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Socio-Economic Determinants of Loan Access and Credit Constraints among Smallholder Orange-Fleshed Sweet Potato Farmers in North-Central Nigeria

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Abstract— *Access to agricultural credit remains a critical constraint on smallholder productivity in sub-Saharan Africa, yet evidence specific to orange-fleshed sweet potato (OFSP) farmers in North-Central Nigeria is limited. This study therefore examined loan-access determinants, credit sources, factors affecting the amount of loan accessed, and challenges faced by smallholder OFSP farmers. A multi-stage sampling technique was used to select 1,200 farmers from Benue, Nasarawa, Kwara and the Federal Capital Territory (FCT), Abuja, and 1,190 valid questionnaires were analysed using descriptive statistics, multiple linear regression and a paired-sample t-test. Only 12.69% of farmers accessed loans, with access highest in Nasarawa (20.6%) and lowest in Benue (6.7%). Female farmers (58.0%) accessed loans more than males (42.0%), and cooperative societies (37.7%) and microfinance banks (26.5%) dominated credit sources. Farmers requested ₦56.79 million but received ₦41.28 million, which represents a 27.3% unmet credit gap, although this difference was not statistically significant ($p = 0.075$). Farm size ($\beta = 0.238$, $p < 0.001$), interest rate ($\beta = 0.680$, $p < 0.001$), loan duration ($\beta = 0.150$, $p = 0.005$) and household-head status ($\beta = 0.120$, $p = 0.008$) significantly influenced loan amount ($R^2 = 0.762$). The dominant challenges were high interest rates (60.3%), short repayment duration (37.7%) and lengthy processing (31.8%). Affordable, flexible credit delivered through cooperatives and microfinance institutions, together with financial literacy and extension support, is therefore essential to improving credit access and OFSP productivity.*

Keywords— Orange-fleshed sweet potato, smallholder farmers, loan access, credit constraints, multiple regression, North-Central Nigeria, financial inclusion, agricultural finance.

I. INTRODUCTION

Smallholder agriculture forms the backbone of many developing economies and contributes significantly to food security, rural livelihoods and employment (Balana & Oyeyemi, 2022). In sub-Saharan Africa, small-scale farmers make up the majority of the agricultural workforce, yet their access to financing for production remains a persistent challenge. Because these farmers possess few or no assets to pledge as collateral, formal financial institutions frequently exclude them through complex lending terms, collateral requirements and rigid repayment conditions (Mpeku & Urassa, 2022; Kolapo et al., 2021). Credit constraints are widely cited as a principal obstacle to agricultural productivity in low- and middle-income countries (Balana & Oyeyemi, 2022), and in Nigeria, smallholder and rural farmers contend with a low capital base and limited access to finance (Ayinde et al., 2022). Empirical evidence further confirms that farmers' productivity, income and overall well-being suffer when they cannot acquire essential inputs on credit (Afolabi et al., 2022; Balana et al., 2022; Ayinde et al., 2022).

Sweet potato (*Ipomoea batatas* (L.)) ranks among the most important food crops globally. In developing countries, it is a critical staple for resource-poor small-scale farmers because of its low input requirements and because it can be harvested piecemeal for domestic consumption or sale (Chah et al., 2020; Nwachukwu & Nwaobiala, 2020). Orange-fleshed sweet potato (OFSP) is of particular nutritional importance, since its high carotenoid (beta-carotene) content helps address vitamin A deficiency among poor and vulnerable women and children in sub-Saharan Africa (Chah et al., 2020; Falola et al., 2022). Agricultural credit is also a strategic instrument for poverty reduction and productivity improvement, because it enables farmers to purchase land inputs, fertilizers, seeds, vines, labour, tools and breeding stock (Asenath & Yiorgos, 2020; Kolapo et al., 2022). Access to credit therefore represents a powerful lever for boosting OFSP productivity, promoting economic growth and reducing household poverty (Balana et al., 2022).

