ASSESSING FINANCIAL INCLUSION BASED ON THE HUMAN DEVELOPMENT INDEX

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Abstract

Financial inclusion is essential for inclusive growth, yet significant access gaps persist in developing nations. This study examines the macroeconomic factors that influence financial inclusion in 26 developing nations between 2015 and 2021, with a particular emphasis on unemployment, urbanization, and the Human Development Index (HDI). A fixed-effects panel regression model is used to investigate the link between these factors and a composite Index of Financial Inclusion (IFI), drawing on recent empirical frameworks (Ozili, 2024; Sapre, 2025). According to the results, unemployment and urban population are the next most important and statistically significant predictors of financial inclusion, after HDI. These findings highlight how crucial urban financial infrastructure and investments in human capital are to increasing financial access. This study enriches the literature by offering macro-level, cross-country evidence to inform inclusive financial policy. Limitations include the study's reliance on supply-side data and the exclusion of gender and education-based variables. Future research could expand the framework to encompass demand-side indicators, regional disaggregation, and digital finance dimensions. These results are most relevant to guiding inclusive financial policy in the post-pandemic recovery phase and in support of Sustainable Development Goals (SDGs).

Keywords: Economic Development, Fixed Effects, Panel Data, Unemployment, Urbanization

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1. INTRODUCTION

Financial inclusion refers to the initiatives aimed at improving access to affordable financial services, particularly among low-income and marginalized groups. Financial inclusion is today universally seen as a viable means of extending macroeconomic stability, inclusive and sustainable economic development, poverty alleviation, and income equality in both developed and developing nations (Chibba, 2009; Sarma & Pais, 2008).

Despite rising global attention, millions in the developing world remain locked out of the formal financial system due to infrastructural constraints, thin financial awareness, and institutional inefficiencies. These restrictions inhibit capital generation, impede savings and investment, and worsen socioeconomic inequality (Singer et al., 2015).

Although there has been previous research on various individual-level and microeconomic determinants of financial inclusion, macro-level factors remain underexplored. In particular, how

socioeconomic variables such as the Human Development Index (HDI), population density of urban areas, and unemployment rates interact with one another to influence financial inclusion remains poorly explored, especially by cross-country comparative analyses (Ozili, 2024; Sapre, 2025).

This study attempts to bridge this gap by addressing the research question:

RQ: How do HDI, urban population ratio, and unemployment rate influence financial inclusion in developing countries?

To this end, the fixed-effects panel regression model is applied to data spanning 26 countries for the 2015–2021 period.

The study has a conceptual basis in a model that situates financial inclusion within a function of structural socioeconomic determinants. HDI is human capability and institutional strength, urban population is spatial and infrastructural access, and unemployment is labor market performance — all of which collectively determine access to and usage of financial services.

This research contributes to the concept of financial inclusion literature by offering macroeconomic-level insights to guide inclusive financial policy. The findings are particularly relevant in post-pandemic recovery contexts, where the rebuilding of resilient and equitable financial systems is a global priority.

The remainder of this paper is structured as follows. Section 2 surveys recent empirical research. Section 3 outlines the methodology and data. Section 4 presents the empirical results. Section 5 interprets findings and implications. Section 6 concludes with limitations and offers directions for future research.

2. LITERATURE REVIEW

This section brings together empirical evidence on the determinants and consequences of financial inclusion through macroeconomic indicators such as unemployment, urbanization, and the HDI. Research in this arena has progressed exponentially in recent years, particularly after the adoption of financial technology (FinTech) and nation-level research in developing countries.

Ozili (2024) examined financial inclusion in Nigeria, focusing on monetary policy and banking sector determinants using two-stage least squares regression. Increased policy and lending rates negatively influence financial inclusion, while savings rate positively influences inclusion. Similarly, Sapre (2025) looked at multidimensional inclusion in emerging markets and determined distance from bank branches, FinTech, governance quality, and rural population density as determinants of major significance.

Tshering and Dorji (2025), using binary probit regression, evaluated income, age, and education against financial inclusion in Bhutan. Income was found to be positively associated with financial inclusion, while age negatively affects financial inclusion; education was not statistically significant. In West Africa, Ouedraogo and Thiombiano (2025) used the Newey-West method to show that institutional quality reaffirms the positive contribution of financial inclusion to human development.

Eshun and Kočenda (2023) employed a system generalized method of moments (GMM) technique for 69 nations and established literacy, political stability, openness of trade, and remittances as significant determinants, having varying impacts in Organisation for Economic Co-operation and Development (OECD) areas and sub-Saharan Africa. Other works by Lenka et al. (2024), Sun and Scola (2023), and Wibowo et al. (2023) emphasized the negative relationship between unemployment and financial inclusion, particularly in African and middle-income nations, whereas the influence of education levels and banking facilities came into account.

