INDONESIAN JOURNAL OF SOCIAL AND ENVIRONMENTAL ISSUES (IJSEI)
Journal Homepage: https://ojs.literacyinstitute.org/index.php/ijsei
ISSN: 2722-1369 (Online)
Research Article

Volume 5	Issue 2	August (2024)	DOI: 10.47540/ijsei.v5i2.1496	Page: 216 – 229

Determinants of Participation in Different Livelihood Diversification Strategies Among Rural Households in Western Bhutan

Sonam Wangmo[1], Ugyen Dorji[2], Nedup Dorji[3]
[1]Department of Environmental and Climate Studies, College of Natural Resources, Bhutan
[2]Department of Forestry Science, College of Natural Resources, Bhutan
[3]Department of Animal Science, College of Natural Resources, Bhutan
Corresponding Author: Sonam Wangmo; Email: erfuijo23@gmail.com

ARTICLE INFO

Keywords: Determinants; Livelihood Diversification Strategies; Non-farm; Off-farm; On-farm; Rural Households.

Received : 29 June 2024
Revised : 28 August 2024
Accepted : 30 August 2024

ABSTRACT

Strategies for diversifying one's source of income are crucial for the development of rural households' rain-fed agricultural economies in developing nations like Bhutan. Participating in off-farm and non-farm activities supports households in tackling a variety of difficulties, such as drought. Nonetheless, little study has been done on determining the factors that affect households' decisions about livelihood choices in the Bhutanese context. Therefore, this study aims to examine the factors influencing rural households' decisions to diversify their livelihood diversification strategies in western Bhutan. A multi-stage stratified random sampling method was employed to select 384 rural household heads as the study area's sample. Primary data were collected using structured questionnaires from sampled households. The factors affecting rural household heads' decision to select livelihood strategies were determined using a multivariate Probit Regression Model. The model's result showed that, while on-farm livelihood strategy was negatively and significantly correlated with distance to market, it had a strong correlation with male-headed households and land holdings. The non-farm livelihood strategy was demonstrated to be significantly and positively affected by the total income, education level, and dependency ratio; whereas, the gender of the household head had a negative and significant impact. Landholding had a negative and significant impact on off-farm livelihood strategy, while the gender of the household head had a positive and significant effect. Therefore, the study recommends policies and initiatives aimed at enhancing rural livelihood should prioritize expanding rural infrastructures, enhance smallholder households' sustainable livelihood ability, and help to participate in income-generating activities in different ways.

INTRODUCTION

Much of the world's agricultural economies depend heavily on agriculture, which also serves as their main economic engine (Habib et al., 2022). A livelihood dependent on agriculture is susceptible to the effects of numerous catastrophes including earthquakes, flash floods, and erosion of riverbanks (Ahmad & Afzal, 2020). Research has demonstrated that the Hindu Kush Himalayan region is one of the regions facing rapid environmental shocks due to nature's extreme fluctuations (Asad et al., 2023). Due to its location in the Eastern Himalayas, Bhutan is extremely vulnerable to a variety of meteorological phenomena that affect the nation's agricultural output and the lives of its people (Chhogyel et al., 2020). Subsistence farming is an integral part of the Bhutanese economy, with 69% of the total population merely depending on agriculture sector as a primary source of income while just roughly 2.93% of all land area is under agriculture crop production (Chhogyel & Kumar, 2018). The nation has seen several changes in recent years such as increased risks of natural hazards of flash floods, excessive rains, and drought leading to huge losses and damages to smallholders (Poudel et al., 2023).

In addition to a range of risks that make them vulnerable to falling below subsistence levels,

Numerous institutional, environmental, and structural shocks and constraints affect subsistence farmers (Mondal et al., 2023). Rural households are encouraged to engage in a variety of activities to secure economic and environmental shocks, adjust to changing conditions, and reduce losses from farming operations (Michalscheck et al., 2023). Therefore, it is crucial to consider a portfolio of livelihoods rather than just one activity. A livelihood encompasses more than just one's income; rather, it involves a variety of daily activities (Singh et al., 2018). Diverse on-farm, off-farm, and non-farm activities can be used to support rural livelihoods, and these activities collectively enable households to adopt a variety of lifestyle choices (Kassegn & Abdinasir, 2023).

Generally, livelihood diversification implies engagement or involvement in diverse socioeconomic activities to be able to sustain minimum household livelihood (Alamneh et al., 2023; Wanjara & Ogembo, 2023). It is a process by which rural households attempt to sustain themselves and raise their level of living by engaging in a wide range of activities and social support networks (Gebru et al., 2018). Rural livelihood diversification is crucial for lowering risk and empowering households to escape the poverty that is pervasive in developing nations' rural areas (Gebremedhin & Negash, 2023; Rahut et al., 2018). In addition to reducing poverty, for agricultural households in underprivileged areas, it often serves as their primary source of savings, which then utilize to buy food during hard times (Helmy & Imane, 2020). Empirical research has demonstrated that reliability, resilience to shocks, and stability are higher among households with non-farm livelihood activities than among those with farming as their primary source of income (Asfaw et al., 2017). Indeed, considering the tremendous pressure brought on by population growth, conceptual and policy-based research has focused on diversifying rural livelihoods (Khatun & Roy, 2016; Gebru et al., 2018). Das & Hilgenstock (2022) demonstrated that to mitigate the various risks related to agriculture, like pests and diseases, erratic rainfall, droughts, floods, erosion, variability in soil, and other weather-related events, rural households enhance their perspectives by participating in both off- and non-farm activities.

Multiple research studies have indicated that for farmers to lead sustainable lives, crop farming and non-agricultural work need to coexist (Khatun & Roy, 2016; Kassie, 2017). The majority of farmers are involved in agriculture, however, due to challenges like small landholdings and degraded soil, which impede sustainable crop production and food security, agriculture is unable to provide enough sustenance to meet their needs (Mudzielwana et al., 2022). Concurrently, frequent weather extremes make these issues worse, which is another reason households are involved in non-farm occupations (Singh et al., 2018). Overall, livelihood diversification is essential for boosting economic expansion and eliminating poverty in developing nations.

