



Naziru Suleiman,
Department of Accounting and
Finance,
Federal Polytechnic N'yak,
Shendam
nazirusuleiman2@gmail.com

Umar Abubakar Saleh,
Department of Electrical and
Electronic Engineering,
Federal Polytechnic N'yak,
Shendam
abubakarumarsaleh1982@gmail.com

Ado Hamisu
Centre for Atmospheric Research,
Prince Abubakar Audu University,
Anyigba
adohamisu@gmail.com

***Corresponding Author**

Naziru Suleiman,
Department of Accounting and
Finance,
Federal Polytechnic N'yak,
Shendam
nazirusuleiman2@gmail.com

ASSESSING DIGITAL FINANCIAL INCLUSION AND RURAL LIVELIHOODS IN SHENDAM LOCAL GOVERNMENT, PLATEAU STATE: PROSPECTS FOR A SUSTAINABLE DIGITAL TRANSFORMATION

Abstract

Digital Financial Inclusion (DFI) has become a vital tool for improving financial access and enhancing livelihoods, particularly within underserved rural communities. This study examines the effect of DFI on household consumption patterns and financial well-being in Shendam Local Government Area (LGA), Plateau State, Nigeria. Using a mixed-methods approach, data were collected from 400 rural households across four districts through structured questionnaires, interviews, and focus group discussions. Analytical techniques including descriptive statistics, chi-square tests, and regression models were employed to assess the relationships between DFI, income, education, household size, and employment status. Findings reveal that while awareness of digital financial services is moderate, actual usage remains limited due to low digital literacy, inadequate infrastructure, and affordability challenges. Notably, DFI exerts a negative direct influence on consumption, suggesting that access alone does not ensure financial improvement without adequate literacy and responsible usage. However, the interaction between DFI and income is positive and significant, indicating that digitally included higher-income households experience more diversified and stable consumption. The study further identifies disparities by age, gender, employment status, and household headship, with male-headed and self-employed households showing higher inclusion levels. It recommends financial literacy initiatives, gender-inclusive financial products, and expansion of agent banking networks to strengthen digital access and consumer protection. Overall, the study underscores DFI's potential as a catalyst for inclusive rural development and supports progress toward relevant Sustainable Development Goals (SDGs) in Nigeria.

Keywords: Digital Financial Inclusion, Rural Livelihoods, Household Consumption, Financial Literacy, Sustainable Development Goal

1.0 Introduction

Financial inclusion is the equitable access to financial services. It remains a key driver of poverty reduction and sustainable growth, particularly in developing nations (Del Sarto & Ozili, 2025). Historically, rural populations have been excluded from formal finance due to distance, cost, and identification barriers. The emergence of digital financial technologies (FinTech), such as mobile money, agent banking, and digital payments, has redefined inclusion through what is now termed digital financial inclusion (DFI) (Nipa, Alam, & Faruque, 2025).

These innovations enable financial access for underserved populations, improving livelihoods and supporting the Sustainable Development Goals (SDGs).

Globally, financial exclusion persists, with over 56% of adults lacking access to formal financial services, a figure that rises to 64% in developing economies (Ardic, Heimann, & Nataliya, 2011). Rural areas remain most excluded, though DFI has narrowed the gap by facilitating access to payments, credit, and savings. In Nigeria, despite the growth of fintech, rural exclusion endures. Studies show that DFI correlates positively with income diversification, financial resilience, and poverty reduction (Del Sarto & Ozili, 2025; Afawubo & Agbaglah, 2024). For instance, mobile money promotes household income diversification and stability, while digital services enhance farmers' income and align with SDG goals (Sayari, Mgadmi, Dhaou, Almehdar, Chishty & Rabeh, 2025; Xia & Xu, 2025; Zhang, Huo, & Yu, 2025).