Despite this potential, OFSP adoption in North-Central Nigeria remains minimal, largely because inadequate access to finance greatly hinders farmers' ability to adopt OFSP production, processing and marketing. Farmers in the region still face barriers such as inadequate formal credit penetration, dependence on informal lenders, high interest rates, stringent collateral requirements, bureaucratic delays and other socio-cultural factors. Empirical evidence indicates that access to loans is shaped by socio-economic factors such as gender, education, farm size and institutional barriers; however, to the best of our knowledge, no published study has specifically examined how these factors influence OFSP farmers' access to loans in North-Central Nigeria. This knowledge gap impedes the design of policies needed to strengthen financial inclusion for OFSP farmers, which could in turn support value-chain development and enhanced livelihoods for OFSP households. Against this background, the broad objective of this study is to analyse the socio-economic determinants of smallholder OFSP farmers' access to loans in North-Central Nigeria. The specific objectives are to: (1) describe the socio-economic characteristics of orange-fleshed sweet potato farmers in the study area; (2) identify the sources of loans accessed by orange-fleshed sweet potato farmers in the study area; (3) determine the socio-economic factors affecting the amount of loan accessed by OFSP farmers; and (4) ascertain the challenges faced by OFSP farmers in accessing loans in the study area.

II. LITERATURE REVIEW

2.1 Conceptual Review

Agricultural credit has long been recognised as a binding constraint on smallholder productivity in developing countries. Balana et al. (2022) document demand- and supply-side credit constraints in Ethiopia and Tanzania, whereas Adigun (2022) and Adeomi et al. (2023) identify socio-economic determinants of loan acquisition among rice farmers in Nigeria. Several studies emphasise that collateral requirements, high interest rates and information asymmetries ration credit away from smallholders (Mpeku & Urassa, 2022; Asenath & Yiorgos, 2020; Ayinde et al., 2022), and that informal sources often substitute for formal finance (Falola et al., 2022). On the demand side, education, farm size, household composition, cooperative membership and gender shape both access to credit and the volume obtained (Kolapo et al., 2021; Amare et al., 2021; Kolapo et al., 2022).

OFSP has been promoted across sub-Saharan Africa as a biofortified staple capable of reducing vitamin A deficiency (Chah et al., 2020; Adekambi et al., 2020). In Nigeria, studies such as Chah et al. (2020) and Nwachukwu and Nwaobiala (2020) examine production efficiency, yet the financing dimension of OFSP adoption in North-Central Nigeria remains under-documented. Because OFSP is input-intensive at establishment (vine cuttings, fertiliser, labour), credit access is a plausible determinant of both adoption and scale of production. This study therefore addresses that gap by examining, among OFSP farmers in North-Central Nigeria, the socio-economic determinants of loan access, the sources farmers actually use, the factors that determine loan size, and the constraints they face.

Empirical studies consistently link credit access to farm-level outcomes. In Nigeria, access to credit has been shown to raise agricultural productivity and household welfare, whereas exclusion from formal finance pushes farmers toward informal lenders at higher cost (Falola et al., 2022; Afolabi et al., 2022). Likewise, microfinance institutions and cooperative societies have emerged as important intermediaries for farmers whom commercial banks exclude (Kolapo et al., 2021; Kehinde et al., 2022). Against this backdrop, the present study focuses specifically on OFSP farmers, a group whose credit needs are heightened by the cost of planting material and other establishment inputs.

2.2 Theoretical Framework

2.2.1 Institutional Financial Inclusion Theory

According to the Institutional Financial Inclusion Theory (Amare et al., 2021; World Bank, 2021), people's interactions with formal and informal institutions shape their financial behaviour and determine whether they enter, remain in, or exit the formal financial sector. Many people and businesses are not fully informed about the risks, participation requirements or ways of obtaining financial services. Because of this uncertainty, they depend on reliable institutions to guide financial decisions, both formally (laws, regulations) and informally (traditions, cultural norms). Social norms, customs and moral standards can raise or lower public confidence in official financial institutions (Adigun, 2022). Negative experiences such as high transaction costs, fraud or perceived exploitation can create lasting mistrust and reduce financial inclusion, whereas positive experiences promote interaction with banks and boost participation in the formal sector. Formal institutions such as consumer-protection bodies and legal frameworks also influence inclusion by guaranteeing security and trust (Mpeku & Urassa, 2022). Applied to this study, the theory explains why bureaucratic delays, high interest rates and perceived exploitation among OFSP farmers reduce their willingness to engage formal lenders.

