International Journal of
Finance
(IJF)

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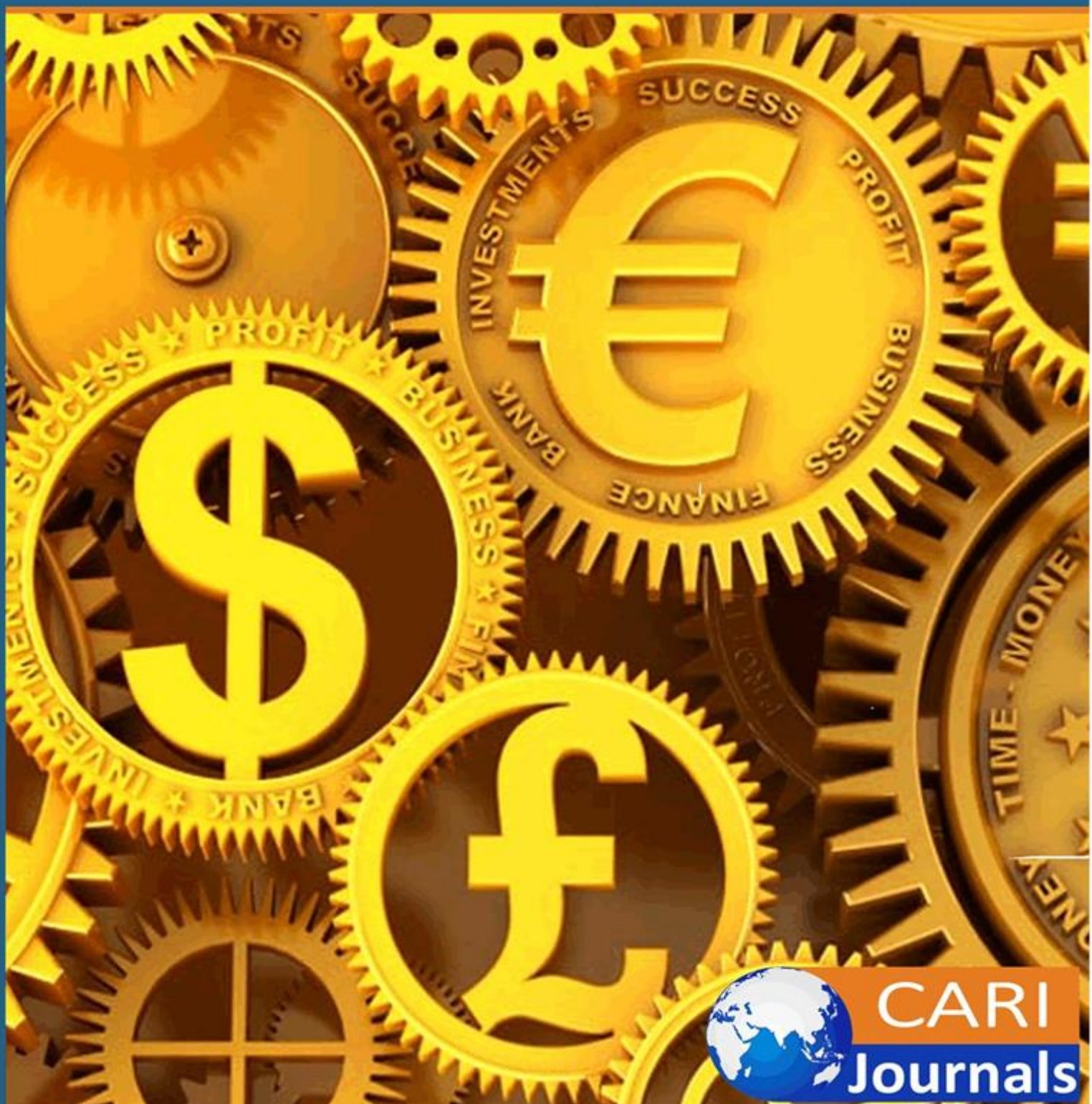

CARI Journals

International Journal of Finance
ISSN 2520-0852 (Online)
Vol. 10, Issue No. 7, pp. 94 - 117, 2025
www.carijournals.org

Financial Inclusion and Remittance Inflows on Human Development in Sub-Saharan Africa

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Accepted: 8th September 2025 Received in Revised Form: 7th October 2025 Published: 16th October 2025

Abstract

Purpose: This study examines the influence of financial inclusion and remittance inflows on human development in Sub-Saharan Africa.

Methodology: It employs secondary data from the World Development Indicators (WDI) for the years 2003–2024. The study implements Ordinary Least Squares (OLS), Random Effects Model, and Generalized Method of Moments (GMM) as estimation techniques to ensure robustness and address potential endogeneity and dynamic relationships among the variables. It also adopts a quantitative research approach. Financial inclusion and remittances are the primary explanatory variables, while the Human Development Index (HDI) is used to measure human development. GDP, education, and inflation are included as control variables.

Findings: The results indicate that financial inclusion and remittance inflows have substantial positive impacts on human development throughout the region. These findings indicate that the inflow of diaspora funds and the increased access to formal financial services make a substantial contribution to the enhancement of education, health, and living standards. Additionally, the dynamic GMM estimates verify that these effects are enduring. Nevertheless, inflation has a detrimental impact on human development, underscoring the necessity of macroeconomic stability in order to maintain development progress. The study concludes that financial inclusion and remittances are critical factors in the advancement of human development in Sub-Saharan Africa.

