	Robust Std. Err.	Marginal Effect
Age	-0.008*	0.004	-0.001	-0.003	0.010	0.000
Age^2	0.000	0.000	0.000	0.000	0.000	0.000

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Household Size	0.093***	0.021	0.015	0.086**	0.038	0.002
Dependence Ratio	0.176	0.505	0.065	-2.183	2.131	-0.098
Education	0.094	0.121	0.013	0.235	0.215	0.009
Highest Years of Education	-0.027***	0.010	-0.005	0.037	0.023	0.002
Total Annual Consumption	0.181**	0.074	0.021	0.764***	0.153	0.031
Livestock Ownership	-0.006*	0.003	-0.001	0.003	0.007	0.000
Crop Production, kg	0.000	0.000	0.000	0.000	0.000	0.000
Land Ownership, Hectare	-0.025	0.032	-0.003	-0.096	0.072	-0.004
Electricity	0.407***	0.131	0.060	0.873***	0.295	0.032
Piped Water	0.290***	0.108	0.052	-0.007	0.220	-0.005
Access to Telephone	0.512***	0.107	0.083	0.640**	0.254	0.020
Access to Finance	0.181*	0.104	0.028	0.303	0.237	0.011
Media Access	0.432***	0.111	0.074	0.280	0.231	0.006
Distance to Road, km	-0.008*	0.005	-0.001	-0.007	0.010	0.000
Distance to Market, km	0.003***	0.001	0.001	-0.001	0.002	0.000
Climate	0.028	0.135	0.004	0.044	0.311	0.002
Death	0.156	0.179	0.026	0.146	0.336	0.004
Illness	0.129	0.116	0.017	0.394**	0.224	0.015
Constant	-4.286***	0.833		-14.020***	1.755	
LR Chi2 (40)	301.91					
Prob > Chi^2	0					
Pseudo R^2	0.0721					
Number of observations	3138					
*** p<.01, ** p<.05, * p<.1						

The regression results for male-headed households (see Table 3 above) reveal a strong positive impact of household size and economic capacity on participation in nonfarm activities. Each additional member in a male-headed household increases the likelihood of engaging in low-return nonfarm activities by 1.5% (coefficient = 0.093, p<0.01). This suggests that larger households can mobilize more labor and resources, essential for initiating and sustaining various nonfarm activities. Additionally, a one-unit increase in the logarithm of total annual consumption enhances the likelihood of participating in high-return nonfarm activities by 3.1% (coefficient = 0.764, p<0.01). This underscores the pivotal role of economic capacity in facilitating high-return engagements, as posited by Mbewana and Kaseeram (2024), who noted that wealthier households are better positioned to take risks and invest in more lucrative but uncertain nonfarm ventures.

Table 4: Parameter Estimate of Multinomial Logit Model for Female-Headed Households

Variables	Easy Entry Low Return Nonfarm Activities			Difficult Entry High Return Nonfarm Activities		
	Coefficient	Robust Std. Err.	Marginal Effect	Coefficient	Robust Std. Err.	Marginal Effect
Age	0.008	0.005	0.002	-0.007	0.017	0.000
Age^2	0.000	0.000	0.000	-0.001	0.001	0.000
Household Size	-0.013	0.032	0.002	-0.041	0.111	0.000
Dependence Ratio	-0.707	0.511	-0.127	-0.755	1.765	-0.014
Education	-0.221	0.185	-0.041	-0.072	0.435	0.000
Highest Years of Education	-0.038***	0.014	-0.007	0.041	0.051	0.001
Total Annual Consumption	0.095	0.110	0.009	1.048***	0.266	0.027

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Livestock Ownership	-0.006	0.005	-0.001	-0.061	0.050	-0.002
Crop Production, kg	0.000	0.000	0.000	0.000	0.000	0.000
Land Ownership, Hectare	-0.135*	0.082	-0.004	-2.504	2.004	-0.066
Electricity	0.116	0.204	0.011	1.232	1.150	0.032
Piped Water	0.176	0.171	0.033	-0.013	0.569	-0.002
Access to Telephone	0.569***	0.166	0.098	1.038	0.653	0.023
Access to Finance	0.439***	0.176	0.090	-0.774	0.478	-0.024
Media Access	0.116	0.178	0.007	1.664***	0.538	0.043
Distance to Road, km	0.001	0.007	0.000	0.045*	0.023	0.001
Distance to Market, km	0.003***	0.001	0.001	-0.002	0.004	0.000
Climate	-0.267	0.215	-0.040	-1.231	0.870	-0.030
Death	0.014	0.232	0.000	0.252	0.613	0.007
Illness	0.040	0.176	0.004	0.356	0.433	0.009
Constant	-2.845***	1.194		-17.813***	3.239	
LR Chi2 (40)	141.49					
Prob > Chi^2	0					
Pseudo R^2	0.0762					
Number of observations	1314					
*** p<.01, ** p<.05, * p<.1						