The primary goal of diversifying livelihood is to manage risk in preparedness for shocks and to manage consequences, to boost household income, and to lower rates of poverty (Kassie, 2017). Previous studies report that rural households throughout developing nations earn 35-50% of household revenue from non-farm occupations and by the way it is proven that non-farm income is huge at the same time it varies among people across different places due to different contextual factors (Erdaw, 2023). Farmers also need to diversify to get sufficient income considering their inability to specialize yet they also need to insure themselves against natural calamities like droughts (Rehan & Backman, 2019; Mekonen & Berlie, 2021). According to research by Jiao et al. (2017) having the ability to work in productive non-farm activities is linked to greater levels of financial security. Through diversification, rural households enhance wealth accumulation and financial returns for greater living quality (Musyoka & Onjala, 2023). In a rural setting, a household's decision to participate in non-farm activities is mainly affected by two factors:

the incentives provided and the household's capacity (Rehan & Backman, 2019). For instance, the marginal productivity of labor determines the division of labor among activities, although it is limited by the household's assets and activities (Daminger, 2019). Similarly, livelihood strategies include household capabilities, activities that generate income, and assets that sustain a means of subsistence, such as natural, physical, human,

financial, and social assets (Rahman & Hickey, 2020).

However, a number of variables, including the total number of livestock, the dependency ratio, and the education level, affect the uptake of a variety of activities (Akhtar et al., 2019; Kassegn & Abdinasir, 2023). Education in particular is crucial for diversifying one's source of income outside of agriculture (Gebru et al., 2018). In comparison to those who lack education, educated individuals in rural areas are favored to work in skilled, non-farm employment (Dinku, 2018). In China, education improves a household individual's likelihood of getting into the non-farm workforce and enhances their earnings (Jagannathan et al., 2019). Several studies have demonstrated an association between education and diversifying into non-farm activities that play an important determinant for involvement in and revenue from non-farm activities (Jiao et al., 2017; Rehan & Backman, 2019). The primary factors that determine a rural household's strategy for diversifying their livelihood are their landholdings, distance from markets, and the age of the household head (Ismail et al., 2018; Kassegn & Abdinasir, 2023). In comparison with households situated a particular distance away from markets, those closer to the markets have greater opportunity to diversify their sources of income (Wang & Ruan, 2024). Households with few assets face a critical problem in diversifying their income due to a lack of capital (Saba et al., 2022). While rural households participate in a wide range of livelihood activities, their involvement in off-farm and non-farm activities is affected by a number of unknown factors.

With 79% of its people working in agriculture and livestock farming, Bhutan is primarily an agricultural country (Chhogyel et al., 2020). Livelihood diversification measures can help reduce poverty, as about one-third of the population lives below the poverty line (Rahut et al., 2018). Literature has demonstrated that factors influencing the decision to diversify one's means of subsistence differ with space and time, including socioeconomic position, cropping systems, the effects of diversification on households, and the degree to which one's livelihood strategies are created (Alamneh et al., 2023; Jiao et al., 2017). Little research has previously been done to investigate and provide an answer to the question of what factors initially influence rural households' decisions to diversify their livelihoods in Bhutan Thus, there is a research deficit about the factors that influence rural households' strategies for diversifying their means of subsistence, particularly in western Bhutan. The results of this study will have significant policy implications for rural livelihood diversification and its ability to reduce poverty while also raising income levels in Bhutanese communities. Since there aren't many studies on rural livelihood diversification strategies for developing nations like Bhutan, the objective of this research is to identify the factors that influence the decisions made about rural livelihood diversification strategies in western Bhutan.

Kinds of literature based on recent scientific journal articles published by recognized researchers similarly, materials on rural livelihood diversification strategies were identified to further explore the association among livelihood diversification strategies and the determinants (Kassegn & Abdinasir, 2023). Three main categories have been utilized to group the livelihood strategies of rural households: 1. on-farm; 2. off-farm activities; and 3. non-farm activities. On-farm activities mean activities bound to agricultural land accessed or raising livestock. Activities outside of agriculture include those in which a household engages, such as wage work and Non-wood forest products whereas off-farm activities are all the agricultural-related activities that occur beyond farm such as extension services, transportation, retail sale, and tourism (Getahun & Fetene, 2022). The conceptual framework shown in this study presents an inclusive and comprehensive perspective on the processes that households use to decide whether or not to diversify their livelihood strategies. It is designed to be applied to the analysis of the determinants of livelihood diversification in rural households (Asfaw et al., 2017). The framework illustrates how various kinds of factors, including policy, institutional settings, and processes, influence a household's ability to decide which kind of livelihood strategy to pursue, or a mix of livelihood strategies to pursue, and what immediate effects have been obtained (Figure 1).

The households create non-farm, on-farm, and off-farm activities that will enable them to combine their resources, skills, and knowledge with different kinds of labor to achieve the best possible standard

of living (Asfaw et al., 2017). Capitals are classified into five categories in the asset-based framework: social, human, economic, natural, and physical capital that households can use for a variety of activities (Alamneh et al., 2023). Livelihood outcomes are the outcomes of livelihood activities, such as improved food security, well-being, reduced vulnerability, and higher income (Dinku, 2018). A livelihood is composed of resources, activities (on and off the farm), and access that together define the standard of life that a household can afford. A household's choice to participate in an activity is influenced by a number of social, economic, and environmental factors (Toyin & Abbyssiania, 2017; Alamneh et al., 2023). Additionally, although a household's limited resources allow for a variety of activities that do not conflict with one another, the choice of farming affects the household's alternative to engage in both on-and off-farm activities (Wang & Ruan, 2024). The terms "policies and institutional context" refer to the regional laws and approaches associated with property entitlement, including land, the community's access to agricultural inputs, and financing schemes that affect the standard of living for households (Saba et al., 2022). It is crucial to understand the various livelihood strategies and assess the factors that influence the diversification of a rural household's income through on-farm, off-farm, and non-farm sources to provide information for the development of appropriate strategies and policies (Mudzielwana et al., 2022).

Exposure to various shocks and trends is a major factor affecting livelihood strategies (Helmy & Imane, 2020). Situations that are outside of an individual's or household's control are known as trends and shocks (Kassegn & Abdinasir, 2023). Trend refers to significant alterations that impact a vast number of people leading to a shift in the national and global economy. For instance, processes of deindustrialization and change in government (Habib et al., 2022). On the other hand, shocks are significant occurrences that happen to a person or household, like losing a job or a home. Trends can trigger livelihoods to gradually erode if people are unable to adapt, and shocks can abruptly harm assets if they are not protected (Amevenku et al., 2019). They signify abrupt and gradual alteration, respectively.