Financial inclusion and urbanization are also interwoven. Aik and Zhang (2023), Liu et al. (2023), and Sun and Tu (2023) concluded that increased access to digital financial services significantly reduces the gap in income between rural and urban areas, especially if complemented by government spending and urbanization policies. Adabor et al. (2023) demonstrated a long-term positive effect of financial inclusion on the growth of urban populations in Ghana.

At the human development level, different scholars like Datta and Singh (2019), Matekenya et al. (2020), Ababio et al. (2020), and Abdelghaffar et al. (2023) have shown a two-way relationship between financial inclusion and HDI. The above authors employed dynamic panel regressions and GMM models, and they provided evidence that financial inclusion proxies such as automated teller machine density, deposit accounts, and mobile financial tools significantly predict advancements in human development indicators.

More recently, Mani et al. (2024) and Pandey (2023) confirmed that financial inclusion has a robust positive correlation with HDI in African countries and BRICS countries (Brazil, Russia, India, China, and South Africa). They emphasized how inclusive financial services help address the gender gap and increase access to education. Likewise, Van and Linh (2019) illustrated how financial institutions and domestic credit help drive economic growth in Asia and the Pacific.

Zulfiqar et al. (2016) and Mansour et al. (2023) investigated the relationship between economic growth and financial inclusion in Pakistan and Egypt, respectively. While Zulfiqar et al. (2016) found inclusive finance to boost growth by expanding education and reducing gender disparity, Mansour et al. (2023) found financial illiteracy and infrastructure shortages as barriers to effective financial inclusion.

In general, the literature evidence indicates that institutional quality, education, urbanization, and financial infrastructure are strongly determined to result in financial inclusion. The majority of the evidence, however, is derived from regional or sectoral studies and not from a uniform cross-national macroeconomic perspective.

This research is based on the gap identified by empirically evaluating the influence of unemployment, urban population, and HDI on financial inclusion across 26 developing nations based on panel data. The theoretical framework postulates that HDI embodies socio-human capacity, urbanization embodies spatial access to the financial system, and unemployment embodies economic vulnerability. The hypotheses to be tested include:

H1: The HDI has a positive influence on financial inclusion.

H2: Financial inclusion is positively related to growth in the urban population.

H3: Financial inclusion is negatively impacted by unemployment.

3. METHODOLOGY

The study focuses on a sample of 26 emerging economies selected based on data availability, regional representation, and economic significance related to the research problems being addressed. The time frame of 2015 to 2021 was used to capture post-crisis recovery trends and structural transformation in the wake of the global financial and health crisis.

In addition to the fixed effects model, several alternative methods could also be suitable for this type of analysis. A pooled ordinary least squares (OLS) regression could be appropriate, which treats the panel dataset as a simple cross-sectional time series without accounting for country-specific effects. While computationally simpler, pooled OLS ignores the panel structure of the data and may produce biased estimates due to unobserved heterogeneity. Another alternative which could be used if lagged dependent variables are expected to influence current financial inclusion levels is the dynamic panel model, such as the Arellano-Bond GMM estimator. This approach addresses endogeneity and autocorrelation concerns but typically requires a larger panel with more time periods to achieve robust results. Lastly, multilevel modeling (hierarchical linear modeling) might be applicable when considering nested data structures, such as countries grouped by regions or income categories, to capture variation at multiple levels of aggregation.

Despite these alternatives, the fixed effects panel model remains the most suitable method for this study, given its ability to address unobserved heterogeneity and its compatibility with the nature of the data.

Purposive sampling was used to choose the sample, which focused on nations for whom comprehensive yearly data on urbanisation, unemployment, HDI, and financial inclusion were accessible from globally reputable databases. For HDI data, information was gathered from the United Nations Development Programme and the World Bank's Global Financial Development and World Development Indicators. For consistency and comparability, all variables were cross-validated across a number of years.

The explanatory variables used in this study are the *HDI*, size of the urban population (*Urban*), and unemployment rate (*Unemp*).

The Index of Financial Inclusion (*IFI*) was computed using normalized indicators of access, usage, and availability of financial services. It is constructed using three main financial inclusion measures: depositors with commercial banks (per 1,000 adults), domestic credit to private sector — percent of gross domestic product (GDP), and the number of commercial bank branches (per 100,000 adults).