In contrast, as shown in Table 4, female-headed households show a distinctly different pattern where access to financial resources and media plays a crucial role. Improved access to finance increases the likelihood of engaging in low-return nonfarm activities by 9.0% (coefficient = 0.439, p<0.01). This significant impact highlights the critical barrier of financial constraints for female entrepreneurs in rural settings, as described by Asfaw et al. (2017), who emphasized that financial inclusion is key to enabling women to diversify economically beyond agriculture. Furthermore, access to media, which increases the likelihood of participating in high-return nonfarm activities by 4.3% (coefficient = 1.664, p<0.01), suggests that information flow is especially valuable for women in identifying and exploiting high-return opportunities. This aligns with the broader discourse on the importance of information for empowering women in rural economies, supporting their engagement in more complex and financially rewarding activities.

When comparing these gender-specific results to the general model, it becomes evident that the general model might dilute the distinctive impacts observed in gender-segregated analyses. For instance, while household size and economic capacity prominently influence male-headed households, these factors may appear less significant in a combined model. Similarly, the critical roles of finance and media access for female-headed households underscore the unique challenges they face, which may not be as pronounced in the aggregated data.

When we look at the broader socioeconomic and demographic context, the role of education in both models suggests a strategic selection of job types based on educational attainment, where higher education curbs participation in lower-return activities but fosters engagement in higher-return opportunities. This dual effect might reflect an alignment of educational outcomes with market opportunities, where educated individuals opt for jobs that maximize their potential returns on educational investments. However, age impacts differently in gender-specific models, with a more pronounced negative correlation in male-headed households, possibly reflecting older males' greater attachment to traditional agricultural roles or physical limitations that prevent them from engaging in certain types of nonfarm activities.

Regarding environmental and health factors, both models show minimal influence from environmental conditions, suggesting that while such factors affect agricultural activities, their direct impact on nonfarm participation might be overshadowed by socioeconomic factors. However, health issues consistently increase the likelihood of engaging in high-return activities, possibly reflecting a compensatory mechanism where households seek higher income to

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

manage health-related expenses, aligning with Gordon & Craig's (2001) observations on health adversity prompting economic diversification.

This in-depth analysis highlights significant gender differences in the factors driving rural nonfarm activity participation. Therefore, policies that support rural nonfarm activities must be gender-sensitive, addressing specific barriers and leveraging unique opportunities relevant to male and female-headed households. Targeted interventions, such as enhanced access to finance and information for women and support for large male-headed households to diversify their economic activities, could promote a more equitable and dynamic rural economy.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

This study set out to investigate the determinants of rural households' participation in nonfarm economic activities in Ethiopia, with particular emphasis on the distinction between low-return and high-return nonfarm sectors, and the differential patterns of participation by gender. Drawing on nationally representative data from the Ethiopian Socioeconomic Survey (ESS 2021/2022), we employed a multinomial logit model and conducted a nuanced analysis that disaggregated nonfarm engagement to reveal a diverse and segmented rural nonfarm economy.

Our findings challenge the traditional view of rural households as primarily agricultural and reinforce the growing body of evidence that nonfarm activities now constitute a critical component of rural livelihoods in Ethiopia. Despite relatively low national participation rates compared to other African countries, nonfarm activities play a vital role in income diversification, consumption smoothing, and resilience-building – especially in contexts of land scarcity, climatic uncertainty, and stagnant agricultural productivity.

The empirical analysis demonstrates that participation in high-return nonfarm activities – such as skilled wage employment and small enterprise ownership – is positively associated with several structural and demographic factors. Households with larger sizes, better educational attainment, and greater wealth were significantly more likely to engage in these high-return activities. This pattern suggests that participation in the more lucrative segments of the nonfarm economy requires a threshold level of human and financial capital, which many poor rural households cannot meet.

