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Implications of Rural Exodus and Financial Remittances on Food Security in Bayelsa State, Nigeria

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ABSTRACT

This study explores how rural exodus and financial development shape food security in Bayelsa State, Nigeria. Despite the region's strong agricultural potential, food insecurity continues to affect many rural households. The growing exodus of people and limited access to financial services continues to restrict farmers' ability to invest in improved inputs and technologies. To better understand these dynamics, the study adopts a quantitative approach. Data were collected from 275 farm households using a multistage sampling technique and structured questionnaires. The study employs Ordinary Least Squares (OLS) regression and inequality analysis using Lorenz curves and Gini coefficients. The results reveal that rural exodus has a negative but statistically insignificant effect on food security, while financial development shows a positive but weak influence. However, the interaction between rural exodus and financial development exhibits a negative and significant effect, indicating that financial systems do not adequately offset the adverse effects of labour migration on agricultural productivity. Furthermore, inequality analysis reveals moderate disparities in financial development (Gini = 0.327) and food security (Gini = 0.344), suggesting structural imbalances in resource distribution. In conclusion, the findings highlight the need for policies that strengthen rural financial systems and make agriculture more attractive, especially to young people. Expanding access to credit, promoting mechanized farming, and improving rural infrastructure are essential steps toward reducing migration pressures and achieving sustainable food security.

Keywords: *Food security, Inequality, Labour shortage, Lorenz Curve, Gini Coefficient*

INTRODUCTION

Rural–urban migration has increasingly shaped Nigeria's population structure and economic landscape. This movement is largely driven by differences in income opportunities, infrastructure, and access to basic services between rural and urban areas. While migration is often pursued in search of better living conditions, it also creates important challenges for agriculture and food systems. The steady departure of young and able-bodied individuals from rural farming communities reduces the available labour force, which in turn affects farm productivity and contributes to food insecurity (Jayne *et al.,* 2019). At the same time, the rapid growth of urban populations increases the demand for food, placing additional pressure on supply systems and contributing to rising food prices (Reardon *et al.,* 2020). Nigeria is therefore confronted with a difficult situation in which food production is weakening in rural areas while demand continues to rise in urban centres.

Although financial inclusion is widely recognized as a key factor in improving agricultural productivity and food access, its connection with migration and food security is not yet fully understood. Access to financial services such as credit, savings, and insurance—can shape household decisions in different ways. On one hand, it can support investment in farming activities and reduce the need to migrate. On the other hand, it can also make migration easier by providing the resources needed to relocate. In many rural areas of Nigeria, however, limited access to finance restricts farmers' ability to adopt improved technologies and expand production. This situation not only weakens agricultural output but also reinforces the tendency for rural dwellers to migrate in search of better opportunities (Quisumbing *et al.,* 2021). In addition, the lack of coordinated policies linking financial development, migration, and food security continues to limit progress toward a more resilient agricultural system.

Previous studies have largely examined migration, financial development, and food security as separate issues. As a result, there is limited empirical evidence that brings these

elements together within a single analytical framework. In particular, little attention has been given to how financial access may influence the relationship between migration and food security. Similarly, income inequality often assessed using measures such as the Gini coefficient and Lorenz curve—has not been sufficiently integrated into this discussion. Yet inequality plays a critical role in shaping both access to financial resources and vulnerability to food insecurity. This gap is especially relevant in contexts such as Bayelsa State, where difficult terrain, inadequate infrastructure, and widespread rural poverty intensify these challenges. A clearer understanding of how migration and financial development interact to influence food security is therefore essential for designing effective and context-specific policies.

Based on this, the study seeks to: examine the effect of rural–urban migration on food security; assess the role of financial development in shaping food security outcomes; analyze the combined effect of migration and financial development; identify key socio-economic factors influencing food security; and evaluate the extent of inequality in financial access and food security among rural households.

Theoretical Framework

This study draws on four interrelated theoretical perspectives to explain the linkages between rural migration, financial development, and food security.

