

Financial inclusion and human development: is there a nexus?

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Abstract

Purpose – The purpose of this study is to investigate the nexus between financial inclusion and human development for countries belonging to different income groups during 2009–2019, and whether this relation differs across these groups.

Design/methodology/approach – The paper constructs an index of financial inclusion (IFI) for different income group countries employing dynamic panel data models estimated by generalized method of moments (GMM) to analyse the relation between financial inclusion and human development.

Findings – Financial inclusion in low and lower-middle-income countries has higher effect on human development than in high and upper-middle income countries.

Research limitations/implications – The study examines the effect of IFI on the human development index (HDI) at the aggregate level. Future research can tackle the IFI effect on every component of HDI and other aspects of financial inclusion could be incorporated like financial technology.

Originality/value – The originality lies in constructing an index for financial inclusion using the most recent data for a wide range of countries, in addition to examining the impact of financial inclusion on the human development levels of different income groups allowing for more accurate analysis tackling the differences in terms of adopted policies across various income groups; unlike other studies that are carried out on a one country basis or only across one or two country groups that do not allow for comparison across various groups of countries.

Keywords Financial inclusion, Human development, Index of financial inclusion, Dynamic panel data model, Generalized method of moments

Paper type Research paper

1. Introduction

With the growing importance of human development, the sustainable development goals (SDGs) have explicitly incorporated human development within four of its goals (no poverty, good health and well-being, quality education and decent work) and implicitly through two of them (zero hunger and peace), to be achieved by the year 2030. These goals, if realized, are expected to promote human development eventually.

On the other side, as the world economy becomes more integrated, great attention is given to financial inclusion, which is considered a trending topic not only for global financial institutions such as the World Bank (WB) and the International Monetary Fund (IMF) but also for governments and regulators in many countries. Financial inclusion is perceived as an enabler for 7 of the WB 17 SDGs. Moreover, the G20 is committed to promoting financial inclusion worldwide and implementing the G20 High-Level Principles for Digital Financial Inclusion. Since 2010, more than 55 countries have been committed to achieving high financial inclusion



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levels, and more than 60 countries have launched or formulated national financial inclusion strategies (World Bank, 2018).

In this regard, great progress has been made towards financial inclusion as 1.2 billion adults (51% of world adults) worldwide have had access to a bank account since 2011, increased to 62% in 2014 and to 69% in 2018. Nevertheless, nearly 1.7 billion adults (one-third) worldwide are still unbanked, and about half of those unbanked are poor women households in rural areas or out of the workforce. On the gender front, in 2018, the gender gap in account ownership remains at 9% in developing countries, hindering women from participating in the financial sector. Nevertheless, such a gap lessens in countries with high mobile money account ownership (World Bank, 2018).

Conceptually, the World Bank (2014) defines “financial inclusion” as “enabling all individuals and businesses to have access to useful and affordable financial products and services that meet their needs in which to be delivered in a responsible and sustainable way”. In societies with a relatively low level of financial inclusion, many people struggle with their financial problems due to the unavailability of financial services (Awad and Eid, 2018). That is why an inclusive financial system not only helps to enhance the efficiency and welfare of the population at large but also facilitates effective utilization of productive resources (Sarma, 2012).

On the human development side, according to the human development report of the United Nations Development Programme (2019), the world HDI recorded 0.737 [1] (UNDP, 2019). Consequently, all high-income countries, considered in this study, enjoy a very high human development level (>0.8) in 2019. In upper-middle-income countries, human development varies from being very high and high (>0.6) except for two countries having medium human development (>0.55). Also, in lower-middle-income countries, human development varies from high and medium human development except one country has a low human development level (>0.3). Eventually, all low-income countries have low human development except one country that enjoys medium human development.

On the empirical front, most of the existing literature tackling the relation between financial inclusion and human development has been criticized for many reasons. Firstly, regarding the studied samples, some of the existing studies are carried out on a one-country basis which undermines differences across countries. While cross-section studies tackle only specific country groups, for instance, developed countries or developing countries, African countries, OECD countries, Asian countries or Indian states, which does not allow for comparison across various groups of countries. Secondly, the employed methodology is either tackled by investigating the degree of association between the two variables using Pearson's correlation coefficient or examining the impact of financial inclusion on economic growth as proxied by real gross domestic product (GDP) per capita which is one dimension of human development. Still, there exists relatively thin literature on the causality relationship between financial inclusion and human development, as well as the impact of financial inclusion upon human development across different income groups.

