# "Do illiteracy and unemployment affect financial inclusion in the rural areas of developing countries?"

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# DO ILLITERACY AND UNEMPLOYMENT AFFECT FINANCIAL INCLUSION IN THE RURAL AREAS OF DEVELOPING COUNTRIES?

## Abstract

The aim of this study is to examine the effects of illiteracy and unemployment on financial inclusion in rural areas of Nigeria between 2017 and 2022. Most rural areas in developing countries have high illiteracy and unemployment rates, creating challenges for researchers to measure the inclusiveness of financial services and products. This study examined the effect of illiteracy and unemployment on the inclusiveness of financial services and products in rural areas of Nigeria. The ex-post facto research design, systematic sampling, dummy for latent variables (erratic power supply and insecurity in rural areas), and autoregressive distributed lag (ARDL) techniques were employed. The result showed that the coefficient estimate for the illiteracy rate is negative (-0.5318), indicating that higher illiteracy is associated with lower financial inclusiveness, and the coefficient estimate for unemployment rate is also negative (-2.1977) and statistically significant, suggesting that the higher unemployment rate is associated with financial inclusiveness. These findings indicate that a decline in the delivery of financial services in developing nations attest to illiteracy and unemployment. This study concluded that there is a need to improve education and employment rates in rural areas of developing countries to achieve optimal inclusiveness of financial services and products.

| **Keywords** | financial inclusion, rural areas, illiteracy, unemployment, Nigeria |
|---|---|
| **JEL Classification** | G53, G20 |

## INTRODUCTION

According to Demirgüç-Kunt et al. (2018), the inclusion of financial services and products continues to be a major challenge in Asia and Africa due to unequal distribution of the benefits of the digital age and significant access gaps based on factors such as gender, household wealth, and location of the population. For example, Nigeria recorded an exclusion rate of 68%, despite having implemented its strategy for FI in 2012 for four years (Cicchello et al., 2021). This trend indicates that FI among individuals have been dwindling in Nigeria, particularly in rural areas. In recent years, various factors have been identified as critical for global inclusiveness of financial services and products. FI increases as individuals with formal education open up and maintain more accounts, save more money, borrow more, and utilize more debit and credit cards. This assumption implies that if the education and employment levels of individuals residing in rural areas of developing countries increase, there would be a need for a corresponding increase in financial products like automated teller machines (ATMs) and points of sale (POS) in those areas.

Achieving essential objectives such as sustainable development goals and high financial and economic activity within a community is high-

ly dependent on education (Mensah, 2019). Zachy (2022) points out that all economic sustainability decisions must be based on the achievement of educational sustainability. This suggests that, for the effective implementation of FI, a certain degree of education for people within the population is required. According to a report by Enhancing Financial Innovation and Access (2021), out of the country's 106 million adults, approximately 38.1 million Nigerians remain financially excluded. Examining the impact of literacy rates and unemployment on the accessibility of financial services and products in Nigeria is crucial to develop effective policies for achieving optimal financial inclusion for rural populations in the country. This represents a research gap in the academic literature.

# 1. LITERATURE REVIEW AND HYPOTHESES

Generally, researchers have explored the connections and effects of financial service delivery on rural areas in Nigeria and other developing African countries. In Nigeria, rural areas form a substantial portion of the population, and their effects can drive economic growth. Financial inclusion is the connecting variable between rural areas and economic growth (Ben, 2023). FI must be prioritized in ensuring the development of the economy, particularly in rural areas where the majority of people work in agriculture and other unregulated industries.