The Lewis Dual Sector Theory (1954) explains economic development as a shift of labour from traditional agriculture to modern industry. The theory assumes that surplus labour exists in rural areas and can move to urban sectors without affecting agricultural output. However, this assumption does not always hold in practice, particularly in developing countries like Nigeria. When migration becomes excessive, it can lead to labour shortages in agriculture, reduced productivity, and lower food availability. Recent studies (Gollin, 2018; McMillan *et al.,* 2020) show that unbalanced labour movement can weaken agricultural systems rather than support overall development. The Financial Intermediation Theory highlights the role of financial institutions in mobilizing savings and directing credit toward productive uses. In agriculture, access to finance enables farmers to invest in inputs, adopt improved technologies, and manage risks. Empirical evidence (Suri and Jack, 2019; World Bank, 2022) suggests that financial inclusion can improve both productivity and household food security. However, the benefits depend not only on access but also on how effectively financial resources are utilized.

The Push–Pull Migration Theory (Lee, 1966) explains migration as a response to conditions that either drive people away from rural areas or attract them to urban centres. Limited economic opportunities, poor infrastructure, and low incomes act as push factors, while better employment prospects and living conditions serve as pull factors. Although migration can generate remittances, large-scale rural outflows often reduce the labour available for farming, leading to lower agricultural output and increased dependence on food markets (Tacoli, 2018; FAO, 2020). The Sustainable Livelihood Theory (DFID, 1999) provides a broader framework for understanding how households secure their livelihoods. It emphasizes the importance of different forms of capital, including human, financial, natural, physical, and social assets. Food security is seen as a key outcome influenced by access to these resources. In this context, financial capital supports investment and consumption, while human capital particularly labour which is critical for agricultural production. The interaction between labour migration and financial access ultimately shapes household food security outcomes (Scoones, 2019; FAO, 2022).

Materials and Methods

The study was carried out in Bayelsa State, Nigeria, which covers a land area of about 10,771 square kilometres and has an estimated population of 2,537,400 people (National Population Commission, 2022). Located in the South-South region, the state is characterized by a tropical environment and a riverine landscape. The main livelihood activities of the people include farming, fishing, and trading (Morgan and Kainga, 2024). A multi-stage sampling procedure was adopted for the study. First, three agricultural zones were selected. Next, three Local Government Areas (LGAs) were randomly chosen from these zones. This was followed by the random selection of three communities from each LGA. Finally, thirty-two farmers were selected from each community, resulting in a total sample size of 288 respondents. The list of farmers was obtained from the State Agricultural Development Programme.

Data were collected using structured questionnaires, while both descriptive and inferential statistical tools were applied in the analysis using SPSS. An equal number of respondents was selected from each community to ensure balanced representation and allow for meaningful comparison across locations. This approach helped to minimize bias that could arise from differences in community size and ensured that smaller communities were adequately represented. It also improved the reliability of the analysis and strengthened the overall validity of

the findings (Etikan and Bala, 2017; Kothari, 2004; Coelho *et al.,* 2022)

Table 1: Summary of the study area sampling procedures

Agricultural Zone	LGA	Community	Number sampled	Number retrieved
Sagbama	Sagbama	Sagbama	32	31
		Ebedebiri	32	31
		Toru-Orua	32	30
Yenagoa	Yenagoa	Zarama	32	31
		Igbogene	32	30
		Okolobiri	32	29
Brass	Ogbia	Kolo	32	31
		Imiringi	32	32
		Opume	32	30
3	**3**	**9**	**288**	**275**

Source: Author's Survey, 2026.

The sample size for this study was determined using the formula proposed by Kothari (2004) for an infinite population as follows:Where: n = Require sample size Z = Standard normal deviate at 95% confidence level (1.96) p = Assumed population proportion (0.5 to ensure maximum variability) q = 1-p = 0.5 e = margin of error – 0.06 (±6) Therefore, the study used approximately 270 respondents as the sample size. Adjustment for miscellaneous errors, add 5-10% extra to account for non-sampling errors (Creswell, 2014). This study will use 5% allowance as follows:

Model specification

The Ordinary Least Squares (OLS) method was employed due to the continuous nature of the food security index. OLS provides Best Linear Unbiased Estimates (BLUE) under classical assumptions and has been widely used in recent food security studies (Mansaray and Jin, 2020; Olojede *et al.,* 2025). The core model is expressed as; Where;

FSX = Food security index; REX = Rural exodus index; FDX = Financial development index; RFDX (REX × FDX) = Interaction term; X = Vector of socio-economic variables; ε = Error term

Logarithm form of the model is expressed as

Food security index in standardized form is expressed as; Where X is the individual value, is the sample mean, and σ is the standard deviation.