Considering, the information gathered above, the conceptual framework below illustrates the important variables and how their relationships help in addressing the study question.

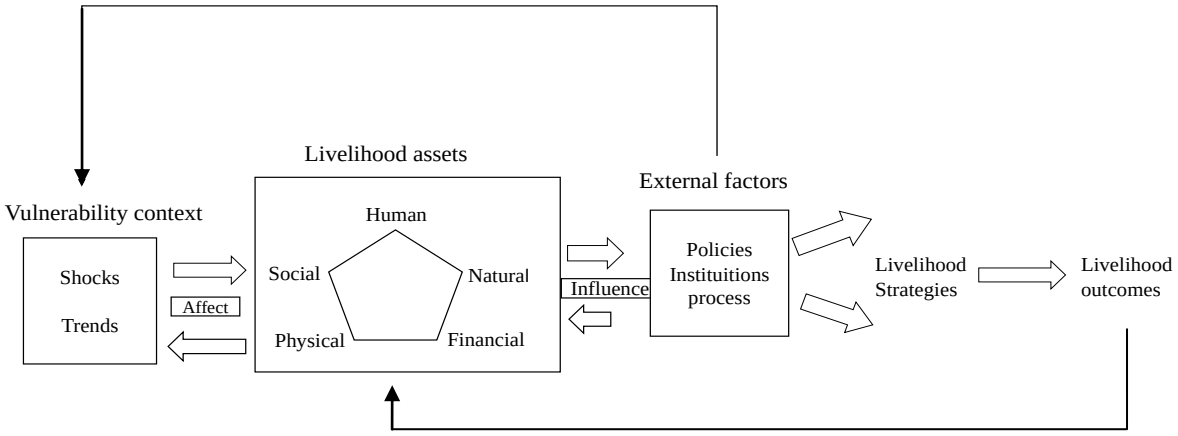

Figure 1 Conceptual Framework

Sources: Adapted from Ellis (1998); DFID (Dept. for International Development (1999) and Barret et al. (2001).

MATERIALS AND METHODS

This study was carried out from October 2022-March 2023 spanning over three districts of Bhutan namely Punakha, Wangduephodrang, and Gasa. Ecologically these three districts represent low and high agro-ecosystems of the country located between 27°35'28.93"N to 27°54'59.99"N latitudes 89°43'36.8"N to 89°52'38.75"N longitudes. The altitude of the study sites spans from 1200 and 3200 m above sea level. Two gewogs (sub-district) from

Punakha, Wangduephodrang, and one gewog from Gasa district was identified: Kabesa and Dzomi from Punakha, Phobjikha and Gangtey from Wangduephodrang and Laya from Gasa (Figure 2).