Therefore, the present study fills this gap in the literature by investigating the impact of financial inclusion on human development in countries belonging to different income group levels (high, upper-middle, lower-middle and low). It reveals the effect of financial inclusion upon long and healthy life, knowledge and a decent standard of living across countries belonging to various income groups. Hence, financial inclusion affects many dimensions reflecting the achievement of socio-economic goals. Concerning the applied methodology, the study first constructs an IFI using four dimensions (ATMs per 100,000 adults, number of bank branches per 100,000 adults, deposit accounts with commercial banks per 1,000 adults and borrowers from commercial banks per 1,000 adults). Then, it investigates the nexus between financial inclusion and human development in countries belonging to different income group levels allowing for more accurate analysis as it tackles the differences in terms

of adopted policies across various income groups. This relation is examined by estimating dynamic panel data models using the GMM technique during the period 2009–2019 [2] (according to the recent WB Global Financial Development Database (GFDD) and IMF Financial Access Survey (FAS) in 2021).

The main findings of this study highlight the positive and significant effect of financial inclusion on human development implying that financial inclusion in low- and lower-middle-income countries has a higher effect on human development than that in high-income and upper-middle-income countries. The results of the study are of policy relevance for concerned governments and policymakers in countries belonging to various income groups. Policymakers should adopt policies comprising innovative financial tools and technological improvement, while governments should work on targeting higher levels of financial inclusion to reap its potential positive impact on human development.

2. Literature review

The link between financial inclusion and human development exists nearly in most fundamental development theories. For instance, Schumpeter (1912) comes up with the finance–development nexus asserting that a developed and well-functioning financial sector is necessary for involving effective entrepreneurs in technological innovation. Moreover, Solow (1956) argues, through his growth model, that savings will increase per capita output leading to an upward shift in the whole production function. Also, Hicks (1969) states that financial development could have a significant contribution to savings and investment inputs. This will further promote output in the economy through capital accumulation channels and through technological enhancements as asserted by Schumpeter. Levine (1997) highlights the role of the financial sector in boosting innovation and production, where savings are pooled through the financial sector having a positive impact on economic growth and development. Empirically, Mohieldin *et al.* (2019) examine the relationship between the financial sector development and economic growth in Egypt from 1980 to 2016 based on comparisons of critical financial indicators between Egypt and selected emerging markets and developing countries. The study reveals a strong association between real growth per capita and financial development measured by money supply to GDP.

Pertaining to the relation between financial inclusion and human development, it prevails since Keynes (1937) stating that the financial sector assists in reducing poverty through financial intermediaries by providing saving opportunities to the poor, leading to higher income and poverty mitigation. And, intuitively, the lower the poverty level, the higher the human development level. Specifically, the financial inclusion process is considered an effective mechanism that would allow humans to fulfil their basic needs. Since the most significant needs are a long and healthy life; being educated and acquiring a decent living standard, financial inclusion positively affects human development level (Laha, 2015).

Empirical studies tackling the relation between financial inclusion and human development are highlighted as follows; Sarma and Pais (2008) explore the nexus between financial inclusion and human development in a sample of 49 countries in 2004. The study designs an IFI as a proxy for financial inclusion and then compares between its value and that of the HDI for each country. The study confirms the existence of a high correlation between the IFI and HDI. Blando (2013) evaluates the relationship between financial inclusion and human development using IFI and HDI in 2011 in 20 countries from the OECD, Europe, Asia and Africa using a Simplified Average for Numerical Domestic Yields (SANDY) method [3]. It is found that Canada has the highest financial inclusion rating (0.96), while Egypt displays total financial exclusion (0.00). The link between the newly developed IFI and the HDI, for all the 20 countries, is examined by Pearson's correlation coefficient (r) = 0.86, revealing a strong positive correlation between financial inclusion and human development. Nanda and Kaur (2016)

compute an inclusive, cross-country index of financial inclusion in 68 countries from 2004 to 2012 to determine the degree of association between financial inclusion and human. Pearson's correlation coefficient is computed for the years 2004, 2008 and 2012. They discover a strong and significant correlation between the two.

Datta and Singh (2019) construct an IFI and examine its association with human development across 102 countries of the world (34 higher income, 55 middle-income and 13 low-income group of countries) for the years 2011 and 2014. The correlation coefficient between IFI and HDI across high-income group countries in the years 2011 and 2014 is found to be high and significant. In the case of middle-income group countries, the correlation values are somehow moderate and significant. Moreover, the values are found to be significant but moderately high in low-income group countries. To sum up, IFI and HDI values are found to be highly correlated and highly significant across most of the countries.

Moreover, Matekenya *et al.* (2020) examine the effect of financial inclusion on human development in Sub-Saharan Africa (SSA) using panel data approach and GMM technique during the period (2004–2017). Financial inclusion is proxied by six indicators measuring access to and usage of financial services. These measures are ATMs per 1,000 people, borrowers at commercial banks per 1,000 adults, number of commercial bank branches per 1,000 km, deposit accounts with commercial banks per 1,000 adults, outstanding deposits with financial institutions and loan accounts at commercial banks per 1,000 adults. The study found that financial inclusion has a positive effect on human development. All financial inclusion indicators have a positive effect on human development, except outstanding deposits that have an insignificant coefficient within the analysis.