Unique contribution to theory, practice and policy: It suggests that policymakers should enhance regulatory frameworks, reduce remittance costs, and promote financial literacy in order to expand inclusive finance. Furthermore, the positive developmental effects of financial flows in the region will be further bolstered by endeavors to maintain price stability and improve institutional quality. The research offers essential insights for the implementation of sustainable development objectives in Africa and the formulation of inclusive growth strategies.

Keywords: *Financial Inclusion, Remittance Inflows, Human Development, Economic Growth, Financial Literacy, Poverty Reduction*

Introduction

Over the past few decades, Sub-Saharan Africa (SSA) has experienced substantial economic growth. Nevertheless, the region continues to confront enduring obstacles, including poverty, inequality, and inadequate access to critical services. Human Development (HD), which encompasses health, education, and standard of living, continues to be a critical area of concern. The Human Development Index (HDI) consistently ranks Sub-Saharan Africa (SSA) countries low, indicating the necessity of ongoing efforts to enhance the quality of life for their populations, as per the United Nations Development Programme (UNDP). Financial inclusion, which is the provision and utilisation of affordable financial services by all individuals, has arisen as a critical instrument for the advancement of human development and economic growth. Economic empowerment and resilience are promoted by the availability of financial services, which allow individuals to manage risks, invest, and save (Mbodj & Laye, 2025; Ateş et al., 2025; DelSarto & Ozili, 2025). According to the World Bank's Global Findex Database (2021) the adoption of mobile money has been the primary factor driving the over doubling of financial account ownership in SSA since 2011. Disparities persist, with women and rural populations frequently encountering more severe obstacles to financial access, despite this progress.

Another substantial factor that influences human development in Sub-Saharan Africa (SSA) is remittance inflows. In 2022, the region experienced a 6.1% increase from the previous year, with an estimated $53 billion in remittances. Remittance receipts have witnessed substantial development in countries such as Ghana, Kenya, and Uganda, which have been crucial in financing household consumption, education, and healthcare expenses (Offor, et al., 2024; Owusu & Crush, 2024). Families frequently depend on remittances as a source of sustenance, particularly in regions where formal financial systems are inadequate (Hoxha, 2025). The opportunity to improve human development outcomes in SSA is presented by the interplay between remittance inflows and financial inclusion. Financially inclusive systems can enhance the impact of remittances on the well-being of recipients by facilitating the efficient transfer and utilisation of these funds (Sritharan & Jothishankar, 2025; Christodoulou et al., 2024). In contrast, the expansion of inclusive financial infrastructures can be facilitated by the demand for financial services that remittances generate.

Although the individual effects of financial inclusion and remittance inflows on human development have been investigated in the existing literature, there is a scarcity of studies that investigate their combined impact within the Sub-Saharan Africa (SSA) context. The majority of research studies examine these variables in isolation, failing to consider the potential synergistic effects that may result from their interaction (Neuger & Susilawati, 2025). Financial inclusion

may improve the effectiveness of remittances by creating secure and accessible channels for recipients to receive and utilize funds (Jegerson & Mertzanis, 2025). In contrast, remittances can promote financial inclusion by increasing the demand for financial services among recipients (Farid et al., 2024). Additionally, existing research frequently adopts a macroeconomic perspective, concentrating on national-level indicators without exploring the micro-level dynamics that influence the impact of financial inclusion and remittances on the well-being of individuals and households (Kamble et al., 2025). There is a necessity for research that accounts for the complex experiences of individuals and communities, taking into account variables such as gender, education, and geographic location.

Furthermore, the financial ecosystem has been significantly altered by the swiftly changing digital landscape in SSA, which is characterized by the proliferation of fintech solutions and mobile money (Iddrisu et al., 2025). Nevertheless, the relationship between human development, remittances, and financial inclusion remains unexplored as a result of these developments (Forhad & Alam, 2025). It is essential to realize the manner in which digital financial services mediate this relationship in order to develop effective policies and interventions. This study aims to address the identified deficiencies by examining the combined impact of remittance inflows and financial inclusion on human development in Sub-Saharan Africa. The quantitative analysis of panel data from reputable databases will be implemented in the research.

This research analyzed the mutual impact of financial inclusion and remittances on human development, in contrast to previous studies that have looked at them separately. This will provide a more comprehensive understanding of their interplay. The study identifies the precise mechanisms by which financial inclusion and remittances affect human development outcomes, taking into account the heterogeneity of various population segments, by incorporating household and individual-level data. The study also evaluates the efficacy of digital financial platforms, including mobile money, in promoting financial inclusion and remittance transfers, with a focus on their impact on human development. The study's results provide policymakers and stakeholders with insights on how to effectively utilize financial inclusion and remittances in a synergistic manner to advance human development, particularly in underserved communities. The study endeavours to enhance the academic discourse on financial inclusion, remittances, and human development by addressing these areas and by offering practical insights for practitioners and policymakers who are striving to enhance the quality of life in Sub-Saharan Africa.

Literature Review

Financial Intermediation Theory posits that financial institutions, including banks, credit unions, and mobile money operators, act as intermediaries that efficiently transfer funds from savers to borrowers (Allen & Santomero, 1997). This process reduces transaction costs, mitigates risks, and enhances the allocation of capital in the economy. The theory, which was initially developed and expanded by scholars such as Marty (1961) and subsequently refined by Diamond and Dybvig (1986) serves as a fundamental framework for comprehending the ways in which financial systems influence economic development and broader welfare outcomes. This theory offers a valuable perspective on the relationship between human development, remittance inflows, and financial inclusion in the context of Sub-Saharan Africa (SSA). Enabling individuals and households to engage in productive investments such as education, healthcare, and small-scale enterprises, financial intermediation facilitates the mobilization of savings and the efficient allocation of resources, these investments are essential for improving human development outcomes.