2.2.2 Vulnerable Group Theory of Financial Inclusion

The Vulnerable Group Theory of Financial Inclusion (Amare et al., 2021; World Bank, 2021) holds that financial-inclusion initiatives should prioritise vulnerable groups to guarantee their integration into the official financial sector and give them access to vital services such as savings, loans and investment products that improve financial well-being. Its focused approach to lowering exclusion targets those already excluded or at high risk of exclusion, and vulnerable groups can be identified using attributes such as age, gender and socio-economic status. Because it targets specific populations, the strategy is also less costly than broad-based programmes. Small-scale farmers in rural areas are particularly vulnerable because they are disproportionately affected by natural disasters and climate change and often cannot obtain funds for agricultural investment owing to restricted access to official financial services. To raise smallholder productivity and living standards, deliberate steps such as agricultural credit programmes must therefore bring them into financial-inclusion initiatives. This theory provides the framework for understanding how demographic, economic, institutional and social factors interact to affect OFSP farmers' access to credit in North-Central Nigeria.

2.3 Conceptual Framework

The study posits that access to loans is a function of two fundamental factors: the socio-economic characteristics of the farmers and institutional factors. Socio-economic factors such as age, marital status, farm size, household size, level of education and farming experience create the demand for loans, while institutional factors such as government policies, political stability, and corporate and organisational policies (interest rate, collateral security, loan repayment conditions) constitute the intervening variable that affects the supply of loans. When there is a positive interaction between this demand and the corresponding institutional supply (intervening variable), access to loans can be guaranteed.

III. MATERIALS AND METHODS

3.1 Study Area

The study was conducted in North-Central Nigeria, specifically in Benue, Nasarawa and Kwara States and the Federal Capital Territory (FCT), Abuja. These four areas were purposively selected from the seven states constituting the North-Central geo-political zone because of their significant engagement in OFSP production. Nasarawa State lies in Nigeria's Southern Guinea Savanna, covers 28,735 km² with about 2.68 million residents, and is predominantly agricultural, producing rice, yams, sorghum, cassava, maize and melon (Balana et al., 2022). Kwara State, "the State of Harmony," is located in the western Middle Belt with Ilorin as its capital and thrives on maize, cassava and beans production. Benue State, "the food basket of the nation," has a population of about 4.26 million, with Makurdi as its capital, and cultivates potatoes, cassava, yams, rice, sesame and groundnuts. The FCT (Abuja), which covers about 3,000 km², comprises six area councils: Abuja Municipal (AMAC), Abaji, Gwagwalada, Kwali, Kuje and Bwari. Finally, all four areas experience a distinct farming season (March–October) and dry season (October–March), with annual rainfall and temperature ranges that support arable crop production.

3.2 Population of the Study

The study population comprised small-scale orange-fleshed sweet potato (OFSP) farmers residing in North-Central Nigeria. The deliberate focus on small-scale farmers reflects their dominant role in Nigeria's agricultural landscape and their pivotal contribution to national food production. Like any enterprise, these small-scale farmers require loans to improve productivity; however, they are disproportionately excluded from formal credit markets.

3.3 Sampling Procedure and Sample Size

A multi-stage sampling technique was employed to ensure representative coverage of the region. In Stage 1, four states (Benue, Nasarawa, Kwara and FCT Abuja) were purposively selected out of the seven North-Central states based on their extensive engagement in OFSP production. In Stage 2, three Agricultural Development Programme (ADP) zones were selected within each state to capture the diversity of agricultural practices and socio-economic contexts (12 zones in total). In Stage 3, four Agricultural Extension Blocks were randomly selected from each agricultural zone (48 blocks in total), and in Stage 4, five cells were randomly chosen within each extension block (240 cells in total). Finally, in Stage 5, five farmers were randomly sampled from each cell, yielding 5 farmers × 60 cells = 300 farmers per state and 1,200 farmers overall. Ten questionnaires were lost, which left 1,190 farmers for the analysis. The sample of 1,200 farmers (1,190 analysed) was considered adequate given the multi-stage design, which balances representativeness with logistical feasibility. Distributing 300 farmers across each state ensured equal-sized subsamples for state-level comparisons, while five-stage randomisation minimised selection bias. The loss of ten questionnaires (0.8%) was negligible and unlikely to bias the results.

TABLE 1
STUDY POPULATION AND SAMPLE SIZE DISTRIBUTION

Variables	Composition	Total
States	Four (4) out of seven (7) North-Central states	4 states
Agric zones	Three (3) agricultural zones per state	12 zones
Extension block	Four (4) blocks per zone (4 × 12)	48 blocks
Cells	Five (5) cells per block (5 × 48)	240 cells
Farmers	Five (5) farmers per cell (5 × 240)	1,200 farmers

Source: Field survey, 2024.