One of the major barriers to the inclusiveness of financial services and products in rural communities is illiteracy (Mossie, 2023; Hassouba, 2023; Hassan, 2022). In these areas, the major obstacle to FI has been recognized as illiteracy. People who lack literacy find it difficult to manage their finances, get financial services, and comprehend financial goods (Chowdhury et al., 2023; Hossain et al., 2023; Morgan, 2020; Liew, 2020). The majority of the world's 750 million illiterate adults live in rural areas, according to the World Bank (Al-Weshahi, 2022). The inability to read and comprehend financial statements, make educated decisions, and obtain financial services is hampered by a lack of literacy skills. A survey revealed that one of the biggest obstacles to FI in rural communities is illiteracy (Kumar et al., 2023; Yasir et al., 2022). Illiteracy rates are inversely connected with the inclusiveness of financial services and products levels (Elzahi, 2022). According to Desai et al. (2023), illiteracy is a significant obstacle to FI in rural areas. The study suggests that increasing literacy rates could increase the inclusiveness of financial services and products levels in the rural areas. However, some studies (Mossie, 2023;

Kumar et al., 2023; Al-Weshahi, 2022; Haso, 2022; Morgan et al., 2020) have presented mixed outcomes in establishing a relationship between illiteracy and FI. For instance, studies (Kumar et al., 2023; Anthony-Orji et al., 2023; Mukalayi et al., 2023; Fahmy et al., 2023; Ediagbonva et al., 2023; Mossie, 2023; Yang et al., 2022; Kedir et al., 2022) have shown that illiteracy rates in isolation do not drive the inclusiveness of financial services and products. These studies have suggested other factors such as income, age, gender, poverty level, poor infrastructure, fear of banking, transaction costs and so on could be more critical determinants of the dependent variable.

Unemployment and the inclusiveness of financial services and products are critical issues affecting rural areas. Unemployment rates in rural areas are generally higher than urban areas (Lal, 2018), and the inclusiveness of financial services and products is often limited due to factors such as poverty, low literacy rates, and lack of access to financial services (Huang et al., 2023; Chipunza et al., 2023; Simatele et al., 2022; Abu et al., 2022; Omar et al., 2020). Unemployment is a significant barrier to FI in rural areas (Chowdhury et al., 2023; Bekele, 2022; Ofosu-Mensah et al., 2021; Liew et al., 2020). Those who are unemployed or underemployed often have limited financial resources and face challenges accessing financial services. A study by the International Labour Organization (ILO), (2021) suggests that COVID-19 pandemic has resulted in significant increase in unemployment rates in rural areas globally, further exacerbating the inclusiveness of financial services and products.

Several studies (Mahalika et al., 2023; Hassan et al., 2023; Sha'ban et al., 2020, Lenka et al., 2018) have demonstrated a negative correlation between unemployment rates and the accessibility of financial services and products in rural areas. However,

some studies (Pandey et al., 2023; Motta, 2023; Ozili, 2021) have reported conflicting results on the relationship between unemployment and financial inclusion. These studies have suggested that income and education may be more crucial determinants of financial inclusion in rural areas.

The theoretical foundation of this study is based on the human capital theory, which posits that the inclusiveness of financial services and products is influenced by factors such as illiteracy and unemployment rates. This theory opines that illiteracy is considered a form of human capital deficit that hinders an individual's ability to obtain and maintain employment, which in turn limits their opportunities for career advancement (Hoyman, 2009). The consequence of this is that individuals may face difficulties or obstacles in accessing financial services and products due to their limited income, thus hindering their financial inclusion. However, Stein et al. (2020) argue that the accessibility of financial services and products can be seen as an investment in human capital, as it can equip individuals with the necessary resources and tools to enhance their economic situation (Huang et al., 2023).

Akintoye et al. (2022) have provided empirical evidence to suggest that financial innovations, which are critical to deposit money banks, are driven by cyber security. This indicates that cyber security, financial innovation, and the accessibility of financial services and products play significant roles in driving financial activities. In a related study, Lenka and Sharma (2017) utilized ARDL to analyze the impact of financial service delivery and economic expansion on India. The findings show no direct causation between the delivery of the inclusiveness of financial services and products services and economic progress. However, Williams et al. (2017) found that adequate regulatory provision for FI reduced poverty in developing countries. Kim et al. (2018) used dynamic panel data to investigate the extent to which the inclusiveness of financial services and products affects 57 organizations in Islamic Cooperation countries. Thus, their study found that an increase in the delivery of financial services would create room for economic expansion in India. Furthermore, Mwaitete and George (2018) used Tanzanian data from 2008 to 2015 to explore the magnitude to which finan-

cial service delivery has created room for economic progress. Chuka et al. (2022) explored the inclusiveness of financial services and products and economic growth. They concluded that FI affects economic growth in Nigeria. Many researchers in finance have reported different findings regarding the contribution of the inclusiveness of financial services and products to economic activities, but the variables of this study directly affect economic growth.