Despite these advances, Enhancing Financial Inclusion & Access (EFInA (2020) reports that rural exclusion remains at 44%—twice the urban rate. Limited banking infrastructure, literacy barriers, and the 2022 Naira redesign crisis exposed rural dependency on cash and weak digital adoption. Though Nigeria's mobile penetration offers opportunities, cultural mistrust, low literacy, and cybersecurity fears constrain rural uptake. Nearly 60% of Nigerians remain unbanked (Ekong & Ekong, 2022), far higher than Brazil (30%) or India (20%). These disparities deepen inequality and marginalization.

Financial inclusion enhances welfare, reduces poverty, and fosters small business growth (Ekong & Ekong, 2022). Conversely, exclusion constrains credit access and limits investments in education and health. Women are disproportionately excluded due to socio-cultural norms and lower literacy. Bridging these gaps is vital to achieving equitable financial empowerment. This study aligns with SDGs 1, 2, 8, 9, 10, and 12, aiming to assess DFI levels, its effect on household consumption, and barriers to adoption in Shendam LGA, Plateau State, while offering strategies for inclusive digital finance in rural Nigeria.

2.0 Literature Review

Global FinTech expansion has transformed financial inclusion. Del Sarto and Ozili (2025) document a post-2019 surge in mobile banking and blockchain innovations that reduce financing costs and boost growth. Sub-Saharan Africa—home to over 300 million mobile money users—illustrates DFI's transformative reach. The Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) explain rural adoption through perceived usefulness, ease of use, and trust (Jena, 2025). Positive attitudes and perceived control strengthen inclusion intentions, especially in low-income contexts.

Digital financial inclusion integrates unbanked individuals into formal finance via mobile and electronic platforms, offering affordable access to savings, credit, and insurance (Ozili, 2021b). Providers include full-service and limited-service banks, mobile network operators, and non-bank issuers. Successful ecosystems rely on digital platforms (e.g., M-Pesa, MTN MoMo, Paystack, Opay), agent networks that link providers to remote

users, and mobile devices enabling secure transactions. These mechanisms reduce dependence on physical banking, increasing outreach to marginalized groups.

Household consumption patterns—spending on food, housing, transport, health, education, and savings—reflect income stability and financial literacy (Modigliani & Brumberg, 1954). DFI promotes consumption smoothing by facilitating secure savings, credit access, and efficient payments (Beck et al., 2019). Access to digital tools allows households to manage shocks, invest in education and health, and enhance productivity through connectivity. However, rural DFI is hindered by weak infrastructure, low literacy, and gender disparities (Aker & Wilson, 2013; Wang & He, 2020). Addressing these gaps requires financial education, consumer protection, and infrastructure investment (Demirgüç-Kunt et al., 2018).

Kama and Adigun (2013) define inclusion as providing accessible financial products to low-income groups, while Sarma (2008, 2012) emphasizes access, availability, and use. Empirical evidence links inclusion to growth (Sarma & Pais, 2011), stability (Morgan & Pontines, 2014), and welfare (Demirgüç-Kunt & Levine, 2009). ICT-driven DFI has revolutionized outreach by lowering transaction costs and broadening coverage (Hart & Prahalad, 2002; Huang et al., 2016).

Empirical studies confirm diverse outcomes. Mallick and Zhang (2019) found DFI's welfare impact varied between rural and urban China. Li and Liu (2023) reported DFI increased household income by CNY4200 annually, while Wang and He (2020) showed digital finance reduced farmers' risk exposure. Omar and Inaba (2020) confirmed that inclusion reduces poverty and inequality across developing nations. In Nepal, Risal (2018) identified low awareness as a key barrier, while Wandeda et al. (2023) found education, gender, and phone ownership as key determinants.

In Africa, the link between finance, inequality, and poverty remains central. Financial development can reduce poverty (Kappel, 2010; Uddin et al., 2014; Abosedra et al., 2016), though institutional weaknesses may limit gains (Adeleye et al., 2018). In Nigeria, low financial literacy impedes inclusion (Migap, Okwanya, & Ojeka, 2015), and widespread exclusion undermines growth (Nkwede, 2015). Access to finance remains crucial for human welfare and development (Chakravarty & Pal, 2013).