Ababio *et al.* (2020) investigate whether the level of human development affects financial inclusion, and vice versa in 20 frontier markets (Argentina, Bangladesh, Botswana, Cyprus, Ecuador, Ghana, Jamaica, Kenya, Kuwait, Latvia, Lebanon, Mauritius, Namibia, Nigeria, Panama, Pakistan, Qatar, Saudi Arabia, Sri Lanka and Tunisia) using dynamic panel GMM from 2005 to 2014. Two general models are carried out; the first one investigates the effects of human development on financial inclusion. Conversely, another model for the impact of financial inclusion on human development is conducted. Human development is proxied using HDI, while financial inclusion is proxied by the number of ATMs per adults, number of mobile cellular, fixed telephone number and Internet usage. Control variables in the model incorporate exports of goods, corruption level, foreign direct investment (FDI) and rule of law. They argue that human development is a catalyst for financial inclusion scale-up in the banking industry, which, in turn, augments the development process. Moreover, the study concludes that low human development could lead to low financial inclusion. Also, enhancing financial inclusion through the banking sector is very crucial to stimulating human development, so the relation is perceived as a bidirectional one.

Thathsarani *et al.* (2021) examine the effect of financial inclusion on economic growth and human development of eight South Asian countries by employing panel data for 2004–2018. Firstly, IFI is constructed. Then, Panel Vector Error Correction Model (VECM) is conducted to capture the relation between HDI and financial inclusion. The results show that financial inclusion is an important causal factor of human capital development in South Asian countries in the long run but not in the short run which means that the positive impact of financial inclusion on human capital development is evident after a long time period.

Last but not least, it is essential to incorporate financial literacy as a critical condition that enhances the rational use of financial services to promote people's active involvement in the financial sector, leading to increased financial inclusion, and, therefore, higher human development levels. Grohmann *et al.* (2017) assess the impact of financial literacy on financial inclusion on the cross-country level (belonging to different income groups), which allows to consider institutional variation. Results assert that institutional and financial characteristics, which promote financial literacy, enhance better financial decisions.

Adetunji and David-West (2019) analyse financial literacy and income levels as drivers of financial services demand employing survey data from 22,000 Nigerian respondents confirming that financial literacy is a key determinant of how often people save. Geraldes *et al.* (2022) set qualitative comparative analysis to analyse financial inclusion drivers across 61 developed, developing and transitional countries worldwide in 2014. The results confirm that financial literacy is a condition of high financial inclusion.

3. Methodology

3.1 Construction of IFI

The newly constructed IFI is designed based on Sarma (2008). It is a composite index that is built using four main dimensions. Firstly, the dimension index is calculated for each dimension of financial inclusion. The dimension index for the i -th dimension, d_i , is computed using the following formula:

$$d_i = \frac{A_i - m_i}{M_i - m_i} \quad (1)$$

where i refers to the dimension number.

Here A_i is the actual value of dimension i in a certain country; m_i is the minimum value of dimension i in the group of selected countries; and M_i is the maximum value of dimension i in the group of selected countries. The value of the dimension (d_i) varies between 0 and 1 (i.e. $0 \leq d_i \leq 1$). The higher the value of d_i , the higher the country's achievement in dimension i . It is notable that this methodology is in line with the methodology adopted by UNDP in the construction of HDI and other similar indices.

Afterwards, the IFI_i for the i_{th} country is measured by applying the following formula:

$$IFI_i = 1 - \frac{\sqrt{(1 - d_1)^2 + (1 - d_2)^2 + \dots + (1 - d_n)^2}}{\sqrt{n}} \quad (2)$$

where n refers to the total number of dimensions.

Since the IFI is composed of the four main aforementioned dimensions, formula number 2 could be restated as follows:

$$IFI_i = 1 - \frac{\sqrt{(1 - d_1)^2 + (1 - d_2)^2 + (1 - d_3)^2 + (1 - d_4)^2}}{\sqrt{4}} \quad (3)$$

where d_1 , d_2 , d_3 , and d_4 represent ATMs per 100,000 adults, number of bank branches per 100,000 adults, deposit accounts with commercial banks per 1,000 adults and borrowers from commercial banks per 1,000 adults, respectively. Depending on the IFI scores, countries are placed in one of the following three categories:

$0.5 \leq IFI \leq 1 \rightarrow$ High financial inclusion,

$0.3 \leq IFI < 0.5 \rightarrow$ Medium financial inclusion,

$0 \leq IFI < 0.3 \rightarrow$ Low financial inclusion (Sarma, 2008).