Onaolapo (2015) opined that a significant relationship exists between the economic growth of Nigeria and the inclusiveness of financial services and products using regression and descriptive statistics, while Babajide et al. (2015) submitted that the use of any close proxies, such as capital per worker, would provide a positive result from the inclusiveness of financial services and products. Sharma (2016) examined ATMs, bank branches, and other financial services tools used to render financial services by financial institutions using VAR models and the Granger causality test. The findings indicate a bidirectional relationship between financial service delivery and economic progress. Green and Mendy (2017) examined the long-run effects of various financial service delivery tools used in modern day finance to meet households' needs and concluded that ATMs and PoS are potent, while Dumitrescu and Hurlin (2012) stated that as financial service delivery tools increase, economic expansion often responds to the inclusiveness of financial services and products. Saab (2017) employs economic analysis techniques such as VAR and MENA to investigate how the provision for the inclusiveness of financial services and products affected economic progress and concludes that bidirectional causality exists between the two variables. There is a need to further investigate the impact of illiteracy and unemployment on FI under varied economic conditions as opined by Pal et al. (2022). Nevertheless, owing to the low educational level in rural areas, point-of-sale (POS) and automated teller machines (ATM) are required to boost the inclusiveness of financial services and products and reduce poverty. Iriobe et al. (2021) identified these tools as financial technologies that boost the inclusiveness of financial services and products and reduce poverty. Onaolapo (2015) disclosed that economic growth in Nigeria was aided by a substantial in-

crease in the delivery of the inclusiveness of financial services and products, while Babajide et al. (2015) quantitatively investigated long-term and short-term effects of FI on economic expansion in Nigeria, concluding that the inclusiveness of financial services and products affects the production factor and capital per worker.

Consequently, this study investigated the long-run and short-run effects of illiteracy and unemployment on FI of rural areas in developing countries. Hence, the study hypotheses are as follows:

$H_1$: *Illiteracy has a significant effect on the FI in the rural areas of developing nations.*

$H_2$: *Unemployment has a significant effect on the FI in the rural areas of developing nations.*

## 2. METHOD

For this study, data from a set of fifteen publicly traded companies over the period of 2017 to 2021 was collected on an annual basis. The selection of both the firms and the time frame was based on the availability of data. The study measures the inclusivity of financial services and products by analyzing the usage of automated teller machines (ATM) and point of sale (POS), with explanatory

variables including unemployment and illiteracy rates. Additionally, the study incorporates latent variables such as power supply and insecurity. To aid reader understanding, Table 1 provides a clear definition, measurement, and sources of the variables. The study model is presented in the following manner:

$$ATM \cdot lv + POS \cdot lv = f\left(ILT, UE\right), \qquad (1)$$

$$ATM \cdot lv + POS \cdot lv = \\ = \beta_0 + \beta_1 ILT + \beta_2 UE + \mu, \qquad (2)$$

Let FI be substituted for $= ATM \cdot lv + PoS \cdot lv$.

$$FI = \beta_0 + \beta_1 ILT + \beta_2 UE + \mu, \qquad (3)$$

$$FI = \alpha_0 + \sum_{k=1}^{m_2} \pounds_i Ilt + \sum_{k=1}^{m_3} \Omega_i UE + + \pounds_t, \qquad (4)$$

The pooled mean group (PMG) technique, introduced by Pesaran et al. (1999), has been employed by researchers to investigate the relationship between unemployment, the inclusiveness of financial services and products, and illiteracy in specific organizations. The PMG technique offers several advantages over previous panel approaches such as ordinary least squares (OLS), mean group (MG), and general method of moments (GMM). Firstly, the PMG technique incorporates both short-run