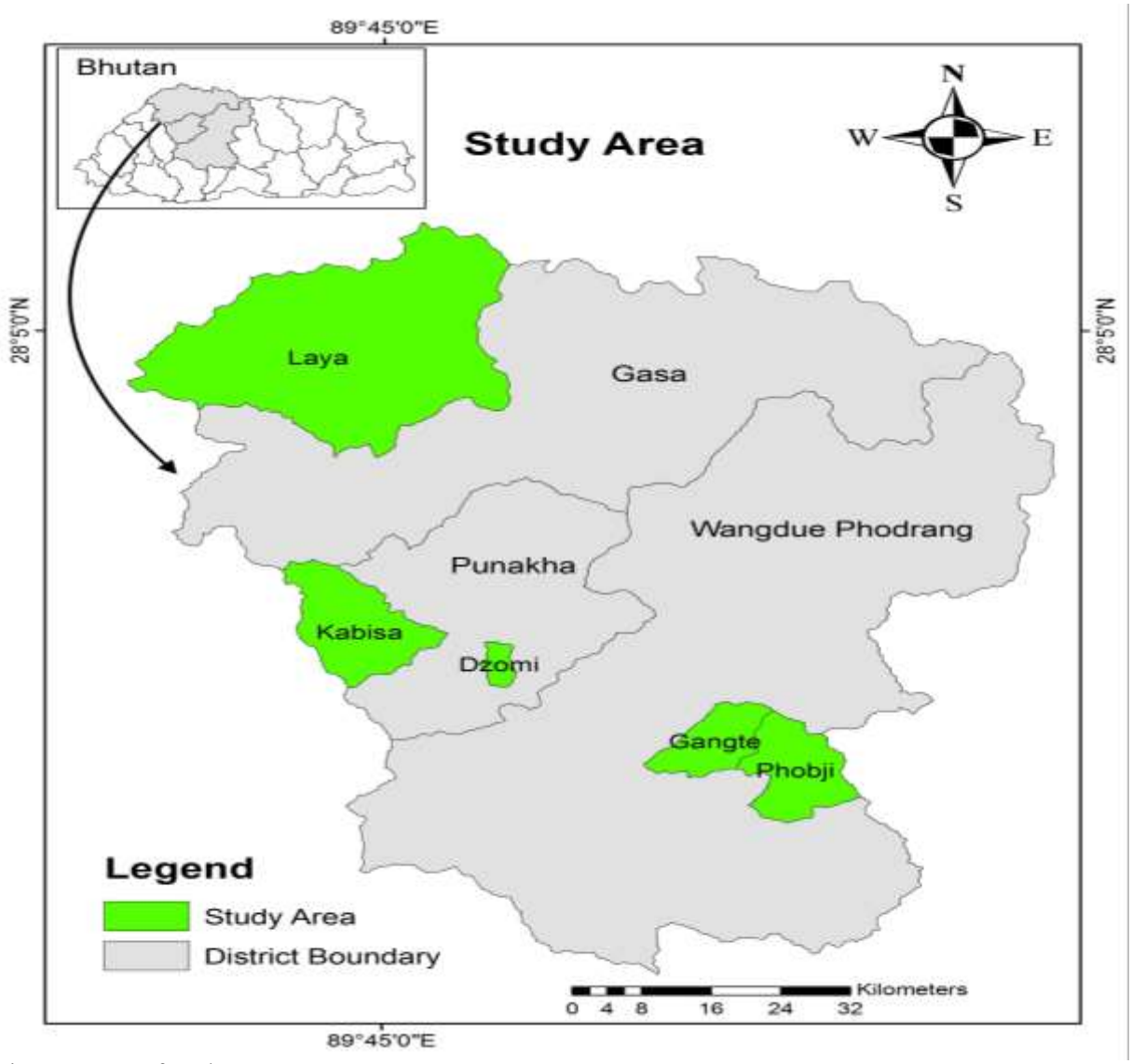

Figure 2 Map of study

Kabesa and Dzomi gewogs represent low-lying valleys and an important locale for farming whereas Phobjikha and Gangtey gewogs represent sites where potato farming is crucial as well as a conservation area. Laya gewog represents a highland area where semi-nomadic pastoralism, livestock management, and collection of high-value medicinal herbs is regarded as a crucial livelihood for the household's sustenance. Laya is not connected by road although a road is currently being constructed. Nonetheless, the degree of dependency on agriculture and its significance for the total household income in the geographical area are equally crucial. The household income generated from agriculture is enhanced by non-farm/off-farm income sources where households have implemented different livelihood strategies for their well-being and improved standard of living although its degree varies from place (Chhogyel et al., 2020). Challenges in the research area include inadequate infrastructure, limitations of agricultural land, insufficient skills, inadequate marketing, and limited potential for non-farm or off-farm pursuits (Tshering & Thinley, 2017).

Sampling Technique and Data Collection

Multi-stage sampling technique was employed to select the sample households. During the first stage, three districts – Punakha, Wangduephodrang, and Gasa districts are purposively selected to represent various agro-ecological zones in the region which determine household's decision for livelihood diversification. In the second stage, the

gewog (the administrative unit divided into blocks) in each district were chosen and stratified into three agroecological zones: dry sub-tropical, warm temperate and alpine zones. Households in these zones were assumed to be homogenous as they share similar livelihood activities and all the gewogs are vulnerable to context-specific such as drought and biophysical risks as the households are rain-fed livelihood systems. Based on the total number of household heads in the various groupings, the sample size approach was utilized in the third step to choose sample household heads from each stratum. The sample size of the study can be determined using the Cochran sample size determination formula. Therefore, the Cochran (1977) formula is used to calculate 380 sample household heads.

$$n=\frac{z^2(pq)}{e^2} \quad \text{.....} \quad 1$$

$$n=\frac{1.96^2 \times 0.5\,(0.5)}{0.05^2}=384 \quad \text{.....} \quad 2$$

Where sample size (n)

z^2 = standard error of the selected degree of confidence (Usually 1.96)

p = the estimated percentage of a characteristic in the population

q = 1-p

e = the required degree of accuracy

$$n=\frac{N_i}{N}.n_0 \quad \text{.....} \quad 3$$

From the sampled gewogs of selected districts, representative households will be selected at random based on the probability proportional to the sample size found in formula (3). Table 1 shows the sample size distribution for each district in the study areas. The study adopted primary data using structured questionnaires which are qualitative and quantitative in nature. Primary data were collected using a household survey designed to generate data on socioeconomic, agricultural as well as institutional characteristics associated with livelihood strategies.

Table 1. Distribution of samples for each district

Name of Districts	Total households	Sample household
Punakha	302	144
Wangduephodrang	212	120
Gasa	234	120
Total	748	384

Analytical Technique and Measures

STATA software version 26 was utilized for the analysis of the survey data. One-way ANOVA was used in the study to analyze data on frequency, chi-square test, mean, standard deviation, maximum, minimum, and percentage. The study applied the chi-square test and t-test to determine whether there were statistically significant differences between different livelihood strategies with regard to the categorical and continuous variables, respectively. Multivariate Probit (MVP) regression analysis was used for analyzing the factors of livelihood diversification strategies among rural households and with regard to choosing determinants of livelihood diversification there is no natural ordering in the alternatives and data analysis was conducted using SPSS. For estimation, MVP regression model predicts the effect of explanatory variables on a dependent variable involving multiple choices with unordered response categories popular in livelihood diversification studies. The MVP model is one kind of correlated binary response regression model, which enables the association of the error terms and promptly predicts the effect of an independent variable on one or more dependent variable (Elsayir, 2019). Multivariate regression is a strategy that predicts a single regression model with many outcome variables since this study demonstrates the interdependence of certain categories of livelihood options. To examine the factors influencing rural households' livelihood strategies in the research area, MVP was employed in this investigation. Household decides to choose more than one

livelihood strategies choices at the one time that delivers utmost effectiveness. In order to allow households to select many strategies at once, this study employed an MVP model.

The dependent variable is the choice of livelihood strategies which is polychromous variable. Socioeconomic, demographic, geography, institutional and agriculture are used to study the factors influencing livelihood diversification. On-farm, off-farm, and non-farm livelihood strategies are the three codependent categories of livelihood strategies. The household choose the livelihood approach that maximizes income and utility from the three non-exclusive choices. Conversely, 10 variables are considered to explain determinants of participating in variety of livelihood activities. Table 2 explains the expected relationship between dependent variable and independent variables.

Table 2. Variables used in Multivariate probit regression model and their description

Variable	Measurements	Expected outcome		
Livelihood strategies choices	1 = on-farm 2 = non-farm 3 = off-farm	On-farm income	Non-farm income	Off-farm income
Gender	1 = Female, 0 = Male	+	-	+
Age of the household	Year completed	-	-	-
Family size	Number	+	+	+
Dependency ratio	In adult equivalent	+	+	+
Education level	Formal education = 1 Non-formal = 2 Unlettered = 3	+	+	-
Landholding size	Acre	+	-	-
Total income	Ngultrum	+	+	+
Credit access	If HH utilized credit, 1; if not, 0	+	+	-
Irrigation access	1 = Yes, 0 = No	+	-	-
Extension contacts	Frequency	+	-	-
Distance to market	Time taken	+	+	+

RESULTS AND DISCUSSION

There are both male and female households in the sample households. 53.6% of the sample households headed by male headed and 45.4% were headed by female (Table 3).