Determinants of inclusion differ regionally. Zins and Weill (2016) found gender, income, age, and education as key predictors in 37 African countries, while Chikalipah (2017) highlighted illiteracy as a barrier in Sub-Saharan Africa. Ali (2019) observed women's exclusion from Islamic finance in Comoros due to illiteracy and poverty. In Argentina, cashless reforms improved tax collection (Mitchell & Scott, 2019), and in Bangladesh, SureCash innovations advanced inclusion (Ghosh & Bhattacharya, 2019). Similarly, Susilowati and Leonnard (2019) found income and education drive financial service use in Indonesia.

The literature collectively affirms that DFI enhances access, efficiency, and welfare. However, structural barriers—digital illiteracy, poor infrastructure, and gender inequality—limit its reach in rural areas. Effective

digital inclusion demands robust policy frameworks, literacy programs, and public–private collaboration. By addressing these constraints, DFI can fulfill its potential as a catalyst for inclusive and sustainable development in rural Nigeria.

3.0 Methodology

This study adopted a survey research design to collect comprehensive data across diverse socioeconomic groups and directly engage respondents for insights into their financial practices. Combining exploratory and explanatory approaches, the study first assessed the level of digital financial inclusion and its associated barriers, and then examined the causal relationships between digital financial inclusion and household consumption patterns. This dual approach provided a holistic understanding of how digital financial services influence consumer decisions in rural areas.

A mixed-methods strategy was employed, integrating both quantitative and qualitative techniques. Primary data were obtained through standardized questionnaires administered to rural households, complemented by in-depth interviews with digital financial service providers and policymakers. In addition, focus group discussions involving household heads and community members were conducted to capture perceptions, experiences, and behavioral factors influencing financial inclusion and consumption.

The sample size for the quantitative analysis was determined using Taro Yamane’s (1967) formula for finite populations, with the 2022 estimated population of Shendam Local Government Area (Plateau State) placed at approximately 301,800 residents. The formula is expressed as:

$$n = \frac{N}{1 + N(e)^2} \dots\dots\dots 1$$

where:

n= required sample size

N = total population = 301,800

e = margin of error = 0.05 (for 95% confidence level)

$$n = \frac{301,800}{1 + 301,800(0.05)^2} = 399.47$$

The study sampled approximately 400 rural households across the five districts of Shendam LGA—Shendam, Dorok, Derteng, Doka, and Kurgwi—selected based on rural population density and adoption levels of digital financial services. A multi-stage sampling technique combining purposive, proportional, cluster, and random sampling ensured representativeness across communities such as Shendam (Shinkwan, Tengzet, Derlit), Dorok (Kalong, Ngoot-long, Ngoottugut), Derteng (Ha’ambiak, Duankwan, Gaklang), and Doka (Tengnaduut, Jagaptuu, Doka). In total, 480 questionnaires were administered, and 400 valid responses were used for analysis, ensuring statistical robustness and rural diversity.

A structured questionnaire served as the main data collection instrument, containing both open-ended and closed-ended questions, as well as Likert-scale items to capture respondents' financial behaviors and perceptions. Sections covered socioeconomic characteristics (age, gender, household size, income, and employment), digital financial inclusion indicators (awareness, accessibility, affordability, and usage), and household consumption behavior, including savings, borrowing, and expenditure patterns. Likert scales varied by context—for example, frequency-based questions ranged from “Always” to “Never,” while affordability items ranged from “Very Affordable” to “Not Affordable at All”—allowing nuanced assessment of digital participation.