3.4 Instrument, Reliability and Validation

Primary data were collected with a well-structured questionnaire administered by trained enumerators from the ADPs, who were proficient in the local languages and thus facilitated direct contact with farmers. The questionnaire was organised into three sections aligned with the study objectives. Section A captured the socio-economic characteristics of the farmers (age, gender, marital status, educational level, household size, farm size, household-head status, cooperative membership, employment status); Section B evaluated farmers' access to loans, sources, amounts and challenges; and Section C addressed general requirements and constraints encountered in accessing loans. Loan access was measured as yes (1) or no (0), loan sources and challenges were nominally coded lists, and the amount of loan accessed (the dependent variable) was measured in Nigerian naira (₦), alongside interest charged, repayment duration (months), amount requested and amount received. Face and content validity were established through review by a panel of scholars from the Department of Agricultural Extension and Rural Sociology, University of Abuja. Reliability was assessed with Cronbach's alpha, with a value of 0.70 or higher considered acceptable for internal consistency, and feedback from a pilot test was used to refine the instrument before full administration. The Cronbach's alpha value for the loan-access scale was 0.78, indicating acceptable internal consistency.

3.5 Data Analysis Techniques

Data were analysed using descriptive and inferential statistics. Descriptive statistics (frequency counts, percentages and means) were used to answer the research questions on socio-economic characteristics, loan sources and challenges in accessing loans, while multiple linear regression was used to determine the socio-economic factors affecting the amount of loan accessed. In

addition, a paired-sample t-test was used to compare the mean amounts of loans requested and received. Chi-square tests were used to examine differences in loan access across categorical variables (gender, marital status, education, etc.) and states. All analyses were performed using SPSS version 26.

3.6 Model Specification

To identify the factors affecting the amount of loan accessed, an ordinary least-squares multiple linear regression model was specified as follows:

$$Y = \beta_0 + \beta_1(\text{Interest rate}) + \beta_2(\text{Duration of loan}) + \beta_3(\text{Residence}) + \beta_4(\text{Farm size}) + \beta_5(\text{Household head}) + \beta_6(\text{Cooperative membership}) + \beta_7(\text{Employment status}) + \beta_8(\text{Crop status}) + U \quad (1)$$

where Y = amount of loan accessed (₦); β_0 = constant; β_1–β_8 = estimated parameters; and U = error term. Residence was coded 1 = indigene, 0 = non-indigene; household head 1 = head, 0 = non-head; cooperative membership 1 = yes, 0 = no; employment status 1 = full-time, 0 = part-time. The interest rate variable was measured as the absolute interest amount charged on the loan (₦), not as a percentage rate. This measurement choice reflects the data available and the way interest is quoted by lenders in the study area; however, it is acknowledged that this creates a mechanical relationship with loan size, and the coefficient should therefore be interpreted with caution (see Discussion).

In addition, a paired-sample t-test was used to test for any significant difference between the loan requested and the loan received:

$$t = \underline{N} / (s^d / \sqrt{n}) \quad (2)$$

where $\underline{N}$ = mean of the paired differences (loan requested − loan received), s^d = standard deviation of the differences, and n = number of paired observations.

IV. RESULTS AND DISCUSSION

This section presents and discusses the findings together and is organised by research question: the socio-economic characteristics of OFSP farmers (RQ1), their sources of loans (RQ2), the factors affecting the amount of loan accessed (RQ3), and the challenges faced in accessing loans (RQ4).

4.1 Socio-economic Characteristics of OFSP Farmers

Table 2 presents the socio-economic characteristics of the two groups of farmers: those who accessed loans (n = 151) and those who did not (n = 1,039).

It is also noteworthy that farmers with ≤10 years of experience dominated both groups (79.5% of recipients; 87.4% of non-recipients), with mean experience of 8.3 years among recipients versus 6.5 years among non-recipients. Kolapo et al. (2021) emphasise that experience positively influences credit demand because experienced farmers better understand credit processes and risks. Even so, the relatively low overall access rate (12.69%) confirms that credit remains scarce for the majority of OFSP farmers in the study area.