Table 3. Overview of all sample households' data (categorical variable)

Variables	Categories	Frequency	Percentage
Gender	Female	206	45.4
	Male	178	53.6
Credit use	Non-users	111	28.9
	Users	273	71.1
Irrigation use	Non-users	240	62.5
	Users	144	37.5

In total, 273 (71.1%) of the sample respondents were credit users, while 111 (28.9%) were not users, as indicated in Table 3. Accessibility to small-scale irrigation is crucial for achieving to self-sufficiency of the household and excess output. Additionally, irrigation users are able to adapt to weather extremes like drought, which can cause rain-dependent crop production to

fail. According to the survey result, about 144 (37.5%) have used irrigation services and the remaining 240 (62.5%) are non-users of irrigation.

Table 4. Demographic, socioeconomic, and institutional traits of the head of the household (continuous variable)

Variables	Mean	Std. Dev
Age	42.17	14.506
Family size	5.02	4.534
Dependency ratio	1.946	1.121
Education type	2.19	1.878
Landholding	1.396	0.894
Total household income	68641.28	16160.787
Distance to market	78.88	69.502
Frequency of extension contact	5.11	4.973

With a standard deviation of 14.506, the average age of the household heads throughout the survey period was around 42.17 years. The average family size in the household was 5.02 men equivalent, with a standard deviation of 4.532. The dependency ratio's mean value was 1.946 and its standard deviation was 1.121 (Table 4). The average level of education of the sample household was 2.19 years, with a standard deviation of 1.878. The average area of land owned by household heads was1.396 acres with standard deviation of 0.894. The mean income of the household heads was 68641.28 per year with standard deviation of 16160.787. The mean time taken of the distance to nearest market was 78.88 minutes (1 hour 31 minutes) with standard deviation of 69.502. The household head in the study area reported an average frequency of 5.11 extension contacts per month, alongside 4.973 as the standard deviation (Table 4).

Table 5. Choice of livelihood diversification strategies approved by the sample households

Variables	Observation	Mean	Std. Dev
On-farm	384	0.98	0.438
Non-farm	384	0.76	0.426
Off-farm	384	0.59	0.493

The three distinct strategies to livelihood diversification in the research area are as follows: (1) On-farm (crop and livestock); (2) Non-farm (self-employment related to agriculture such as wage labor, Non-Wood Forest Products); (3) Off-farm (extension services, retail sale, transportation). Such diversification and classification are in line with Imane (2020) and Kassegn & Abdinasir, (2023) studies who reported similar result. On-farm activities are the agricultural generating activities including practice of crop cultivation and rearing livestock important for individuals residing in rural areas (Bongole, 2016). Results of the study show that, as shown in Table 5, 98% of all households earn their living only from the agricultural sector. Activities outside of agriculture are those that support the cash flow from self-employment that is connected to wage work in both sectors of the economy. Furthermore, non-farm activities in rural household have a significant potential to increase rural employment, which would primarily improve the economic situation and the standard of living for people in developing nations. The survey's findings indicate that while 59% of all households considered living off from off activities, 76% of all households cited non-farming as their primary source of income. While livelihood pursuits including retail sales, transportation, and extension services take place wholly outside of farms are referred to as off-farm activities (Asfaw et al., 2017).

Result of Multivariate Probit Model

Using SPSS, the Wald and Likelihood ratio tests were used to examine if coefficients related to independent variables are jointly equal to zero. From the multivariate regression model analysis,

the results revealed that Wald chi2 values of 214.937***prob>chi2 equals 0.0000 is significant at 1% significance level. It demonstrates that the explanatory factor in the model is satisfactory and the coefficients are jointly significant. The observed high Wald chi2 value suggests that the model fits the empirical data statistically. The model is well-fitted and the variables' choice may explain the link between the explained and explanatory variables, as seen by the significant prob > chi2 obtained for estimate at 1% significance level. At the significance level of 1%, the null hypothesis of independence between the livelihood strategy choices as established by the likelihood ratio test decision is rejected (chi2(3) = 39.67***). This illustrates that the estimated coefficients in each of the model's equations had both positive and negative signs, demonstrating strong correlations and interdependencies between off- and non-farm variables. Thus, there is a negligible and negative association between on-farm and off-farm. The model results showed a likelihood households chose on-farm, non-farm and off-farm livelihood strategies were 98%, 76% and 59% respectively.

In summary, the MVP model revealed that eleven explanatory factors, excluding family size and extension contacts, were shown to have a significant impact on farmers' choice and adoption of various livelihood strategies at different probability levels (Table 6).

Table 6. Determinant of smallholder farmer's livelihood diversification strategies

Variables	On-farm		Non-farm		Off-farm	
	Coef.	Std. Err.	Coef.	St. Err.	Coef.	Std. Err.
Age	0.0013	0.0012	-0.004	0.006	-0.007	0.005
Gender	0.401**	0.156	-0.285*	0.166	0.384*	0.172
Family size	0.039	0.042	0.068	0.065	0.061	0.054
Dependency ratio	0.162	0.142	0.253**	0.131	-0.095	0.124
Education level	0.037	0.041	0.053*	0.032	0.057*	0.035
Land holding	0.439*	0.294	0.041	0.224	-0.853***	0.258
Distance to market	-0.354***	0.176	-0.156	0.109	-0.171	0.115
Extension contact frequency	0.01	0.022	-0.052	0.080	-0.049	0.033
Total income	1.64e-05	2.47e-05	0.00004***	4.66e-06	-1.98-06	1.57-06
Credit use	0.452	0.214	0.125	0.199	-0.356	0.236
Irrigation use	0.182	0.165	0.152	0.223	0.026	0.149
Constant	-1.586***	0.577	-0.046	0.608	3.200***	0.592
Predicted probability	0.745		0.652		0.532	
Joint probability(success)	0.247					
Joint probability (failure)	0.000					
Number of draws (#) = 11	Number of obs. = 384			Log likelihood = - 584.98		
Waldchi2(45) =214.937***	Prob > chi2 = 0.0000					
Likelihood ratio test of rho20 = rho30 = 0 chi2(3) = 39.67***						

Note: ***, ** and * are statistically significant at 1%, 5% and 10% significance levels respectively.

