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Factors affecting vegetable farmers' participation in the formal credit program and intensity of borrowing in Kavrepalanchok district, Nepal: A Double Hurdle Approach

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Abstract

The Agriculture Development Strategy (2015–2035) identifies credit as a key instrument for enhancing food security and reducing poverty. The Government of Nepal has prioritized agricultural financing by implementing an interest-subsidized credit program. However, there is limited understanding regarding the factors that influence farmers' decisions to participate in credit programs. This study examines the determinants of access to agricultural credit among vegetable farming households of Kavrepalanchok district, Nepal. A total of 166 vegetable farming households were interviewed, and data were analyzed using the Double hurdle model. The results revealed that information about the credit scheme and the amount of non-farm income significantly and positively influenced farmers' decisions to participate in the credit program, while occupation had a negative effect. Furthermore, the intensity of borrowing by households was positively associated with the investment plan, credit experience, and family size, whereas the interest rate negatively affected loan amounts. These findings underscore the need to enhance farmers' capacity to formulate investment strategies, diversify income sources, and conduct financial literacy programs to raise awareness about credit programs for improving credit access.

Keywords: Credit access, subsidy, agriculture credit, vegetable farming, credit Information, financial institution

Introduction

Farmers in low-income regions have low savings and limited equity, making access to credit for commercialization, risk resilience, market development, and increasing competitiveness (MOAD, 2016). Credit facilitates investment in modern agricultural technologies, which can enhance productivity and reduce vulnerability to poverty and food insecurity (Dahal and Thapa, 2020; NRB, 2019b). Providing appropriate financial services is therefore critical for Sustainable Agricultural Development (NRB, 2019a).

According to Diagne et al. (2000), access to credit improves the well-being of farming households by enabling them to purchase inputs during periods of low cash flow, thereby increasing labor and agricultural productivity. Farmers with access to credit achieved higher productivity compared to those without, although not all credit-seeking farmers obtained credit, highlighting a constraint in credit access (Awoitde et al., 2015). The agriculture census 2021 revealed that only 12% of agricultural holdings in Nepal have obtained formal credit (NSO, 2023).

Recognizing the challenges, agricultural credit has become a priority for public policymakers in Nepal. The Agriculture Development Strategy (ADS) identifies credit as a determinant of competitiveness. To address this, ADS aims to implement the Secured Transaction Act 2006, enabling movable assets, future crops, and intangible goods to serve as collateral (MOAD, 2016). Similarly, the Agribusiness Promotion Policy-2063 facilitates credit access by accepting farmers' groups as guarantors and agricultural businesses as collateral (MOAC, 2006). In 2018/19 AD, the government introduced the "Interest subsidy for the concessional loan program, 2075", expanding subsidized loan programs to include commercial agriculture (NRB, 2019a, 2019b).

Policy efforts from the Government of Nepal have significantly expanded agricultural credit disbursements. Between 2012/14 and 2018/19, credit from commercial banks to the agriculture sector grew by 167% (Dahal and Thapa, 2020; Dumre et al., 2020; MoF, 2018). and by mid-January 2023, a total of NRs. 141 billion had been disbursed through concessional loan programs (NRB, 2023). In Fiscal Year 2020/21 alone, NRs. 100.104 billion in credit was allocated to the agriculture sector in Bagamati province (NRB, 2022a). However, this aggregate growth masks significant spatial inequality in credit distribution. Despite Kavrepalanchok district being the largest vegetable-producing district in Bagamati province—contributing 22.6% of the province's total vegetable production, it received only NRs. 4,569.24 million, representing a mere 4.56% of the province's total agricultural credit allocation (MOALD, 2023; NRB, 2022a). This disproportionate distribution, where

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production contribution exceeds credit allocation by nearly fivefold, highlights critical misalignment between agricultural productivity and financial resource allocation, raising questions about equitable access to institutional credit for commercially active farming communities.