Two differences exist between this index and Sarma's (2008). Firstly, in Sarma's (2008) index, the volume of credit and deposit as a proportion of the country's GDP is utilized to measure the usage dimension. In this study, deposit accounts with commercial banks per 1,000 adults, and borrowers from commercial banks per 1,000 adults are used instead to measure this dimension. Given the wider availability of those two variables across various

countries, including them in the present study allows for increasing the sample size and hence enhancing the precision of the study and its findings. Secondly, [Sarma \(2008\)](#) measures the penetration dimension using number of bank accounts as a proportion of the total population. However, this study uses ATMs per 100,000 adults as a measure of the ownership of accounts. It is assumed that the ownership of accounts indicates how many people have accounts at formal financial institutions. Although the best way to measure this key factor is by counting the number of people who own accounts, the relevant data provided by the WB is limited for some countries. Therefore, the number of ATMs is used as a proxy for the ownership of accounts. It is because formal financial institutions generally issue either a debit card or an ATM card tied to an account. Hence, the ATM penetration rate (ATMs per 100,000 adults) represents the accounts penetration rate ([Kim et al., 2018](#)).

3.2 Dynamic panel data modelling approach

After calculating the IFI, the Granger causality test using panel data is carried out to examine the direction of causality between financial inclusion and human development in order to build up the model. The results of the test are reported in [Table 1](#). From the findings, it is concluded that financial inclusion Granger causes human development.

The methodology and the model specification follow [Sarma \(2008\)](#) and [Ababio et al. \(2020\)](#). After determining the direction of causality between IFI and HDI, dynamic panel data models are estimated to capture the relation between financial inclusion and human development. HDI is employed as the proxy variable for human development as it captures both non-monetary indicators such as life expectancy and education, in addition to per capita income. Lagged dependent variable of HDI is included as human development tends to change slowly over time, and hence the persistence of human development is captured, this creates the dynamic structure of the model ([Saptoka, 2014](#)). Lagged dependent variables also corrects for autocorrelation in the models. Besides, two control variables are incorporated: openness to trade and FDI. Trade openness is calculated as the share of exports plus imports relative to GDP. It assesses the degree of openness of the country to international trade and connectivity with the global economy. The rationale behind the choice of those two control variables is that empirical studies confirm the positive relation between trade openness [\[4\]](#) and FDI [\[5\]](#) and human development.

The estimated regression equation is specified as follows:

$$HDI_{it} = \beta_0 + \beta_1HDI_{it-1} + \beta_1IFI_{it} + \beta_2TROP_{it} + \beta_3FDI_{it} + \epsilon_{it} \quad (4)$$

$i = 1, \dots, N$ and $t = 1, \dots, T$

where,

HDI_{it} : Human development index for country i at time t

HDI_{it-1} : Human development index for country i at time $t-1$

IFI_{it} : Index of financial inclusion (composite index) for country i of countries at time t

Table 1.
Pairwise granger
causality test

| Null hypothesis | F-statistic | Probability |
|---|-------------|-------------|
| IFI does not granger cause HDI | 5.17195 | 0.0235 |
| HDI does not granger cause IFI | 1.21675 | 0.2707 |
| Source(s): Done by the authors based on the findings of the test | | |

$TROP_{it}$: Openness to trade for country i at time t

FDI_{it} : Foreign direct investment for country i at time t

ε_{it} : Error term (independent and identically distributed (i.i.d.) over the whole sample with variance σ_ε^2)

i : cross-sectional countries

t : Time period

Empirically, dynamic panel data models are estimated using GMM technique proposed by [Arellano and Bond \(1991\)](#) who suggest a GMM estimator [6] that utilizes lagged levels of endogenous variables as instruments for equations in difference forms ([Tsonas, 2019](#)). Hence, the two employed econometric models are estimated using GMM technique; model A for high and upper-middle-income countries and model B for low and lower-middle-income countries. These models can be country-fixed effect (FE) or random effect (RE). To choose between FEs or REs, Hausman specification test is conducted to select the model that fits the data better. Then, some robustness checks tests as endogeneity, cross-sectional dependence, serial correlation and the presence of heteroskedasticity are carried out to check for the accuracy and robustness of the estimated models.