Variance Inflating Factor (VIF) was used to test the multicollinearity in the models as used by Aroyehun et al. (2024) expressed in regression form as;

Where;

G = Gini coefficient

X = Food security index (FSX)

Y = Household number (sample size 275)

A Priori Expectations

A priori expectations suggest that rural exodus (REX) will negatively influence food security due to labour depletion, while financial development (FDX) is expected to exert a positive effect by improving access to productive resources. The interaction term (RFDX) is anticipated to be positive, indicating that financial development may cushion the adverse effects of rural–urban migration. Socio-economic variables such as education, farm size, income, and access to services are expected to positively influence food security, while household size may exert a negative effect due to increased consumption pressure.

Table 2: Descriptive statistics

Variable	N	Minimum	Maximum	Mean	Std. Dev.
Socio-economic characteristics					
Gender	2	0	1	0.73	0.446
Age		22	71	49.27	11.335
Marital status		0	1	0.37	0.484
Level of education	275	1	4	1.69	0.901
Household size	275	1	11	5	1.903
Primary occupation	275	1	5	2.37	1.307
Monthly income	275	40000	230000	83752.73	42869.14
Farm size	275	0.55	3.50	1.1444	0.60126
Migration dynamics					
Household members migrated to urban areas	275	0	1	0.55	0.498
Number of households migrated to urban areas	275	0	3	0.82	0.863
Major reasons for migration	275	1	5	3.22	1.775
Migration reduced the labour available for farming	275	1	5	4.13	0.909
Rural–urban migration negatively affected food production of the household	275	1	5	4.26	0.902
Migration has improved household income through remittances	275	1	5	4.06	1.029
Financial development					
Access to formal financial institutions (banks, microfinance)	275	0	1	0.11	0.312
Access to credit/loans	275	0	1	0.15	0.360
Source of credit	275	2	6	4.91	1.082
Purpose of the credit obtained	275	0	1	0.13	0.338
Amount of credit received in the last 12 months (in Naira)	36	40000	800000	147027.78	180605.88
Easy financial services accessibility in the community	275	1	5	4.44	0.610
Access to credit improved agricultural productivity	275	1	5	2.36	1.117
Lack of finance limits the ability to produce enough food	275	1	3	1.30	0.586
Food security status					
Often does household have enough food	275	1	3	1.56	0.764
Skipped meals due to lack of food	275	0	1	0.76	0.428
Number of meals the household consumes daily	275	1	3	2.15	0.525
Access to balanced and nutritious food	275	0	1	0.97	0.178
Food prices have affected ability to feed household adequately	275	1	3	2.39	0.564
Household produces enough food for consumption	275	1	5	4.56	0.609
Institutional and market access					
Access to agricultural extension services	275	0	1	0.13	0.342
Access to market	275	0	1	0.76	0.426
Interaction between migration and finance					
Migration has reduced the capacity to produce food, even when finance is available	275	1	4	2.79	1.015
Access to finance helps to offset labour shortages caused by migration	275	1	3	2.15	0.525
Improved financial services can reduce the negative effects of rural exodus	275	1	5	3.42	1.283
Policy insights					
Measures to reduce rural–urban migration	275	1	4	1.40	0.683
Kind of financial support needed most	275	1	3	2.86	0.380

Source: Author's Survey, 2026.

Table 2 shows the descriptive statistics. The results of socio-economic characteristics show that 73% of the farmers were male, indicating male dominance in agricultural activities in the study area. This aligns with findings by Ogunniyi et al. (2021), who reported that men are more engaged in farm decision-making in rural Nigeria. The mean age of 49.27 years suggests that most farmers were in their economically active years, though slightly ageing. This supports the assertion by Jayne et al. (2019) that African agriculture is increasingly dominated by middle-aged farmers due to youth migration. A household size of 5 persons indicates moderate family labour availability, consistent with Liverpool-Tasie et al. (2020), who noted that household size is a critical determinant of labour supply and food production. The mean monthly income (₦83,752.73) with a high standard

deviation (₦42,869.14) reflects income variability among households. This finding aligns with Fosu (2021), who emphasized income disparities in rural Africa. Farm size (mean = 1.14 ha) confirms smallholder dominance, consistent with FAO (2022b), which reports that most Nigerian farmers operate on less than 2 hectares.