Gender of Household Head

Household characteristics such as age, gender and demographic structure influence the household's potential to diversify into different livelihood strategies. The result demonstrated that gender of household head was positively and significant related with likelihood of participation in on-farm and off-farm activities 5% significant level while negatively and significantly associated with probability of engaging in non-farm activities at the 10% significance level. Table 6 shows that the male-headed household heads derive maximum share of their income from farming activities as compared to female-headed households where in comparison to female-headed households, male-headed households are 40.1% and 38.4% more likely to select on-farm and off-farm activities as their livelihood strategy, respectively. This is

reinforced by the fact that Male are more physically stronger to work at agricultural farm field as well as at off-farm category of livelihood choices. Bongole (2016) and Kassie (2017) studied that male-headed households has significantly influenced on-farm and off-farm livelihood diversification whereas female headed has difficulty in participating off-farm activities due to feminine responsibilities in taking care of children and often the cultural barrier. Similarly, non-farm activity is chosen as a livelihood strategy by households headed with women 28.5% more frequently than male headed households. Hence female headed household have higher likelihood of choosing non-farm activity due to the fact that women working in farmland are also the ones who owns small business and wages from non-farm activities to improve household income. Also, women have more social connections with buyers through small vegetable business in the markets.

Education Level

As shown in the Table 6, Education plays a prominent and distinction role across different livelihood strategies. It was shown that one of the key factors influencing livelihood diversification was education level (Bongole, 2016). This study showed that Education level of household head was found to be positive and significant at 10% level of significance in probability of choosing non-farm and off-farm livelihood approaches. Household head with a better education derive larger share of income from high salaried jobs and self-employment. Whereas the ones with poorly or less educated households are forced to engage in low-income labour and wage earnings also, have less probability to work in non-farm activities. A study conducted by Jiao et al. (2017) in Cambodia revealed that household with lower income and educational levels seem to be associated primarily with low-return non-farm and on-farm activities. It can also be explained by the fact that educated farmers are better able to look at opportunities for revenue-generating activities and are more likely to take calculated risks, which gives them the skills and increased capability of households to choose non-farm and off-farm activities with knowledge. Thus, the outcome is consistent with the research conducted by Ahmed et al. (2016), Bongole (2016), Asfaw et al. (2017) and Gebru et al. (2018) which demonstrated that heads of households with higher levels of education and better access to technology are better able to search for alternative livelihood opportunities than heads of households with lower levels of education.

Land Holding

The results showed that, contrary to expectations, there was a positive correlation between a household's landholdings owned by farmers and livelihood diversification, with the exception of off-farm and non-farm diversification strategies.

It demonstrated that, at the 10% probability level, land ownership has a positive and significant likelihood of opting an on-farm livelihood strategy. On the other hand, at the 1% significance level, it had a negative and substantial impact on the likelihood of a household diversifying into non-farm activities. This is due to the fact that households with huge land holdings are more dependent on farming than other sources of income to meet their needs. Accordingly, the study's findings indicated that for every unit increase in landholding, there might be a 43.9% increase in the likelihood that a household will participate in on-farm activities and an 85.3% decrease in the likelihood that they will participate in off-farm activities. Consequently, having an immense land holding allows households to pursue agricultural growth in order to increase production and agricultural revenue. According to the findings of this study, Asfaw et al. (2017) in the North Central Ethiopia also discovered that households with larger land sizes relied more on crop production than they engage on activities off the farm, and the researcher recommended that farmers who owned greater areas of land be encouraged to take part in activities related to agricultural activities.

Dependency Ratio

For the study, it was predicted that there would be a positive correlation between the dependency ratio and livelihood diversification strategies. Dependency ratios are considered to correlate with a decrease in household requirements and an increase in opportunities for both on- and off-farm income diversification. In fact, at the 5% significant level, the dependency ratio from this study was revealed to have a positive and statistically significant in likelihood of choosing non-farm activities. This finding was consistent with Mudzielwana et al. (2022) and Oduniyi & Tekana,

(2019) who indicated that number of dependents in a household has positive influence on diversifying into various non-farm activities. As a result, the dependency ratio will encourage the head of the household to pursue additional sources of income through diversification. As a result, there will be fewer dependents in a household, increasing the probability of achieving food security and increasing income.

Distance to Market

Another significant factor influencing the diversification of livelihoods is geographic location. In order to analyze this determinant, average time taken reach to the nearest market was calculated. In line with predictions, at the 1% significance level, the time it took to get to the market was negatively correlated with the likelihood of choosing an on-farm livelihood plan. The negative correlation demonstrates that as market distance increases, the likelihood of choosing to diversify one's livelihood decreases. Due to the difficulty of transporting their produce to a distant-off market and the lack of convenient and immediate physical access, households that are situated far from the closest market are likely to refrain from engaging in on-farm activities. Other related possible justification could be with regard to youth's opportunity for interaction with information and experience sharing also have better infrastructure and transportation services where they can easily involve in market based livelihood activities (Tedla & Mekonen, 2019). This investigation supported the findings of the Asfaw et al. (2017) study which found that ability of household diversifying beyond on-farm activity is probably going to be decrease with increasing market distance. Household located near to market provides access to additional income through employment opportunities, information on inputs and transportation. Furthermore, it is evident that households located far from the market centers struggle in diversifying their source of income into non-farm choices (Mudzielwana et al., 2022).

Total Income

At the 1% significant level, this variable showed to have a positive and significant impact on the household's probability of diversifying into non-farm activities. The findings show that compared to households with lower incomes, those with higher cash amounts are more likely to diversify into non-farm income-generating sectors and raise their level of diversity. This result demonstrated the necessity of taking the households' financial situation into account while designing development intervention systems that would give people with lower incomes opportunities. For example, households with sufficient income sources can increase their level of income diversification by engaging in other sources of revenue in order to overcome financial constraints. Therefore a similar study by Adem & Tesafa (2020) reported who demonstrated the positive and significant relationship between total income and the degree of revenue diversification into non-farm activities.

Credit Access

Access to credit is crucial for heads of single-parent households in order to bridge the financial gap and diversify their income sources. The results demonstrated a negative and significant effect of credit availability on households' likelihood for participating in non-farm activities at the 10% significance level. This is because having access to credit has generally made it easier to purchase agricultural inputs for agricultural intensification, such as farm technologies, as opposed to seeking other sources of income. This result is in-line with a research study by Tsegay et al. (2021). Furthermore, improved access to farm inputs will boost household income through agricultural intensification, boosting productivity and enabling households to participate in non-farm economic activities. This indicates that establishing both official and informal credit facilities is essential to safeguard vital assets for subsistence as well as to fund agricultural inputs. Therefore, a household's capacity of obtaining credit is essential to both the development and diversity of its sources of income. Additionally, the outcome agrees with that of Dinku (2018) and Amevenku et al. (2019) who reported the same result.