Financial inclusion improves financial intermediation by incorporating the under banked and unbanked populations into the formal financial system. Individuals are enabled to accumulate capital, manage resources more efficiently, and invest in their future by having access to fundamental financial services, including savings accounts, credit facilities, insurance, and payment solutions.

Mobile money platforms have been instrumental in the advancement of financial inclusion in sub-Saharan Africa, with a particular emphasis on rural and underserved regions. These platforms function as new channels for financial intermediation by reducing geographical and bureaucratic barriers to entry. This increased participation in the financial system, according to the Financial Intermediation Theory, enhances the capacity of financial institutions to intermediate capital towards development-enhancing sectors, boosts aggregate savings, and improves the circulation of money within the economy. Individuals have the ability to invest in the fundamental dimensions of the Human Development Index (HDI) of education, healthcare, and entrepreneurship as they acquire access to credit and insurance products.

Remittances, which are cross-border transfers sent by migrants to family and acquaintances, are a significant financial inflow in SSA, frequently surpassing foreign direct investment and official development assistance in certain countries. Remittances to Sub-Saharan Africa totaled approximately $53 billion, as reported by the World Bank (2022). These inflows not only provide income support to recipients but also deepen financial intermediation when they travel through

formal financial institutions. Remittances that are conveyed through formal systems enhance liquidity within financial institutions, according to Financial Intermediation Theory (Brown et al., 2013). This enhances their capacity to offer loans and other services, consequently, recipients who receive remittances through banks or mobile money platforms are more likely to establish a bank account, save consistently, and access additional financial products (Kitimbo, 2021). This process promotes a cycle of capital accumulation and financial integration that can be used to achieve productive human development objectives, such as financing children's education, accessing improved healthcare, or establishing a small business (Bonfiglioli, 2008; Galor & Moav, 2004; Guliyeva et al., 2019).

Opportunities for long-term enhancements in human development are generated by the synergistic effect of financial inclusion and remittance inflows when they are appropriately intermediated (Saydaliyev et al., 2022). Financial intermediation guarantees that these financial resources are not only utilized to satisfy immediate consumption requirements, but they are also converted into productive investments that enhance life expectancy, educational attainment, and income levels (Gorton & Winton, 2003). A household that receives consistent remittances and has access to a microfinance institution may elect to invest in a child's secondary education or avail themselves of preventive healthcare services (Ambrosius et al., 2014). Improvements in human capital and overall well-being are the result of such investments over time. Additionally, the developmental impact of financial intermediaries may be further enhanced by the development of customized products, such as education savings plans or micro-insurance, that is specifically designed to meet the requirements of remittance-receiving families. Although Financial Intermediation Theory offers a robust explanatory framework, its efficacy in Sub-Saharan Africa (SSA) is frequently hindered by institutional obstacles, such as inadequate regulatory environments, inadequate financial literacy, and a lack of trust in financial institutions. In order to optimize the developmental effects of financial inclusion and remittance inflows, it is imperative to establish robust institutions, consumer protection frameworks, and financial education programs. Additionally, the expansion of financial intermediation can be enhanced by fostering partnerships between governments, fintech firms, and traditional institutions, as well as enhancing digital financial infrastructure. These policy actions would enhance the influence of financial flows on human development outcomes, which is consistent with the objectives of sustainable and inclusive development.

A developing interest in the ways in which financial mechanisms affect socioeconomic well-being is evident in the empirical literature on the nexus between financial inclusion, remittance inflows, and human development in Sub-Saharan Africa (SSA). In order to

comprehend the direct and indirect relationships among these variables, scholars have implemented a variety of methodologies, such as instrumental variable approaches, structural equation modeling, and panel data regression. Drawing from research conducted in Sub-Saharan Africa (SSA) and other comparable regions, this section synthesizes extant empirical findings. The subject matter is presented in a balanced manner, with both positive and negative empirical results. It has been determined that there is a positive correlation between human development and financial inclusion in SSA by numerous studies. Indicators such as the number of bank accounts per 1,000 adults, the use of mobile money, and access to credit and savings instruments are frequently used to measure financial inclusion.

Ngong et al., (2024) investigated the impact of digital financial services on human capital development in East Africa. They discovered that rural households experienced enhanced educational outcomes and reduced health vulnerabilities as a result of increased mobile money usage. Similarly, Tissaoui et al., (2024) utilized panel data from 20 Sub-Saharan Africa (SSA) countries to determine that a 0.8% increase in the Human Development Index (HDI) was associated with a 1% increase in access to formal financial services. In contrast, certain studies have reported associations that are either insignificant or negative. For instance Demirgüç-Kunt et al. (2024) point out in their analysis of the Global Findex database that access to financial services alone does not guarantee enhanced welfare unless it is accompanied by financial literacy and appropriate financial products. In Ghana, Memon et al. (2025) discovered that financial inclusion did not result in an improvement in the living standards of the bottom 40%. This was attributed to high service charges, limited access to credit, and poor product suitability.