Prior studies have identified a range of factors influencing participation and borrowing intensity decisions. Collateral remains a major constraint for smallholder farmers and small enterprises (Isaga, 2018; Duy et al., 2012). Other influential variables include education, age, social capital, diversity of crops, access to extension services, adults in a farming household, non-agriculture income, distance to the farming area, having livestock, farm size, awareness of banks and financial institutions, and family size (Moahid and Maharjan, 2020; Qin et al., 2019; Awotide et al., 2015; Benjamin et al., 2015; Duy et al., 2012; Doan et al., 2010). In the Nepalese context, land size, cultivated area, age, number of adults, years of schooling, and gender (Pandey and Timilsina, 2024; Choudhary et al., 2021); education, training, extension services (Singh et al., 2024), organization/cooperative membership (Dhakal et al., 2021), food security, and income (Upadhyay et al., 2020) were key determinants of decisions regarding credit participation and intensity of borrowing.

For credit programs to be effective, efficient, and equitable, it is crucial to understand the socioeconomic barriers that prevent farmers from accessing credit. Such insights are essential for Nepal Rastra Bank and financial institutions to design inclusive policies and targeted interventions that address information asymmetries and develop equitable access mechanisms. While previous research, such as Mishra (2021) and Upadhyay et al. (2020), has explored the usage of credit, there has been limited investigation into the determinants of credit participation and intensity of borrowing. Hence, this study seeks to address the gap in empirical understanding of farmers' access to credit in Nepal, with a focus on Kavrepalanchok district in Bagamati province. Using household survey data from commercial vegetable farmers, this study examines the socioeconomic factors influencing both participation in formal credit programs and intensity of borrowing. The findings aim to inform policy decisions by identifying strategies to expand credit access for commercial farmers and streamline the credit disbursement process.

Materials and methods

Study area

The Kavrepalanchok district is a hub for vegetable production in the Bagmati Province, Nepal. The total cultivable land of Kavrepalanchok is 61,598 hectares (ha), out of which 10,028 ha is under commercial fresh vegetable production and 9,159 ha is under potato cultivation, which is the highest among all districts of Bagmati province (MOALD, 2023). Panchkhal and Panauti municipalities are recognized as agricultural hubs within the district. Consequently, these two municipalities were purposively selected for the study.

Sample size determination and data collection

According to the "Interest Subsidy for the Concessional Loan Program 2075," each branch is mandated to disburse a minimum of 10 credits annually under the Interest-subsidized scheme (NRB, 2019b). There were 94 branches of commercial banks in Kavrepalanchok (NRB, 2022b). Therefore, with 940 credit recipients each year and considering seven years had passed since the program's initiation, the total number of credit recipients should be 6,580. The program has agriculture as one of the focused credit disbursement areas, among ten programs. Assuming that agriculture constituted 50% of this quota annually, and the population to be targeted was estimated at 3,290 agricultural credit recipients. Based on the estimated population and 10% error tolerance, the sample size was calculated using the Yamane (1967):

$$n = \frac{N}{1+Ne^2} \qquad \text{[Equation 1]}$$

Where n= sample size

N= number of recipients,

e = error tolerance (0.1 for this study)

The required sample size was calculated to be 95. The study initially aimed to collect data from 95 credit recipients and 95 non-recipients for comparison. However, due to COVID restrictions at the time of fieldwork, data were collected from 92 credit users and 74 non-credit users, resulting in a final sample of 166 vegetable farming households. Bank and financial institutions did not provide a list of recipients due to privacy concerns. Therefore, an enumeration with screening was followed to address sampling frame limitations. Credit participant households were identified by visiting farming households and only households that utilized credit from banks and financial institutions. From identified credit users, 92 households willing and available to participate were interviewed. Non-credit users were

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selected through simple random sampling from household lists in the same villages to ensure comparability with credit participants.

Secondary data on the amount of concessional credit disbursed at the national, provincial, and district levels was obtained from Nepal Rastra Bank's report. Data on agriculture production and productivity were sourced from reports prepared by the Ministry of Agriculture and Livestock Development, Nepal, and demographic data were obtained from the National Statistics Office.

