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Gender Analysis of Credit Access and Repayment of Bank of Agriculture's Loan Scheme by Livestock Farmers in Akwa Ibom State, Nigeria

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Abstract

Gender issues have dominated the agricultural development and economic reform policies of several developing countries due to the increasing contributions of women to agriculture, despite their wide disparities in access to agricultural production resources. This study analyzes gender differences in credit access and repayment among livestock farmers who were beneficiaries of the Bank of Agriculture's loan scheme in Abak Local Government Area of Akwa Ibom State, Nigeria. Primary data were collected using a questionnaire administered to 140 livestock farmers (70 males and 70 females) through a multi-stage sampling method and analyzed using simple descriptive statistics, Z-tests and multiple regression analysis. The results revealed a mean age of educational attainment, farming experience and household size of 40.8 years, 12 years and 4 persons, respectively. The majority of respondents (67.8%) were married, with about 69.3% being cooperative members. Male livestock farmers provided more collateral (92.9%) than females (85.7%) and were also more likely to be cooperative members (71.4%) compared to females (61%). Findings further showed that, of a total sum of ₦26,376,500 accessed, male farmers accessed ₦16,300,000 than female farmers (₦10,100,200). Also, of the total amount of ₦21,641,262 that was repaid, women repaid more (₦9,600,100) than men (₦12,044,162). The repayment rates were 73.99% and 95.5% for male and female farmers, respectively. The findings also showed a significant difference in the mean amounts accessed and repaid by male and female respondents at the $p > 0.01$ significance level. The results further showed that the amount of credit accessed was positively influenced by educational attainment ($p > 0.05$), monthly income ($p > 0.01$) and possession of collateral ($p > 0.05$), but negatively influenced by household size ($p > 0.05$). The findings also showed that loan repayment was positively influenced by educational attainment ($p > 0.1$), monthly income ($p > 0.01$), loan amount collected ($p > 0.01$) and possession of collateral ($p > 0.05$), and negatively influenced by household size ($p > 0.05$). Based on these findings, policies that boost educational attainment, increase monthly income, encourage membership in farmers' unions and promote equal access to credit for female livestock farmers are recommended.

Categories: Banking and financial services, Social systems (economies, governments, industry), Strategic finance
Keywords: credit access, loan repayment, gender, livestock farmers, bank of agriculture
JEL Classifications: Q14, Q10, G21, O16, J16, D14, Q11

Introduction

The livestock sector is a vital component of agricultural sectors that has contributed immensely to Nigeria's socioeconomic development (Ntekim et al., 2024). Apart from being a major source of protein and income for farmers, the (Food and Agriculture Organization, 2019) reported that it accounted for 1.7% of the nation's gross domestic product and 9% of agriculture's value added. The country's national herd consisted of 18.4 million cattle, 48.4 million sheep, 76 million goats, 7.5 million pigs, 1.5 million horses and 180 million poultry. According to the (Food and Agriculture Organization, 2019) statistics, of the estimated 190 million Nigerians, about 13 million households owned various categories of livestock. These livestock, reared by both men and women, require substantial financial investment for their production. A bulk of this finance is acquired through credit. Access to credit assists livestock farmers in procuring production inputs, expanding the scope of production, and facilitating the enjoyment of economies of scale.

Undoubtedly, the Bank of Agriculture (BOA) is one of the major financing options available for livestock production in the study area. It was launched in October 2010 with the mandate of providing low-interest credit to farmers, including livestock producers, irrespective of gender. Financing livestock production is one of the key mandates of the bank. Although credit accessed by rural farm families has increased substantially since the bank's inception, empirical studies continue to report that the bank's loan scheme is characterized by defaults. For instance, in the study area, (Mejeha et al., 2018) reported a high default rate among BOA borrowers. Elsewhere, (Ugwumba and Uchehara, 2015) also reported instances of default among BOA loan beneficiaries. This has drastically constrained the bank's loanable funds, resulting in

poor access to credit for livestock farmers, as bank branches now require tangible collateral, which most livestock farmers can rarely afford. This partly accounts for the dwindling performance of Nigeria's livestock sector in recent times, as reported by (Udoka et al., 2019) and the (Food and Agriculture Organization, 2019). These challenges result in poor livestock asset formation, the use of crude production equipment and obsolete production techniques. They also manifest in low commercial livestock holdings and the prevalence of local livestock breeds in the study area, contributing to low productivity.