Majority of studies have reported positive effects on education, health, and poverty reduction, and the role of remittances in human development has been extensively documented. From 2000 to 2017 Kamguia and Mekongo (2025) discovered that a 10% increase in remittances resulted in a 3% increase in per capita education expenditure and a 2.5% reduction in infant mortality, as evidenced by panel data from 33 African countries. They contended that remittances facilitated the accumulation of human capital and protected households from disruptions. Remittance-receiving households spent substantially more on education and healthcare than non-receiving households, as demonstrated by micro-level evidence (Dey & Ahmed, 2024). The notion that remittances function as private welfare transfers in regions with inadequate public social service provision was substantiated by their findings. Nevertheless, certain publications contest these conclusions. Zaman et al. (2021) contended that remittances may result in long-term dependency by decreasing the incentives of recipients to supply labour. Prasertsoong (2025) discovered in a related Sub-Saharan Africa study that remittances did not result in

proportional improvements in educational attainment or health status in low-income rural areas, despite the fact that they increased household income. This was due to the misuse or prioritization of consumption over investment.

Although there are fewer studies that have examined the combined or interaction effects of financial inclusion and remittances on human development in Sub-Saharan Africa, these studies offer significant insights. Nacanabo et al. (2025) discovered that the developmental impact of remittance inflows was substantially enhanced by the presence of a well-functioning financial system. Their cross-country regression analysis demonstrated that countries with higher financial inclusion indices were more likely to invest remittances in human capital.

Similarly Alinasab (2025) discovered in their seminal work that households with access to mobile money platforms were able to save and invest in health and education, which resulted in long-term improvements in welfare outcomes, they also received remittances more reliably. Dada et al., (2025) conducted a recent panel study that investigated the relationship between remittance flows and financial inclusion in 30 countries in the Southern African Development Community. Their results suggested that financial inclusion served as a moderator, thereby enhancing the beneficial impact of remittances on HDI scores. Nevertheless, they cautioned that the beneficial effects may be undermined by inadequate financial decision-making in the absence of adequate financial education. Methodologically, panel data with fixed effects or generalized method of moments (GMM) estimators are frequently employed in studies to mitigate endogeneity and unobserved heterogeneity. In South Saharan Africa, financial inclusion and remittance data are frequently underreported, which is a significant limitation in terms of data quality and consistency. Becha et al. (2025) among other scholars have also expressed concern regarding the difficulty of accurately measuring financial inclusion, particularly in the context of local economies that heavily rely on informal financial services. Additionally, the majority of empirical studies fail to consider financial literacy and institutional quality, which are essential for the conversion of financial access and remittances into human development outcomes.

Methodology

This investigation employs a balanced panel dataset that spans the years 2003 to 2024 and includes specific Sub-Saharan African nations. The countries included in the analysis are chosen based on the consistency and availability of pertinent data across the variables of interest. The World Bank's Global Findex Database was used to acquire data on financial inclusion indicators, including account ownership, mobile money usage, and access to credit. The Human Development Index (HDI) and its components, including life expectancy, education, and

standard of living, are used to proxy human development outcomes. These data are obtained from the Human Development Reports of the United Nations Development Programme (UNDP). The World Bank's Migration and Remittances Facebook is used to derive data on remittance inflows as a percentage of GDP. National statistical agencies' figures are supplemented as needed. The World Development Indicators (WDI) is used to obtain macroeconomic and demographic control variables, including the inflation rate, population growth, and GDP per capita. In order to improve the profundity of the financial inclusion variable, the International Monetary Fund (IMF) Financial Access Survey is utilized to extract additional financial access indicators.

The study employs econometric techniques to investigate the impact of financial inclusion and remittance inflows on human development in the Sub-Saharan African context, utilizing a quantitative approach. The dependent variable in the empirical model is human development, as measured by the HDI. The primary independent variables are remittance inflows and financial inclusion. In order to evaluate the moderating impact of financial inclusion, an interaction term between remittances and financial inclusion is introduced. In order to account for additional factors that may impact human development, such as inflation, public expenditure on education and health, GDP per capita, and foreign direct investment, a set of control variables is incorporated. In order to account for unobserved heterogeneity and global disruptions, the model incorporates both country-specific fixed effects and time-specific effects. The Hausman test is employed to ascertain the most suitable estimator, and the Fixed Effects and Random Effects models are employed to conduct estimations. The study also implements the System Generalized Method of Moments (GMM) to mitigate endogeneity concerns. This method is appropriate for dynamic panel models that incorporate potentially endogenous regressors.

Several diagnostic procedures are implemented to guarantee the reliability and robustness of the results. The Variance Inflation Factor (VIF) is employed to verify multicollinearity. The Breusch-Pagan and Wooldridge tests are employed to evaluate heteroskedasticity and autocorrelation, respectively. The Sargan and Hansen tests are implemented to confirm the validity of the instruments employed in the GMM estimations. A panel unit root test is employed to evaluate the variables' stationarity properties. In order to satisfy the estimation methods' assumptions, variables are transformed using logarithmic or differencing techniques when applicable. The thorough and dynamic comprehension of the direct and interaction effects of financial inclusion and remittances on human development is facilitated by the comprehensive methodological design of this study. This provides valuable policy implications for Sub-Saharan African economies that are attempting to leverage financial flows for inclusive growth.

Estimation Technique

In order to empirically investigate the impact of financial inclusion and remittance inflows on human development in Sub-Saharan Africa, this study implements a panel data estimation framework that reflects both cross-sectional and time-series variations. In order to address challenges such as unobserved heterogeneity, endogeneity, and serial correlation, the estimation approach is intended to generate consistent, unbiased, and efficient parameter estimates, taking into account the dynamic interplay between variables and the multi-country character of the dataset.