Analytical method

Two aspects of credit were analyzed in this study: a) the determinants of the decision to participate in credit, and b) the intensity of borrowing from banks and Financial Institutions (BFIs). These two aspects have been addressed by the Double Hurdle (DH) model given by Cragg (1971) and used by researchers such as Aditya et al. (2020); Moahid and Maharjan (2020); Woldekidan et al. (2017); Mal et al. (2013); Duy et al. (2012). In this approach, households must pass two separate hurdles before a positive loan amount is observed: a participation decision (to borrow or not) and a consumption/intensity decision (how much to borrow), each with its own latent equation and potentially different determinants (Moahid and Maharjan, 2020; Duy et al., 2012). An alternative for the DH model is the Heckman selection model (Heckman, 1979), which treats zero outcomes as arising only from the first stage. Once an individual passes the first hurdle, the outcome is assumed to be strictly positive; zeros are interpreted as unobserved (truncated) values rather than optimal corner solutions.

For that reason, the Heckman model (Heckman, 1979) is most appropriate when all observed zeros are due to non-participation or data truncation, not when individuals may choose zero even after having access or after passing the first hurdle. By contrast, the DH model explicitly allows zero observations to arise from either non-participation or from the intensity decision, relaxing Heckman's restriction and permitting censoring at both stages (Odhiambo et al.,2023; Moahid and Maharjan, 2020; Abu et al.,2017; Von Cramon-Taubadel and Saldias, 2014; Duy et al., 2012). In rural credit markets, households may choose not to participate (no loan application) or to demand zero/very low amounts even when they have access, if they expect no utility gain, face high interest rates, lack collateral, or anticipate being rationed (Barslund and Tarp, 2008). Researcher therefore argue that credit access and loan size are conceptually distinct processes, and that the same variables need not affect them in the same

way or with the same magnitude (Odhiambo et al., 2023; Fonke, 2021; Aditya et al., 2020) Therefore, according to the DH model, the first hurdle analyzes the decision to participate in credit, and the second Hurdle defines the decision regarding the intensity of borrowing. Consequently, the probit model determines the factors for participation, and the Tobit model analyzes factors affecting the amount of credit.

$$Y_1 = \alpha Q_i + V_i \ldots \quad \text{[Equation 2]}$$

$$Y_2 = \beta X_i + U_i \ldots \quad \text{[Equation 3]}$$

$$Y = \beta X_i + U_i \; if \; Y_1 > 0 \; and \; Y_2 > 0 \ldots \quad \text{[Equation 4]}$$

$V_i \sim N(0,1)$ and $U_i \sim (0, \sigma^2)$

The DH model censors each step of the model, relaxing the assumption that the loan amount is positive once the household participates in credit (Moahid and Maharjan, 2020; Duy et al., 2012). The first Hurdle is Equation 2, as the first step that any firm has to take is deciding whether to participate in the credit program of Banking and Financial Institutions (participation decision). Y_1 is the latent variable that explains the farmer's decision to take credit; α is the vector of the parameters to be estimated, and Q_i is the set of regressors that affect the participation decision.

The second equation (Equation 3) explains the second Hurdle, which concerns the intensity of borrowing. Y_2 is the latent variable that shows the intensity of borrowing; β is the vector of unseen parameters to be estimated, and X_i is the set of regressors that shows the individual's decision regarding the intensity of borrowing. U_i is an unnoticed random variable explaining all factors other than X_i that affect the decision about the amount of credit. The dependent variable Y is the observed loan size, which is only observed when the two hurdles are positive. Log transformation of the loan amount value has been used in the analysis to compress large values, reduce the influence of outliers, stabilize the variance and make the relationship linear (Changyong et al., 2014).

The equation is assumed to be independent; thus, the error terms V_i and U_i are randomly and independently distributed with constant variance and zero mean (Mal et al., 2013). The likelihood function for the DH model is given below, where the probability of individual I taking credit is given by P ($Vi > -\alpha Q$), the probability of obtaining a certain credit amount, and f ($Y_i \mid U_i > -\beta X_i$) models the distribution of the credit amount of those who decide to participate.

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$$L = \Pi_1 P(V_i > -\alpha Q_i)\, P(U_i > -\beta X_i)\, f(Y_i | U_i > -\beta X_i)\, .\Pi_0(1 - P(V_i > \alpha Q_i)\, P(U_i > -\beta X_i)\ldots \quad \text{[Equation 4]}$$

Description of the variables used in the model

This section explains the variables and their expected effect on participation and the number of borrowing decisions (Table 1). Previous studies have identified a diverse range of factors such as the diversity of crops cultivated, access to extension services, adults in a farming household, non-agricultural income, distance to farming area, livestock, farm size, and family size, all of which influence the intensity of borrowing and participation decisions (Moahid and Maharjan, 2020; Duy et al., 2012; Doan et al., 2010).