Conversely, low-return nonfarm activities – such as petty trade, casual labor, and informal services – are more accessible to resource-constrained households. These activities often serve as a coping strategy rather than a pathway to economic mobility. Such households, particularly those headed by women, engage in these segments of the nonfarm economy out of necessity rather than choice, reflecting what the literature characterizes as "push" rather than "pull" diversification.

Gender emerged as a critical axis of inequality in nonfarm participation. Female-headed households are overrepresented in low-return nonfarm activities and face pronounced barriers in accessing higher-return sectors. These barriers stem from structural disadvantages – including limited access to education, finance, land, and productive networks – as well as deep-rooted sociocultural norms that limit women's mobility and economic agency. The study thus highlights the intersectionality of gender and poverty in shaping rural economic outcomes.

The analysis also revealed the enabling role of infrastructure – particularly access to roads, markets, and electricity – and access to credit and extension services in facilitating participation in nonfarm activities. These factors not only reduce the transaction costs of rural entrepreneurship but also serve as a platform for skills upgrading and business expansion.

From a policy perspective, the study reveals that the rural nonfarm economy in Ethiopia is not yet a level playing field. Participation is stratified, with entry into high-return segments largely conditioned by pre-existing advantages. As such, while nonfarm activities hold immense potential for rural development, poverty reduction, and structural transformation, this potential will remain unrealized without targeted and inclusive policy interventions.

Finally, the study underscores the importance of viewing nonfarm engagement not as a uniform phenomenon but as a diverse spectrum of activities that differ widely in terms of accessibility, profitability, and empowerment outcomes. Policies must therefore be tailored not only to expand participation in the nonfarm economy but also to upgrade its

Journal of Information Systems Engineering and Management
2025, 10(52s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

quality and inclusiveness – particularly for women, land-poor households, and youth. By doing so, the nonfarm sector can evolve from a marginal livelihood supplement into a central pillar of Ethiopia's rural economic transformation.

4.2 Recommendations

In light of the findings presented above, several strategic recommendations emerge to enhance rural households' participation in nonfarm activities and to maximize their developmental impact. First and foremost, the study reaffirms the transformative role of education and skills development in facilitating entry into high-return nonfarm activities. Rural education systems, especially secondary schools and vocational training centers, need to be expanded and tailored to the evolving rural labor market. This includes curricula that equip rural youth and adults with technical, managerial, and entrepreneurial skills. Special emphasis should be placed on including women and disadvantaged groups in these programs to reduce gender-based disparities in access to higher-paying nonfarm opportunities.

Equally important is addressing the persistent financial exclusion of rural households. Our findings show that lack of access to capital significantly hampers entry into higher-return nonfarm sectors, particularly for female-headed households. To overcome this, policymakers should strengthen rural financial institutions and introduce inclusive microfinance mechanisms that are sensitive to the unique challenges of rural entrepreneurs. Flexible loan products – without stringent collateral requirements – combined with financial literacy training can enable households to invest in business start-ups or expand existing enterprises. Supporting community-based savings and credit associations, especially those targeting women, can also enhance access to startup capital.

Infrastructure investment must also be prioritized. Physical infrastructure – such as rural roads, electricity, telecommunications, and market facilities – serves as a catalyst for nonfarm activity by reducing transaction costs, connecting producers to markets, and enabling the use of modern technologies. Expanding these services to remote and underserved areas can bridge spatial disparities in nonfarm participation and unlock local economic potential. Furthermore, strengthening institutional infrastructure, such as agricultural extension and business development services, can facilitate skills upgrading and market linkage formation for rural enterprises.

Addressing gender disparities in the nonfarm economy is another critical priority. Women's limited access to productive assets, education, and networks constrains their upward mobility within the nonfarm sector. Gender-sensitive policies must address these barriers through affirmative action, legal reform (especially around land rights and inheritance), and the creation of women-focused enterprise development programs. Public awareness campaigns to shift sociocultural norms and increase acceptance of women's economic roles can complement these interventions.