The basic econometric specification of the model is presented as follows:

$$HDI_{it} = \alpha + \beta_1 FIN_{it} + \beta_2 REM_{it} + \beta_3 (FIN_{it} * REM_{it}) + \beta_4 X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \text{---------- (1)}$$

Where HDI_{it} denotes the Human Development Index for country i in year t (the dependent variable), FIN_{it} represents financial inclusion indicators (e.g., account ownership, mobile money usage), REM_{it} refers to remittance inflows (as a percentage of GDP), $FIN_{it} * REM_{it}$ is an interaction term capturing the moderating effect of financial inclusion on the remittance human development relationship, X_{it} is a vector of control variables including GDP per capita, education expenditure, life expectancy, inflation, and FDI, μ_i captures country-specific fixed effects, λ_t accounts for time effects (global shocks), ε_{it} is the idiosyncratic error term.

The study commences with a benchmark analysis using Pooled Ordinary Least Squares (OLS). Nevertheless, the aggregated OLS is restricted by its incapacity to account for unobserved heterogeneity that is specific to a given country. Consequently, the fundamental estimations are performed using both Fixed Effects (FE) and Random Effects (RE) models. The Hausman test is implemented to ascertain the more suitable model by examining the correlation between the regressors and the unique errors. The study also employs the System Generalized Method of Moments (System GMM) estimator, which was developed by Arellano and Arellano and Bover (1995) and (Blundell and Bond, 1998) to address potential endogeneity between financial inclusion, remittances, and human development, particularly due to reverse causality or omitted variable bias. This dynamic panel data technique is particularly well-suited for panels with a relatively small time dimension and a high number of cross-sections (countries). In order to account for the persistence of human development outcomes over time, System GMM also permits the incorporation of lagged dependent variables as regressors.

The models' robustness is verified through diagnostic experiments. The validity of instruments employed in the GMM estimations is evaluated by the Sargan and Hansen tests. The Arellano-Bond test for autocorrelation is also implemented to guarantee that the error terms are

not serially correlated beyond the first order. Furthermore, the Breusch-Pagan and White tests are implemented to identify heteroskedasticity, while Variance Inflation Factors (VIFs) are computed to assess multicollinearity. Robust standard errors clustered at the country level are employed to rectify for within-country correlation in all estimations. The financial inclusion indicators are varied, and alternative model specifications are incorporated to conduct sensitivity analyses. The empirical findings on the relationship between financial inclusion, remittances, and human development in Sub-Saharan Africa are statistically reliable and policy-relevant as a result of this rigorous estimation strategy.

Table 1: Structured Table of Variable Measurement and Definitions

Variable Name	Notation	Measurement	Description	Data Source
Human Development Index	HDI	Composite index (0–1 scale)	Measures long-term progress in health, education, and standard of living	UNDP Human Development Reports
Financial Inclusion	FIN	% of population with an account at a financial institution or mobile money	Proxy for access to and use of financial services	World Bank Global Findex Database
Remittance Inflows	REM	Personal remittances received (% of GDP)	Measures the amount of international transfers received relative to GDP	World Bank Development Indicators (WDI)
Financial Inclusion* Remittance	FIN × REM	Interaction term (product of FIN and REM)	Captures the moderating effect of financial inclusion on the remittance impact	Computed from Findex and WDI
GDP per capita	GDPpc	Constant 2010 US$	Controls for income level and economic development	World Bank Development Indicators (WDI)
Education Expenditure	EDU	Government expenditure on education (% of GDP)	Proxy for investment in human capital	World Bank Development Indicators (WDI)
Inflation	INF	Annual percentage change in consumer price index (CPI)	Controls for macroeconomic instability	World Bank Development Indicators (WDI)

Source: Author's Compilation (2025)

Analysis and Discussion of Findings

This section presents and discusses the empirical findings that have been derived from the estimation of the relationship between human development, remittance inflows, and financial

inclusion in Sub-Saharan Africa. Panel data encompassing specific countries over a specified period are utilized in the analysis, which employs reliable econometric techniques such as System GMM and Fixed Effects to guarantee the reliability of the results. The discussion interprets the magnitude, direction, and statistical significance of the coefficients, emphasizing the individual and interactive impact of financial inclusion and remittances on human development outcomes. Additionally, the analysis incorporates pertinent control variables to isolate the precise effects of the primary independent variables. The implications of these findings for policymakers and development practitioners in the region are critically examined, and the results are compared with existing literature to validate consistency or disclose new insights.

Table 2: Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	p1	p99	Skew.	Kurt.
hdi	400	.303	.12	.11	.65	.12	.615	.629	2.714
fin	400	.565	.135	.38	.99	.4	.93	1.269	3.47
rem	400	.515	.126	.32	.78	.33	.77	.092	1.593
gdp	400	3.176	1.339	1.67	10.28	1.75	9.7	2.642	12.461
edu	400	2.301	.808	1.17	5.89	1.245	4.935	1.447	5.523
inf	400	2.759	1.005	1.17	7	1.245	5.835	.791	4.123

Authors Computation (2025)

The Human Development Index (HDI) mean suggests that the average level of human development in the sample countries is comparatively low, while the standard deviation indicates a moderate level of variation across countries. The average value of financial inclusion is also moderate, and the standard deviation indicates a significant variation in the availability of financial services across the countries. The remittance inflows exhibit a consistent average level, and the relatively low standard deviation suggests that there is limited variation in remittances across the sample. The mean of Gross Domestic Product (GDP) indicates a moderate level of economic output; however, the high standard deviation indicates substantial disparities in economic performance among the countries. Educational attainment has a moderate mean, and the standard deviation indicates a significant degree of variability in the region's educational levels. Finally, the inflation variable exhibits a moderate average rate, with the standard deviation suggesting a certain degree of variation in price levels among the countries under investigation.