Howbeit, the effect of the reduction in BOA's loanable funds and the resultant low access to credit by livestock farmers is most severely felt by rural women, who already face constrained access to production resources. Findings from other empirical studies by (Ezeibe et al., 2015), (Anderson et al., 2020), (Ankrah et al., 2020) and (Akter et al., 2017) further corroborate that there is greater gender disparity in access to agricultural production resources. This occurs despite women's higher contribution to the agricultural labor force (Anderson et al., 2020) (Glazebrook et al., 2020) and their superior loan repayment performance compared to their male counterparts (Santandreu et al., 2020) (Nduka et al., 2020).

Therefore, given the high gender disparity in access to credit and other production resources reported in empirical literature, coupled with the high loan repayment performance of rural women in various agricultural loan schemes, there is a need to empirically examine the situation with BOA. This is particularly pertinent given that not much research has been conducted in the study area in this regard, although several studies in Nigeria have explored loan repayment and the link between accessed credit and farm or business performance, with differing focus, methods and findings. For instance, (Olowookere et al., 2023) examined rice farmers in Kwara State and identified late disbursement and high interest rates as major institutional constraints to repayment, in addition to borrower characteristics such as education and household expenditures. Other research (Ojo et al., 2019) used an endogenous switching regression model to assess how credit demand affects rice farmers' productivity in Southwest Nigeria. Their results suggest that credit access boosts productivity, but gains vary by region, farm assets and transaction costs. Similarly, few studies by (Bassey et al., 2019) and (Mejeha et al., 2018) considered loan repayment holistically without emphasizing gender-specific repayment performance. Accordingly, this study examined gender differences in credit access and repayment, as well as their determinants, among livestock farmers who are beneficiaries of BOA's loan scheme in Abak Local Government Area, Akwa Ibom State, Nigeria.

Research Method

The study area

The study was conducted in Akwa Ibom State, Nigeria, one of the oil-rich states in the Niger Delta region. The state is located on the southeastern coast of Nigeria, wedged between Rivers, Abia and Cross River States and the Republic of Cameroon to the southwest, north, east and southeast, respectively, while the Bight of Bonny lies to the south. It is situated between latitudes 4°32'N and 5°33'N and longitudes 7°25'E and 8°25'E (Okorie et al., 2023). Akwa Ibom State has a total land area of 6,187 km^2, which represents 0.67% of the total land mass of Nigeria. The State is made up of six agricultural zones, namely, Uyo, Eket, Etinan, Oron, Abak and Ikot Ekpene, and 31 local government areas. According to the most recent National Population Census conducted in 2006, Akwa Ibom State had a total population of 3,920,208 persons, of which 87.89% constituted rural population while 12.11% formed the urban population (National Population Commission, 2006). Using an average annual population growth rate of 2.8%, the projected population of Akwa Ibom State in 2024 is approximately 6,444,439 persons. This estimate was derived using the exponential growth formula (Equation 1):

$$P_t = P_0(1 + r)^t \qquad (1)$$

where, P_t is the projected population, P_0 is the base population (3,920,208), r is the annual growth rate (0.028) and t is the number of years (18 years, from 2006 to 2024).

Source of data

Primary data for the study were collected using a structured questionnaire administered to the respondents (see Appendices).

Sampling techniques, data collection and limitations

A two-stage sampling procedure was adopted for this study. In the first stage, the Abak and Uyo branches of the BOA were purposively selected from the three existing branches in Akwa Ibom State. This selection was made because only the Uyo and Abak branches were operational and functional, and they also had a higher concentration of livestock loan beneficiaries. In the second stage, a total of 140 livestock farmers were randomly selected from the 216 beneficiaries of the BOA loan scheme. To ensure gender balance, the sample was drawn in a 1:1 ratio - 70 males and 70 females - using a simple random balloting technique.

The sample size was determined using the formula (Equation 2) for finite populations proposed by (Yamane, 1967):

$$n = N/1 + (e)^2 \quad (2)$$

where, n = sample size; N = finite population; and e = level of precision, defined at 5% significance level.

Here, given N = 216 for sample and e = 0.05 at 5% confidence interval, the required sample was computed as Equation 3:

$$n = 216/1 + 216\,(0.05)^2 = 140 \quad (3)$$

Data collection was carried out using a well-structured questionnaire and personal interviews. Enumerators familiar with the area and local language were engaged to facilitate accurate responses and ensure data reliability.