Table 1. Variables used in the model

Dependent variables	Description
Credit obtained	1 = If the household had obtained formal credit 0 = otherwise
Credit amount	Amount of credit obtained in NRs.
Independent variables	
Formal education	Years of formal education of the respondent
Area	Size of the cultivable land in hectares
Family size	Number of family members
Age	Age of the household head
Commercial farm experience	Years of commercial vegetable farming experience of the household head
Owned area	The area under farming, owned by the respondent, in hectares
Interest in the credit	The interest rate charged on the principal amount in %
Amount of non-farm income	Amount of non-farm income in NRs.
Credit experience	1 = If respondent had a history of using formal credit, 0 = otherwise
Occupation of the household head	0 = No other occupation except vegetable farming only, 1 = vegetable farming and other sector occupation such as poultry, goat, retail
Investment plan	0 = No other sector investment except vegetable farming, 1= vegetable farming and other sector investment (household need, construction, education, etc.)
Information on the credit scheme	1= If the respondent has access to information about the credit program, 0 = otherwise
Membership	• Farmers group, • Cooperatives, • Members of both

Education is expected to positively influence participation and the amount of credit. Educated people are better equipped to process information and make productive use of the credit they obtain (Balkhenhol and Schutte, 2001). A large family size is expected to increase the credit amount; however, this variable is omitted from the participation decision. A larger family has a higher credit need because they require a larger production area and have higher household expenses. Having a higher number of family members also ensures labor availability within the household, which decreases credit risk (Moahid and Maharjan, 2020). Non-farm income and occupation are expected to have positive and significant relationships with participation and the amount of credit. A diversified income source increases a family's ability to repay credit on time, thus increasing access to credit and making farmers resilient (Awotide et al., 2015). The coefficient of age is expected to bear a positive sign. Older households demand less capital and take less initiative in developing new ventures. Younger people are more actively engaged in local organizations and better informed about credit sources (Luan and Bauer, 2016; Von Cramon-Taubadel and Saldias, 2014).

The total farm area and owned area are expected to bear a positive sign in participation and amount of credit. Higher cultivable land demands higher farming input (Moahid and Maharjan, 2020). On the contrary, an owned area indicates wealth and acts as collateral to obtain credit (Duy et al., 2012). Farming experience is expected to positively influence participation decisions. Experienced farmers take on larger enterprises and have higher credit needs. With long experience working in the agriculture sector and as professionals, farmers have better credit access owing to a strong network in the financial sector and a higher level of trust (Qin et al., 2019). The coefficient of credit experience is expected to be positive. Having previous credit experience informs farmers about banking procedures and criteria for obtaining credit. The history of good financial transactions also increases creditworthiness. Membership in farmer groups or cooperatives is expected to positively influence participation. Being a member of a different group makes farmers aware of credit schemes and increases their network. We included a dummy on purpose, a proxy to capture the intent of farmers on the utilization of agriculture credit: do they intend to invest in the vegetable farming sector only or do they want to spend for other purposes? The assumption here is that most farmers form a plan for credit use before they begin the process of acquiring credit. As a farmer, having the intention to use it for other purposes as well can be a powerful drive to obtain agricultural credit. It does not have any expected signs. Interest in credit is expected to negatively affect the credit amount, as farmers borrow less with a higher interest rate.

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Information about credit schemes is expected to increase the probability of credit participation (Qin et al., 2019; Asante-Addo et al., 2017).

While this study utilizes 14 explanatory variables to assess the determinants of credit participation and amount, there is a potential risk of overfitting due to the relatively high number of predictors compared to the sample size. To mitigate this risk, variables were selected based on prior empirical findings from relevant papers and reports. Nevertheless, the results should be interpreted with caution, and future studies with larger samples are recommended to validate the findings. Variables such as social network, remittance, distance to farm, programs at the local level and private sector, and types of collateral have not been directly included in the paper. Membership in the social group often acts as a way to build up a social network; non-farm income includes the income from remittance (If any); the commercial vegetable farmers were mostly located near major roads in the survey area; Informal credit has been excluded from the study.