**Table 1.** Variables, description, measurement and sources

Source: Researchers compilation.

| Variables | Description | Measurement | Source(s) |
|---|---|---|---|
| Automated Teller Machine (ATM) in rural areas | Measures the financial activities done through ATM. | Total numbers of ATM per 1000 adults in the country divided by total numbers of financial institutions | https://data.worldbank.org/indicator/FB.ATM.TOTL.P5?locations=NG www.knoema.com/atlas/ |
| Point of Sales (POS) in rural areas | Measures the financial activities done through the POS. | Total numbers of POS in the country divided by total numbers of financial institutions | https://statista.com/statistics/1178109/number-of-pos-terminals-in-nigeria/ |
| Illiteracy | Measures the rate of persons unable to read and write in relation to the total population. | Subtract literacy rate from 100% | https://www.macrotrends.net/countries/NGA/nigeria/literacy-rate |
| Unemployment | Measures the rate of persons unemployed in relation to the population. | Subtract employment rate from 100% | https://www.macrotrends.net/countries/NGA/nigeria/unemployment-rate |
| Power Supply | Measures the level of power supply within the country under study | 1 constant power supply, 0 otherwise | Computed by authors |
| Insecurity | Measures the level of power supply within the country under study | 1 good security, 0 otherwise | Computed by authors |
| Latent Variable (lv) | Measures the direct effect of power and insecurity on FI. | The joint probability of power and insecurity | Computed by authors |
| Financial Inclusion (FI) | Measures the combination of ATM and PoS usage | The addition of adjusted ATM and PoS values | Computed by authors |

and long-run dynamics while retaining all the necessary information. Secondly, it allows for variations in the intercept, short-run coefficient, and error variance between groups, while keeping the long-run parameters constant. Additionally, the PMG method can be used with stationary variables at either the level or first difference. This technique is also suitable for short time periods and various lag times for different factors, ensuring consistent and reliable outcomes. Thus, the ARDL (p, q) model is represented as follows:

$$FI_{it} = \sum_{j=1}^{p} \lambda_{ij} FI_{i,t-j} + \sum_{j=0}^{q} \varphi_{ij}' X_{i,t-j} + \mu_i + \varepsilon_{it}. \quad (5)$$

In the model, the variable "$i$" represents the number of selected firms, ranging from 1 to $N$. The variable "$t$" denotes the time period, ranging from 1 to $T$. The dependent variable, $FI_{it}$, represents FI, while $FI_{i,i-j}$ denotes the lagged dependent variable. The explanatory variables are represented by the kx1 vector, $X_{it}$. The coefficient vectors are denoted by $\phi_{ij}'$, and $\lambda_{ij}$ are scalars. $\mu_i$ represents the country-specific effects, while $\varepsilon_{it}$ is the error term. All variables in the model are cointegrated, and the error term is integrated of order zero for all cross-sections. Consequently, Equation (1) is transformed into an error correction model, as shown below:

$$\Delta FI_{it} = \rho_i \left( FI_{i,t-1} - \phi_i' X_{it} \right) +$$
$$+ \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta FI_{i,t-1} + \sum_{j=1}^{q-1} \varphi_{ij}' \Delta X_{i,t-j} + \mu_i + \varepsilon_{it}. \quad (6)$$

The parameter $\rho_i$ represents the speed of adjustment.

$$\rho_i = -\left(1 - \sum_{j=1}^{p} \lambda_{ij}\right). \quad (7)$$

The parameter $\varphi_i$ is defined as

$$\sum_{j=1}^{p} \lambda_{ij} / (1 - \sum_{j} \lambda_{ij}), \quad (8)$$

and denotes the long-run parameter vector. The parameters $\lambda_{ij}^*$ and $\phi_{ij}^*$ represent the short-run parameters and are defined as

$$\lambda_{ij}^* = -\sum_{m=j+1}^{p} \lambda_{im} \quad \text{and}$$
$$\varphi_{ij}^* = -\sum_{m=j+1}^{q} \varphi_{im}. \quad (9)$$

It is assumed that the variables in the model return to long-run equilibrium, and based on this assumption, the parameter is expected to be negative and statistically significant (Blackburne & Frank, 2007).