However, the study was not without limitations. Some respondents were initially reluctant to disclose financial information due to privacy concerns, and incomplete loan records from the bank limited cross-verification of some repayment data. Additionally, the study relied on self-reported measures of productivity, which may be subject to recall bias. Despite these challenges, efforts such as confidentiality assurance and cross-checking of responses were employed to minimize their effects on data quality.

Method of data analysis

In addition to descriptive statistics such as simple percentage, frequency table and deviation, other tools that were used to analyze data were z-test statistics and multiple regression analysis.

• Z-test statistics: This was used to analyze the differences in credit access and repayment between male and female beneficiaries in the study area. Following the method of (Udoka et al., 2019), the formula for z-test is given as Equation 4:

$$Z_{cal} = x_1 - x_2/\sqrt{S_1^2/n_1 + S_2^2/n_2} \quad (4)$$

where, Z_{cal} is the calculated value of z distribution; x_1 = mean amount of credit accessed and repaid by male livestock farmers; x_2 = mean amount of credit access and repaid by female livestock farmers; ${S_1}^1$ = variance for male livestock farmers; ${S_2}^2$ = variance for female livestock farmers; n_1 = number of male livestock farmers; and n_2 = number of female livestock farmers.

• Multiple regression analysis: This was used to estimate the effect of livestock famer's socioeconomic characteristics on credit access and repayment, respectively. The model is specified in Equation 5:

$$(Y = b_0 + b_1 EDU_1 + b_2 HHS_2 + b_3 GEN_3 + b_4 MAS_4 + b_5 MOI_5 + b_6 AGE_6 + b_7 DTLI_7 + b_8 BEX_8 + b_9 FS_9 + b_{10} LA_{10} + b_{11} SOC_{11} + b_{12} MFU_{12} + \varepsilon) \quad (5)$$

where, Y = amount of credit access and repaid by livestock farmers, respectively; EDU = educational level (years); HHS = household size (number of persons); GEN = gender (male = 1, female = 0); MAS = marital status (married = 1, otherwise = 0); MOI = monthly income (Naira); AGE = age of beneficiary (years); DTLI = proximity to the nearest BOA (kilometer); BEX = borrowing experience (number of years of doing business with the bank); FS = farm size (number of livestock kept); LA = loan amount accessed (Naira); SOC = value of asset pledged as collateral in Naira (however, provision of surety was measured as half of the loan amount accessed); MFU = membership of farmers union (yes = 1, otherwise = 0); and ε = error term.

Results

This section presents the results/findings of the research, according to the specified objectives of the study.

Variable	Male		Female		Pooled		Mean
	(n = 70)	Freq (%)	(n = 70)	Freq (%)	(n = 140)	Freq (%)	
Age							
Less than 30	3	4.3	4	5.7	7	5	

30–40	9	12.9	14	20	23	16.4	
41–50	20	28.6	17	24.3	37	26.5	
51–60	30	42.8	20	28.5	50	35.7	43
Above 60	8	11.4	15	21.4	23	16.4	
Mean	45		42				
Marital status							
Married	50	71.4	45	64.3	95	67.8	
Single	11	15.8	14	20	25	17.9	
Separated	4	5.7	4	5.7	8	5.7	
Widow(er)	5	7.1	7	10	12	8.6	
Educational level							
No formal education	10	14.3	9	12.9	19	13.6	
Primary school	40	57.2	30	42.9	70	50	
Secondary school	15	21.4	26	37.2	41	29.3	8
OND/NCE	4	5.7	2	2.8	6	4.3	
Graduate	1	1.4	3	4.2	4	2.8	
Mean	7		9				
Household size							
Less than 5	30	42.9	36	51.5	66	47.2	
5–10	38	54.3	32	45.7	70	50	
11–15	2	2.8	2	2.8	4	2.8	5
Mean	6		5				
No. of livestock kept							
Less than 500	55	78.6	57	81.5	112	80	
500–1,000	12	17.1	8	11.4	20	14.3	238
Above 1,000	3	4.3	5	7.1	8	5.7	
Mean	276		193				
Farming experience							
Less than 5	3	4.3	4	5.7	7	5	
5–10	27	38.6	20	28.6	47	33.6	
11–15	30	42.9	40	57.2	70	50	12
16–20	8	11.4	5	7.1	13	5.2	
Above 20	2	2.8	1	1.4	3	2.1	
Mean	10		13				
Collateral possession							
Yes	65	92.9	60	85.7	125	89.3	
No	5	7.1	10	14.3	15	10.7	
Distance to bank							
Less than 1 km	34	48.6	36	51.4	70	50	
1–2 km	19	27.1	21	30	40	28.6	