3.3 Data and variables selection

The study relies on an annual dataset of 38 countries which are categorized into high, upper-middle-, lower-middle- and low-income groups according to the WB definition of GNI per capita (in US dollars, converted from local currency). Countries' selection is carried out on the basis of the presence of data within a common time period; from 2009 to 2019, and on the commitments of countries to financial inclusion, and launching or developing a national financial inclusion strategy since 2010. The time span ends by 2019 to capture the evolution of financial inclusion as the Universal Financial Access 2020 initiative by the World Bank Group has committed to achieving financial access and decreasing financial exclusion by 2020. The table showing countries' classification according to their income groups in addition to the table describing the method of calculation of financial inclusion variables are presented in [Appendix](#). A number of ATMs and number of bank branches are measured per 100,000 adults and are extracted from [WB GFDD \(2021\)](#). While deposit accounts with commercial banks and borrowers from commercial banks are measured per 1,000 adults and taken from [IMF FAS \(2021\)](#). Hence, the GFDD and FAS are combined to construct the index as the four dimensions needed are not present in one dataset. WB human development reports are the source for HDI while control variables are retrieved from world development indicators database of the WB.

4. Estimation results and empirical findings

4.1 Estimation results

The first estimated model (Model A) encompasses 20 countries belonging to high- and upper-middle-income groups during the period (2009–2019). The second model (Model B) encompasses another set of 18 countries belonging to low and lower-middle-income groups during the same period. To choose between FEs and REs models, Hausman specification test is carried out for Models A and B. REs are asserted by Hausman specification test in Model A as the null hypothesis is not rejected at significance level 5%. For Model B, the null hypothesis of the test is rejected at 5% significance level in favour of the FEs estimation which caters for heterogeneity in the cross-sectional units (countries) which can be an ideal technique. The results of the Hausman specification test are shown in [Table 2](#).

Robustness checks such as endogeneity, cross-sectional dependence, serial correlation and the presence of heteroskedasticity are essential for checking the fitness of the model and the validity of the estimation technique, these checks are presented in Table 3. Sargan test shows that the model is correctly specified in terms of endogeneity and instrumental validity. The null hypothesis confirms that instruments as a group are exogenous. In Models A and B, the null hypothesis is not rejected proving that the instruments are valid and indeed exogenous. Wald test is conducted for testing for heteroscedasticity. In Model A, the null hypothesis is rejected at a 5% significance level, which would imply that at least one of the regressors' coefficients is equal to zero confirming the presence of heteroscedasticity problem. To correct that problem, Model A is re-estimated using the white's heteroscedasticity cross-section standard errors and covariance. In Model B, the null hypothesis is not rejected at a 5% significance level confirming the absence of heteroscedasticity problem.

The test for cross-sectional dependence is carried out using Pesaran's CD test [7], which is suitable for a panel with a time dimension less than the cross-sectional dimension. In Model A, the null hypothesis is not rejected confirming the absence of cross-sectional dependence among the cross-sections. The probability value of 0.55 suggests that there is not enough evidence for cross-sectional dependence among the cross-sectional units in the model. Concerning Model B, the null hypothesis is rejected confirming the presence of cross-sectional dependence among the cross-sections. This means that there is a limit to which the results in panel analysis are generalized. Hence, this dependence is corrected for by re-estimating the model using panel-corrected standard error. Concerning the Arellano-Bond test, the Arellano-Bond test values show that the model error terms are serially uncorrelated in levels in both models. The findings of the models and robustness checks are displayed in Table 3.

Table 2.
Hausman specification test for fixed or random effects for models A and B

| Null hypothesis (H_0) | Output (Model A) | Output (Model B) |
|---|--|--|
| Difference in coefficients not systematic (random effect is present) | Chi-Sq. Statistic (4) = 14.85491 Probability = 0.107 | Chi-Sq. Statistic (4) = 18.337950 Probability = 0.0011 |
| Source(s): Authors' computation based on the findings of the model | | |

Table 3.
Models A and B estimation results of the GMM random effects model (A) and cross-section fixed effects model (B) after correction

| Variables | Model A | Model B |
|--|-------------------------------|-------------------------------|
| <i>Dependent Variable: HDI</i> | | |
| Constant (β_0) | 0.018631** (0.006209) | 0.065150** (0.008330) |
| HDI_{it-1} | 0.978319** (0.007460) | 0.888177** (0.0001) |
| IFI_{it} | 0.007012** (0.003073) | 0.034558** (0.0012) |
| $TROP_{it}$ | 0.0000624** (0.000018) | 0.0000259* (0.06) |
| FDI_{it} | 0.000206** (0.000071) | 0.0000515 (0.7377) |
| Number of countries | 20 | 18 |
| Total panel observations | 194 | 173 |
| Arellano-Bond test for AR(1) in first differences | 1.094415 (0.2738) | -1.577092 (0.1148) |
| Arellano-Bond test for AR(2) in first differences | 0.093155 (0.9258) | 0.467888 (0.6399) |
| Sargan test | χ^2 (1) = 0.72 (0.56) | χ^2 (1) = 0.42 (0.24) |
| Pesaran's CD test | 10.56 (0.55) | 6.22 (0.011) |
| Wald test | χ^2 Probability = 0.0001 | χ^2 Probability = 0.467 |
| Note(s): Standard errors are reported in parentheses. * and ** refer to being statistically significant at 10% and 5%, respectively | | |