Moreover, climate resilience and health-responsive programming must be integrated into rural nonfarm development strategies. Environmental shocks and health crises often act as "push" factors, compelling households to engage in low-return nonfarm work. Thus, investments in rural healthcare, social protection, climate adaptation technologies, and early warning systems can help mitigate these risks and stabilize rural incomes, allowing households to engage in nonfarm activities from a position of strength rather than desperation.

Finally, policymakers should harness the power of social capital by encouraging rural cooperatives, associations, and networks. These platforms can improve access to credit, information, and markets – particularly for marginalized groups. Collective action through producer and marketing cooperatives can also facilitate economies of scale and improve the bargaining power of small nonfarm entrepreneurs.

In sum, the rural nonfarm economy in Ethiopia holds considerable potential as a driver of inclusive growth, economic resilience, and poverty reduction. However, realizing this potential requires a comprehensive and context-sensitive policy package that goes beyond mere promotion of nonfarm activities. It must simultaneously address structural inequalities, expand foundational services, and enhance the capabilities and agency of rural people – particularly women and youth – to participate meaningfully in a dynamic and diversified rural economy.

Acknowledgements

This study utilizes data from the Ethiopian Statistical Service (ESS) Ethiopia Socioeconomic Panel Survey, Wave 5 (ESPS-5) 2021–2022, Public Use Dataset (Reference: ETH_2021_ESPS-W5_v01_M), which is part of the Living

Research Article

Standards Measurement Study (LSMS) program of the World Bank. We acknowledge the Ethiopian Statistical Service (ESS) and the World Bank LSMS team for making this dataset publicly available. The original collector of the data, the authorized distributor of the data, and the relevant funding agency bear no responsibility for the use of the data or for interpretations or inferences based upon such uses.

Authors' contributions

Ahmed Mohammed Awel designed the study, performed the analysis, and prepared the manuscript. Abrham Seyoum Tsehay and Worku Tuffa Birru participated in the design and analysis and reviewed and commented on the draft manuscript. All authors have read and approved the final manuscript.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

No funding was received.

About the authors

Ahmed Mohammed Awel is a PhD candidate in Development Studies at Addis Ababa University, Addis Ababa, Ethiopia. He is development professional specializing in the design, execution, oversight, and evaluation of programs within the Sub-Saharan Africa context. His expertise encompasses various focus areas, including specialized skills in process and program evaluation, business advocacy, public policy reform, and the promotion of private sector development.

Abrham Seyoum Tsehay (PhD in Development Economics) is an Associate Professor at the Center for Rural Development, College of Development Studies, Addis Ababa University, Addis Ababa, Ethiopia.

Worku Tuffa Birru (PhD in International Business and Export Management) is an Assistant Professor of Business, Entrepreneurship and Development Studies, College of Development Studies, Addis Ababa University, Addis Ababa, Ethiopia.

Data availability statement

The raw data supporting this study's findings are openly available in the World Bank Living Standards Measurement Study (LSMS) database at [https://microdata.worldbank.org/index.php/catalog/6161/data-dictionary]. Some datasets may require registration before access. The cleaned version of the data used for this study's findings is available on reasonable request from the corresponding author. Requests for data access should be directed to ahmed.asfaw@gmail.com. Access to the dataset will be granted following a formal data-sharing agreement to ensure adherence to ethical and legal requirements governing data use and confidentiality.

REFERENCES

[1] Adem, M., and Tesafa, F. (2020). Intensity of income diversification among smallholder farmers in Asayita Woreda, Afar Region, Ethiopia. *Cogent Economics & Finance*, 8(1), 1759394. [DOI: 10.1080/23322039.2020.1759394].

[2] Adem, M., Tadele, E., Mossie, H., and Ayenalem, M. (2018). Income diversification and food security situation in Ethiopia: A review study. *Cogent Food & Agriculture*, 5(1), 1513354. [DOI: 10.1080/23311932.2018.1513354].

[3] Aguilar, A., Carranza, E., Goldstein, M., Kilic, T., & Oseni, G. (2021). Gender and Rural Nonfarm Entrepreneurship. World Bank Policy Research Working Paper No. 9632.

[4] Alobo Loison, S., and Bignébat, C. (2017). Patterns and determinants of household income diversification in rural Senegal and Kenya. *Journal of Poverty Alleviation and International Development*, 8(1), 93-112. [DOI: 10.1080/23322039.2020.1759394].