To ensure content validity, experts in financial inclusion, economics, and survey research reviewed the instrument. A pilot test refined ambiguous or inconsistent items, adapting established scales to suit the rural Shendam context. Data collection involved face-to-face surveys with household heads, complemented by in-depth interviews (IDIs) with financial service providers and policymakers, and focus group discussions (FGDs) with community members to triangulate quantitative findings and contextualize digital finance experiences. Instrument reliability was tested using Cronbach's Alpha. DFI Awareness exhibited high reliability ($\alpha = 0.80$), confirming consistent responses. DFI Accessibility ($\alpha = 0.55$) and DFI Usage ($\alpha = 0.63$) demonstrated moderate consistency, prompting item revisions for conceptual alignment. However, the Consumption Pattern construct showed low reliability ($\alpha = 0.17$), leading to comprehensive restructuring and refinement to strengthen measurement coherence and ensure dependable analysis.

Table 1: Cronbach alpha Reliability test

Source: Finding of the Author's (2025)

Variables	Cronbach alpha stats	Questions	No. of Questions
DFI Awareness	0.80	Q19 – Q26	7
DFI Accessibility	0.55	Q27 – Q38	12
DFI Usage	0.63	Q39 – Q56	16
Consumption Patterns	0.17	Q63 – Q67	5

According to Gedik et al. (2015), the interpretation of the Cronbach statistics are as follows:

$0.00 \leq \alpha \leq 0.39$: Scale not reliable

$0.40 \leq \alpha \leq 0.59$: Scale has low reliability

$0.60 \leq \alpha \leq 0.79$: Scale has high reliability

$0.80 \leq \alpha \leq 1$: Scale is definitely reliable

Model Specification

$$\ln C_{ijt} = \beta_0 + \beta_1 Y_{ijt} + \beta_2 Digital_{ijt} + \xi' X_{ijt} + \theta_t + \mu_{ijt} \dots \dots \dots (1)$$

Where:

- **lnC_{ijt}** = Log of total household consumption expenditure for household i in region j at time t, representing overall household consumption.
- **Y_{ijt}** = Household income level, which serves as the primary determinant of consumption.
- **Digital_{ijt}** = Digital financial inclusion indicator, capturing access to and usage of digital financial services (e.g., mobile banking, digital payments).
- **X_{ijt}** = Vector of control variables such as education level, household size and employment status.
- **θ_t** = Time-fixed effects, controlling for external macroeconomic factors that may influence household consumption over time.
- **μ_{ijt}** = Error term, capturing unobserved variations affecting consumption behavior.

To investigate the impact of digital financial inclusion on household spending stability, an interaction term is incorporated in an alternative model:

$$C_{ijt} = \beta_0 + \beta_1 Y_{ijt} + \beta_2 Digital_{ijt} + \beta_3 (Digital \times Y)_{ijt} + \xi' X_{ijt} + \theta_t + \mu_{ijt} \dots \dots \dots (2)$$

The interaction term (Digital×Y)_{ijt} determines whether the effect of income on consumption is increased by digital financial inclusion. Households with higher digital financial access have more steady and diverse consumption patterns.

Data Analysis Techniques

The collected data was examined using descriptive and inferential statistical methods to investigate the influence of digital financial inclusion on rural household consumption diversification and stability. Descriptive statistics, such as frequency distributions, mean values, and percentages, were used to summarize major socioeconomic factors like age, gender, employment status, income levels, and household financial practices. These statistics offered an overview of the level of digital financial inclusion as well as variations in rural household purchasing patterns.

For assessing the impact of digital financial inclusion on household consumption diversification, a Consumption Diversity Index (CDI) regression was used. This index tracked how households divided their spending across various consumption categories, including food, healthcare, education, and durable goods. The regression analysis examined whether access to digital financial services resulted in increased consumption diversification and better financial decision-making.

A Moderated Regression Analysis (MRA) was used to investigate the impact of digital financial inclusion on consumption stability and financial resilience. This model looked at how income levels and other socioeconomic characteristics (education, employment status, and household size) affected the connection between digital financial inclusion and household consumption stability. The interaction effects revealed

whether financial inclusion alone was sufficient to promote steady consumption patterns, or if other socioeconomic circumstances were also important. To ensure robust statistical interpretation and accuracy, the data were examined using both descriptive and inferential methods.