Female farmers constituted a higher proportion (58.0%) of loan recipients than males (42.0%), which suggests a more favourable access environment for women and is consistent with Adigun (2022), who found that women were more often considered creditworthy under assessment frameworks accounting for their specific conditions. This may also reflect gender-targeted interventions and NGO assistance in the study area. However, Amare et al. (2021) caution that greater access does not guarantee investment autonomy, which often remains with spouses, and Adeomi et al. (2023) note that systemic barriers, including limited decision-making power and bureaucratic inefficiency, still impede women's full empowerment. Institutional reforms and cultural reorientation are therefore needed so that women also control how loans are used.

Married farmers predominated among recipients (73.6%), which Adigun (2022) attributes to perceptions of greater financial responsibility and stability that ease credit constraints. Similarly, larger households (6–10 members) showed higher access, consistent with Kehinde et al. (2022), who observed that larger households borrow more because of greater needs and are perceived by lenders as having more substantial financial requirements. Post-secondary-educated farmers accessed loans most (45.7%), which aligns with Kolapo et al. (2022) and Mpeku and Urassa (2022), since education lowers default risk, improves understanding of loan terms and makes farmers more attractive to lenders. The slightly older mean age of recipients (45.1 years) supports Kolapo et al. (2021), although Adekambi et al. (2023) report the opposite in some contexts and call for age-sensitive policies. Farmers with larger farms (>1.0 ha) also accessed loans more (39.8%), corroborating Mpeku and Urassa

(2022) and Ayinde et al. (2022) that larger operations benefit more from credit. Finally, cooperative membership was far higher among recipients (73.0% vs 36.7%), confirming Kehinde et al. (2022) and Amare et al. (2021) that cooperatives cut transaction costs, present a unified profile to lenders and strengthen collective bargaining. Together, these patterns show that social capital, financial literacy and collective organisation facilitate credit entry, while small farm size and limited experience are associated with exclusion.

TABLE 2
SOCIO-ECONOMIC CHARACTERISTICS OF OFSP FARMERS IN NORTH-CENTRAL NIGERIA

Variables	Accessed loan (n=151) f (%)	No access (n=1039) f (%)	χ^2 / t	p-value
Gender			6.12	0.013*
Male	64 (42.0)	548 (52.7)		
Female	87 (58.0)	491 (47.3)		
Head of household			27.84	<0.001***
Yes	58 (38.5)	641 (61.7)		
No	93 (61.5)	401 (38.6)		
Marital status			5.41	0.067
Single	19 (12.8)	142 (13.7)		
Married	111 (73.6)	803 (77.3)		
Divorced/widowed	21 (13.6)	94 (9.0)		
Household size			4.89	0.087
1–5	53 (35.0)	473 (45.5)		
6–10	85 (56.6)	479 (46.1)		
>10	13 (8.4)	87 (8.4)		
Education			9.76	0.021*
No formal school	17 (11.3)	114 (11.0)		
Primary	14 (9.2)	142 (13.7)		
Secondary	51 (33.8)	373 (35.9)		
Post-secondary	69 (45.7)	410 (39.4)		
Age			11.23	0.011*
≤30	19 (12.6)	165 (15.9)		
31–40	41 (27.1)	355 (34.2)		
41–50	45 (29.8)	317 (30.5)		
>50	46 (30.5)	202 (19.4)		
Farm size			22.45	<0.001***
0.01–0.50 ha	57 (37.7)	499 (48.0)		
0.51–1.0 ha	34 (22.5)	307 (29.6)		
>1.0 ha	60 (39.8)	233 (22.6)		
Experience			8.91	0.012*
≤10 yrs	120 (79.5)	908 (87.4)		
11–20 yrs	22 (14.6)	83 (8.0)		
>20 yrs	9 (5.9)	48 (4.6)		
Cooperative			51.67	<0.001***
Yes	110 (73.0)	381 (36.7)		
No	41 (27.0)	658 (63.3)		

Source: Field survey, 2024. Household size means: 6.05 (SD 3.1) vs 6.3 (SD 3.8); age means: 45.1 (SD 11.6) vs 41.7 (SD 10.8); farm size means: 1.27 ha (SD 1.11) vs 1.03 ha (SD 1.28); experience means: 8.3 yrs (SD 7.7) vs 6.5 yrs (SD 6.8). Chi-square tests were used for categorical variables; t-tests were used for continuous variables. *p < 0.05; **p < 0.01; ***p < 0.001.