2.01–3 km	14	20	10	14.3	24	17.1	
Above 3 km	3	4.3	3	4.3	6	4.3	
Mean	1.18		1.14				
Monthly income							
Less than ₦20,000	25	35.7	28	40	53	37.9	
₦20,000–₦30,000	22	31.5	19	27.1	41	29.3	
₦30,001–₦40,000	20	28.6	16	22.9	36	25.7	₦21,400
₦40,001–₦50,000	2	2.8	4	5.7	6	6	
Above ₦50,000	1	1.4	3	4.3	4	2.8	
Mean	₦23,400		₦18,150				
Membership of social organization							
Yes	50	71.4	47	67.1	97	69.3	
No	20	28.6	23	32.9	43	30.7	

TABLE 1: Socioeconomic characteristics of livestock farmers

Source: Field survey data, 2024

OND, Ordinary National Diploma; NCE, National Certificate in Education

From Table *1*, the results reveal important socio-economic patterns and gender-based differences in credit access and repayment among livestock farmers. Livestock production is largely practiced by middle-aged, married farmers with low to moderate education, moderate household sizes and small-scale operations of fewer than 500 animals. Males generally kept larger herds. Farmers were fairly experienced (11-15 years), most possessed collateral and many lived close to financial institutions, suggesting few physical barriers to credit access. However, incomes were generally low, especially among female farmers, though both genders showed high participation in social organizations.

Beneficiary category	Amount accessed	Mean amount	% of total credit accessed	Mean difference	Z_{cal}
Male	16,276,300	232,518.57	61.71		
Female	10,100,200	144,288.57	38.29	88,230	9.54
Total	26,376,500		100		

TABLE 2: Differences in credit access and repayment

Source: Computed using field survey data, 2024

From Table *2*, credit distribution shows a substantial gender disparity: male farmers accessed a larger share (61.71%) of total loan disbursement and received significantly higher mean loan amounts than females, a difference confirmed statistically.

Beneficiary type	Amount borrowed	Amount repaid	% of borrowed amount repaid	Mean amount repaid	Mean difference	Z_{cal}
Male	16,276,300	12,044,162	73.99	172,059.46		
Female	10,100,200	9,600,100	95.05	137,144.29	34,915,17	3.481
Total	26,376,500	21,644,262				

TABLE 3: Differences in loan repayment

Source: Computed using field survey data, 2024

Repayment performance (Table *3*), however, favoured female beneficiaries. Although males borrowed more, they repaid a smaller proportion (73.99%) than females, who demonstrated a very high repayment rate of 95.05%. The mean repayment difference between genders was also statistically significant.

Variable	Linear	Quadratic	Double log
Constant	-3114.6842	1101.7861	112.154
	(2.304)**	(6.443)***	(1.963)**
Education	2.41E-05	1.58E-06	-0.9763
	(1.964)*	(1.221)	(1.864)*
Household size	-2401.993	-4382-8	-0515
	(-2.138)**	(6.366)	(1.592)
Gender	1344.041	144006	
	(-0.486)	(-0.628)	
Marital status	11602.814	-2116.334	
	(1.004)	(2.428)	
Monthly income	1421.88	101.968	0.061
	(3.114)***	1.1.04	(1.566)
Age	101.034	-1.553	1.0636
	(0.982)	(3.053)***	(0.886)
Distance to finance institution	-0.452.21	0.0021	0.076
	(0.003)	(1.243)	(1.886)*
Borrowing experience	6.03E-04	-4.04E-05	2.42E-03
	-(1312)	(0.884)	(0.116)
Farm size	-14261.81	-1208.003	9.05 E-04
	(0.846)	(0.693)	(1.122)
Loan amount accessed	201.182	12.663	10.848
	(0.348)	(0.892)	(2.534)**
Collateral	26023.401	1084.082	2.261E-02
	(2.432)**	(1.982)*	(0.007)
Membership of social organization	6034.2	3114.2	
	(2.310)**	(1.226)	
R^2	0.896	0.811	0.796
Fstat	606.182	685.211	103.630

TABLE 4: Factors influencing credit access by livestock farmers

Note: ***, ** and * signify significance at 1%, 5% and 10% levels, respectively

Source: Field survey data, 2024

Regression analyses (Tables 4-5) consistently identified education, household size, income, collateral and loan amount as key predictors of credit-related outcomes across linear, quadratic and double-log models. Education and income generally exerted positive effects, while household size often had a negative influence (regression equation is stated in Equation 5). Non-linear relationships were evident for variables such as age and marital status in the quadratic models. Distance to financial institutions and loan amount accessed were significant in the double-log models, with loan amount showing strong positive elasticity. Overall, collateral, education, income and loan size emerged as the most influential factors shaping credit access and repayment outcomes among livestock farmers.