4.0 Empirical Analysis

The socioeconomic data in Table 2 reveal that most rural household heads are middle-aged, with an average age of 43 years (± 14). Nearly half (46.5%) fall within the 35–54 age range, representing individuals in their most economically active years, while 30% are young adults (18–34) who are generally more receptive to digital financial innovations. About 22.8% are aged 55 and above, reflecting an older population segment that may exhibit lower adoption of digital finance due to limited digital literacy or technology exposure.

Rural households are typically large, averaging seven members (± 4), with almost half (48.5%) comprising 4–6 persons and 37.2% containing seven or more. This prevalence of extended family structures indicates significant financial dependency and shared household obligations, factors that may constrain savings and influence consumption patterns in areas such as food, education, and healthcare.

Income distribution among households shows considerable variation, with an average monthly income of ₦93,460 ($\pm$ ₦66,000). The dominant income group earns between ₦50,000 and ₦100,000 monthly (41.3%), while 27.5% live on less than ₦50,000, suggesting widespread economic vulnerability. Only 9% of respondents earn above ₦200,000, pointing to pronounced income inequality within rural communities. The wide income disparity highlights the uneven distribution of financial resources, which directly affects participation in digital finance.

These findings emphasize the dual challenge of income inequality and large household size in shaping financial behavior and digital inclusion. Targeted interventions that expand access to affordable digital services, strengthen financial literacy, and address the economic needs of low-income and large households are essential for promoting equitable financial inclusion in rural Nigeria.

Table 2: Socio-economic Profile of Rural Households in Shendam LGA

Source: Finding of the Author's (2025)

Variables	Scale	N = 400	Perc. (100 %)	Table 3 shows large
Age (Mean 43 years $\pm$ 14 years)	Under 18 years	3	0.7	
	18-34 years	120	30.0	
	35-54 years	186	46.5	
	55 and above	91	22.8	
Household Size (Mean 7 persons $\pm$ 1-3 persons 4 persons)		57	14.3	

		4-6 persons	194	48.5
		7-9 persons	82	20.5
		10 or more persons	67	16.7
Monthly Income	(Mean ₦93,460 ± ₦66,000)	Less than ₦50,000	110	27.5
		₦50,000 - ₦100,000	165	41.3
		₦100,001 - ₦200,000	89	22.3
		Above 200,000	36	9

gender discrepancies among sampled respondents, with 7 out of 10 (70.3%) males and just 3 out of 10 (29.7%) females. This pattern was reinforced in household headship, with men leading more than 8 out of every 10 rural homes (85.7%), leaving only 14.3% under female leadership. According to these statistics, men make the majority of financial decisions and have economic control, which may have an impact on household access to financial services and digital financial inclusion. The lower number of female-headed families may indicate that women have less economic prospects or that social systems favor male financial leadership. Employment and income sources reflect the financial situation of rural households. Almost three-quarters (72.5%) of rural residents were self-employed, implying that most households relied on farming, small-scale businesses, and informal work. Government employment accounted for only 11.5%, with private-sector jobs accounting for only 3.5%, indicating a lack of formal employment opportunities in rural areas. Alarming, 1 in every 8 rural homes (12.5%) were not employed, demonstrating economic fragility for a considerable share of households. Agriculture remained the principal source of income for nearly half (46.5%) of the households, while 3 in every 10 (30.5%) relied on small businesses. Additionally, less than 10% obtained their income via remittances, artisanal work, or private-sector occupations, totalling 13.8%. These findings emphasize the ubiquity of informal economic activity and the significance of financial interventions geared to self-employed and agricultural work-based households, guaranteeing that they may use digital financial services to support economic stability and growth.