4.2 Access to Loans Across States and Sources of Loans

Overall, only 151 of 1,190 farmers (12.69%) accessed loans. Table 3 revealed that Nasarawa recorded the highest access rate (20.6%), followed by Abuja (12.3%), Kwara (11.3%) and Benue (6.7%), which suggests differences in financial-service penetration, institutional presence and the socio-economic environment for credit ($\chi^2 = 18.42$, $p < 0.001$). Such spatial heterogeneity implies that a uniform national credit policy may be ineffective, so state-specific outreach matters.

TABLE 3
PERCENTAGE OF OFSP FARMERS WHO ACCESSED LOANS, BY STATE

State	Total farmers	Accessed loan	Access per state (%)	Share of all OFSP farmers (%)
Abuja (FCT)	300	37	12.3	3.11
Kwara	300	34	11.3	2.86
Nasarawa	290	60	20.6	5.04
Benue	300	20	6.7	1.68
Total	1,190	151	12.69	12.69

Source: Field survey, 2024. $\chi^2 = 18.42$, $p < 0.001$.

Table 4 showed that co-operative societies (37.7%) and microfinance banks (26.5%) dominated as credit sources, which reflects farmers' preference for flexible terms, lower interest rates and easier access. This aligns with Kolapo et al. (2021) and Kehinde et al. (2022) on cooperatives' financing role, and with Asenath and Yiorgos (2020) and Kolapo et al. (2022) on microfinance serving farmers excluded from traditional banking. Commercial banks (14.6%) were less used because collateral and documentation requirements deter smallholders (Mpeku & Urassa, 2022; Ayinde et al., 2022). Informal sources, namely friends and family (13.2%), filled the gap for farmers lacking collateral or wishing to avoid interest, consistent with Falola et al. (2022). The Bank of Agriculture's low share (7.9%) reflects bureaucratic bottlenecks, slow processing and poor outreach (Adigun, 2022; Adeomi et al., 2023; Ayinde et al., 2022). Overall, the dominance of cooperatives and microfinance banks, together with the underutilisation of formal institutions, underscores the need for reforms, namely simplified processes, reduced interest rates and better outreach, to make formal credit more farmer-friendly.

TABLE 4
SOURCES OF LOANS ACCESSED BY OFSP FARMERS IN THE STUDY AREA

Source of loan	Frequency (n = 151)	Percentage
Co-operative societies	57	37.7
Microfinance bank	40	26.5
Commercial banks	22	14.6
Friends and family members	20	13.2
Bank of Agriculture	12	7.9

Source: Field survey, 2024. Multiple frequencies observed.

4.3 Loan Parameters and Factors Affecting the Amount of Loan Accessed

Table 5 summarizes the loan parameters across the states. The wide range of loan requests (₦10,000 to ₦5,000,000) and the high standard deviation reflect substantial differences in farm scale and financial needs across the study area. Total interest paid across all loans was ₦5,910,030 (mean ₦40,479.70 per loan), and its wide variation (₦30 to ₦700,000) creates unequal repayment pressure. In addition, the average repayment duration of 12.4 months (1–24 months) is flexible but relatively short for long-term investments such as storage facilities or mechanisation that extend beyond a single production cycle.

TABLE 5

LOAN PARAMETERS ACROSS THE STUDY STATES

Parameter	Total	Mean	Std. deviation	Minimum	Maximum
Loan requested (₦)	5,67,85,000	3,76,059.60	6,39,596.70	10,000	50,00,000
Loan received (₦)	4,12,81,000	2,73,384.10	2,96,825.30	5,000	20,00,000
Interest (₦)	59,10,030	40,479.70	74,964.80	30	7,00,000
Duration (months)	—	12.4	8.1	1	24

Source: Field survey, 2024. n = 151.

Table 7 presents the paired-sample t-test comparing loans requested and received. Farmers collectively requested ₦56,785,000 (mean ₦376,059.60) but received only ₦41,281,000 (mean ₦273,384.10), which leaves a 27.3% unmet credit gap. The mean difference was ₦102,675.50 (SD = ₦705,825.40), and the paired t-test ($t = 1.789$, $p = 0.075$) shows that this difference is not statistically significant at the 5% level, meaning that the gap varies across individual farmers rather than being uniform. Nevertheless, individual shortfalls remain substantial and may constrain farm operations and food security.