Migration dynamics in Table 2 show that about 55% of households reported having members who migrated, indicating a high prevalence of rural–urban migration. This supports the Push–Pull Migration Theory, where economic pressures drive migration. The mean score of 4.13 for "migration reduced labour" and 4.26 for "negative effect on food production" strongly confirms that rural exodus significantly reduces agricultural productivity. This aligns with Barrett et al. (2021), who found that labour loss negatively affects food systems. Interestingly, farmers agreed (mean = 4.06) that migration improves income via remittances, supporting the dual-effect hypothesis noted by de Brauw (2022), where migration can both harm production and improve income.

Financial development in Table 2, shows that only 11% of households have access to formal financial institutions, and 15% have access to credit, indicating severe financial exclusion. This supports Financial Intermediation Theory, which emphasizes that limited financial access constrains productivity. Despite this, farmers rated financial accessibility in communities highly (mean = 4.44), suggesting perceived availability but limited actual access—a common paradox noted by the World Bank (2021). The high mean score (2.36) for "credit improves productivity" confirms the importance of finance in agriculture, consistent with Karlan et al. (2020), who showed that credit access enhances farm output. The food security indicators reveal mixed outcomes. 76% of households skipped meals, which indicates significant vulnerability. Mean of 2.15 meals/day, indicates below optimal standard. However, 97% report access to nutritious food. This paradox suggests that while food quality may be available, access and consistency are constrained, aligning with IFPRI (2022), which emphasizes multidimensional food insecurity. The high mean (4.56) for "household produces enough food" indicates production capacity, but market and financial constraints may limit access—consistent with FSX inequality (Gini = 0.344) in Figure 4.

Institutional and market access shows that only 13% have access to extension services, indicating weak institutional support. This supports findings by Anderson (2020), who emphasized the role of extension in improving productivity. However, 76% have market access, suggesting that marketing channels exist but may not be efficiently utilized due to financial or production constraints. Interaction between migration and finance shows that the mean score (2.79) indicates that migration reduces production even when finance is available, confirming that labour loss cannot always be substituted by capital. However, farmers agree (mean = 3.42) that financial services can mitigate migration effects, supporting the complementarity between labour and finance in agricultural production. Policy insights show that the farmers strongly indicated the need for financial support (mean = 2.86) and migration control strategies. This aligns with the African Development Bank (2023), which recommends rural finance and infrastructure to reduce migration pressures.

Effect of rural exodus on food security

Table 3: Effect of rural exodus on food security

Variable	Coefficients	Std. Error	t-value	Sig.	Tolerance	VIF
Constant	0.620	0.429	1.444	0.150		
LREX	-0.055	0.061	-0.907	0.365	0.971	1.030
LHhSiz	0.045	0.144	0.310	0.757	0.766	1.306
LGender	-0.002	0.015	-0.102	0.918	0.913	1.095
Lage	-0.875***	0.266	-3.294	0.001	0.817	1.224
LMarSta	-0.045***	0.013	-3.357	0.001	0.979	1.021
LEdu	0.367***	0.129	2.850	0.005	0.918	1.089
LFamSiz	0.257*	0.137	1.873	0.062	0.932	1.073
R-squared	0.624			Akaike info criterion		1.127
Log likelihood	-144.117			Schwarz criterion		1.233
F-statistic	5.279			Hannan-Quinn criter.		1.170
Prob(F-statistic)	0.000			Durbin-Watson stat		1.654

***, **, and * means significant at 1%, 5%, and 10% respectively; VIF = Variance Inflation Factor.

Source: Author's Survey, 2026.

Table 3 presents the estimated relationship between rural exodus and food security. The regression results indicate that the model is statistically significant, as reflected by an F-statistic of 5.279 ($p < 0.01$). This suggests that the explanatory variables jointly provide a meaningful explanation of variations in food security. The R^2 value of 0.624 shows that approximately 62.4% of the variation in food security (FSX) is accounted for by the model. In addition, the Durbin–Watson statistic of 1.654 suggests that autocorrelation is not a major concern. Taken together, these results point to a reasonably strong and reliable model, consistent with findings from similar empirical studies such as Olojede et al. (2025). Further diagnostic checks confirm the robustness of the estimates. The variance inflation factor (VIF) values, which range from 1.021 to 1.306, are well below the commonly accepted threshold, indicating that multicollinearity is not a problem. Similarly, the

tolerance values are sufficiently high, suggesting that the explanatory variables are not excessively correlated and that the model is stable.