4.2 Empirical findings

Table 3 presents the regression results of the system GMM technique for Models A and B, respectively. It could be concluded that financial inclusion has a positive and significant effect on human development at the same significance level in the two models. The study implies that a high level of financial inclusion would trigger higher levels of human development. This result advocates the findings of [Sarma and Pais \(2008\)](#), [Nanda and Kaur \(2016\)](#), [Datta and Singh \(2019\)](#), [Ababio et al. \(2020\)](#), [Matekenya et al. \(2020\)](#) and [Thathsarani et al. \(2021\)](#).

Moreover, the study concludes that the value of the coefficient of financial inclusion in Model A (0.007012) is lower than that of Model B (0.034558) confirming that financial inclusion in low- and lower-middle-income countries has a higher impact on human development than that in high-income and upper-middle-income countries. Similar results are verified by the higher level of financial inclusion in high-income countries than low-income ones as documented by [Ardic et al. \(2011\)](#). Their study finds that high-income countries have around 17% of the adult population as unbanked adults, while the ratio surges to around 64% of the adult population in low-income countries. Similarly, according to [Allen et al. \(2011\)](#), adults' account penetration in the poorest 20% of the high-income countries is 23% higher than that of adults in the richest 20% at low-income ones. This further asserts the finding that the high- and upper-middle-income countries have already attained high levels of financial inclusion, so the effect of financial inclusion on human development in those countries is expected to be lower than low- and lower-middle-income countries that still suffer from relatively lower financial inclusion levels.

These findings support the hypothesis that financial inclusion may be a means of resolving some of the developmental goals, especially for lower-middle- and low-income countries. Although lower-middle- and low-income countries achieve economic growth, poverty and unemployment levels remain high in most countries. Consequently, increasing the human development pace has to be the major focus of policymakers while formulating financial inclusion strategies.

Accordingly, these findings can be explained in the context of the characteristics of different income groups. For instance, developed countries are usually classified as high-income countries, characterized by political stability, technologically advanced infrastructure, high GDP levels, high industrialization levels, social welfare programs and, consequently, a more matured economy compared to other income group countries. Hence, these countries enjoy high human development levels, so the impact of financial inclusion is not as high as that in lower-middle- and low-income countries as high and upper-middle countries already achieved a high threshold of financial literacy, lower poverty levels, higher unemployment levels and better health services. This is asserted by a study conducted by [Park and Mercado \(2018\)](#) asserting that the effect of financial inclusion on poverty is less for high-income economies than for other income groups ([Park and Mercado, 2018](#)). On the other hand, low-income countries are often considered as underdeveloped or developing countries and emerging or newly industrialized countries, facing challenges associated with poor economy and low human development levels, such as below-average life expectancy, high infant mortality rates, poor educational levels, environmental and climate problems and poor health conditions. Since the impact of financial inclusion on human development in these countries is high, this implies that those countries ought to enhance access to and usage of financial services in addition to promoting financial literacy as means of achieving the socio-economic goals of poverty reduction, equality and lowering unemployment levels.

Achieving a higher level of financial inclusion could expand deposits and improve access to financial services, which results in increasing investment in education and

household expenditure on healthcare. For instance, access to financial opportunities enables micro-enterprise owners to start a business and earn income, this income is often used to defray essential health care expenditures. This leads to alleviating poverty, reducing income inequality and raising individuals' living standards and thereby boosting human development. So, it is crucial to analyse the effect of financial inclusion on long and healthy life, knowledge and a decent standard of living representing the three main aspects of human development. As a start, financial inclusion plays a vital role in enhancing health and individuals' well-being via offering enhanced access to insurance facilities and other health-care services. Also, a study by [Koomson *et al.* \(2021\)](#) reveals a greater association between financial inclusion and expenditures on medical products and appliances than on outpatient services. However, in low-income countries, there has been limited attention to the financial inclusion effect on health although these countries are witnessing rapid economic development, while individuals still suffer from poverty and inequality ([Ajefu *et al.*, 2020](#)).

On the education aspect, a higher level of financial inclusion results in increasing investment in education through increased access to financial services, especially by women who have the tendency to invest a larger portion of their income in education, health and well-being of their children. Moreover, increased access to financial services by women provides them with fundamental tools to generate income and raising social well-being ([Kazemikhasragh and Pineda, 2022](#)). And as previously mentioned that in low-income countries, women are hindered from participating in the financial sector; it is essential to increase their participation which has spillover effects on the whole society's educational level. On the income front, financial inclusion is perceived to be the key factor in decreasing the income gap. When the poor increase their access to financial services, where all their transactions are done through banking services, so transaction costs decrease which, in turn, might lead to increasing the income of the poor, and hence, welfare is increased. Therefore, the income gap is narrowed and income inequality decreases. In low-income countries, access and use of financial services by the poor is less than high-income countries. Hence, it is critical to provide them with attractive financial services that encourage them to be engaged within the financial sector.