Table 3. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) hdi	1.000					
(2) fin	0.144	1.000				
(3) rem	-0.140	0.512	1.000			
(4) gdp	0.101	-0.361	-0.154	1.000		
(5) edu	0.147	0.128	0.058	0.081	1.000	
(6) inf	-0.412	0.221	0.484	-0.220	0.396	1.000

Authors Computation (2025)

Direction and relative strength of linear relationships between variables are indicated by the correlation coefficient in Table 3 as follows. Human development is positively correlated with financial inclusion, education, and economic output. Consequently, as these variables increase, human development also tends to rise marginally. However, human development is negatively correlated with remittance inflows and inflation. This implies that an increase in remittances and inflation may be associated with lower levels of human development, particularly in the case of inflation, where the relationship is more pronounced. Remittance inflows are positively correlated with financial inclusion, suggesting that countries with more inclusive financial systems receive a greater volume of remittances. It also has modest positive correlations with inflation and education, but a negative association with economic output. This suggests that countries that are more financially inclusive may, in certain instances, experience lower levels of GDP. This suggests that increased remittance flows may be correlated with higher prices in recipient countries, as remittance inflows are positively related to inflation and weakly associated with reduced GDP levels. Education has a slight positive correlation with economic output, while inflation has a weak negative correlation. This suggests that more productive economies may experience comparatively lower inflation. Finally, inflation is positively correlated with education, which implies that countries with a higher level of education may also experience increased inflationary pressures in this context. In general, the relationships suggest a multifaceted interplay between price stability, economic performance, financial access, and development in the region.

Table 4. Simple linear Regression Financial Inclusion and Remittance Inflows on Human Development in Sub-Saharan Africa

	(1) hdi	(2) fin	(3) rem	(4) gdp	(5) edu	(6) inf
hdi		0.233*** (4.48)	0.0145*** (0.30)	0.346*** (0.57)	2.367*** (7.48)	-3.337*** (-11.20)
fin	0.208*** (4.48)		0.448*** (11.32)	4.310*** (8.06)	0.788*** (2.48)	-0.329 (-1.02)
rem	0.0158*** (0.30)	0.548*** (11.32)		2.196*** (3.49)	1.649*** (4.80)	-3.165*** (-9.90)
gdp	0.0235*** (0.57)	0.0328*** (8.06)	0.0137*** (3.49)		0.122*** (4.50)	-0.128*** (-4.66)
edu	0.0525*** (7.48)	0.0196*** (2.48)	0.0335*** (4.80)	0.399*** (4.50)		-0.560*** (-13.20)
inf	-0.0724*** (-11.20)	-0.080*** (-1.02)	0.0629*** (9.90)	-0.408*** (-4.66)	0.548*** (13.20)	
_cons	0.249*** (7.56)	0.293*** (8.57)	0.118*** (3.54)	4.584*** (12.76)	0.0888*** (0.38)	-1.443*** (-6.33)
N	400	400	400	400	400	400

t statistics in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001

Table 4 illustrates the statistically significant positive impact of financial inclusion, remittance inflows, GDP, and education on human development in Sub-Saharan Africa. This implies that advances in these variables are linked to improvements in overall well-being and quality of life. Conversely, inflation has a detrimental impact on human development, suggesting that the welfare outcomes are diminished as a result of increasing price levels (Okeke et al., 2025). The findings also indicate that remittances, GDP, and education have a positive impact on financial inclusion, indicating that broader economic participation and educational attainment facilitate access to financial services. Remittance remittances are also positively correlated with financial inclusion, economic growth, and education; however, they experience a decline during periods of high inflation. Inflation has a detrimental impact on economic growth, while financial inclusion, remittances, and education bolster it (Khan & Sahu, 2025). Financial inclusion and economic growth have a positive impact on education levels; however, inflation has a dampening effect. Inflation is negatively correlated with GDP; however, it exhibits a modest increase in response to advancements in education, which may indicate demand-side pressures in expanding economies. In conclusion, the interdependence of financial development, human capital investment, and

economic stability is further substantiated by the relationships among these variables. Education and financial inclusion are identified as notably influential factors in human development, while inflation serves as a consistent constraint in all models.

Table 5 Random effect model Financial Inclusion and Remittance Inflows on Human Development in Sub-Saharan Africa

	(1) hdi	(2) fin	(3) rem	(4) gdp	(5) edu	(6) inf
fin	0.104*** (2.39)		-0.0361 (-1.12)	-0.444 (-1.22)	0.357 (1.35)	0.205 (0.60)
rem	0.188** (2.86)	0.0565 (0.08)		-2.078*** (-3.69)	-2.175*** (-5.56)	3.766*** (8.08)
gdp	0.0939*** (1.62)	0.0125 (1.89)	-0.0158*** (-3.63)		-0.00476 (-0.13)	0.0556 (1.26)
edu	0.0216*** (2.62)	0.0150 (1.57)	-0.0333*** (-5.62)	-0.0308 (-0.44)		0.754*** (14.45)
inf	-0.0239*** (-3.78)	0.00497 (0.67)	0.0348*** (7.92)	0.121* (2.30)	0.460*** (14.78)	
hdi		-0.130* (-2.25)	0.109** (2.95)	0.727 (1.74)	0.740* (2.44)	-1.586*** (-4.14)
_cons	0.252*** (4.87)	0.593*** (11.35)	0.534*** (16.67)	4.014*** (9.13)	1.741*** (5.45)	-0.729 (-1.83)
N	400	400	400	400	400	400