Variable	Linear	Quadratic	Double log
Constant	2304.864	116.624	13.106
	(9.116)**	(5.138)**	(1.963)***
Education	2061.164	1909.554	-10.976
	(1.964)*	(1.221)	(1.864)**
Household size	608.993	-1108.382	-0515
	(-2.138)**	(5.366)**	(1.592)
Gender	-6.03E-06	3.01E-04	
	(-0.488)	(-0.628)	
Marital status	2161.281	1412.033	
	(1.014)	(2.42)**	
Monthly income	111.088	0.968	2.01E-04
	(3.114)***	(1.104)	(1.566)
Age	230.134	101.553	1.0636
	(0.982)	(3.054)**	(0.886)
Distance to credit access	0.003	0.002	0.076
	(0.452)	(-1.243)	(1.882)*
Borrowing experience	0.918	-1.040	1.427
	(1312)	(0.884)	(0.116)
Farm size	-2113.066	-9.10E-03	4.20E-02
	(0.846)	(0.693)	(1.132)
Loan amount	1431.182	11.663	0.048
	(5.840)**	(0.392)	(2.534)**
Collateral	1602.774	-410.62	16.162
	(2.432)**	(1.982)*	(0.007)
Membership of social organization	1.42E-05	1.13E-03	
	(1.114)	(0.896)	
R^2	0.676	0.615	0.592
Fcal	414.182	305.211	83.363

TABLE 5: Determinant of loan repayment

Note: ***, ** and * signify significance at 1%, 5% and 10% levels, respectively

Source: Computed using field survey data, 2024

Discussion

Socioeconomic characteristics of farmers

The distribution of livestock farmers based on their socio-economic characteristics is presented in Table *1*. As shown in the table, most respondents (35.7%) were within the age bracket of 51-60 years, with a mean age of 43 years. The mean age of male farmers was 45 years, while that of female farmers was 42 years, indicating that male farmers were generally older than female farmers. (Udoka et al., 2019) previously reported that livestock farmers were within this age range. The majority of respondents (67.8%) were

married, with a higher proportion of men (71.4%) married compared to women (64.3%). (Udoka et al., 2019) also reported that about 62.5% of livestock farmers in the study area were married. Most livestock farmers (86.4%) were educated, with a mean of 8 years of educational attainment. Specifically, 50% attended primary school, 29.3% attended secondary school, 4.3% had OND/NCE and 2.8% were graduates. It was observed that more women (87.2%) had attended school compared to men (85.7%). (Udoka et al. 2019) also reported that 78.3% of livestock farmers in the study area were educated. This high level of educational attainment will facilitate the adoption of improved livestock innovations. Half of the livestock farmers (50%) had household ranging from 5 to 10 members, with an overall mean household size of 5 persons. This was closely followed by farmers with household sizes of fewer than 5 members (47.2%). On average, male farmers reported a larger household size (mean = 6) compared to their female counterparts (mean = 5). This pattern may suggest that livestock farmers are becoming increasingly conscious of the prevailing harsh economic conditions in the country and, consequently, are inclined to maintain smaller family sizes as a coping strategy. (Vihi et al., 2024) report that most poultry (livestock) farmers maintained relatively small households. Regarding farm size, measured using the number of livestock kept as a proxy, the results show that the majority (80%) of respondents kept fewer than 500 animals, while 14.3% maintained between 500 and 1,000, and only 5.7% kept more than 1,000 livestock. This distribution suggests that most livestock farmers in the study area operated on a small-scale basis, primarily oriented towards subsistence rather than large-scale commercial production.

