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Determinants of Loan Repayment Performance of Smallholder Farmers in Debark Woreda, Northwest Ethiopia

Degif Desalegn Mulatie[a], Tadele Kassahun Wudu[b]

[a]College of Agriculture, Department of Agricultural Economics, Debark University, Ethiopia

[b]Collegeof Natural and Computational Science, Department of Statistics, Debark University, Ethiopia

Email: degifatdku@gmail.com

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Abstract

Agricultural credit plays a vital role in enhancing productivity and improving the livelihoods of smallholder farmers; however, poor loan repayment performance continues to threaten the sustainability of rural financial institutions. Despite the expansion of formal credit services, loan default remains a persistent challenge among smallholder farmers in Debark Woreda. This study intended to examine the determinants of loan repayment performance among smallholder farmers in Debark Woreda. A multi-stage sampling technique was employed to select 94 smallholder farmers. Primary data were collected through structured interviews, and secondary data were obtained from institutional reports and relevant documents. Descriptive statistics were used to investigate household characteristics, while a binary logistic regression model was applied to examine factors affecting loan repayment performance. The empirical results indicatethat age, education level, marital status, access to extension services, and total household income have a positive and significant effect on loan repayment performance. In contrast, family size, distance from the lending institution, and loan size negatively and significantly affect repayment behavior. The model explains approximately 68% of the variation in loan repayment performance, indicating strong explanatory power. The study concludes that loan repayment performance among smallholder farmers is determined by both borrower characteristics and institutional factors. Strengthening farmers' education and financial literacy, improving extension service delivery, tailoring loan sizes to repayment capacity, and enhancing

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Corresponding author: degifatdku@gmail.com

access to rural financial services are suggested to reduce default risks and promote sustainable agricultural credit systems.

Keywords: loan repayment,determinants, logit model, smallholder farmer, North Gondar.

1. Introduction

The economic growth of developing countries depends to a great extent on the growth of their agricultural sector. Developing countries are characterized by a predominantly subsistence agrarian economy. Agriculture plays a vital role in the economic development of developing countries by providing food, employment, raw materials, and income for rural households. Ethiopia is one example of a country whose economy depends substantially on agriculture, which is dominated by smallholder and largely subsistence-oriented farming systems(Apelike *et al.,* 2021). However, smallholder agriculture is often characterized by limited landholdings, traditional way of production what they perform, low productivity, and insufficient financial resources. These constraints limit farmers' ability to purchase improved seeds, fertilizers, pesticides, and other agricultural inputs essential to boost production and productivity(Shikur, 2020).The nature of farming in Ethiopia is dominated by traditional micro holdings of the subsistence type, with less than two hectares of land being the average holding (Guja, 2022). The principal components of the sector's output are food crops, livestock, and livestock products. Small farmers work on 96.3% of the total cultivated area and produce over 95 percent of the national crop production, whereas private investors and state farms work on the rest. Smallholder farmers cultivate a considerable proportion of the country’s agricultural land and contribute substantially to national crop production(Deputy*et al.,* 2016). However, their production and incomegenerating capacity may be constrained by limited access to finance, low agricultural productivity, exposure to climatic shocks, and inadequate market opportunities.

According to Salesio & Geofrey (2023), one of the major challenges facing smallholder farmers is limited access to the capital required to finance agricultural production. This constraint does not arise from subsistence farming alone; rather, it may result from low and unstable crop yields, dependence on rainfall, limited market access, fluctuating agricultural prices, rising input costs, and insufficient household savings. When farm income is low or seasonal, farmers may be unable to save enough to purchase improved seeds, fertilizer, pesticides, and other essential inputs before the next production season(Pandey, 2022). Consequently, access to appropriate

agricultural credit can help farmers overcome liquidity constraints, invest in productive activities, and improve their production and income(Adesiyan, 2025).

In response to these financial constraints, formal financial institutions provide credit and other services to rural households and smallholder enterprises(Chen, 2025). Such services can support investment in agricultural inputs, livestock, and other income-generating activities. Access to suitable financial services is also relevant to the Sustainable Development Goals (SDGs), particularly Goal 1, which seeks to end poverty in all its forms everywhere(Shikur, 2020). Nevertheless, the availability of credit does not automatically ensure improved household welfare or sustainable agricultural development. The benefits of borrowing depend partly on how loans are used, the returns generated from investments, and borrowers' ability to meet their repayment requirements(Mazengiya *et al.*, 2022).