CONCLUSION

The study examined the rural livelihood strategies that Bhutanese households have chosen, as well as the key determinants that affect their decision to choose livelihood strategies in the western districts of Bhutan. In addition to producing only crops and livestock, many rural households also take part in other types of income-generating activities. It has been identified that in the research area, where the farming system is mostly rain-fed

and subsistence-oriented, agriculture is the primary economic activity and the source of income for rural households. The majority of rural households participate in a variety of income-generating activities in addition to coping with various challenges related to their livelihoods because of the unpredictable patterns of rainfall and the low yield from agriculture. The survey's findings showed that the most relevant livelihood strategies in the research region are those that involve on-farm (98%), non-farm (76%), and off-farm (59%). Furthermore, results of multivariate probit model (MVP) revealed that Distance to market and credit availability were found to have negative and significant effects on households' choice of various livelihood diversification strategies, while gender of the household head, dependency ratio, education level, landholding, and total income were found to have positive and significant influences on households' likelihood and adoption of livelihood diversification strategies. The study concluded that on-farm activity alone cannot be relied upon as a principal livelihood strategy and in order to achieve food security, diminishing poverty also enhancing livelihoods in western Bhutan.

The study makes the following recommendations based on its findings to enhance rural household livelihoods in the study region and promote the use of household livelihood diversification strategies: (1) In order to promote household involvement in both non-farm and off-farm lifestyles, rural infrastructures including as road networks, market centers, and credit services has to being developed and expanded; (2) To raise awareness among households concerning the need for women and men to participate equally in all developmental activities, the government and other responsible institutions need to develop vital strategies; (3) Enabling smallholder farmers to access irrigation is crucial for achieving a steady income and improved livelihood in the face of drought; (4) Among rural irrigation schemes, policymakers should concentrate on the initiatives that are best suited to promoting a sustainable livelihood outcome; (5) Development stakeholder should enhance smallholder household's sustainable livelihood ability and help to take part in various revenue-generating activities.

REFERENCES

Adem, M., & Tesafa, F. (2020). Intensity of income diversification among small-holder farmers in Asayita Woreda, Afar Region, Ethiopia. *Cogent Economics & Finance*, *8*(1), 1759394.

Ahmad, D., & Afzal, M. (2020). Flood hazards and factors influencing household flood perception and mitigation strategies in Pakistan. *Environmental Science and Pollution Research*, *27*(13), 15375–15387.

Ahmed, A., Lawson, E. T., Mensah, A., Gordon, C., & Padgham, J. (2016). Adaptation to climate change or non-climatic stressors in semi-arid regions? Evidence of gender differentiation in three agrarian districts of Ghana. *Environmental Development*, *20*, 45–58.

Akhtar, S., Li, G., Nazir, A., Razzaq, A., Ullah, R., Faisal, M., Naseer, M. A. U. R., & Raza, M. H. (2019). Maize production under risk: The simultaneous adoption of off-farm income diversification and agricultural credit to manage risk. *Journal of Integrative Agriculture*, *18*(2), 460–470.

Alamneh, T., Mada, & Abebe T. (2023). The Choices of Livelihood Diversification Strategies and Determinant Factors Among the Peri-Urban Households. *Cogent Social Sciences*, *9*(2).

Amevenku, F. K. Y., Asravor, R. K., & Kuwornu, J. K. M. (2019). Determinants of livelihood strategies of fishing households in the volta Basin, Ghana. *Cogent Economics & Finance*, *7*(1), 1595291.

Asad, S.A., Abid, M., Ahmad, I., Thapa, G., Dendup, T. (2023). Climate change risk perceptions, vulnerability, and adaptation in high altitude farming regions of Hindu Kush Himalaya. *Global Change Research*, *13*(1), 2522–7971.

Asfaw, A., Simane, B., Hassen, A., & Bantider, A. (2017). Determinants of non-farm livelihood diversification: Evidence from rainfed-dependent smallholder farmers in northcentral Ethiopia (*Woleka* sub-basin). *Development Studies Research*, *4*(1), 22–36.

Bongole, A.J. (2016). Determinants of Farm and Non-Farm Activities as Sources of Income amongst Rural Households: Evidence from Kahama District in Tanzania. *Journal of*

Economics and Sustainable Development, *7*(4), 132–139.

Chhogyel, N., & Kumar, L. (2018). Climate change and potential impacts on agriculture in Bhutan: A discussion of pertinent issues. *Agriculture & Food Security*, *7*(1), 79.

Chhogyel, N., Kumar, L., & Bajgai, Y. (2020). Consequences of Climate Change Impacts and Incidences of Extreme Weather Events in Relation to Crop Production in Bhutan. *Sustainability*, *12*(10), 4319.

Daminger, A. (2019). The Cognitive Dimension of Household Labor. *American Sociological Review*, *84*(4).

Das, M., & Hilgenstock, B, B. (2022). The exposure to routinization: Labor market implications for developed and developing economies. *Elsevier: Structural Change and Economic Dynamics*, *60*, 99–113.

Dinku, A. M. (2018). Determinants of livelihood diversification strategies in Borena pastoralist communities of Oromia regional state, Ethiopia. *Agriculture & Food Security*, *7*(1), 41.

Ellis, F. (1998). Household strategies and rural livelihood diversification. *Journal of Development Studies*, *35*(1), 1–38.

Elsayir, H. (2019). Residual Analysis for Auto-Correlated Econometric Model. *Open Journal of Statistics*, *9*, 48–61.

Erdaw, M.M. (2023). Contribution, prospects and trends of livestock production: A review. *International Journal of Agricultural Sustainability*, *21*(1).

Gebremedhin, K. G., & Negash, E. G. (2023). Management Practices and Economic Contribution of Eucalypts Woodlots to the Rural Household Livelihoods: The Case of Cheha District, Southern Ethiopia. *Indonesian Journal of Social and Environmental Issues* (*IJSEI*), 4(1), 59-71.

Gebru, G. W., Ichoku, H. E., & Phil-Eze, P. O. (2018). Determinants of livelihood diversification strategies in Eastern Tigray Region of Ethiopia. *Agriculture & Food Security*, *7*(1), 62.