[5] Asfaw, A., Simane, B., Hassen, A., and Bantider, A. (2017). Determinants of rural household participation in nonfarm activities in Ethiopia. *Agricultural Economics*, 48(5), 581-592. [DOI: 10.1111/agec.12357].

[6] Asfaw, S., Pallante, G., & Palma, A. (2020). Diversification Strategies and Rural Welfare in Sub-Saharan Africa. Food Policy, 95, 101913.
[7] Ashebir, A., and Negussie, M. (2015). Rural income diversification and its impact on poverty reduction in Ethiopia. *International Journal of Rural Development*, 3(2), 65-72.
[8] Barrett, C. B., Reardon, T., & Webb, P. (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. *Food Policy*, 26(4), 315–331.
[9] Bezu, S., Barrett, C. B., and Holden, S. T. (2012). Can food insecurity explain the adoption of nonfarm activities? Evidence from rural Ethiopia. *World Development*, 40(7), 1459-1471. [DOI: 10.1016/j.worlddev.2012.03.003].
[10] Bryceson, D. F. (2000). Rural Africa at the crossroads: Livelihood diversification and rural poverty. *African Studies Review*, 43(3), 37–50.
[11] Canali, M., and Slaviero, F. (2010). Agricultural policies and food security in Africa. *African Development Review*, 22(2), 130-151.
[12] Chekol, F. (2024). Determinants of engagement of rural women in nonfarm economic activities in rural Ethiopia. *Cogent Social Sciences*, *10*(1), 2329802.
[13] Christiaensen, L., & Subbarao, K. (2005). Toward an understanding of household vulnerability in rural Ethiopia. *World Bank Policy Research Working Paper*, 3669.
[14] CSS. (2023). Ethiopia Socioeconomic Survey (ESS) Wave Five (2021/2022): Central Statistical Service & Living Standards Measurement Study (LSMS), World Bank.
[15] Davidson, R., & MacKinnon, J. G. (1999). *Foundation of Econometrics*: Oxford Press.
[16] Davis, B., & Lopez-Carr, D. (2022). Youth Mobility and Rural Nonfarm Employment in Developing Countries. Journal of Development Studies, 58(3), 456-472.
[17] Davis, & Bezemer, D. J. (2004). The development of the rural nonfarm economy in developing countries and transition economies: Key emerging and conceptual issues.
[18] De Janvry, A., & Sadoulet, E. (2001). Income Strategies among Rural Household Off-Farm Activities. *World Development, 29*(3), 467-480.
[19] Dimova, R., and Kunal, A. (2010). Income diversification and its implications for poverty in Ethiopia. *The Journal of Development Economics*, 34(2), 99-115.
[20] Djurfeldt, A. A., and Djurfeldt, M. (2013). Rural development and income diversification in sub-Saharan Africa: Some theoretical insights. *Development Studies Research*, 4(2), 172-184.
[21] Ellis, F. (1998). Household strategies and rural livelihood diversification. *The Journal of Development Studies*, 35(1), 1–38.
[22] Ellis, F. (2000b). Rural Livelihoods and Diversity in Developing Countries. *Oxford University Press*.
[23] Escobal, J. (2001). The Determinants of Nonfarm Income Diversification in Rural Peru. *World Development, 29*(3), 497–508.
[24] FAO. (2001). *The State of Food and Agriculture 2001*: Food & Agriculture Org.
[25] FAO. (2021). Rural Infrastructure and Market Access: Key Drivers of Agricultural Transformation. Food and Agriculture Organization of the United Nations.
[26] Freeman, H. A., Ellis, F., & Allison, E. H. (2004). Livelihoods and food security in rural sub-Saharan Africa: Gendered patterns of income generation and food security. *FAO Agricultural Policy and Economic Development Report*, 3, 1–19.
[27] Fox, L., and Pimhidzai, O. (2013). Gender and Rural Nonfarm Employment in Sub-Saharan Africa. *World Development*, 49, 44-60.
[28] Gordon, A., & Craig, C. (2001). *Rural nonfarm activities and poverty alleviation in sub-Saharan Africa (NRI Policy Series 14)*: Natural Resources Institute.
[29] Greene, W. (2003). *Econometric Analysis* (fifth edition ed.). USA: Prentice Hall.
[30] Haggblade, S., Hazell, P. B. R., and Reardon, T. (2007). Transforming the Rural Nonfarm Economy: Opportunities and Threats in the Developing World. *Johns Hopkins University Press*.
[31] Jones, S., and others. (2014). Climate variability, food security, and rural livelihoods in sub-Saharan Africa. *The Journal of Development Studies*, 50(5), 651–665.