Results

The first section provides an overview of the descriptive characteristics of the surveyed households. The second section shows the factors affecting participation and credit amount decisions presented in the Table 4 and Table 5, along with the discussion.

Characteristics of the respondent farm households

Table 2 presents a summary of the descriptive statistics of the farm households. The result shows that 55% and 41% of non-recipients and credit recipients, respectively, earned income from agriculture and the non-agriculture sector, respectively. Most non-recipients (54 %) and credit recipients (51%) had no previous credit experience. The average age of the respondents in both categories was 41 years, and the average family size was five. The average owned area was 0.28 ha and 0.30 ha for non-recipients and credit recipients, respectively.

Table 2. Descriptive statistics of the variables

Variables	Items/unit	Variable type	Non-recipients	recipients	Chi-square test
Occupation of the household head	Agriculture	Categorical	33 (45)	54 (59)	$\chi^2 = 2.73$, p = 0.099
	Both agriculture and non-agriculture		41 (55)	38 (41)	
Credit experience	Yes	Categorical	34 (46)	45 (49)	$\chi^2 = 0.18$, p = 0.673
	No		40 (54)	47 (51)	
Information about the credit scheme	Yes	Categorical	60 (81)	71 (77)	$\chi^2 = 1.44$, p = 0.486
	No		14 (19)	21 (23)	
Membership	Farmers group	Categorical	12 (16)	10 (11)	
	Cooperatives		36 (49)	52 (56)	
	Both		26 (35)	30 (33)	
Investment plan	Investment in Vegetable farming only	Categorical		44 (47.8)	
	Vegetable farming and other sector investment			48(52.1)	

Note: The figures in parentheses indicate percentages

Although many respondents had been engaged in farming for many years, the average farm experience on a commercial scale was 5–6 years. The revenue generated by non-recipients and credit recipients was NRs 1.32 million and NRs 1.5 million, respectively. The average credit amount obtained was NRs 1.89 million, and the average compound interest rate was 7.12 % per year (Table 3).

Agricultural credit borrowing decision: Double hurdle model

Table 4 presents the results of the double-hurdle model used to examine the determinants of access to formal credit. In the first hurdle, representing the participation decision, the variables' information on the credit scheme and non-farm income were found to have a positive and significant effect. A one-unit increase in non-farm income increases the probability of credit participation by 2 % points, whereas having information about the credit scheme increases the probability of participation by 42 %. Similar information was obtained by Qin et al. (2019); Asante-Addo et al. (2017); Anang et al. (2016); Muhongayire et al. (2013). In Nepal, Mishra (2021) found an insignificant relationship of non-farm income with formal credit use in the far western region, whereas Singh et al. (2024) found significant to formal credit use among rice farmers. Farmers with greater knowledge of credit schemes and higher non-farm income are more likely to participate in credit programs.

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Table 3. Descriptive statistics of the continuous variables

Variables	Unit	Non recipients	Credit recipients	t- test
Age	Years	41.14 (11.28)	41.52 (9.41)	t = -0.23, p = 0.817
Year of education	Years	7.82 (4.88)	8.98(4.67)	t = -1.55, p = 0.123
Family size	number	5.47 (1.96)	5.25 (1.66)	t = 0.77, p = 0.443
Owned area	hectare	0.28 (0.24)	0.30 (0.28)	t = -0.50, p = 0.621
Farm experience (commercial)	Years	6.03 (4.4)	5.87 (3.6)	t = 0.25, p = 0.801
Annual non-farm income	NRs.	235081 (398917.1)	210069 (304769.1)	t = 0.45, p = 0.657
Annual farm revenue	NRs.	1321161.5 (12266604)	1550765.5 (1368777)	t = -0.16, p = 0.873
Credit amount	NRs.		1892934.8 (2530208)	
Interest rate	% p.a.		7.12 (4.4)	

Note: The figures in parentheses indicate standard deviations

*** significant at 1%, ** significant at 5%, * significant at 10%

Conversely, the occupation of the household head demonstrated a negative but significant relationship with participation decisions; engaging in agriculture and non-agriculture jobs decreases the probability of credit participation by 27% points, indicating that farm households that are engaged in non-farm occupation along with agriculture were less likely to participate in credit programs than households that engaged only in agriculture. Similar results have been obtained by Amegnaglo et al., (2024); Berhe, (2022), and Nguyen et al., (2021).