Credit can contribute to poverty reduction by providing funds for productive investment, supporting employment and income generation, enabling farmers to adopt improved technologies, and also helping households manage liquidity constraints and respond to economic shocks(Monica *et al.*, 2024). However, these benefits depend on whether the borrowed funds are invested effectively and generate sufficient returns to cover production costs, household needs, and loan repayments. So, sustainable agricultural lending requires both appropriate access to credit and clear understanding of the factors associated with repayment performance(Lukšić *et al.*, 2022).

In Debark Woreda, smallholder farmers obtain financial services from formal institutions, such as Tsedey Bank, as well as information obtained from the branch. The reported lending arrangements include group-based lending, through which borrowers may share responsibility for repayment. Group lending can encourage peer monitoring and collective responsibility, but it does not eliminate the risk of repayment difficulties. Farmers may encounter production losses, insufficient income, or other constraints that affect their ability to repay loans on time (Fayisa, 2025).

Moreover, smallholder farmers in Ethiopia often require external finance to purchase agricultural inputs and adopt technologies that could improve productivity(Shikur, 2020). However, limited savings and unstable agricultural income can make it difficult to obtain and repay credit. The

problem intensifies when input prices increase more rapidly than farm income or when farmers have limited opportunities to sell their products at remunerative prices (Bjornlund *et al.,* 2020; Zerssa *et al.,* 2021). Credit can support agricultural development when loan amounts, repayment schedules, and investment opportunities are consistent with borrowers' financial circumstances.

According toBandung, (2025), borrowers involved in the agricultural sector are more defaulters equated with other sectors, similar to industry and service. Likewise, Tesgera, (2019), research result shows urban borrowers have a better repayment rate than rural borrowers. Since there were low repayment performances in rural borrowers, it discourages lender to promote and extending credit to large and fragmented farm households. The failure is partly due to failures to set up and implement prudent and innovative institutional approaches suited to local situations. Additionally, administrative lending procedures, stringent collateral requirements, and high transaction costs made the problem worse(Suryono & Budi, 2020).The credit default problem is a tragedy; it leads to a system failure to implement appropriate lending strategies and credible credit policies. In addition, it discourages financial institutions from refinancing the defaulting members, which puts defaulters again into a vicious circle of low productivity(Ngcai, 2018).

Several factors may influence loan repayment performance, including Borrowers' demographic and socioeconomic characteristics, including age, sex, education, family size, marital status, landholding, and household income, may affect their capacity to manage credit and generate sufficient income for repayment. Institutional factors, such as loan size, access to agricultural extension services, and distance from the lending institution, may also influence repayment behavior. For example, higher household income may improve repayment capacity, whereas large household consumption requirements, high borrowing costs, and long distances to credit institutions may create additional financial pressure. The direction and magnitude of these relationships depend on the circumstances of individual borrowers and the institutional context(Khan *et al.,* 2024). However, the relative importance of these factors may differ across locations and borrower groups. Therefore,it is necessary to examine the determinants of repayment performance within the specific institutional and agricultural context of the study area.

Although formal credit institutions operate in the study area of Debark Woreda, reports obtained from different institutions and households indicate that loan repayment problems persist. Such problems can constrain the sustainability of lending services, discourage lenders from expanding credit services,and reduce opportunities for farmers to access future credit. Although group-based lending arrangements may encourage peer monitoring and collective responsibility, these arrangements do not necessarily eliminate repayment difficulties.

Despite the importance of agricultural credit, understanding the factors associated with loan repayment performance in the local context remains necessary for designing appropriate lending policies and borrower support mechanisms. Evidence on the socioeconomic and institutional characteristics associated with repayment can help financial institutions improve borrower screening, loan allocation, monitoring, and repayment arrangements. It can also inform agricultural extension services and local policymakers seeking to strengthen farmers' productive capacity and financial resilience.

Against this persistent problem,this study intended to examine the determinants of loan repayment performance among smallholder farmers. Specifically, it described the demographic and socioeconomic characteristics of borrowers and assessed the relationships between selected borrowerhousehold characteristics, institutional factors, and loan repayment performance. Understanding the determinants of loan repayment performance,the findings are intended to contribute to a better considerate of repayment behavior, and to inform measures that may improve the sustainability of formal agricultural credit services, designing effective credit policies and support mechanisms in the study area. Hence, this study aimed to assess the loan repayment performance among smallholder farmersin Debark Woreda, North Gondar Zone of Northeast Ethiopia.The findings are intended to inform policies and institutional practices aimed at improving repayment performance and expanding sustainable access to agricultural credit.

1.2. Conceptual Framework

It is conceptualized that loan repayment is influenced directly and indirectly by various factors. Government policy, institutional, and environmental factors are out of the control of farmers. Government policy and environmental factors indirectly influence loan repayment and directly influence farmers' efforts; institutional factors influence loan repayment directly and indirectly. Other factors,like demography and farmer attributes, directly affect loan repayment.