On another note, the lagged value of HDI has both positive and significant effects on human development in the two models. Its coefficient value is even greater than that of other incorporated variables, showing the relatively large effect of the lagged level of human development on its current level. And, the impact of such a variable is almost the same across various country groups.

Pertaining to the control variables, the present study confirms the positive and significant effect of trade openness on HDI in the two models. The positive effect is confirmed by studies such as [Nourzad and Powell \(2003\)](#) and [Asongu \(2013\)](#) who support the positive effect of trade openness on HDI. As for FDI, it displays a positive effect in the two models while it shows a significant effect on HDI in Model A only. This is further asserted in the study by [Sharma and Gani \(2004\)](#). That is to say, FDI has a significant effect on human development only in high and upper-middle countries rather than low- and lower-middle-income ones. [Rastogi and Gaikwad \(2017\)](#) mention that FDI represents the level of openness in an economy, which boosts human development via job creation, development of skills and the prevalence of technology. So, it can be concluded that the level of openness in the economies of high- and upper-middle-income countries is higher than that in lower-middle- and low-income group countries showing a significant effect of FDI on HDI in high- and upper-middle-income countries. As a result, human development is promoted through skills development, technology diffusion and created job opportunities.

5. Concluding remarks and policy recommendations

The intensity of financial inclusion problems worldwide poses substantial socioeconomic challenges to the agenda of many countries. As such, realizing socio-economic goals has been the major concern of policymakers. That is why the main objective of this study is to highlight the importance of financial inclusion for human development in countries belonging to different income groups during a specific period of time. The main contribution and value-added of the present study relative to the existing literature is by investigating the impact of financial inclusion on human development in countries belonging to different income group levels (high, upper-middle, lower-middle and low). It reveals the effect of financial inclusion upon long and healthy life, knowledge and a decent standard of living across countries belonging to various income groups. Hence, financial inclusion affects many dimensions reflecting the achievement of socio-economic goals.

Concerning the applied methodology, the study first constructs an IFI using four dimensions. The nexus between financial inclusion and human development is investigated by estimating dynamic panel data models using the GMM technique during the period 2009–2019 employing the latest dataset available in countries belonging to different income group levels. These income groups are classified according to the WB definition of GNI per capita, reflecting a dimension of human development (countries citizens' standard of living). This relation is examined allowing for a more accurate analysis and a more robust and accurate comparison across a wide range of countries tackling the differences in terms of adopted policies across various income groups. While there is minor empirical evidence on the effect of financial inclusion on human development in countries belonging to different income groups.

The results of this study highlight the positive and significant effect of financial inclusion on human development showing that financial inclusion in low- and lower-middle-income countries has a higher effect on human development than that in high-income and upper-middle-income countries. This finding could be attributed to the high levels of financial inclusion already attained in high- and upper-middle-income countries. Owing to these findings, low- and lower-middle-income countries should work on targeting higher levels of financial inclusion to reap its potential positive impact on human development. Providing both attractive and affordable formal financial services for the unbanked should remain a milestone on policymakers' agenda in low- and lower-middle-income countries. It is advisable for those countries to adopt policies comprising innovative financial tools and technological improvement to increase credit facilities which assist in reducing poverty levels and hence allow people to meet their basic human needs, specifically, educational and health-care facilities. Policymakers can formulate programs to boost the level of financial inclusion which leads to increasing demand for health, resulting in better health outcomes. Moreover, policymakers can design and implement policies that empower women and enhance their financial literacy to increase their participation in the financial sector due to their vital role in enhancing the society's human development. Lastly, policymakers have to design a financial inclusion promoting a policy to minimize income inequality, as narrowing the income distribution gap can be achieved through account and borrowing and saving components. Also, well-designed policies, that enhance access and usage of financial inclusion instead of depending on raising credit volumes, are essential to reduce income inequality.

Finally, financial literacy is clearly part of the solution as it is critical for people to achieve financial inclusion, especially in lower-middle- and low-income countries. So, policymakers should work on enhancing financial literacy and actively eliminating poverty traps that hinder economic development. By raising financial literacy, through a more inclusive financial system, can boost both access and uses of financial services, in a way that people can invest in their education, health, achieve empowerment, increase their welfare and eventually achieve greater human and economic development levels. Thus, financial literacy is perceived as a core condition that ensures a rational use of financial services to increase

6. Limitations of the study and future research

It is notable that some limitations within this study need to be pinpointed.