The coefficient of rural exodus (LREX) is negative (-0.055), which aligns with theoretical expectations, but it is not statistically significant (p = 0.365). This implies that, within the context of this study, rural out-migration does not exert a direct short-term effect on food security. While migration may reduce the availability of farm labour—as indicated in the earlier descriptive results it is possible that remittances from migrants help to offset these losses. This finding supports de Brauw (2022), who noted that migration can have mixed effects by reducing labour supply while simultaneously improving household income. It is also in line with Wouterse (2021), who emphasized that the overall impact of migration depends on how households adjust to these changes. Among the socio-economic variables, age shows a significant negative effect on food security (-0.875; p = 0.001). This suggests that older farmers may face constraints related to declining physical strength and slower adoption of new technologies, which can reduce productivity. Similar observations were made by Abdulai (2020), who linked ageing to lower agricultural efficiency.

Marital status also exhibits a negative and significant relationship with food security (-0.045; p = 0.001). This may reflect the higher dependency burden often associated with married households, which increases consumption needs and can strain available resources. This finding is consistent with Ogundari (2021), who reported that larger household responsibilities tend to reduce per capita food access. In contrast, education has a positive and highly significant effect on food security (0.367; p = 0.001). This indicates that educated farmers are more likely to adopt improved farming practices, access financial services, and make better production decisions. This result aligns with Asfaw (2020), who found that education plays a critical role in enhancing both agricultural productivity and food security. Farm size also shows a positive relationship with food security (0.257), although it is only marginally significant (p = 0.062). This suggests that larger farm holdings may contribute to increased food production and availability, even if the effect is not particularly strong in this case. This finding is broadly consistent with FAO (2022b), which identifies land size as an important factor in determining agricultural output.

Effect of financial development on food security

Table 4: Assessment of the effect of financial development on food security

Variable	Coefficients	Std. Error	t-value	Sig.	Tolerance	VIF
Constant	0.794*	0.443	1.791	0.074		
LFinInst	-0.002	0.028	-0.084	0.933	0.569	1.756
LAcceCred	0.019	0.024	0.785	0.433	0.572	1.748
LFamSiz	0.250*	0.134	1.859	0.064	0.975	1.025
LHhSiz	0.048	0.145	0.330	0.742	0.755	1.325
LEdu	0.345***	0.129	2.671	0.008	0.912	1.096
LMarSta	-0.045***	0.013	-3.315	0.001	0.966	1.035
Lage	-0.929***	0.268	-3.472	0.001	0.806	1.241
R-squared	0.624			Akaike info criterion		1.127
Log likelihood	-144.096			Schwarz criterion		1.233
F-statistic	5.286			Hannan-Quinn criter.		1.169
Prob(F-statistic)	0.000			Durbin-Watson stat		1.669

***, **, and * means significant at 1%, 5%, and 10% respectively; VIF = Variance Inflation Factor.

Source: Author's Survey, 2026.

Table 4 presents the effect of financial development on food security. The model is statistically significant (F = 5.286; p < 0.01), with an R^2 of 0.624, indicating that about 62.4% of the variation in food security is explained by the included variables. The Durbin–Watson statistic (1.669) suggests no serious autocorrelation problem. Diagnostic tests further confirm the reliability of the estimates, as VIF values remain low (below 2), indicating no multicollinearity concerns. Overall, the model performs well and is comparable to similar empirical studies such as Mhlanga and Dzingirai (2024). Interestingly, the financial variables access to financial institutions and credit are not statistically significant. This suggests that formal financial access, on its own, does not directly translate into improved food security in the study area. A possible explanation is that access remains limited in practical terms, loans may be too small, or funds may not be used for productive purposes. High transaction costs and institutional inefficiencies may also weaken the expected impact. This finding supports Dupas et al. (2020) and the World Bank (2021), both of which emphasize that access alone is insufficient without effective use and supportive institutions.