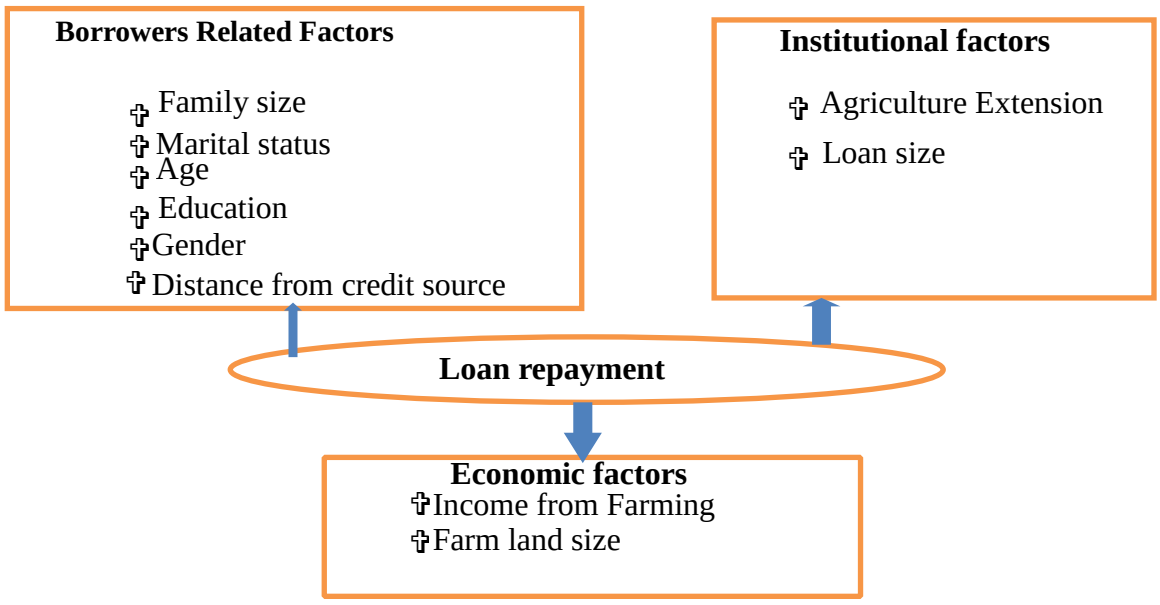


Figure 1: Conceptual frameworkof loan repayment determinants founded on earlier study.

2. Research methodology

2.1. Study area descriptions

The study was conducted in Debark Woreda, North Gondar Zone of Amhara National Regional State. The area shares a border with Dabat woreda in the south, Addi-Arkay woreda in the north, and Jan-Amora woreda in the east. The woreda is located in northwest Ethiopia, 103 kilometers from Gondar and 830 kilometers from Addis Ababa. The woreda is described topographically as consisting of 20% valley, 60% flat land, and 20% mountainous terrain. Based on its topography, itincludes different agro-ecologiesand comprises 15% lowland (Kolla), 43% middle land (Weina Dega), 34% highland (Dega), and 8% moist highland (Wurch). These percentages represent the estimated distribution of different land types within the woreda. The mean annual minimum and maximum precipitation in the area range from 1000 to 2000mm, respectively. The mean annual temperature varies between 8.95^{0}_{C} and 21.14°_{C}. It has a latitude and longitude of 13˚08'N35˚54E with an elevation of 2850m above sea level. According to data from the woreda's agriculture office, there are 33 kebeles and 159,193 people living there: 80,274 men and 78,919 women. In the woreda, subsistence farmers practice a mixed farming system, crop production, and livestock agriculture. So, crop production and animal husbandry are the main livelihoods of farmers based on the data received. The majority of fields are devoted to crop production. The major field crops

grown in the study area are wheat, barley, potato, garlic, pea, bean, and others. From these crops, Wheat is the dominant crop, covering 5,200 ha, followed by barley. However, inadequate infrastructure and weak institutional support make the area one of the drought-prone and chronically food-insecure parts of the Zone (DWAO, 2025/26, unpublished).

2.2. Research approach

This study employed a mixed research approach to examine the relationship between loan repayment performance and demographic, socioeconomic, and institutional characteristics of smallholder farmers. The approach was appropriate because the study used structured household survey data and numerical variables that could be summarized, triangulated to validate the data, and analyzed statistically. The quantitative approach allowed us to describe borrowers' characteristics, compare categories of respondents, and estimate the associations between the explanatory variables and loan repayment performance, and also provided a consistent basis for evaluating the statistical significance of the relationships examined. A qualitative approach has provided additional insights into borrowers' experiences, trust in lending institutions and in institutional dynamics, grouplending dynamics, and social pressures affecting repayment. However, the study was designed mainly to examine measurable relationships using household survey data. Consequently, the findings are mainly interpreted as quantitative evidence about the variables included in the analysis, rather than a complete explanation of every behavioral or institutional factor influencing repayment.