TABLE 7

PAIRED-SAMPLE T-TEST COMPARING LOAN REQUESTED AND LOAN RECEIVED

Variables	Mean (₦)	Std. deviation	Std. error mean	Mean difference	t-value	p-value
Loan requested	3,76,059.60	6,39,596.70	52,049.60	1,02,675.50	1.789	0.075
Loan received	2,73,384.10	2,96,825.30	24,155.30			

Source: Field survey, 2024. n = 151. SD of the difference = 705,825.4; standard error of the difference = 57,398.2.

Table 6 presents the multiple regression results. The regression model explained 76.2% of the variation in loan amount. Interest rate was the strongest predictor ($\beta = 0.680$, $p < 0.001$), which indicates that farmers seeking larger loans were willing and able to bear higher interest because of urgent capital needs, and not that high interest encourages borrowing. However, because interest was measured as the absolute interest amount (₦) rather than as a percentage rate, this coefficient partly reflects the mechanical relationship between loan size and interest paid; it should therefore be interpreted with caution. Loan duration was also significant ($\beta = 0.150$, $p = 0.005$), since larger loans carried longer repayment periods that gave farmers more time to repay after a successful season. Farm size had a significant positive effect ($\beta = 0.238$, $p < 0.001$), indicating that farmers with larger holdings secure larger loans because of their greater capacity to utilise credit productively. Household-head status was likewise significant ($\beta = 0.120$, $p = 0.008$), because in most African societies household heads make financial decisions and therefore request and receive larger loans. Residence, cooperative membership, employment status and crop status were not significant, which implies that loan size is driven by economic capacity rather than geography or cooperative affiliation. Aligning disbursement more closely with verified needs would therefore improve productivity.

TABLE 6

MULTIPLE REGRESSION OF SOCIO-ECONOMIC FACTORS AFFECTING THE AMOUNT OF LOAN ACCESSED (R^2 = 0.762; adjusted R^2 = 0.747; F = 51.20, p < 0.01)

Variables	B	Std. error	Beta	t-stat	Sig.	VIF
Constant	-48,582.50	48,092.87	n/a	-1.01	0.314	—
Interest rate	2.661	0.212	0.68	12.554	0	1.42
Duration of loan	5,552.02	1,952.22	0.15	2.844	0.005	1.28
Residence of farmer	12,901.65	28,498.43	0.02	0.453	0.652	1.09
Head of household	72,190.79	27,005.52	0.12	2.673	0.008	1.15
Cooperative membership	10,703.74	31,514.27	0.017	0.34	0.735	1.21
Employment status	9,234.58	30,010.19	0.015	0.308	0.759	1.08
Farm size	63,270.69	14,504.97	0.238	4.362	0	1.33
Crop status	18,684.00	27,462.41	0.031	0.68	0.498	1.11

Source: Field survey, 2024. n = 151. Dependent variable: amount of loan accessed (₦). VIF = variance inflation factor.

4.4 Challenges Faced in Accessing Loans

Table 8 presents the challenges faced by the 151 farmers who accessed loans. Because these challenges were reported only by farmers who obtained loans, they describe barriers experienced even by those who succeeded. Among the 1,039 farmers who did not access loans, the same barriers (interest rates, collateral, processing delays and information gaps) plausibly operated as outright exclusion mechanisms. This interpretation is consistent with the Vulnerable Group Theory of Financial Inclusion, which predicts that farmers with few assets and limited institutional support are the most likely to be rationed out of formal credit markets.

The dominant challenges were high interest rates (60.3%), short repayment periods (37.7%) and lengthy processing procedures (31.8%), followed by inadequate information (13.2%), lack of collateral (10.6%) and lender distrust (6.6%). High interest rates raise the perceived risk of borrowing and push farmers toward informal credit (Afolabi et al., 2022; Ayinde et al., 2022). Short repayment durations misalign with the seasonal cash flows of agriculture and thereby create repayment difficulties (Kolapo et al., 2022). Bureaucratic delays cause missed planting and harvesting windows (Kolapo et al., 2022), and simplifying procedures enhances microcredit access (Mpeku & Urassa, 2022). Collateral requirements exclude asset-poor smallholders from formal credit and drive demand for group lending (Kolapo et al., 2021; Mpeku & Urassa, 2022), while high default rates (up to 45.1% in some regions; Adigun, 2022) create a cycle of mistrust that financial-literacy and record-keeping programmes could break. These challenges are also mutually reinforcing: high interest raises credit costs, short durations compress repayment into periods before farm income is realised, and bureaucratic delays push farmers toward informal lenders, while information gaps compound the problem by leaving farmers unaware of available credit. Coordinated action across pricing, product design, process simplification, information dissemination and trust-building is therefore required.