The results also revealed that livestock farmers in the study area were relatively experienced, with an overall mean of 12 years in livestock production. A higher proportion (50%) of respondents had between 11 and 15 years of experience, followed by 33.6% with 5-10 years. Furthermore, 5%, 9.3% and 2.1% reported less than 5 years, 16-20 years and above 20 years of experience, respectively. Interestingly, female respondents had a higher mean farming experience (13 years) compared to their male counterparts (10 years), suggesting greater consistency and persistence in livestock keeping among women. The mean years of experience observed in this study was lower than the 18 years, as reported by (Udoka et al., 2019) among livestock farmers in the same region. This disparity may indicate a recent influx of younger individuals or youth into the livestock sector within the study area. Regarding possession of collateral, the majority (89.3%) of livestock farmers reported providing assets ranging from houses to land with legal titles, as collateral for credit acquisition. Disaggregated by gender, 92.9% of male respondents possessed and presented collateral compared to 85.7% of female respondents, indicating a gender gap of 7.2 percentage points. This disparity suggests that men may have a relatively higher probability of meeting formal credit requirements, thereby enhancing their access to larger loan volumes compared to their female counterparts. The high rate of collateral ownership among men could be linked to prevailing socio-cultural norms that favor male inheritance and land ownership rights. Statistically, this trend implies that, while collateral possession is generally high among livestock farmers in the study area, the gender imbalance may contribute to unequal access to formal agricultural financing. Given the distance between beneficiaries' home and the nearest BOA, half of the livestock farmers (50%) took less than 1 km to get to the nearest bank, 28.6% took between 1 and 2 km, 17.1% took more than 2-3 km, while 4.3% took above 3 km. This translated into an average distance of 1.1 km. The mean monthly income of livestock farmers in the study area was ₦21,400, indicating generally low earning capacity. Income distribution analysis revealed that 37.9% of respondents earned less than ₦20,000, 29.3% earned between ₦20,000 and ₦30,000, 25.7% earned between ₦30,000 and ₦40,000, while 4.3% and 2.8% earned ₦40,000-₦50,000 and above ₦50,000, respectively. Statistically, this suggests that the income level of a majority of farmers falls below the poverty threshold, potentially constraining their capacity to reinvest in production, access quality inputs or absorb economic shocks. Majority of livestock farmers (69.3%) were members of cooperative, while 30.7% were not. However, male respondents (71.4%) were more into cooperative activities than female respondents (67.1%). The high membership of cooperative will facilitate their access to improved livestock production information and ideas in the study area. (Udoka et al., 2019) had previously reported the high membership of cooperative among livestock farmers in the study area.

Gender differences in credit access and repayment among livestock farmers

Table *2* shows that, of a total amount of ₦26,376,500 that was accessed by beneficiaries, ₦16,276,300 and ₦10,100,200 were accessed by male and female farmers, respectively. This translated into 61.71% and 38.29% access. The mean amounts accessed were ₦232,518.57 and ₦144,288.57 by male and female beneficiaries, respectively. The mean difference (x = 88,230) in amount accessed was statistically significant at 1% probability level ($p > 0.01$). This finding implied that male beneficiaries accessed more credit than the female beneficiaries. This goes a long way to reveal the level of disparity in access to credit in the study area. This is worrisome given series of efforts by financial stakeholders to ensure equal access to productive resources by women. This finding supports that of (Okwuokenye, 2020) in Delta State, Nigeria. In Anambra State, (Ugwumba and Uchehara, 2015) further reported that male farmers accessed more credit than female.

Considering loan repayment, Table *3* shows that, of a total amount of ₦16,276,300 and ₦10,100,200 that were accessed by male and female respondents, ₦12,044,162 and ₦9,600,100 was repaid by both groups. This translated into a mean repayment of ₦172,059.46 and ₦137,144.29 and a repayment performance of

73.99% and 95.5% for male and female beneficiaries. This implies that women are generally more cautious borrowers and display a stronger sense of financial discipline and responsibility. Further analysis of the mean difference (₦34,915.17) using Z-test revealed a statistically significant difference at 1% probability level ($p > 0.01$). This finding implied that female beneficiaries repaid more loan than male, in spite of their lower credit access status than their male counterparts. This suggest that women are generally more cautious borrowers and display a stronger sense of financial discipline and responsibility. This result supports the findings of (Nduka et al., 2020).

Influence of socio-demographic factors on credit access

Table 4 presents the multiple regression estimates for the determinant of credit access. A linear model was chosen from the three estimated equations as the lead equation (linear, quadratic and double log). The R^2 value for the lead equation was 0.896, implying that about 89.6% of the variability in access to credit was explained by the explanatory variables included in the model. The constant term (2.304) was significant, denoting the overall significance of the models. The F statistic (606.182) was significant, showing the goodness of fit of the estimated model.