2.3. Research design

The study adopted a cross-sectional research design, where data were collected from sample households at one point in timeduring the production year of 2025/26. This design was suitable because it allows assessment of loan repayment behavior and associated factors during a specific production year. The design also enables efficient comparison between defaulters and non-defaulters.

2.4. Data type and source

In order to collect reliable data, both primary and secondary data were used for this study to get firsthand information about determinants of loan repayment performance. The primary source of data was collected from the sample respondents of smallholder farmers benefiting from the formal credit service directly through face-to-face interviews and a household interview schedule,by explaining the purpose of collecting the information to obtain reliable data in order

to triangulate the survey data.Whilesecondary data was obtained mainly from publications, seasonal and annual reports of woreda, zone, and regional offices of Agriculture through reviewing, examination of documents, reports, and records of published documents.The data collection process was carried out under the close supervision of the researcher. In addition, lending procedures, monitoring system, problems of defaulting, and legal enforcement mechanisms and executions of the decisions were collected from woreda cooperative promotion office, Woreda Tseday Bank Branch Office.

2.5. Sampling technique and sample size determination

A multi-stage sampling technique was used to select the study area and respondents.At the First stage,Debark Woreda was selected purposively due to its high participation in formal agricultural credit programs and the presence of repayment performance challenges. In the Second stage, four kebeles (Mikara, Kino, Gondar Bar, and Dib Bihar) were purposively selected based on the concentration of formal credit users. In the third stage, lists of smallholder farmers who borrowed from formal credit institutions were obtained from lending institutions. From these lists, individual respondents were selected using simple random sampling, ensuring each borrower had an equal chance of inclusion.This procedure helped reduce selection bias and ensured the representativeness of credit-using farmers. Then,by using Yamane formula (1967) with a 95% confidence level, 94 respondents were selected using a simple random sampling technique, taking into account the probability proportional to size of borrowers in such a way that each member of the population had the same chance of being included in the sample. Therefore, based on the Yamane formula, the sample size is given by:

$n = \frac{N}{1+N(e)^2} = \frac{122}{1+122(0.05)^2} = 94$

Where: n = sample size, N = total number of credit users

e = level of precision (error level) at 95% confidence level (to reduce sample size because of resource constraints, i.e., budget, time, manpower, and other facilities).

Then, by using proportionality, the number of respondents from the four available kebeles is as follows

$n1 = \frac{N1}{N} \times n = \frac{35}{122} \times 94 = 27$ Where n_1=sample size from Mikara kebele

$n2 = \frac{N2}{N} \times n = \frac{31}{122} \times 94 = 24$ n_2=sample size from Kino Kebele

$n3 = \frac{N3}{N} \times n = \frac{26}{122} \times 94 = 20$ n_3= sample size from Gondar Bar Kebele

n4=N4/N*n=30/122*94=23 n_4=sample size from Dib Bihar

Then, $N=35+31+26_{+30}=122$

Table 1: Sample distribution of smallholder farmers

Name of kebeles	Total number of borrowers	Sample borrowers
Mikara	35	27
Kino	31	24
Gondar bar	26	20
Dib Bihar	30	23
Total	122	94

Source: Kebeles Administration and own computation (2025/26).

2.6. Methods of data collection

A structured and pre-tested questionnaire administered through face-to-face interviews was used for this study. This method was appropriate given the varying literacy levels among respondents. Enumerators were trained, and close supervision was conducted to ensure data quality.

2.7. Data analysismethod

The data analysis was undertaken following the collection of relevant information from both primary and secondary sources. The collected data were coded,entered, and analyzed using STATA version 15**.**

2.7.1. Descriptive Statistics

To achieve the study's general and specific objectives, descriptive statistics such as percentages, frequencies, and tables were used to compare different categories of sample households with respect to the desired characteristics. A t-test was applied to continuous variables, while the chi-square test was used for categorical variables.