Getahun, T., & Fetene, G. (2022). *Determinants of participation in rural off-farm activities and effects on food shortage, relative deprivation and diet diversity*.

Habib, N., Rankin, P., Alauddin, M., & Cramb, R. (2022). Determinants of livelihood diversification in rural rain-fed region of Pakistan: Evidence from fractional multinomial logit (FMLOGIT) estimation. *Environmental Science and Pollution Research*, *30*(5), 13185–13196.

Helmy & Imane. (2020). Livelihood Diversification Strategies: Resisting Vulnerability. *Global Labor Organization*, *34*(5), 40–53.

Hossain, K., Quaik, S., Ismail, N., Rafatullah, M., Ali, I., Hatta, Z. A., Avasn, M., Pant, G., & Rameeja, S. (2015). Climate Change-Perceived Impacts on Agriculture, Vulnerability and Response Strategies for Improving Adaptation Practice in Developing Countries (South Asian Region). *International Journal of Agricultural Research*, *11*(1), 1–12.

Ismail, N., Okazaki, K., Ochiai, C., & Fernandez, G. (2018). Livelihood Strategies after the 2004 Indian Ocean Tsunami in Banda Aceh, Indonesia. *Procedia Engineering*, *212*, 551–558.

Jagannathan, S., Ra, S & Maclean, R. (2019). Dominant recent trends impacting on jobs and labor markets—An Overview. *International Journal of Training Research*, *17*(1).

Jiao, X., Pouliot., M., Walelign, S.Z. (2017). Livelihood Strategies and Dynamics in Rural Area. *Elsevier: World Development*, *97*, 266–278.

Kassegn, A., & Abdinasir, U. (2023). Determinants of rural households' livelihood diversification strategies: In the case of north Wollo zone, Amhara National Regional State, Ethiopia. *Cogent Economics & Finance*, *11*(1), 2185347.

Kassie, G. W. (2017). The Nexus between livelihood diversification and farmland management strategies in rural Ethiopia. *Cogent Economics & Finance*, *5*(1), 1275087.

Khatun, D., & Roy, B. C. (2016). Rural Livelihood Diversification in West Bengal: Nature and Extent. *Agricultural Economics Research Review*, *29*(2), 183.

Michalscheck, M., Kizito, F., Hotu, B.H., Avornyo, F.F. (2023). Preparing for, coping with and

bouncing back after shocks. A nuanced resilience assessment for smallholder farms and farmers in Northern Ghana. *International Journal of Agricultural Sustainability*, *21*(1), 234–244.

Mondal M et al., (2023). Evaluating rural poverty and livelihood diversification in the context of climate-induced extreme events in coastal area: Insights from Indian Sundarban. *Regional Studies in Marine Science*, *67*(103191).

Mudzielwana, R. V. A., Mafongoya, P., & Mudhara, M. (2022). An Analysis of Livelihood-Diversification Strategies among Farmworker Households: A Case Study of the Tshiombo Irrigation Scheme, Vhembe District, South Africa. *Agriculture*, *12*(11), 1866.

Musyoka, P. K., & Onjala, J. (2023). Livelihood Diversification and Household Vulnerability to Climate Shocks in Rural Kenya. *International Journal of Economics Development Research (IJEDR)*, *4*(1), 27–47.

Oduniyi & Tekana. (2019). Analysis of Rural Livelihood Diversification Strategies Among Maize Farmers in North West Province of South Africa. *International Journal of Entrepreneurship*, *23*(2), 1939–467523.

Poudel, S., Mishra, B., Ghimire, S., Luintel, N. Thapa, P., Spakota, R. (2023). Climate change and agroecosystem: Impacts, adaption, and mitigation in South Asia. *Developments in Weather and Climate Sciences*, *6*, 329–244.

Rahman, H. M. T., & Hickey, G. M. (2020). An Analytical Framework for Assessing Context-Specific Rural Livelihood Vulnerability. *Sustainability*, *12*(14), 5654.

Rahut, D. B., & Micevska Scharf, M. (2012). Non‐farm employment and incomes in rural Cambodia. *Asian-Pacific Economic Literature*, *26*(2), 54–71.

Rahut, D. B., Mottaleb, K. A., & Ali, A. (2018). Rural Livelihood Diversification Strategies and Household Welfare in Bhutan. *The European Journal of Development Research*, *30*(4), 718–748.

Rehan, S.F & Backman,S. (2019). The determinants and purpose of income diversification of rural households. *International Journal of Agricultural Resources, Governance and Ecology*, *15*(3), 232–251.

Saba, S., Sarkar, A.R., Gow, J. (2022). Determinants of non-farm income diversification strategies and decisions of-farm households. *Elsevier: Economic Analysis and Policy*, *76*, 226–235.

Singh, R. D., Tewari, P., Dhaila, P., & Tamta, K. K. (2018). *Diversifying livelihood options of timberline resource dependent communities in Uttarakhand Himalayas: Conservation and development implications*.

Tedla T. W & Mekonen D. K. (2019). The Situation of Rural Youth Livelihood Diversification and Its Determinants in North Western Ethiopia. *Research on Humanities and Social Sciences*, *9*(23), 14–24.

Toyin, M.E & Abbyssiania, M. (2017). Income Diversification and its Determinants among Households in South Africa. *Journal of Economics and Behavioral Studies*, *8*(6).

Tsegay, K., Fan, H., Shifare, H., & Adikari, P. (2021). Does credit access matter for household livelihood diversification in Ethiopia?: An evidence from logistic regression model. *International Journal of Business Ecosystem & Strategy (2687-2293)*, *3*(2), 51–61.

Tshering, K., & Thinley, P. (2017). Assessing livestock herding practices of agro-pastoralists in western Bhutan: Livestock vulnerability to predation and implications for livestock management policy. *Pastoralism*, *7*(1), 5.

Wang, L & Ruan, J. (2024). Cultural diversity, social network, and off-farm employment: Evidence from China. *International Review of Economics and Finance*, *89*, 581–596.

Wanjara, A. O., & Ogembo, P. O. (2023). Impact of Climate Change on Health and Livelihoods of Pastoral Communities in Kenya: A Case of North Eastern Region. *Indonesian Journal of Social and Environmental Issues* (*IJSEI*), 4(3), 299-315.