Table 4. Factors affecting credit participation decisions

Variables	Marginal Effect (ME)	Standard Error (SE)	p>|z|
Age	0.02	0.05	0.47
Years of formal education	0.06	0.08	0.42
Area	-0.02	0.10	0.97
Farm experience	0.05	0.13	0.70
Credit experience	-0.45	1.021	0.65
Amount of non-farm income	0.02	0.07	0.05**
Occupation type	-0.27	0.09	0.04**
Information on the credit scheme	0.42	0.07	0.00**
Membership			
Farmers group	0.20	0.20	0.31
Cooperatives	0.19	0.14	0.18

Note: P>|z| is the probability of observing the z-test statistic under the null hypothesis, with the e predictor regression coefficient set to zero, given that all other predictors are in the model.

*** significant at 1%, ** significant at 5%, * significant at 10%

In the second hurdle analysis result, marginal effects on the expected log credit amount are very close to the underlying coefficients due to the linear specification and limited truncation effect. So, Marginal values are only reported in Table 5. The analysis reveals that interest rate, family size, credit experience, and investment planning significantly influence the intensity of borrowing. Table 5 shows that a one-unit increase in interest rate decreases the log of credit amount by 0.11 units, approximately an 10.4% decrease. The interest rate exhibited a negative and significant effect on the credit amount, underscoring that higher borrowing costs act as a deterrent for farmers. This result is in line with findings by Amanullah et al. (2020); Assogba et al. (2017); Muhongayire et al. (2013) and Ololade and Olagunju (2013), who identified interest as a constraint to credit access. Although the Nepal Rastra Bank has introduced concessional credit schemes to mitigate the barrier (NRB, 2019b), interest rates still play a critical role in influencing borrowing behavior.

Similarly, each additional family member increases the log of credit amount by 0.14 units, approximately a 15% increase in credit amount. The result is in line with Rizwan et al. (2019) and Anang et al., (2016). Having an investment plan increases the log of credit amount by 0.47 units, about a 60% increase in credit amount. The results also indicate that having prior credit experience increases the log of credit amount by 0.28 units, approximately a 32%

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increase. The result is consistent with Lelisho and Lelisho, (2024); Jisha and Palakkeel (2023) and Awotide et al., (2015).

Table 5. Factors affecting the intensity of borrowing decisions

Variables	Coef.	Marginal Effect (ME)	Standard Error (SE)	p>|z|
Owned area	0.32	0.32	0.30	0.28
Age	-0.006	0.06	0.08	0.46
Family size		0.14	0.05	0.002***
Investment plan		0.47	0.16	0.003***
Credit experience		0.28	1.01	0.06*
Interest rate		-0.11	0.01	0.00***
Amount of non-farm income		0.05	0.01	0.36
Years of formal education		0.06	0.01	0.74
Occupation type		-.33	0.1	0.72
No. of observations		166		
LR chi-square		87.05		
Prob > chi square		0.000		
Pseudo R2		0.19		
Log likelihood		-196.43		

P>|z| is the probability of observing the z-test statistic under the null hypothesis, with the e predictor regression coefficient set to zero, given that all other predictors are in the model.

Option coded as 0 is the reference variable for occupation type, information on credit scheme, investment plan, and credit experience; option coded as 1 is the reference variable for membership

***significant at 1%, ** significant at 5%, * significant at 10%

Discussion

Non-farm income plays a crucial role in credit participation decisions, as it can enhance borrowers' perceived creditworthiness and may serve as collateral or provide confidence in borrowers' repayment capacity. Since agricultural income is often unstable, additional income sources can mitigate credit risk, instill lender confidence, and improve loan eligibility (Qin et al., 2019; Chandio et al., 2018; Asante-Addo et al., 2017; Muhongayire et al., 2013. According to OECD (2013), financial institutions prioritize borrowers' repayment capacity and aim to reduce credit risk. Higher non-farm income improves this capacity and may allow borrowers to accumulate collateralizable assets (Key, 2020a).