2.7.2. Econometric model

A binary logistic regression model was used empirically to assess the loan repayment performance of borrowers. This model was also recognized as a linear regression in the sense that it analyzeda sample in which information on the dependent variable (regressed variable) was not censored. The binary logistic regression model was selected because loan repayment performance, which served as the dependent variable, was a dichotomous outcome**.** To evaluate the repayment performance of borrowers, the variable loan repayment performance (LRP) was used as the dependent variable in the model. In this study, the value of the dependent variable was defined as the repayment ratio, which was computed as the ratio of the amount of loan

repaid to the total amount borrowed. Thus, the value ofthe dependent variable ranged between 0 and 1, taking the value 0 if the borrower was a defaulter and 1 if the borrower was a non-defaulter.The logit regression model is specified as:

$$\underline{\text{Ln (Pi)}}_{(1-\text{Pi})} = \beta 0+\beta 1X1+\beta 2X2+\cdots+\beta 10X10+\varepsilon i$$

Where:Pi=probabilitythat a farmer repays the loan, β0=intercept

βi= coefficients and Xi= explanatory variables and εi= error term

2.8. Research hypothesis and variables definition

2.8.1. Dependent variable

The dependent variable is the loan repayment rate, which is computed as the ratio of the amount of loan repaid to the total amount borrowed. Its value ranges between 0 and 1. Those farmers who borrowed but did not repay the full amount of money that they had borrowed are considered complete defaulters (i.e., the value of the repayment rate in this case is zero), and those who had repaid only partly are non-complete defaulters (it takes a value between 0 and 1). On the other hand, those farmers who repaid all the money that they had borrowed within the stated time are considered non-defaulters (it takes the value 1).

2.8.2. Independent variable

Based on previous studies and the importance of this study, the explanatory variables were selected for this study, and their likely influence on loan repayment performance is presented below.

Age: A continuous variable measured by the total number of years from the respondent's birth until the survey is conducted. The households' age is hypothesized to have a positive association with farmers' loan repayment performance(Owusu, 2017). As the age increases, farmers acquire experience, knowledge, stability, and honesty, which in turn might help them to accumulate wealth over time, which enables borrowers to repay their debt in time than young borrowers. Therefore, it was expected that age would affect loan repayment performance positively.

Sex: A dummy variable, 1 for male, 0 otherwise, and male-headed households was mobility, participated in different meetings, and had more exposure to information (Gallo et al., 2022). Therefore, it was expected that sex would affect loan repayment performance positively.

Family size: A continuous variable refers to the number of people in the same household. Persons who have a large family size may imply self-insufficiency in feeding because large households consume more than do small households(Paul & Peter, 2023). Therefore, the effect of family size on loan repayment capacity was negative.

Education level:A categorical variable;if the farmers can read and write, they increase their ability to obtain, process, and use information. Moreover, education may enable farmers to be more aware of the importance of formal loans and hence may reduce willful default(Mokgomo et al., 2022). Therefore, all things being equal, education is expected to reduce the rate of loan default.

Total land size: A continuous variable representing the total farm size (in hectares) owned by the family. According to Belay (2020), farmers with more hectares of land are expected to be better off in terms of loan repayment performance. Because of other factors of production increasing, large farm size was giving higher production, that was enabling the borrower to repay his/her loan. Therefore, the effect of total land size on loan repayment capacity was Positive.

Get extension agent: A continuous variable representing the number of days per month that the farmer contacts a development agent for technical guidance. The higher the relationship between farmers and development agents, the more the information movements and the technological (knowledge) transfer from the latter to the former(Taylor & Bhasme, 2018).Therefore, the effect of the extension agent on loan repayment capacity was Positive.

Distance from credit source: Borrowers who live farther from the credit source face higher transportation costs to visit the lending institution. These increased costs (both time and money) may discourage borrowers from maintaining regular contact with the lender, making it difficult to follow up on repayment schedules(Mori *et al.,* 2024). Therefore, the effect of distance from the creditsource on loan repayment capacity was negative.

Loan size:A continuous variable, the greater the loan size, the greater the probability of unwilling default (negatively relate with loan repayment). This is because, in the event of production failure, the borrower finds it more difficult to meet repayment obligations out of his /her personal funds(Iqbal & Rao, 2026).

Total Household Income:A continuous variable that represents the combined income of a household from all sources, including crop sales, livestock products, and off-farm activities. Higher total income increases the likelihood of timely repayment and reduces the probability of default(Baidoo et al., 2020). So, it was expected to have a positive effect.

Marital status: A categorical variable; the household heads' marital status was married. There was good performance in access to credit. The marital status of farmers, single, divorced, and widowed, showed low performance in loan repayment capacity(Bhat, 2020). It was expected that married household headswould positively affect loan repayment.