## 3. RESULTS

The results from the study analysis are presented below. The histogram normality test is presented in Figure 1.

Figure 1 shows the need for the stationarity of the data with ADF test.

Table 2 displays the original stage value of each variable; along with the results of the unit root test



Series: Residuals
Sample 2017M01 2020M12
Observations 48

| | |
|---|---|
| Mean | 6.11e-16 |
| Median | -0.620385 |
| Maximum | 6.910272 |
| Minimum | -3.852237 |
| Std. Dev. | 2.447189 |
| Skewness | 0.625477 |
| Kurtosis | 2.706049 |
| | |
| Jarque-Bera | 3.302586 |
| Probability | 0.191802 |
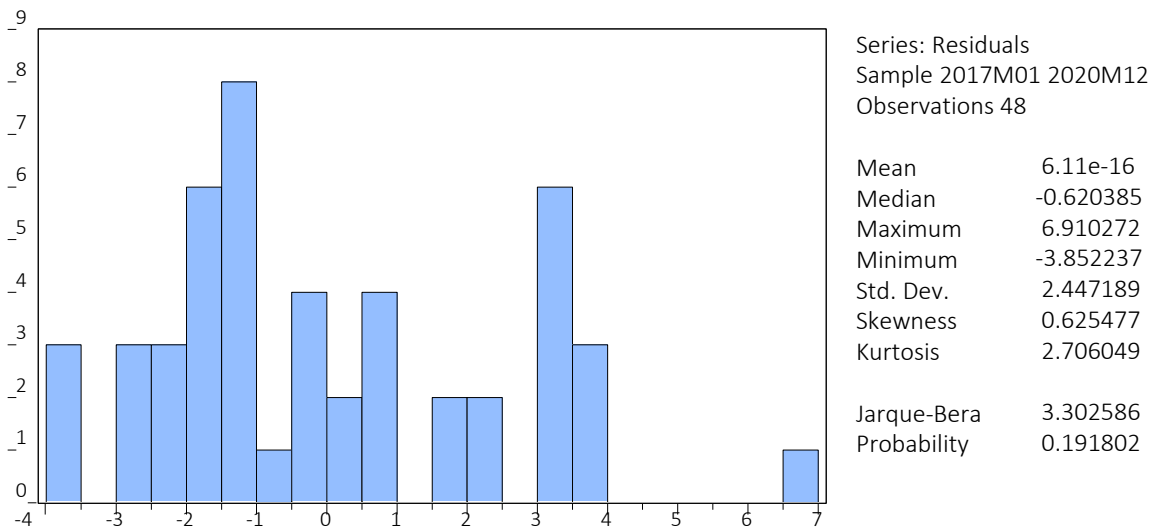
**Figure 1.** Histogram normality test

**Table 2.** ADF test

| Variables | ADF | Prob. | Crit. values | Order of integration |
|---|---|---|---|---|
| FI | −3.01271 | 0.0295 | −2.94584** | I(1) |
| IT | −4.10021 | 0 | −2.94584** | I(1) |
| USE | −3.61101 | 0.0193 | −3.54033** | I(1) |

*Note*: ** Sig @ 5%.

conducted using the Augmented Dickey-Fuller (ADF) test. The critical values of each variable at a 5% significance level are compared with their respective ADF values. The null hypothesis is rejected if the ADF value is more negative than the critical value, and accepted if the opposite is true. The first-order differencing indicates co-integration among the variables. As shown in the table, all three variables (FI, IT, and USE) have ADF statistics that are more negative than their corresponding critical values at the 5% significance level, implying that the null hypothesis of non-stationarity for each variable can be rejected. This indicates that the variables are stationary and lack a unit root. Consequently, it suggests that these variables show no or minimal trends, and their mean and variance remain constant over time. The ADF statistics values for FI, IT, and USE are -3.01271, -4.10021, and -3.61101, respectively, all of which are more negative than the critical values at the 5% significance level, indicating robust evidence against the null hypothesis of non-stationarity. The associated probability values for FI, IT, and USE are 0.0295, 0, and 0.0193, respectively, which is less than the 5% significance level, pro-

viding additional support that the three variables are stationary.