Among the control variables, farm size shows a positive (though marginal) effect (0.250; p = 0.064), suggesting that larger landholdings improve production capacity. Education has a strong positive and significant effect (0.345; p = 0.008), indicating that better-informed farmers are more likely to use resources efficiently and adopt improved practices. In contrast, marital status (-0.045; p = 0.001) and age (-0.929; p = 0.001) both have negative effects, reflecting higher dependency burdens and reduced productivity among older farmers. These results are consistent with existing studies (Asfaw, 2020; Ogundari, 2021; Abdulai, 2020).

Determinants of socio-economic factors and food security

Table 5: Determinants of socio-economic factors influencing food security

Variable	Coefficients	Std. Error	t-value	Sig.	Tolerance	VIF
Constant	-0.960	0.773	-1.241	0.216		
LREX	-0.070	0.060	-1.160	0.247	0.960	1.042
LFDX	0.049	0.047	1.040	0.299	0.947	1.056
LMthlyIncom	0.284**	0.139	2.045	0.042	0.908	1.102
LEdu	0.314** -	0.129	2.436	0.016	0.900	1.111
LHhSiz	0.017 -	0.145	-0.117	0.907	0.733	1.364
LExtVis	0.050***	0.019	-2.668	0.008	0.914	1.094
LGender	0.006	0.015	0.412	0.681	0.874	1.144
Lage	-0.811***	0.268	-3.024	0.003	0.785	1.274
LMarSta	-0.046***	0.013	[9]-3.419	0.001	0.963	1.039
R-squared	0.648			Akaike info criterion		1.113
Log likelihood	-140.286			Schwarz criterion		1.247
F-statistic	5.024			Hannan-Quinn criter.		1.167
Prob(F-statistic)	0.000			Durbin-Watson stat		1.698

***, **, and * means significant at 1%, 5%, and 10% respectively; VIF = Variance Inflation Factor.
Source: Author's Survey, 2026.

Table 5 shows the determinants of socio-economic factors influencing food security in the study area. The model was statistically significant overall ($F = 5.024$, $p < 0.01$) with a relatively strong explanatory power ($R^2 = 0.648$), indicating that about 64.8% of the variation in food security is explained by the included variables. The Durbin–Watson statistic (1.698) suggests no serious autocorrelation, while VIF values (< 2) confirm the absence of multicollinearity.

Rural exodus (-0.070, p = 0.247) shows a negative but insignificant effect on food security. This suggests that although migration tends to reduce food security (likely through labour loss), the effect is not strong enough when controlling for other socio-economic factors. This finding agrees with Barrett et al. (2021), who reported that migration reduces agricultural labour but effects vary depending on remittances. It also agreed with de Brauw (2022), who noted that migration impacts are heterogeneous and can be neutral where remittances offset labour loss. Financial development (0.049, p = 0.299) has a positive but insignificant effect, implying that access to finance alone does not significantly improve food security in this context. This finding agree with Dupas et al. (2020), who noted that financial access does not automatically translate to welfare gains without proper utilization. It also, agree with the World Bank (2021), who reported that financial inclusion impacts depend on institutional quality.

Income (0.284, p = 0.042) is significantly improves food security, confirming that economic access to food is critical. This finding agree with FAO (2023), who reported that income is a key determinant of food access. Educational level (0.314, p = 0.016) is significantly enhances food security by improving farm management, enhancing adoption of innovations, and increasing income opportunities. This finding agrees with Asfaw (2020), who reported that education improves productivity and food security outcomes. Extension services (-0.050, p = 0.008) show a significant negative effect, which is counterintuitive. This finding agree with Anderson and Feder (2021), who reported that weak extension systems in developing countries reduce effectiveness. Age with coefficient of -0.811 (p = 0.003), shows that older household heads are associated with lower food security. This could be attributed to reduced labour capacity and lower adoption of innovations. This finding agrees with Udry (2020), who reported that younger farmers are more productive and adaptive. Marital status (-0.046, p = 0.001) negatively affects food security, possibly due to increased household responsibilities and higher consumption burden. Therefore, the findings demonstrate that food security is driven more by socio-economic fundamentals (income and education) than by structural factors like migration and financial access alone.

Inequality analysis

To complement the econometric analysis, this study employs the Lorenz curve and Gini coefficient to examine the distributional patterns of financial development index (FDX) and food security index (FSX) among the households in the study area. While regression analysis explains causal relationships, inequality analysis provides insight into how these variables are distributed across households, thereby revealing structural imbalances that may not be captured by mean-based estimations.