Table 2: Hypothesized predictor variables on credit use

No	Determinants	Continues variable	Categorical variable	Impact on credit use
1	Age	✓		+
2	Sex		✓	+
3	Family size	✓		_
4	Education level		✓	_
5	Land size	✓		+
6	Get an extension agent.	✓		+
7	Distance from credit source	✓		_
8	loan size	✓		_
9	Total Household Income	✓		+
10	Marital status		✓	+

3. Result and discussion

3.1. Demographic results and discussion

Table 3. Sex of respondents

Sex	Frequency (n)	Percentage
Male	68	72.3
Female	26	27.7
Total	94	100

The results show that the majority of respondents were male 68(72.3%), while female respondents accounted for 26 (27.7%). This clearly reflects the male-dominated nature of

agricultural household leadership and formal credit use in rural Ethiopia. Even so, the participation of female farmers is encouraging, signaling that these women are becoming more active in agricultural finance and production decisions. This growing female involvement is important, as it suggests a gradual shift toward more inclusive access to credit. Therefore, the results reflect the composition of the sample rather than establishing institutional progress toward gender inclusion.

Table 4. Age distribution of respondents

Age Category (Years)	Frequency (n)	Percentage
18–30	15	16.0
31–45	49	52.1
46–60	23	24.5
Above 60	7	7.4
Total	94	100

Most respondents,49 (52.1%), were between 31 and 45 years, showing that borrowers tend to be in their most productive working years. Farmers in this age group typically have enough experience to manage agricultural activities while still being flexible and motivated to take loans. Younger farmers (18–30) represented only 16%, which may reflect limited land ownership among youth. Meanwhile, the smaller number of older respondents (above 60) suggests that aging farmers are less likely to engage in borrowing, possibly due to reduced labor capacity or risk aversion.These results indicate that the majority of the selected borrowers fall within the 31 to 45 age range. However, it cannot be concluded that the relatively low number of young people among the respondents is due solely to age. To validate this, factors such as land fragmentation and small landholding size, eligibility for credit, and the overall age distribution within the borrower population are cited as additional evidence. Furthermore, a regression analysis is required to determine whether there is a statistically significant relationship between age and loan repayment performance, while accounting for other relevant explanatory variables.

Table 5. Family size of respondents

Family Size (Number of Members)	Frequency (n)	Percentage
1–3	18	19.1
4–6	54	57.4

Above 6	22	23.5
Total	94	100

More than half of the respondents,54 (57.4%), had a medium-sized household with 4–6 members. This is a common family size in rural Ethiopia, including the study area, where larger families provide more labor for farming activities. However, families with more than six members (23.5%) may face higher consumption pressure and higher food requirements, which can strain household finances and make loan repayment more challenging. Smaller families, although having fewer dependents, may also have limited labor to expand agricultural activities. Thus, family size plays a dual roleboth as a source of labor and as a financial burden. However, the descriptive distribution alone does not establish whether larger households experienced more loan defaults. So, consider and recall the regression results to get more relevant evidence regarding these issues.

Table 6. Education level of respondents

Education Level	Frequency (n)	Percentage
Illiterate	28	29.8
Read &write	21	22.3
Primary (1–8)	30	31.9
Secondary &above	15	16.0
Total	94	100

The findings reveal that 28 (29.8%) of respondents were illiterate, and another 21 (22.3%) could only read and write, indicating that more than half have limited formal education. Education influences how well farmers understand loan terms, manage finances, and use credit for productive purposes. Respondents with primary education (31.9%) and those with secondary or higher education (16%) are generally better positioned to make informed borrowing decisions. This distribution suggests that improving farmers' financial literacy could positively influence loan repayment behavior.The distribution shows variation in educational attainment among sampled borrowers. Based on the survey data, respondents'education supports borrowers' understanding of loan conditions, recordkeeping, and financial decision-making. This supported by the reported regression coefficient for education is positive (0.4123) and statistically significant ($p < 0.001$). This provides evidence of a positive association between education and repayment outcome.

Table 7: Land size of respondents

Land Size (ha)	Frequency (n)	Percentage
Less than 0.5	21	22.3
0.5–1.0	46	48.9
Above 1.0	27	28.8
Total	94	100

The result indicates that 46 (48.9%) of respondents owned between 0.5 and 1 hectare of land, while 27 (28.8%) owned more than 1 hectare. Larger landholdings enable higher agricultural production and income generation, which may improve repayment capacity. Farmers with smaller land sizes,21(22.3%), may struggle to generate sufficient surplus. This suggests that land size may positively influence loan repayment behavior.Landholding size may influence agricultural production and the capacity to generate marketable surplus. However, the reported regression coefficient for land size is 0.0389, with a p-value of 0.455. Therefore, land size was not statistically significant at the 5% level in the reported model. So, we cannot conclude that larger landholdings significantly improved loan repayment performance based on these estimations. That means it may not be a major factor in determining loan repayment behavior.