- (1) Firstly, the study examines the effect of IFI on HDI at the aggregate level. It could be interesting for future research to study the effect of IFI on every component of HDI namely, health, education and income to come up with a more detailed and policy-oriented recommendations.
- (2) Secondly, other aspects of financial inclusion could be incorporated while modelling the effect of financial inclusion on human development in future research. Namely, financial technology (Fintech) as one of the emerging technologies currently employed by many countries. In addition, the environmental aspect has to be taken into consideration by examining the effect of inclusive green finance on human development.

Notes

1. High-income OECD countries recorded HDI of 0.9 (very high), Europe and Central Asia 0.791, Latin America and the Caribbean 0.766, East Asia and the Pacific 0.747 (all considered high human development), Arab states and South Asia recorded 0.705 and 0.641 (considered medium human development) respectively. Sub-Saharan Africa has the lowest HDI across the world (0.547) (UNDP, 2019).
2. The selection of years is based on the most recent available data till 2019 published by the recent WB Global Financial Development Database (GFDD) and IMF Financial Access Survey (FAS) in 2021.
3. SANDY method follows [Sarma's \(2012\)](#) dimensions (the same dimensions as [Sarma's \(2008\)](#) but they are given weights) but includes new categories and an amended formula to present a complete financial inclusion index. Countries are ranked between 0 and 1 to produce a spectrum from full financial exclusion to full inclusion, respectively.
4. [Eusufzai \(1996\)](#) examines the relationship between the trade openness index and different variables used to measure country's level of human development (HDI, income distribution adjusted HDI, level and rate of change of under 5 mortality rate, and level and rate of change of proportion of population having access to safe water) for different country groups. The study records a positive and high Pearson correlation coefficients between the variables. Moreover, [Nourzad and Powell \(2003\)](#) and [Asongu \(2013\)](#) confirm the positive effect of trade openness on human development.
5. [Sharma and Gani \(2004\)](#) explore the impact of FDI on human development for low- and middle-income countries from the period 1975 to 1999. It is found that FDI affects human development positively in low- and middle-income countries. Moreover, the relation is asserted by [Gokmenoglu et al. \(2018\)](#) who examine the FDI effect on human development in Nigeria from the period 1972 to 2013. Results show a positive relationship between FDI and human development indices in the long run confirming that FDI affects human development significantly in Nigeria during the sample period.
6. The usage of GMM technique has many advantages. Firstly, it is widely used in finance due to the existence of endogeneity in financial decisions as acknowledged in the literature ([Ahmed et al., 2021](#)). So, GMM controls for potential endogeneity bias as a correlation between endogenous variables and the error term is reduced ([Kim et al., 2018](#)).

Secondly, it is considered the most appropriate method utilized when the cross-sectional data (N) are larger than the time dimension (T) of the data (In the study, the number of cross-sections (countries) are 38, while the period is 11 years). Thirdly, with the aid of this technique, a researcher could remove any bias created by unobserved country-specific effects. Consequently, the system

GMM produces unbiased results, with the assumption that there is no second-order autocorrelation in addition to the absence of correlation between the instruments and the error terms (Ababio *et al.*, 2020).

7. There are many tests for checking cross-sectional dependence, but Pesaran's CD test is preferred whenever the cross-sectional data (N) are larger than the time dimension (T) of the data.

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| Income level | Countries |
|--------------|---|
| High | Estonia, Italy, Latvia, Portugal, Saudi Arabia, and Seychelles |
| Upper-middle | Argentina, Colombia, Costa-Rica, Ecuador, Equatorial, Georgia, Lebanon, Malaysia, Montenegro, Namibia, Paraguay, Peru, Thailand, and Turkey |
| Lower-middle | Bangladesh, Bolivia, Djibouti, Egypt, Guatemala, Honduras, Indonesia, Kenya, Moldova, Uzbekistan, Myanmar, Pakistan and Samoa |
| Low | Guinea, Madagascar, Mozambique, Rwanda and Zimbabwe |

Table A1. Classification of countries according to income level

Source(s): Done by the authors based on data from [WB GFDD \(2021\)](#)

| Variable | Method of calculation (in each reporting country) |
|---|--|
| ATMs per 100,000 adults | 100,000*Number of ATMs/adult population |
| Bank branches per 100,000 adults | 100,000*reported number of commercial bank branches/adult population |
| Deposit accounts with commercial banks per 1,000 adults | 1,000*reported number of deposit accounts/adult population |
| Borrowers from commercial banks per 1,000 adults | 1,000*number of borrowers from commercial banks/adult population |

Table A2. Description of financial inclusion variables

Source(s): Compiled by the authors based on [WB GFDD \(2021\)](#)

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