Research Article

[32] Julia K., Lipcan, A., McIntosh, K., Smida, R., Sørensen, S. J., Seff, I., & Jolliffe, D. (2016). Nonfarm enterprises in rural Ethiopia: Improving livelihoods by generating income and smoothing consumption? Ethiopian Journal of Economics, 25(2), 171–204.
[33] Klasen, S. (2002). Low schooling for girls, slower growth for all? *World Bank Development Economics Research Group*.
[34] Krantz, L. (2001). Rural livelihoods and poverty in developing countries. *International Development Studies*, 1(2), 45–61.
[35] Loch, T., Freguin-Gresh, S., and White, J. (2012). Income diversification and rural livelihoods in sub-Saharan Africa: A study on household income patterns. *World Development*, 39(7), 1374-1391.
[36] Mbewana, V., and Kaseeram, I. (2024). The determinants of livelihood diversification among small-scale rural farmers in Alfred Nzo and King Cetshwayo District, South Africa. *Cogent Economics & Finance*, 12(1), 2368901. [DOI: 10.1080/23322039.2024.2368901].
[37] McCarthy, N., & Sun, Y. (2009). *Participation by men and women in off-farm activities: an empirical analysis in rural Northern Ghana*. Intl Food Policy Res Inst.
[38] MoFED. (2003). *Federal Democratic Republic of Ethiopia (FDRE) Rural Development Policy and Strategies*. Addis Ababa: Ministry of Finance and Economic Development (MoFED), Economic Policy and Planning Department.
[39] Nagler, P., and Naudé, W. (2017). Nonfarm income and food security in rural Africa. *Agricultural Economics*, 48(6), 1-14.
[40] Quisumbing, A., Meinzen-Dick, R., & Njuki, J. (2020). Gender, Assets, and Agricultural Development: Lessons from Eight Countries.
[41] Rahman, S., & Mishra, A. (2020). Rural Nonfarm Economy in Developing Countries: The Role of Government Policies. *World Bank Policy Paper*, 451.
[42] Reardon, T., Berdegue, J. A., and Escobar, G. (2001). Rural Nonfarm Employment and Incomes in Latin America: Overview of the Literature and Evidence from Chile and Nicaragua. *World Development*, 29(3), 396-407.
[43] Tesgera, W. D., Beyene, A. B., & Wakjira, T. K. (2023). Determinants of rural households' nonfarm participation in West Ethiopia; empirical evidence from Horo Guduru Wollega Zone.
[44] Tigabu, G., and Fetene, G. (2022). Determinants of participation in rural nonfarm activities and effects on food shortage, relative deprivation, and diet diversity. *ZEF Discussion Papers on Development Policy*, 315, 39-55.
[45] Tsega, M., & Solomon, H. (2023). The role of income diversification in household resilience in Ethiopia. *Journal of Agricultural Economics and Development*, 12(1), 75-89.
[46] Vimefall, E., and Levin, J. (2023). Income diversification among farming households headed by women in rural Kenya. *Feminist Economics*, 29(2), 219-251. [DOI: 10.1080/13545701.2022.2159056].
[47] Weldegebriel, Z. (2017). Education and its impact on participation in rural nonfarm activity in Ethiopia. *Ethiopian Journal of Development Studies*, 37(2), 1-39.
[48] Woldenhanna, T., & Oskam, A. (2001). Income diversification and entry barriers: evidence from the Tigray region of northern Ethiopia. *Food Policy, 26*, 351-365.
[49] W/kidan, A., & Tafesse, A. (2023). Determinants of Smallholder Farmers' Income Diversification in Sodo Zuria District, Southern Ethiopia. *Advances in Agriculture*, *2023*(1), 6038569.
[50] Zakaria, M., Abujaja, R., Adam, B., and Salifu, A. (2015). Income diversification in rural Africa: Challenges and opportunities. *International Journal of Rural Development*, 19(4), 345-358.