TABLE 8
CHALLENGES FACED BY OFSP FARMERS IN ACCESSING LOANS

Challenge faced in accessing a loan	Frequency (n = 151)	Percentage
High interest rate charged on the loan	91	60.3
Short duration for loan repayment	57	37.7
Long process involved in processing a loan	48	31.8
Inadequate information on sources of loans	20	13.2
Lack of collaterals	16	10.6
Lack of confidence in me by the source	10	6.6

Source: Field survey, 2024. Multiple frequencies observed.

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The findings carry practical weight for agricultural extension and rural sociology. Extension agents are well placed to deliver financial-literacy training and to link farmers with cooperative-based credit, while policymakers can use the state-level variation to target outreach where access is lowest. For OFSP value-chain development, reliable credit would also enable farmers to purchase quality vine cuttings and inputs at planting time, which would raise yields and household nutrition outcomes simultaneously.

This study analysed loan access among smallholder OFSP farmers in North-Central Nigeria. Only 12.69% of the 1,190 farmers surveyed accessed loans, with Nasarawa recording the highest rate (20.6%) and Benue the lowest (6.7%). Female farmers accessed loans more than males (58.0% vs 42.0%), possibly due to gender-focused policies and NGO interventions, and married farmers, larger households, more educated farmers and cooperative members also showed better access. Cooperative societies (37.7%) and microfinance banks (26.5%) were the main credit sources, whereas commercial banks and the Bank of Agriculture were underutilised because of strict terms. Farmers requested ₦56.79 million but received ₦41.28 million, a 27.3% unmet credit gap, although this difference was not statistically significant ($p = 0.075$). Farm size, interest rate, loan duration and household-head status significantly influenced the amount accessed ($R^2 = 0.762$), while high interest rates, short repayment

periods and bureaucratic processing were the major challenges. It should be noted, however, that interest rate was measured as the absolute interest amount rather than as a percentage rate, so its coefficient should be interpreted with caution. The study therefore concludes that affordable, flexible credit channelled through cooperatives and microfinance institutions, supported by financial-literacy and extension services, is essential to improving credit access, OFSP productivity and household food security in North-Central Nigeria.

The findings imply that credit programmes for OFSP farmers should prioritise affordable interest rates, repayment schedules aligned with crop cycles, and simplified processing. Channelling credit through cooperative societies and microfinance banks, the sources farmers already trust, would expand outreach, while financial-literacy and extension programmes can address information gaps and lender distrust. Because farm size and household-head status drive loan amounts, tailored credit products scaled to farm size and household decision structures would improve the match between credit supply and demand. From a policy standpoint, the low overall access rate (12.69%) confirms that credit remains scarce for most OFSP farmers. Moreover, since OFSP is a biofortified crop with high potential for reducing vitamin A deficiency, improving its financing is both an agricultural and a nutrition intervention, and state-level differences call for locally targeted rather than uniform national credit schemes.

In summary, the evidence shows that credit access for OFSP farmers in North-Central Nigeria is low, uneven across states and shaped by farm size, household-head status, interest rates and loan duration, while cooperative societies and microfinance banks carry most of the credit supply. Policy and practice should therefore focus on making formal credit affordable and flexible, strengthening cooperative and microfinance channels, and pairing credit with financial-literacy and extension support, so that loans translate into productivity, income and improved household food and nutrition security.

5.2 Recommendations

1) Government agencies, NGOs and financial institutions should implement financial-literacy programmes to improve farmers' understanding of loan processes and financial management, especially among low-education rural farmers. This recommendation is supported by the finding that inadequate information on loan sources was a challenge for 13.2% of loan recipients and that lender distrust affected 6.6%.

2) Financial institutions and government should reduce interest rates and introduce farmer-friendly products, with repayment durations aligned to agricultural production cycles.

3) Microfinance banks, cooperative societies and extension services should expand outreach to underserved areas and promote loan awareness through targeted campaigns, particularly in Benue State, where access was lowest (6.7%).

4) Policymakers and community leaders should promote cultural reforms and awareness campaigns that empower women farmers in loan-related decision-making, since greater access does not necessarily translate into control over loan use.

5) Government and agricultural organisations should strengthen extension services, simplify loan-processing procedures, and invest in storage, market linkages and input supply (especially OFSP vine cuttings) to reduce production constraints.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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