Table 3: Socio-economic Profile of Rural Households

Access Level of Digital Financial Inclusion among Rural Household

Variables	Scale	N = 400	Perc. (100 %)
Gender	Male	281	70.3
	Female	119	29.7
Household Headship	Male-headed	343	85.7
	Female-headed	57	14.3

Employment Status	Self-employed	29	72.5
	Gov. Employee	46	11.5
	Private Sector	14	3.5
	Not employed	50	12.5
Source of Income	Agriculture	186	46.5
	Small business	122	30.5
	Public sector	26	6.5
	Private sector	11	2.7
	Remittances (Family)	7	1.8
	Artisan (Handwork)	26	9
	Other	13	3

Source: Findings of the Author's (2025)

Table 4 presents the distribution of rural households by demographic characteristics and digital financial inclusion (DFI) levels—classified as low, moderate, and high. The DFI Index, constructed from indicators such as awareness, accessibility, affordability, and usage of digital financial services, measures households' engagement with digital finance. Scores between 0.0–0.3 indicate Low Inclusion, 0.31–0.6 Moderate Inclusion, and 0.61–1.0 High Inclusion. These categories enable the identification of households most excluded from financial systems and the socioeconomic factors influencing their inclusion levels.

Chi-square (χ^2) tests assessed relationships between DFI and socioeconomic characteristics, revealing significant associations with age, household headship, employment, and income, but not gender.

Age significantly affected financial inclusion ($\chi^2 = 21.84$, $p = 0.001$), with respondents aged 35–54 showing the highest engagement with digital financial services. Older adults (55+) were concentrated in the Low Inclusion category, reflecting technological and literacy barriers, whereas younger respondents (18–34) showed balanced participation, suggesting higher adaptability to digital finance.

Gender, however, showed no significant difference ($\chi^2 = 3.33$, $p = 0.189$), indicating that while men slightly outnumber women in all categories, gender is not a determinant of digital inclusion. Nonetheless, women's lower representation may reflect deeper socioeconomic and cultural constraints limiting their financial autonomy.

Household headship exhibited a strong association ($\chi^2 = 31.50$, $p = 0.000$); male-headed households dominated the High Inclusion group (701), while female-headed households were overrepresented in Low Inclusion (31).

This disparity underscores systemic economic disadvantages and limited access to financial resources faced by women-led families.

Employment status also strongly influenced inclusion ($\chi^2 = 64.53$, $p = 0.000$). Self-employed individuals recorded the highest inclusion (601 in High Inclusion), indicating frequent interaction with digital transactions. Conversely, unemployed respondents clustered in Low Inclusion (29), revealing that lack of income significantly hinders digital engagement.

Finally, income level correlated positively with inclusion ($\chi^2 = 13.19$, $p = 0.040$). Respondents earning ₦50,000–₦100,000 monthly formed the largest inclusion group, while those earning below ₦50,000 were mostly financially excluded. Enhancing affordability, reducing transaction costs, and expanding income opportunities are essential for improving digital financial inclusion among low-income rural households in Shendam LGA.

Table 4: Access Level of Digital Financial Inclusion

Source: Findings of the Author's (2025)

Rural Demographics	Household	Low	Moderate	High	Chi-Square	Sig.	Total	The
		Inclusion (0.0 – 0.3)	Inclusion (0.31 – 0.6)	Inclusion (0.61 – 1)				
Age		Freq.	Freq.	Freq.	21.84	0.001	400	
Under 18 years		1	1	1				
18-34 years		41	40	39				
35-54 years		76	56	53				
55 years and above		41	23	28				
Gender					3.33	0.189	400	
Male		111	84	86				
Female		50	34	35				
Household Headship					31.50	0.000	400	
Male Headed		129	105	109				
Female Headed		31	13	13				
Employment Status					64.53	0.000	400	
Self-Employed		105	92	93				

Impact of DFI on Consumption pattern of rural household

Government	19	15	11	The
Employees				
Private Sector	6	4	5	
Not Employed	29	8	13	
Monthly Income				
			13.19	0.040
				400
Less than ₦50,000	46	30	34	
₦50,000 - ₦100,000	68	51	46	
₦100,001 - ₦200,000	32	28	30	
Above 200,000	12	11	12	

regression results in Table 5 evaluate the effect of digital financial inclusion (DFI) and key household characteristics on consumption and financial well-being using both baseline and interaction models. The model explains about 9% of the variation in household consumption ($R^2 = 0.090$; Adjusted $R^2 = 0.088$), indicating that while the predictors are relevant, external factors also influence financial outcomes.