Breusch-Godfrey results show that 0.13% value represents the calculated F-value. This value is less than the standard value of 1.96 (0.001311<1.96). Therefore, there exists a positive serial correlation in the variables proxies for the inclusiveness of financial services and products.

The DW value of 1.99 (see Table 4) indicates a positive serial correlation. The coefficient of variation shows 79.9% of illiteracy and unemployment persons are captured by the inclusiveness of financial services and products. The coefficient estimate for ILT(-1) (i.e., the lagged value of the illiteracy rate) is 1.1647 with a t-statistic of 9.1277 and a p-value of 0.0000, indicating a highly significant positive relationship between the illiteracy rate and FI. The coefficient estimate for IT (Illiteracy rate) is negative (-0.5318), indicating that higher illiteracy is associated with lower FI. The coefficient estimate for USE (Unemployment rate) is also negative (-2.1977) and statistically significant, suggesting that higher unemployment is associat-

**Table 3.** Breusch-Godfrey test

Source: Extracted from EViews.

| Summary of Results | | | |
|---|---|---|---|
| F-stat. | 0.001311 | Prob. F(1,30) | 0.4111 |
| Obs*R$^2$ | 0.003218 | Prob. Chi-Square(1) | 0.3915 |

**Table 4.** ARDL summary results

Source: EViews.

| Dependent Variable: FI | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
| ILT(−1) | 1.1647 | 0.1276 | 9.1277 | 0.0000 |
| IT | −0.5318 | 0.1345 | −3.9539 | 0.0041 |
| USE | −2.1977 | 0.9420 | −2.3330 | 0.0271 |
| UE(−1) | 2.9539 | 1.0446 | 2.8278 | 0.0086 |
| C | −1.4449 | 0.6418 | −2.2513 | 0.0324 |
| R$^2$ | 0.7994 | Mean dependent var. | | 29.3538 |
| F-stat. | 6.6500 | Durbin-Watson | | 1.9920 |
| Prob(F-statistic) | 0.00 | | | |

**Table 5.** Summary results of heteroskedasticity

| | | | |
|---|---|---|---|
| F-statistic | 1.975000 | Prob. F(4,32) | 0.0911 |
| Obs*R² | 13.35100 | Prob. Chi-Square(4) | 0.1003 |
| Scaled explained SS | 6.530011 | Prob. Chi-Square(4) | 0.5822 |

ed with lower FI. The coefficient estimate for UE(-1) (i.e., the lagged value of unemployment rate) is positive (2.9539) and statistically significant. In addition, the constant term (C) is also statistically significant with a negative coefficient (-1.4449), implying that there are other factors not included in the model that have a negative impact on the inclusiveness of financial services and products. The model's R-squared is 0.7994, indicating that 79.94% of the variation in the inclusiveness of financial services and products can be explained by the independent variables included in the model. The F-statistic is 6.6500 with a p-value of 0.00, suggesting that the model is statistically significant overall. The Durbin-Watson statistic is 1.9920, which is close to the ideal value of 2 and suggests that there is no significant autocorrelation in the model. Summarily, the above ARDL regression result suggests that the negative values represent a decline in the delivery of financial services in developing nations attesting illiteracy and unemployment. These results corroborate the generalized assumptions and conclusions that illiteracy and unemployment affect the use of financial products avail by the inclusiveness of financial services and products in rural areas in developing nations. Hence, policies aimed at reducing illiteracy rates and unemployment may increase FI.

The violation of the Homoscedasticity would give the researchers a spurious result. Comparing the F-calculated (1.975) value with a standard value of 1.96 attested to an absence of heteroscedasticity as the F-calculated value is > the standard value of 1.96 z-score value. Furthermore, the omissions of variables proxies for FI are not captured as the latent variables were used as support for the inclusiveness of financial services and products.