Table 8:Access to extension services

Extension Access	Frequency (n)	Percentage
Yes	61	64.9
No	33	35.1
Total	94	100

The result shows that 61(64.9%) of respondents had contact with extension agents at least once per month, while 33 (35.1%) did not.Access to regular extension contact improves and helps farmers access improved technologies, obtain technical information, and improve production decisions and farm management practices. This enhances productivity and income, thus improving loan repayment performance. The extent to which this access improved repayment performance was also assessed through the regression results. So, the reported coefficient for extension service access is positive (0.0912) and statistically significant at the 5% level ($p = 0.015$), conditional on the model specification. This finding supports an association between extension access and the repayment outcome.

Table 9: Distance from credit source

Distance (km)	Frequency (n)	Percentage
Lessthan5	39	41.5
5–10	34	36.2
Above 10	21	22.3
Total	94	100

The findings show that 22.3% of respondents traveled more than 10 km to reach the credit institution. Longer distance increases transaction costs and reduces follow-up with lenders, which may negatively affect repayment performance.

Table 10: Loan size obtained by respondents

Loan Size (Birr)	Frequency (n)	Percentage
Less than 10,000	26	27.7
10,000–20,000	45	47.9
Above 20,000	23	24.5
Total	94	100

The result indicates that 72.4% of respondents borrowed more than 10,000 ETB. Although larger loans increase investment potential, they also increase repayment risk, especially under production uncertainty. Implies that loan size negatively affects loan repayment performance.

Table 11:Total household income of respondents (Annual)

Income Level (Birr)	Frequency (n)	Percentage
Less than 25,000	38	40.4
25,000–50,000	45	47.9
Above 50,000	11	11.7
Total	94	100

The results indicate 45 respondents (47.9%) reported annual household income between ETB 25,000 and ETB 50,000. 38 (40.4%) reported income below ETB 25,000, while 11 (11.7%) reported income above ETB 50,000. Household income may influence repayment capacity because it determines the financial resources available to meet household expenses and loan commitments. The reported regression coefficient for total household income is positive (0.0852) and statistically significant at the 5% level ($p < 0.001$). This suggests a positive association between household income and the repayment outcome. So, the finding implies that this combined income variable provides a more comprehensive view of household financial capacity.

Higher total income enhances farmers' ability to repay loans on time because it smooths cash flow across agricultural and non-agricultural sources. Households with lower total income may face financial constraints, increasing the risk of delayed repayment or default.

Table 12: Respondents'marital status

Marital Status	Frequency (n)	Percentage
Married	73	77.7
Unmarried	21	22.3
Total	94	100

The majority of respondents (77.7%) were married, while smaller proportions were unmarried (22.3%). Marital status positively influences credit use and repayment performance, as married households can pool labor and financial resources to support agricultural activities. This collective effort often improves productivity and the ability to meet loan obligations on time. Conversely, unmarried farmers may face higher economic vulnerability due to limited labor and resource-sharing opportunities, which could negatively affect their repayment capacity.

3.2. Econometric model results and discussion

Table 13: Logitregression results for determinants of loan repayment performance

Explanatory Variable	Coefficient	Standard Error	t-value	p-value
Age	0.0452	0.0120	3.77	0.000
Sex	0.0381	0.0295	1.29	0.201
Family Size	-0.0364	0.0192	-1.90	0.061
Education Level	0.4123	0.0785	5.25	0.000
Land Size	0.0389	0.0521	0.75	0.455
Extension Service	0.0912	0.0365	2.50	0.015
Distance to Lending Institution	-0.0765	0.0248	-3.08	0.003
Total Household Income	0.0852	0.020	4.25	0.000
Loan Size	-0.000012	0.000006	-2.00	0.049
Marital Status	0.18	0.0550	3.27	0.002
Constant	1.350	0.168	8.04	0.000

Source: own survey 2025/26,

No. of observations = 94

R-squared= 0.68, and Adjusted R-squared= 0.64

The estimated logit model R-squared value of 0.68 indicates that 68 percent of the variation in loan repayment performance among smallholder farmers in Debark Woreda is explained by the socio-economic and institutional variables included in the model. This relatively high explanatory power suggests that the selected variables,such as age, education level, family size, extension contact, distance to credit source, loan size, household income, and marital status,are strong and relevant determinants of loan repayment behavior in the study area.

3.2.1. Socio-economic characteristics and their impact on loan repayment

Age: A one-year increase in the age of the household head is associated with an increase of about 4.52% in the loan repayment rate (LRR)**,** holding other factors constant. This suggests that older farmers tend to have more experience, stability, and financial discipline, which enhances repayment capacity. This finding aligns with Jote, (2018), Magali & Jacob, (2022), and (Tegambwage & Kasoga, 2022), who reported that older farmers generally demonstrate better loan repayment performance due to their accumulated experience in agricultural and financial management.