Household income exerts a modest but significant positive effect ($\beta = 0.012$, $p = 0.012$), confirming that higher income enhances financial stability and inclusion. However, the low coefficient suggests that structural and institutional constraints continue to limit participation, even among higher-income groups.

Contrary to expectation, digital financial inclusion exhibits a negative relationship with household consumption ($\beta = -0.015$, $p = 0.002$). This finding challenges the assumption that greater digital access automatically improves welfare. The result implies that while digital finance broadens access, it may expose users to financial risks such as impulsive spending, high transaction costs, and debt accumulation through digital lending. This underscores that access alone is insufficient—users also need financial literacy and consumer protection mechanisms to benefit meaningfully.

Education positively influences financial inclusion ($\beta = 0.026$, $p = 0.000$), emphasizing the transformative role of literacy and awareness in enabling individuals to navigate financial platforms responsibly. Educated respondents demonstrate greater financial discipline, savings culture, and ability to interpret digital financial tools effectively.

Conversely, household size has a negative and significant effect ($\beta = -0.039$, $p = 0.000$), suggesting that larger families face higher dependency burdens, reducing their capacity to save, invest, or engage effectively with digital financial systems.

Employment status emerges as the strongest positive determinant ($\beta = 0.045$, $p = 0.000$). Securely employed individuals are substantially more financially active, benefiting from steady income and confidence in using financial services.

Overall, the results demonstrate that income, education, and employment enhance financial engagement, while household size constrains it. The unexpected negative impact of digital financial inclusion reveals that without proper guidance, access may lead to financial vulnerability rather than empowerment. Therefore, enhancing financial literacy, enforcing consumer protection, and promoting job creation are crucial policy directions for ensuring that digital finance effectively improves the well-being of rural households.

Table 5: Impact of DFI on Consumption pattern of rural household

Independent Variable	Coefficient	t-value	p-value	Source:
Constant (β_0)	2.757	125.237	.000	
HI (Household Income)	.012	2.511	.012	
DFI (Digital Financial Inclusion)	-.015	-3.071	.002	
Educational Level	.026	6.497	.000	
Household Size	-.039	-8.931	.000	
Employment Status	.045	11.200	.000	
R squared	0.090			
Adj. R	0.088			

Findings from the Authors (2025)

- Dependent Variable: $\ln_Consumption$
- Predictors: (Constant), Employment Status, Household size, Highest level of Education, DFI, Income
- **. Significant at 0.05 level (2-tailed).

To enhance the analysis, an interaction term ($DFI \times Y$) from model (2) is included to see if digital financial inclusion affects the link between income and consumption. This helps to establish if access to digital financial services boosts or dampens the impact of income on spending habits. The model also has control variables (X_{ijt}), time-fixed effects (θ_t), and an error term (μ_{ijt}) to account for unobserved heterogeneity. This analysis will provide insights into whether digital finance serves as a consumption-smoothing tool for rural households and whether it influences financial behavior and economic resilience by comparing the results of the standard regression model to those of the interaction model.

The interaction model in Table 4 gives important insights into the relationship between household income, digital financial inclusion (DFI), and household spending. The substantial R-squared value of 0.097 (with an adjusted R-squared of 0.095) indicates that, while the model explains a little amount of the variation in household spending, the independent variables have a considerable impact. The constant factor ($\beta_0 = 2.856$, p

<.001) is extremely significant, suggesting that baseline household consumption stays positive even when all independent variables are set to zero. Household income has a negative and significant effect on consumption ($\beta = -0.036$, $p = .002$). This suggests that when income increases, consumption habits may move towards savings or other non-consumptive financial activities. This contradicts typical economic predictions and suggests that higher-income households may be more likely to invest or save rather than increase spending proportionally.