The researchers conducted a bound test to examine the impact of each independent variable on the dependent variable, given that the variables were integrated at order 1. They checked if the variables were bounded by comparing the calculated F value (Fcal) with a standard value of 1.96. The F value obtained (5.90) was greater than the level of significance, including the 1.96 z-score value. This led the researchers to conclude that there is evidence of co-integration in the provision of financial services based on their quantitative findings.

The extent to which illiteracy and unemployment would affect the inclusiveness of financial services and products is dependent on the level of financial activities in the rural areas in the form of a long or short period. The researchers are in-

**Table 6.** Bound test

| Test Statistic | Value | Sign in. | I(0) | I(1) |
|---|---|---|---|---|
| | | | Asymptotic: n=100 | |
| F-statistic | 5.904177 | 0.1 | 2.26 | 3.35 |
| K | 2 | 0.05 | 2.62 | 3.79 |
| | | 0.025 | 2.96 | 4.18 |
| | | 0.01 | 3.41 | 4.68 |
| Actual Sample Size | 48 | | Finite Sample: n=48 | |
| | | 0.1 | 2.223 | 2.928 |
| | | 0.05 | 2.132 | 3.111 |
| | | 0.01 | 3.015 | 4.056 |
| **Test Statistic** | **Value** | **Sign in.** | **I(0)** | **I(1)** |
| t-statistic | 1.312011 | 0.1 | -2.57 | -3.86 |
| | | 0.05 | -2.86 | -4.19 |
| | | 0.025 | -3.13 | -4.46 |
| | | 0.01 | -3.43 | -4.79 |

**Table 7.** Hypotheses testing results

| Dependent Variable: D(FI) | | | | |
|---|---|---|---|---|
| ECM Regression | | | | |
| Variable | Coefficient | Std Error | t-Stat. | Prob. |
| C | −2.2451 | 1.0021 | −2.2404 | 0 |
| D(ILT) | −1.6251 | 1.1821 | −1.3748 | 0.0233 |
| D(UE) | 0.1045 | 0.0521 | 2.0058 | 0.0151 |
| CointEq(−1)* | 0.5612 | 0.0222 | 25.2793 | 0 |
| $R^2$ | 0.8165 | Mean dependent var. | | 0.183307 |
| Adj. $R^2$ | 0.8091 | S.D dependent var. | | 0.10683 |
| F-stat. | 19.123 | Durbin-Watson value | | 1.992091 |
| Prob(F-stat.) | 0 | | | |

terested in knowing the period of effect hence the researchers adopted the Error Correction Model (ECM). The ECM value shows a negative one (-1). The coefficient for the constant variable (C) is -2.2451, which indicates that when all other independent variables are zero, the dependent variable (D(FI)) is expected to decrease by 2.2451. The coefficient for D(ILT) is -1.6251, which indicates that a 1% increase in the illiteracy rate in the long run leads to a decrease of 1.6251% in FI. The coefficient for D(UE) is 0.1045, indicating that a 1% increase in the unemployment rate leads to an increase of 0.1045% in the inclusiveness of financial services and products. The CointEq(-1) variable coefficient is 0.5612, shows a statistically significant relationship at 1% level. This coefficient measures the speed of adjustment to the long-run equilibrium relationship between the dependent variable and its determinants. It reveals that a difference between the current level and the long-term equilibrium level of FI will lead to a 56.12% increase in the following period. The R-squared value of 0.8165 shows that 81.65% of the variability in financial investment is accounted for by the independent variables included in the model. The adjusted R-squared value of 0.8091 indicates that the model is well-suited, and the independent variables employed in the model are statistically significant. The F-statistic of 19.123 is also statistically significant, with a p-value of 0. To summarize, the findings suggest that the inclusiveness of financial services and products is adversely affected by the interest rate in the long term but positively affected by the unemployment rate. Additionally, the adjustment rate to the long-run equilibrium relationship is moderate, and the model explains a significant portion of the variability in FI.