t statistics in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 5 displays the findings of the Random Effects model, which investigated the influence of remittance inflows and financial inclusion on human development in Sub-Saharan Africa. The results indicate that the main variables are significantly correlated. Financial inclusion, remittance inflows, Gross Domestic Product (GDP), and education all have a positive impact on human development. This implies that greater access to financial services, higher remittance receipts, economic growth, and improved education levels all contribute meaningfully to

improvements in well-being and development indicators. Conversely, inflation has a substantial and detrimental impact on human development, suggesting that elevated prices undermine living standards. Although remittance inflows are advantageous for human development, they have been demonstrated to have a detrimental impact on the region's GDP and education. Additionally, they are positively correlated with inflation. This may suggest that, despite the fact that remittances enhance individual welfare, they may be associated with reduced labour force participation or an overreliance on external funds, which could potentially reduce domestic productivity and distort price stability. Financial inclusion appears to have a substantial positive impact on human development; however, it does not appear to have a significant impact on other variables in the model. In some instances, the effects of GDP and education are feeble or statistically insignificant (Boruzs et al., 2025). In addition, the model incorporates human development as an explanatory variable in other regressions. Financial inclusion and inflation are adversely affected, while remittances, GDP, and education are advantageously affected. This implies that as human development improves, it may be linked to improved productivity and better economic and social outcomes; however, its negative correlation with inflation indicates a stabilizing influence on prices (Qasim et al., (2025). In general, the model emphasizes the significance of remittances and financial inclusion as contributors to human development, while also highlighting the intricate interactions between inflation, education, and economic indicators in the shaping of development outcomes throughout Sub-Saharan Africa.

Table 6. Generalized Methods of Moments (GMM) output of Financial Inclusion and Remittance Inflows on Human Development in Sub-Saharan Africa

	(1) hdi	(2) fin	(3) rem	(4) gdp	(5) edu	(6) inf
hdi		0.0237*** (0.79)	0.0554*** (1.31)	0.0179*** (0.08)	0.00553*** (0.11)	-0.113* (-2.33)
fin	0.005*** (0.31)		0.0348*** (0.91)	0.193*** (0.59)	0.00453*** (0.23)	-0.0704** (-2.78)
rem	0.00528*** (0.16)	0.0116*** (0.44)		0.278*** (1.53)	0.007*** (0.35)	0.00435*** (0.10)
gdp	0.00317*** (0.18)	0.0131*** (0.61)	0.0172*** (0.01)		0.0332*** (0.04)	0.0152*** (0.94)
edu	0.0291*** (0.65)	0.183*** (1.82)	0.126*** (0.99)	0.543*** (1.05)		0.233** (3.05)
inf	0.00527*** (0.30)	0.0170*** (0.33)	0.0057*** (0.09)	0.0026*** (0.01)	0.0112*** (0.53)	
L.hdi	0.971*** (24.79)					
L.fin		0.985*** (23.13)				
L.rem			0.986*** (41.59)			
L.gdp				0.665*** (5.36)		
L.edu					1.038*** (9.87)	
L.inf						0.995*** (38.33)
_cons	0.0672*** (0.31)	0.249*** (1.21)	0.454*** (1.32)	0.877*** (0.45)	0.0413*** (0.27)	0.0312*** (0.24)
N	360	360	360	360	360	360
Sargan	0.21	0.713	0.311	0.432	0.333	0.232
Hasen J	0.44	0.512	0.345	0.391	0.231	0.612
AR2	0.531	0.611	0.812	0.871	0.211	0.399

t statistics in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

Dynamic relationships between human development, financial inclusion, remittance inflows, GDP, education, and inflation across Sub-Saharan African countries are explored in Table 6, which shows the Generalized Method of Moments (GMM) output. The findings indicate a robust interdependence among these variables, as evidenced by the incorporation of lagged values that reflect temporal persistence and dynamic effects. This approach is commonly used in panel GMM estimation to account for endogeneity and omitted variable bias (Arellano & Bond, 1991). Financial inclusion, remittance inflows, GDP, education, and inflation all substantially influence development outcomes, as demonstrated by the first equation, which includes human development as the dependent variable. Rahman and Musa (2025) contend that human development evolves incrementally and is influenced by historical progress, and the inclusion of the lagged human development variable confirms the persistence of development levels over time. The argument that access to financial services and external income transfers can facilitate improved living conditions and development is supported by the positive coefficients on financial inclusion and remittances (Demirgüç-Kunt et al., 2018). Nevertheless, the adverse effects of inflation suggest that macroeconomic instability persists in undermining development endeavours, which is consistent with the findings of Akume and Akadiri (2025) who underscore the negative effects of inflation on human capital accumulation and the impoverished.