Digital financial inclusion ($\beta = -0.066$, $p < .001$) has a negative and substantial influence on consumption, suggesting that more access to digital financial services leads to less immediate consumption. This could be because digital access fosters financial discipline, encourages saving, or directs expenditure toward non-consumption investments such as education and healthcare. However, the interaction term ($DFI \times Y$) is positive and significant ($\beta = 0.024$, $p < .001$), indicating that digital financial inclusion reduces the negative impact of income on consumption. In other words, households that earn more while concurrently having access to digital financial services are more likely to increase consumption than those without digital access. This emphasizes the role of financial inclusion in enabling consumption smoothing, potentially via enhancing credit availability, streamlining transactions, or decreasing liquidity limitations.

Higher education level ($\beta = 0.027$, $p < .001$) has a positive and significant effect on household spending. This may be attributed to enhance financial literacy and earning capacity. Household size ($\beta = -0.039$, $p < .001$) negatively impacts consumption, indicating that bigger households may face financial difficulty, resulting in lower per capita consumption levels. Employment status ($\beta = 0.043$, $p < .001$) has a beneficial impact on consumption, highlighting the importance of consistent revenue sources for household financial well-being.

Table 4: Interaction of DFI and Income Analysis

Source: Findings from the Authors (2025)

Independent Variable	β	t-value	p-value
Constant (β_0)	2.856	91.841	.000
HI (Household Income)	-.036	-3.109	.002
DFI (Digital Financial Inclusion)	-.066	-5.336	.000
(DFI x Income)	.024	4.481	.000
Control Variables (X)			
Educational Level	.027	6.825	.000
Household Size	-.039	-8.895	.000
Employment Status	.043	10.640	.000
R Squared	0.097		

Adj R

0.095

-
- a. Predictors: (Constant), Employment Status, Household size, Highest level of Education, DFI, Income, (DFI x Income)
 - b. Dependent Variable: In_Consumption.
 - c. **. Significant at the 0.05 level (2-tailed).

5.0 Conclusions and recommendations

This study investigated the influence of Digital Financial Inclusion (DFI) on rural household consumption patterns in Shendam LGA, using data from 400 households across four districts. Descriptive statistics, chi-square tests, and regression models were employed to explore the interactions between digital financial access and socioeconomic variables such as age, gender, education, employment, and income. The findings revealed that most households were male-headed, with an average age of 43 years and a mean household size of seven. Significant income inequality existed, as nearly one-third earned below ₦50,000 monthly. Chi-square results indicated that age, employment, and income significantly influence digital financial inclusion, with middle-aged, educated, employed, and higher-income individuals being more digitally included. Regression analysis showed that education, income, and employment positively influence inclusion, while household size has a negative effect. However, the negative association between DFI and financial well-being suggests that access to digital finance alone does not guarantee improved welfare, particularly when financial literacy is lacking. The interaction model further revealed that both income and DFI negatively affect consumption, indicating that increased access may promote savings and financial restraint. However, the positive and significant interaction between DFI and income implies that digital inclusion moderates this relationship, enabling financially included households with higher incomes to spend more productively. Education and employment status were also found to enhance consumption, while large household sizes constrained spending per capita. These results demonstrate that while digital inclusion holds potential for improving financial participation, its impact on consumption and welfare depends largely on literacy, gender, and income structures.

Consequently, enhancing financial literacy is essential to ensure that rural households translate digital access into meaningful economic outcomes. Expanding affordable financial products, improving rural connectivity, and encouraging entrepreneurship can strengthen inclusion and household resilience. Efforts should also focus on bridging gender disparities by supporting women's access to finance through cooperative savings and microcredit schemes. Moreover, stronger regulation and consumer protection are necessary to address the risks of digital borrowing and financial exploitation. Promoting education, income stability, and digital competence will not

only deepen inclusion but also transform it into a sustainable tool for poverty reduction and rural economic development in Shendam and similar communities across Nigeria.

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