## 4. DISCUSSION

The study results indicate that unemployment and illiteracy in rural areas of developing countries have an impact on the provision of financial services. The study supports the demand-leading and supply-following hypothesis, specifically in terms of the demand for financial services resulting from education and employment. However, the study does not support the idea that illiteracy in a population group drives inclusiveness of financial services and products. These findings align with previous work by Morgan et al. (2020) and Akintoye et al. (2022), who found a negative significant relationship between literacy and FI. These findings differ from the work of Gourene and Mendy (2017), Sharma (2016), Ofosu-Mensah et al. (2021), Ben (2023), Hasan et al. (2023), and Hossain et al. (2023), who found that the inclusiveness of financial services and products drives economic and financial activities.

The findings of this study are in line with some literature on the inclusiveness of financial services and products, including the works of Pandey et al. (2023), Motta (2023), Chuka et al. (2022), Ozili (2021), Kim et al. (2018), Onaolapo (2015), and Babajide et al. (2015). These studies concluded that FI has a positive effect on economic growth, but they did not consider the contribution of education and employment as support tools for promoting the inclusiveness of financial services and products. In contrast, Iriobe et al. (2021) had to use a four-year period of quarterly observations due to the scarcity of data on the inclusiveness of financial services and products in developing nations. Another reason is that researchers attempting to measure the inclusiveness of financial services and products using the same parameters for both developed and developing nations without con-

sidering power supply and security would yield spurious results as this research considered power and security as latent variables to FI in developing nations. The data obtained in this study are tested using the t-statistics. We compared the t-statistics of illiteracy (2.056) and unemployment (1.98) obtained from the ARDL result and tested it against 1.96 standard z-score. The results obtained by Lenka and Sharma (2017) using ARDL methodology indicates that the inclusiveness of financial services and products variables affect economic activities but fail to account separately for underdeveloped and developing nations. Also, illiteracy and unemployment rate were not captured in their model. The test of hypotheses using the t-statistics in this study supports the findings of the study that illiteracy and unemployment affect the inclusiveness of financial services and products in developing nations. The significance and

acceptance of the alternative hypotheses are possible because of the adjustment done by the researchers on the variables proxies for the inclusiveness of financial services and products. Thus, not adjusting FI variables is likely to yield the same result with that of other studies not considering illiteracy and unemployment in model specification.

Demand leading and supply following hypothesis in the inclusiveness of financial services and products arise with increase in education and employment otherwise decline. The results of this study are in line with the hypothesis stated by McKinnon (1973) in Hermes et al. (2013), Schumpeter (1911) in Aluko et al. (2020) and Shaw (1973) in Swamy et al. (2018). Therefore, this study notes that FI is a term used in finance and economics to refer to increasing provision of financial services.

## CONCLUSION

The objective of the study was to examine how illiteracy and unemployment in rural areas of developing countries affect the inclusiveness of financial services and products. The study revealed that these factors have a negative impact on financial inclusion, as rural areas lack the necessary education levels to utilize financial tools automated teller machines and point of sale. Furthermore, the employment rate in these regions does not correspond to the demand for financial products, and challenges such as low power supply and insecurity add to the problem. Additionally, improving literacy rates could increase financial literacy levels and encourage the adoption of mobile banking, ultimately boosting the inclusiveness of financial services and products in rural areas. Hence, the study concludes that financial institutions need to consider the literacy and employment rates in their efforts to expand the inclusiveness of financial services and products in rural areas. It also suggests that reducing illiteracy and unemployment rates, and addressing power and security issues, can lead to exponential growth in financial inclusiveness. The findings of the study suggest that financial institutions and policymakers should adopt a holistic approach to enhance the inclusiveness of financial services and products in rural areas of developing nations. This requires the design of customized financial products and services that cater to the unique requirements of rural populations, as well as the implementation of financial education and training programs to boost financial literacy. Additionally, the study underscores the importance of generating job opportunities that align with the usage of financial tools to enhance the inclusiveness of financial services and products in rural areas. This means that financial institutions and policymakers need to work together to address the mismatch between the need for financial products and low employment rates in these areas. Finally, the study recommends that any effective measurement of financial inclusiveness should take into account the education and employment rates of the population.

## AUTHOR CONTRIBUTIONS

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