Table 6: **Lorenz curve and Gini coefficient for financial development index (FDX)**

Households (F)	FDX	Midpoint (X)	FX	Cum.F	Cum.Pop share (Xi)	Cum.FDX	Cum.FDX share (Yi)	Xi-Xi	Yi+Yi	XY
0	-	-	-	0	0.000	0	0.000	-	-	-
209	0-0.50	0.25	52.25	209	0.76	52.25	0.453	0.76	0.453	0.344
44	0.51-1.0	0.755	33.22	253	0.92	85.47	0.740	0.16	1.193	0.191
19	1.1-1.50	1.3	24.7	272	0.989	110.17	0.954	0.069	1.695	0.117
3	1.51-2.0	1.755	5.265	275	1	115.435	1.000	0.011	1.954	0.021
Gini coefficient			**0.327**						Σxy	0.673

Source: Author's Survey, 2026.
Table 6 shows the distribution of financial development index (FDX) across households using the Lorenz framework. The Lorenz curve analysis for financial development index (FDX) reveals a moderate level of inequality, with a Gini coefficient of 0.327. The bottom 76.0% of households account for only 45.3% of total FDX, indicating unequal access to financial resources/services. The bottom 92.0% control 74.0% of FDX, implying that the top 8.0% of households account for about 26.0% of total financial access

Table 7: Lorenz Curve and Gini Coefficient for food security index (FSX)

Household (F)	FSX	Midpoint (X)	FX	Cum. F	Cum.Pop share (Xi)	Cum.FSX	Cum.FSX share (Yi)	Xi-Xi	Yi+Yi	XY
0	-	-	-	0	0.000	0	0.000	-	-	-
183	0-0.50	0.25	45.75	183	0.665	45.75	0.351	0.665	0.351	0.233
69	0.51-1.0	20	0.755	52.095	252	0.916	97.845	0.751	0.251	1.102	0.277
1.10-1.50	1	1.51-2.0	2	2.10-2.50	1.3	26	272	0.989	123.845	0.951	0.073	1.702	0.124
1.755	1.755	273	0.993	125.6	0.965	0.004	1.916	0.007					
Gini coefficient		2.3	4.6	275	1	130.2	1	0.007	1.965	0.014			
			0.344						Σxy	0.656			

Source: Author's Survey, 2026.

Table 7 shows the Lorenz distribution of food security index (FSX) across households, revealing how food security is shared within the population. The Lorenz curve analysis for FSX reveals a moderate-to-high level of inequality in food security distribution, with a Gini coefficient of 0.344. The bottom 66.5% of households account for only 35.1% of total FSX, indicating substantial inequality at the lower end of the distribution. The bottom 91.6% of households account for 75.1% of FSX, meaning the top 8.4% of households control about 24.9% of food security outcomes. The distribution curve lies below the line of equality (Figure 4), confirming unequal access to food security resources and outcomes. This indicates that food security is not evenly distributed, with a noticeable concentration among relatively fewer households. Compared to financial access (FDX), FSX exhibits the highest level of inequality, suggesting that inequalities in underlying economic conditions are amplified in food security outcomes. This finding aligns with Jayne et al. (2019), Reardon et al. (2020), and Quisumbing et al. (2021) who emphasize that structural inequalities in access to assets, markets, and services translate into unequal welfare and food security outcomes in developing economies