Family Sizenegatively affects loan repayment. Each additional household member reduces LRR by about 3.64%, indicating that larger households face higher consumption burdens, which can constrain financial resources available for repayment. This reflects the effect of family size in rural settings, where additional members contribute labor but also increase household expenditure.This result agrees with Agama, (2021) and Baidoo *et al.*,(2020), who found that large family size negatively influences repayment performance due to higher dependency ratios.

Education Levelis one of the strongest positive predictors, with literate or formally educated farmers demonstrating approximately 41.2% higher repayment rates. Education equips farmers with the ability to understand loan terms, manage finances, and make informed production and marketing decisions, thus significantly improving repayment capacity.This finding is supported by (Belay, 2020) and Hordofa, (2023), who emphasized that educated borrowers are more likely to repay loans on time.

Marital Statusis another significant positive determinant, with married household heads repaying about 18% more than their unmarried counterparts. Marriage appears to offer economic

stability, labor pooling, and shared resource management, which support timely repayment.This result is consistent with Luginaah, (2024), who noted that marital stability enhances economic resilience and timely loan repayment.

3.2.2. Institutional factors and their influence

Extension contacts are positively significant. Farmers who engage with extension agents at least once per month repay about 9.12% more of their loans than those without such access. Regular technical guidance and knowledge transfer improve agricultural productivity, income, and financial management, directly supporting loan repayment.This is in line with Jote, (2018) and State & Kassegn, (2021), who emphasized that regular contact with extension agents improves farmers' knowledge, productivity, and repayment behavior.

Distance to Credit Source: negatively affects repayment performance. Each additional kilometer of distance reduces LRR by 7.65%, highlighting the challenge that remote borrowers face due to increased travel time, transportation costs, and difficulty in maintaining close contact with lenders.Performance et al., (2019), also reported that greater distance negatively affects repayment due to increased transaction costs and lower engagement with financial institutions.

Loan Size: negatively impacts repayment performance. Every extra birr borrowed reduces the LRR by 0.0012%, indicating that larger loans increase financial burden and risk, especially if agricultural production is uncertain or if the borrower has insufficient income to cover repayments.This aligns with Komba, (2024) and Garomsa, (2017), who noted that high loan amounts can negatively affect repayment, especially if borrowers lack sufficient resources or experience.

Total Household Income: positively and significantly affects loan repayment performance. Each additional birr of total household income is associated with an increase of about 8.52% in the loan repayment rate (LRR)**,** holding other factors constant. This indicates that households with higher combined income from crop sales, livestock products, and off-farm activities have more financial resources to meet repayment obligations on time. This finding is consistent with (Bandung, 2025), (R. State, 2022), and (Kunguru *et al.*, 2024).

4. Contribution and future research

4.1. Contribution

This study examined the factors influencing loan repayment performance among smallholder farmers in Debark Woreda, North Gondar Zone. The findings indicate that both the socio-economic characteristics of farmers and institutional factors show a significant role in determining whether loans are repaid on time or not. Among the socio-economic variables, older farmers, literate household heads, male-headed households, those with larger landholdings, and married farmers were more likely to repay their loans reliably. Conversely, larger family sizes slightly reduced repayment performance, likely due to higher consumption needs and pressure on household income. Institutional factors also had a substantialinfluence. Farmers who maintained regular contact with extension agents, had diversified income sources from crops, livestock, and off-farm activities, and lived closer to credit institutions were more consistent in meeting their repayment commitments. Larger loan sizes, on the other hand, slightly increased the risk of default, suggesting that very high debts may become difficult to manage in the context of smallholder farming.

4.2. Future research

Based on the reported findings of the study, the following recommendations were forwarded to strengthen the loan repayment status of households:

Agricultural development offices and other relevant stakeholders should support feasible off-farm and non-farm income-generating opportunities for households with limited land, large family size, or substantial household consumption requirements. Additional income sources may help households manage seasonal fluctuations in agricultural earnings and meet repayment duties.

Financial institutions and Government agencies, microfinance institutions, and extension services should expand and strengthenadult education and financial literacy programsfor smallholder farmers**.**

The agricultural office should expand and strengthen the farmerextension agent linkage by increasing the number of development agents and improving follow-up frequency to improve farmers' productivity and income-generating capacity.

Financial institutions should carefully assess borrowers' repayment capacity before approving loan amounts,match them with borrowers' repayment capacity and income sources, and should consider household size when assessing loan terms and repayment schedules.

Credit institutions should improve outreach services, including mobile banking or a digitalsystem, to reduce distance-related transaction costs.

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