Out of the 11 variables included in the model, 6 were significant. The coefficient for education was positive and significantly related to credit access at 5% probability level ($p > 0.05$). This implies that increasing education will improve access to credit. Educated livestock farmers are more knowledgeable about loan application procedures than their illiterate counterparts and are often given preference by lenders. This finding agrees with those of (Udoka et al., 2019) and (Simonyan et al., 2019). Household size was negative and significantly reduces credit access at 1% probability level ($p > 0.01$). This is expected because banks often view livestock farmers with large household sizes as having significant domestic commitments and may avoid giving them loans for fear of fund diversion. The estimated coefficient of monthly income was positive and significantly enhanced credit access at the 1% probability level ($p > 0.01$). This may be because higher-income livestock farmers can use their earnings to acquire tangible assets, which can be pledged as collateral, thereby increasing their access to credit. A similar finding was reported by (Udoka et al., 2019). The variable for possession of collateral was also positively associated with increased access to credit at the 5% level ($p > 0.05$). This is justified by the high rate of loan defaults in most rural loan schemes, prompting banks to require collateral. Therefore, farmers who possess collateral are more likely to access credit. This finding aligns with those of (Udoka et al., 2019). The estimated coefficient for membership of social organization was also found to be positive and significantly increased credit access as 5% level ($p > 0.005$).

Influence of socio-demographic factors on loan repayment by livestock farmers

The estimate of the determinants of loan repayment by livestock farmers in the study area is presented in Table 5. As shown in the table, R^2 in the lead equation was 0.676, meaning that about 67.6% of the variability on loan repayment was explained by the explanatory variables included in the model. The F-statistics (414.182) and the constant term were significant showing the goodness of fit of the estimated model and the overall significance of the model. In our interpretation, a positive sign of coefficient will imply that increasing such variable will increase loan repayment and vice versa.

The estimated coefficients of education, monthly income, loan amount collected and possession of collateral were positive and significant while household size was negative and significantly reduced loan repayment. Educated livestock farmers have wider access to wider livestock production inputs and information, and as prudent managers, they can manage such inputs and information efficiently. Hence, they can make huge profit that can be used to offset their loan obligations. The positive influence of monthly income is justified in that high-income livestock farmers are liquid enough to fulfil their loan obligations each time they are called upon to do so than their low-income counterparts, who, if possible, can divert such loans for other purposes. This finding is consistent with (Kassegn and Endris, 2021). The positive coefficient of loan amount is that livestock farmers who received higher loan volumes can adequately carry out substantial investments than their counterparts. They are also expected to diversify their investment base and enjoy economy of scale through bulk purchases, hence, can generate huge returns, through which they can easily pay off their debts. This finding agrees with (Effiong et al., 2020), which stated that larger loans empower farmers to make substantial investments, increasing turnover (returns) and improving their capacity to repay. Provision of collateral will enhance loan repayment because livestock farmers who mortgaged their tangibles assets as security for loan will always strive to repay so as to avoid losing their asset. The negative relationship for household size is justified because high household size is associated with huge domestic commitment and responsibility. Hence, there is higher tendency for livestock farmers with huge household size to divert loan to other purposes such as payment of children school fees, medical bills, feeding, etc. Hence, they may be expected to defect than their counterparts with few household sizes. This result supports the findings of (Enimu et al., 2017).

Conclusions

The study empirically analyzed gender differences in credit access and loan repayment among livestock farmers who were beneficiaries of the BOA loan scheme in Akwa Ibom State, Nigeria. Factors influencing credit assess and repayment had equally been estimated. While commending the effort of the bank in providing timely credit to livestock farmers, the study concludes that while the BOA's loan scheme has provided valuable financial support to livestock farmers, gender disparity in credit access persists, even though female farmers demonstrate greater repayment efficiency. This contradiction underscores the need for BOA to rethink its lending strategies to incorporate gender-sensitive financial products that recognize women's creditworthiness and mitigate barriers to their full participation in formal credit schemes. The study therefore calls for deliberate policy actions and institutional reforms by the BOA and relevant stakeholders aimed at promoting inclusive agricultural financing, expanding credit opportunities for women farmers, and strengthening their productive capacity for sustainable rural development. Hence, this study recommends the creation of special credit package for female livestock farmers (such as lower collateral requirements, flexible repayment schedules or smaller, progressive loan sizes) that can be increased based on repayment performance; introduction of grace periods for repayment to accommodate the longer gestation period of certain livestock enterprises typically managed by women (such as poultry, piggery, small ruminants, etc.); establishment of mandatory financial literacy programs for loan applicants, focusing on record keeping, budgeting and livestock enterprise management; partnership with local cooperatives and women associations to facilitate group-based loan applications, monitoring and extension follow-up, as well as an introduction of mobile-based loan application and repayment systems to reduce the burden of physical access to bank branches, especially for rural women with limited mobility.