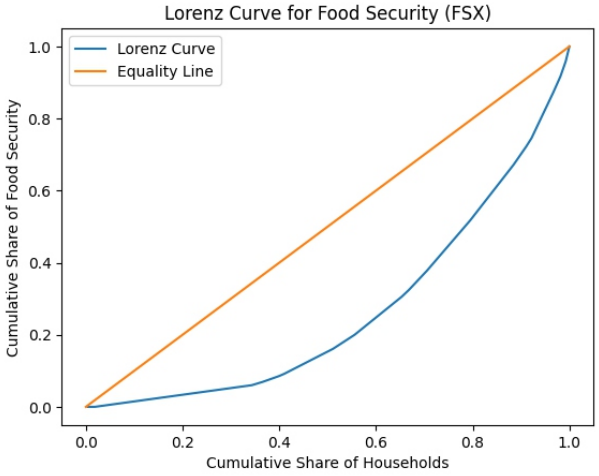
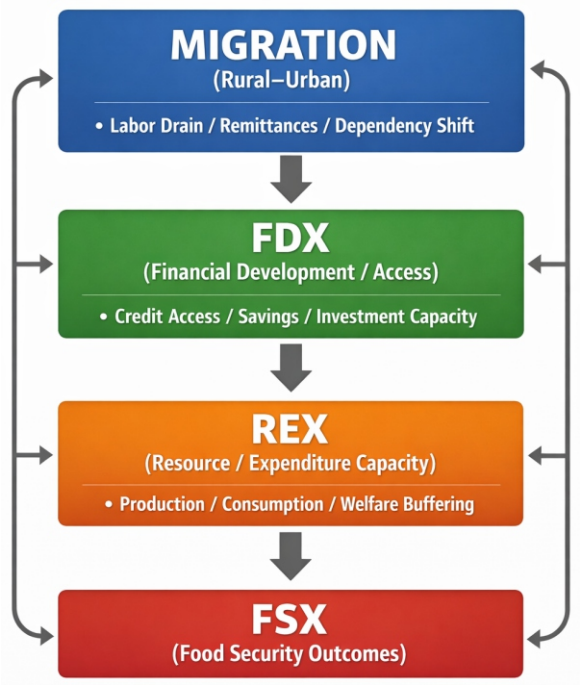


Figure 1 Lorenz curve for food security index
Source: Author's Survey, 2026.

The curve as shown in Figure 1 lies below the line of equality, confirming inequality in financial distribution. This suggests that financial access is disproportionately concentrated among relatively fewer households, particularly those at the upper end of the distribution. Financial access appears more unequally distributed, suggesting structural barriers to financial inclusion. This finding corroborates existing studies (Jayne *et al.,* 2019; Reardon *et al.,* 2020; Quisumbing *et al.,* 2021), which highlight the role of financial exclusion in exacerbating welfare and food security disparities in developing economies. The results underscore the importance of integrating financial inclusion policies into food security and rural development strategies.



8

Figure 2: Conceptual framework for rural exodus and financial development on food security
Source: Author's Survey, 2026.

Figure 2 presents a causal and feedback framework linking rural–urban migration to food security outcomes through financial and resource transmission channels. Migration is therefore ambivalent: it can weaken production capacity but strengthen household income. Financial development acts as a mediating financial bridge between migration and real economic capacity. Rural exodus is the transmission layer where financial access becomes real economic power. The curved arrows on the sides indicate bidirectional or reinforcing feedback mechanisms. FSX ↔ Migration: food insecurity can trigger migration, and migration can also

reshape food security outcomes. FDX ↔ Migration: migration increases remittances, strengthens financial systems, and strong financial systems can influence migration decisions. REX ↔ Migration: migration alters household resources, and resource constraints can also push further migration.

Conclusion and Policy Recommendations

The study concludes that rural exodus alone does not significantly determine food security, but it contributes to labour shortages that can undermine agricultural production. Financial development, while important, is not sufficient in isolation to improve food security due to issues of access, utilization, and institutional inefficiencies. The interaction between rural exodus and financial development produces adverse outcomes, suggesting that financial systems are not effectively compensating for labour loss in agriculture. Socio-economic factors—especially income and education—are the most critical drivers of food security, reinforcing the importance of economic empowerment and human capital development. Moderate inequality in financial access and food security persists, indicating structural imbalances in resource distribution and access to productive opportunities. Achieving sustainable food security in the study area requires more than improving income or financial access; it demands a coordinated approach that addresses labour dynamics, institutional weaknesses, and structural inequalities.

Based on the findings, the following policy recommendations are proposed:

i. Strengthening rural financial systems: expand access to affordable credit through microfinance and rural banking; promote targeted agricultural lending to ensure funds are used for productive purposes; and improve financial literacy among rural households.
ii. Reducing structural inequality: improve rural infrastructure (roads, storage, and markets); ensure equitable access to financial services and agricultural inputs; and target vulnerable households with food security interventions.
iii. Promoting an integrated policy approach: align migration, financial, and agricultural policies; and foster collaboration among government, financial institutions, and development partners.

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