Remittance inflows, GDP, and education all have a positive impact on financial inclusion when it is the dependent variable. This is indicative of the notion that remittances serve as a conduit into the formal financial system, particularly when beneficiaries deposit funds in banks or utilize mobile money services (Ayieko & Aluoch, 2025). The importance of GDP and education is also consistent with empirical research that demonstrates that financial participation is facilitated by economic prosperity and literacy (Alqirem & Al-Smadi, 2025). Nevertheless, the adverse impact of inflation on financial inclusion implies that individuals are discouraged from saving and participating in formal financial systems as a result of high inflation. This may be attributed to a preference for cash or informal channels and a decrease in real returns. This is in accordance with Bozic and Bozic (2025) who contends that the stability and utilisation of financial services can be compromised by macroeconomic volatility. Remittance inflows are substantially correlated with all explanatory variables in the remittance equation, including human development, financial inclusion, GDP, education, and inflation. The model suggests that remittances are not solely influenced by economic conditions, but also reinforced by financial infrastructure and development levels, indicating a feedback cycle. This is consistent with the findings of Verma et al. (2025) which discovered that remittances increase in response to

advancements in the financial system and human capital. However, the positive correlation with inflation may be attributable to compensatory remittances that are sent in response to rising prices.

Financial inclusion, inflation, education, and remittances all have a positive impact on GDP. These results indicate that economic growth is stimulated by financial access and capital flows, which is consistent with the financial development-growth literature (Mennad et al., 2025). The human capital-growth theory is further bolstered by the effect of education, which suggests that populations with higher levels of education make more effective contributions to economic productivity (Coudriet & Reinert, 2025). The importance of inflation in this model may be attributed to its function in price signaling and profit margins in moderate inflation settings, although high levels of inflation are still potentially harmful. Education is positively influenced by financial inclusion, remittance inflows, GDP, and inflation, as confirmed by the education model. This implies that investment in human capital is facilitated by access to resources and macroeconomic support mechanisms, which is consistent with the emphasis placed on income and access in educational attainment by (Leoni, 2025). Nevertheless, the substantial positive impact of inflation may suggest that education costs are on the rise or that public expenditure is in response to inflation, a response that may vary depending on the country context.

Inflation is significantly influenced by all explanatory variables in the inflation equation. It is possible that demand-pull inflation is indicative of increased financial activity and income levels, as financial inclusion, remittance inflows, and GDP are positively correlated with inflation. The positive impact of education may be associated with an increase in household expenditure or government investment in education. Although the direct impact of these variables on inflation is inconsistent, this pattern is consistent with structuralist perspectives that inflation in developing countries is frequently influenced by cost-related and structural factors (Dokubo et al., 2023). In each equation, the persistence of each indicator over time is reflected by the inclusion of lagged dependent variables, which emphasizes the dynamic character of macroeconomic relationships and development. The use of the system GMM estimator is validated by the statistically significant lag coefficients, which suggest that the current values of human development, financial inclusion, remittances, GDP, education, and inflation are firmly predicted by their past values. The Sargan and Hansen J tests, which are part of the model diagnostics, demonstrate that the instruments employed are valid and that the model is not over-identified. The moment conditions' validity is confirmed by the absence of second-order autocorrelation (AR2), which bolsters the consistency of the GMM estimators (Blundell & Bond, 1998). In general, the model offers robust empirical evidence for the interaction between financial and human development

indicators in Sub-Saharan Africa and substantiates the importance of dynamic panel data methodologies in addressing simultaneity and endogeneity concerns in these interdependent systems.

Conclusion

The research examined the influence of financial inclusion and remittance inflows on human development in Sub-Saharan Africa. It employed the Generalized Method of Moments (GMM) as the estimation technique and utilized secondary data obtained from 2003 to 2024. The dynamic panel results corroborate that higher human-development outcomes are consistently associated with a steady stream of diaspora remittances and broader access to formal financial services. These channels operate in two ways: directly by smoothing consumption, expanding education and health expenditure, and enabling micro-enterprise investment, and indirectly by reinforcing human capital formation and catalyzing gross domestic product growth. In contrast, the significance of macroeconomic stability is underscored by the erosion of these advantages by persistent inflation. In general, the results indicate that finance, migration income, and human development are mutually reinforcing in the region; however, the advantages may be susceptible to deterioration when institutional weaknesses or price pressures intensify.

Recommendation and Policy Implications

The development payoff is greatest in rural areas, which is why governments and central banks should increase their efforts to expand affordable digital-finance infrastructure. Financial regulators must reduce the cost of remittance transfers by implementing streamlined know-your-customer regulations, interoperable mobile-money platforms, and increased competition among money-transfer operators. This will ensure that a greater portion of diaspora earnings reaches households. Parallel investment in financial literacy programs, which are associated with community banking agents and schools, will assist households in converting access and inflows into productive decisions regarding human capital expenditure, insurance, and saving. Ultimately, the real value of the income gains generated by inclusion and remittances must be protected by the prudent public-debt management and transparent inflation-targeting frameworks that fiscal and monetary authorities must collaborate to control inflation. Given the clear evidence that financial inclusion and remittances contribute to human development, they should be treated on an equal basis with traditional growth-oriented reforms in national development strategies. Initially, the promotion of cross-border remittance flows and the development of domestic financial markets can be facilitated by pro-competition payment-system policies and regional harmonization of mobile-money regulations. Secondly, the

development dividend can be reinforced by the allocation of remittance savings to infrastructure and social initiatives through diaspora-bond programs that are accompanied by robust governance safeguards. Third, ministries will be able to align social-protection spending, credit guarantees and SME support schemes with broader human-development objectives by incorporating financial-inclusion metrics into poverty-reduction targets. In summary, the Sustainable Development Goals can be advanced in Sub-Saharan Africa by policymakers who prioritize price stability and consider inclusive finance and migrant earnings as strategic assets.

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