Furthermore, having information about the interest-subsidized credit scheme was highly significant and positively related to participation decisions. The findings align with Duy et al. (2012), who emphasized that awareness and understanding of credit procedures increase the

likelihood of engagement. Information access equips farmers with knowledge to navigate the formal banking system, comply with regulatory requirements, and present themselves as more reliable borrowers. Petrick (2004) further asserts that informed farmers are perceived as more creditworthy, enhancing their chances of securing credit.

Occupational diversification makes households less credit-constrained and reduces agricultural credit demand (Nguyen et al., 2021). It can also reduce agricultural input investment as they rely less on credit-financed farm intensification (Berhe, 2022). Among diversified households, higher non-farm income signals greater creditworthiness and capacity to overcome participation barriers (Key, 2020b). Agricultural-specialized households have higher baseline participation, yet the positive income effect operates consistently across both occupation types. Decomposition of the amount of non-farm income showed that among the respondents who received credit, respondents with only agriculture as occupation on average had Rs 98, 817 non-farm income, whereas respondents having both agriculture and non-agriculture profession had Rs 3,68,162 non-farm income.

Family size had a positive and significant relationship with the intensity of borrowing. Larger households typically have greater financial needs, both for household consumption and agricultural production, thereby increasing their credit demand (Rizwan et al., 2019; Benjamin et al., 2015). Mishra (2021) found family size results in the study of the far western region of Nepal. He argues that a larger number of families have a good network, which helps to obtain a higher credit amount.

Additionally, a well-defined investment plan was positively associated with higher credit amounts. Farmers planning to allocate credit to non-agricultural ventures, such as small businesses, education, or family events, were more likely to secure larger credit. Credit utilization often extends beyond agricultural inputs to cover working capital, fixed investments, healthcare, and social obligations. In such contexts, credit serves as a critical financial tool for managing economic fluctuations and fulfilling both livelihood and production needs (Saqib et al., 2018).

Credit experience has a positive and significant effect on the intensity of burrowing. Farmers with established loan repayment histories increases probability of receiving loan approvals over time, whereas those with limited credit history face barriers and are considered high-risk. Bank officials look for applicants with a history of borrowing to reduce the risk and use the criteria in screening (Kamugisha et al., 2025; Rotimi et al., 2024). Having experience also makes the application process, as well as utilization, easier and can secure a larger loan (Lelisho & Lelisho, 2024).

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The study examined the socioeconomic factors influencing both participation in and the amount of formal agricultural credit accessed by vegetable farmers in the Kavrepalanchok district. The double-hurdle model analysis revealed that access to information about the credit scheme and non-farm income significantly increased participation in formal credit programs, while reliance solely on farming as an occupation negatively influenced participation. Furthermore, investment intent, credit experience and family size positively impacted the amount of credit, whereas higher interest rates adversely affected the borrowed amount.

Conclusion and policy implication

These findings indicate that barriers to credit access and adequacy are both informational and structural. Farmers with diversified income sources, larger farm operations, and better access to credit-related information are more likely to secure credit, whereas those with limited assets or sole reliance on farming face exclusion. Policymakers should prioritize three key interventions: (i) establishing community-based credit information dissemination programs leveraging agricultural extension networks and local cooperatives, as information availability shows the strongest impact on participation (42% points); (ii) designing occupation-responsive credit products that recognize non-farm income as legitimate collateral and repayment sources, addressing Nepal's diversifying rural economy; and (iii) linking credit programs with technical assistance for investment planning while reducing land-based collateral requirements to include smallholders and tenant farmers. Effective implementation requires coordination between financial institutions, agricultural extension services, and local governance structures to ensure systemic reform beyond mere interest rate subsidies. The study can open an avenue and guide future research. This research focuses solely on formal credit sources and commercial farmers in the mid-hill region, without accounting for the broader socioeconomic diversity across Nepal. Future research can explore various geographical regions, credit types (subsidized and non-subsidized/formal and informal), and institutional arrangements to assess the broader effectiveness of credit delivery and the role of informal credit systems in promoting inclusive agricultural development.

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Declaration of conflict of interest

The authors declare no competing interests.

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