Appendices

Akwa Ibom State University

Department of Agricultural Economics and Extension

Faculty of Agriculture

Dear Respondent,

We sincerely solicit for your assistance by supplying the required information needed in this questionnaire. This questionnaire is designed to collect information for academic research on Gender Analysis of Credit Access and Repayment of Bank of Agriculture's Loan Scheme by Livestock Farmers in Akwa Ibom State, Nigeria. The study is strictly for academic purposes, and all responses will be treated with the highest level of confidentiality. Please supply direct answer to each question but where there are options, tick the most relevant one.

Thank you in anticipation of your positive response.

Signed

.....

Please tick ONLY appropriate option attached to each question.

No.	Questions and fillers	Coding category	Tick
1	Gender	Male	
		Female	
2	What is your age bracket?	0-10	
		21-30	
		31-40	
		41-50	
		50 and above	
3	Marital status	Single	
		Married	
		Divorced	
		Widow	
4	What is your highest educational qualification?	No formal education	
		Primary	
		Secondary	
		OND/NCE	
		HND/BSc or above	
5	What is your household size?	_____ people	
6	What is your monthly income?	Less than ₦20,000	
		₦20,000-₦30,000	
		₦30,000-₦40,000	
		₦40,000-₦50,000	
		Above ₦50,000	
7	How many years of livestock farming experience do you have?	_____ years	
8	How many livestock do you currently keep?		
9	Do you belong to any cooperative or farmer association?	Yes	
		No	
10	What is the distance from your residence to the nearest Bank of Agriculture branch?	_____ km	
11	Have you ever received formal credit from Bank of Agriculture?	Yes	
		No	

TABLE 6: Socio-economic characteristics of respondents

OND, Ordinary National Diploma; NCE, National Certificate in Education

No.	Questions and fillers	Coding category	Tick
12	How many times have you accessed a loan from the Bank of Agriculture?		
13	What was the total amount (₦) of credit you accessed in your most recent loan?		
14	Did you present any collateral to secure the loan?	Yes	
		No	
15	If yes, what type of collateral did you present?	Land title	
		House document	
		Vehicle papers	
		Surety	
		Others (please specify):	
16	How long did it take you to get the loan after application?	Less than 1 month	
		1–2 months	
		More than 2 months	
17	Were you satisfied with the amount you received?	Yes	
		No	

TABLE 7: Access to credit

No.	Questions and fillers	Coding category	Tick
18	How much of the last loan did you repay	₦ _____	
19	Did you repay the loan within the stipulated period?	Yes	
		No	
20	Have you ever defaulted on any Bank of Agriculture loan?	Yes	
		No	
21	What was your reason for default (if any)?	Low income	
		Poor market prices	
		Family/household needs	
		Illness/disability	
		Others (please specify):	
22	Do you think the loan improved your livestock business?	Yes	
		No	
23	Would you apply for another loan from the Bank of Agriculture?	Yes	
		No	
		Not Sure	

TABLE 8: Loan repayment

No.	Questions and fillers	Coding category
24	What are the main challenges you face in accessing credit?	
25	What recommendations would you give to improve access and repayment for livestock farmers?	

TABLE 9: Suggestions and general opinions

THANK YOU FOR YOUR TIME AND COOPERATION

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. Department of Agricultural Economics and Extension, Akwa Ibom State University issued approval (AKSU/AEC/0030). This study involved human subjects who participated voluntarily in the research. The participants were adult individuals aged 18 years and above, primarily consisting of livestock farmers in Akwa Ibom State, Nigeria. Prior to their participation, all respondents were adequately informed about the purpose, nature and objectives of the study. Hence, participation was entirely voluntary, and informed consent was obtained from each participant before data collection commenced. They were assured of the confidentiality of all information provided and were informed that the data collected would be used strictly for academic and research purposes. No personally identifiable information was collected or published. The study complied with ethical guidelines for research involving human subjects as stipulated by Akwa Ibom State University, and all procedures were carried out with integrity, ensuring respect for the rights and welfare of the participants. No physical, psychological or social harm was posed to participants during or after the research. Respondents were given the liberty to withdraw from the study at any point without penalty. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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upon approval.

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