The approach of Sarma and Pais (2008) is adopted in the calculation of the *IFI*. Equal weights are assigned for all the dimensions. The country's yearly *IFI* is computed as follows:

$$IFI_i = \frac{1}{2}\left[\frac{\sqrt{I_b^2 + I_c^2 + I_d^2}}{\sqrt{n}} + \left(1 - \frac{\sqrt{(1-I_b)^2 + (1-I_c)^2 + (1-I_d)^2}}{\sqrt{n}}\right)\right] \tag{1}$$

where,
- IFI_i — the Index of Financial Inclusion;
- I_b — the number of commercial bank branches (per 100,000 adults);
- I_c — the domestic credit to the private sector (% of GDP);
- I_d — the number of depositors with commercial banks (per 1,000 adults).

The *IFI* is bounded between 0 and 1, where 0 represents total financial inclusion and 1 represents complete financial inclusion.

A natural logarithmic transformation is applied to all the variables when building the panel regression model. This has different benefits, such as linearizing the relationships, reducing skewness, handling outliers, stabilizing the variances, and most importantly, improving the model fit.

The fixed effects panel regression model can be presented by the following Eq. (2).

$$Ln\,(IFI) = \beta_0 + \beta_1 Ln(HDI)_{it} + \beta_1 Ln(Urban)_{it} + \beta_3 Ln(Unemp) + \alpha_i + \varepsilon_{it} \tag{2}$$

where,
- *IFI* represents our dependent variable, which is the Index of Financial Inclusion;
- *Urban* is the percentage of urban population;
- *Unemp* is the unemployment rate;
- α_i represents the country-specific effects;
- ε_{it} is the error term.

The main tool for gathering data was secondary data sources. Among these were datasets that could be downloaded from institutional databases and processed with R software (version 4.2.1), which normalised, transformed, and modelled indicators for statistical analysis. Data analysis was conducted using R software (version 4.2.1), ensuring reproducibility and transparency of the econometric procedure.

4. RESULTS

4.1. Descriptive statistics

To analyze the overall distribution of financial inclusion across the 26 developing countries in the study, we adopt an arbitrary cut-off classification of the *IFI*: values below 0.2 are categorized as low, between 0.2 and 0.5 as moderate, and above 0.5 as high financial inclusion. According to this classification, most of the countries (53.85%) fall into the low inclusion category, 30.77% exhibit moderate levels, while only 15.38% are considered to have high financial inclusion. Figure 1 presents a world map highlighting the classification of countries based on their *IFI* levels.

Figure 1. World map highlighting countries by the Index of Financial Inclusion classification
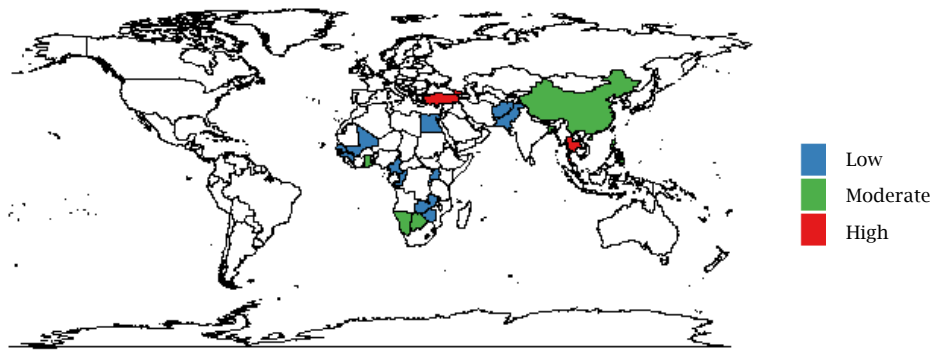
Source: Authors' elaboration.

The summary statistics reported in Table 1 provide further insight into the variation of IFI across countries. Countries such as Guinea, Afghanistan, and Cameroon are among those with the lowest levels of financial inclusion, while countries like Georgia and Thailand demonstrate high levels. This categorization reveals significant heterogeneity in the financial inclusion achievements across the sample.

Table 1. Summary statistics of the Index of Financial Inclusion by country

Country	Obs.	Mean	Std. dev.	Min	Max
Low FI					
Guinea	7	0.033	0.002	0.030	0.035
Afghanistan	7	0.040	0.002	0.037	0.042
Cameroon	7	0.043	0.005	0.036	0.048
Republic of Congo	7	0.049	0.004	0.044	0.055
Burkina Faso	7	0.087	0.007	0.076	0.096
Mali	7	0.103	0.004	0.098	0.109
Zambia	7	0.089	0.019	0.063	0.110
Rwanda	7	0.110	0.005	0.102	0.117
Senegal	7	0.118	0.007	0.106	0.124
Lesotho	7	0.122	0.007	0.110	0.130
Uganda	7	0.096	0.027	0.068	0.137
Zimbabwe	7	0.127	0.022	0.087	0.148
Egypt	7	0.146	0.014	0.130	0.168
Pakistan	7	0.180	0.013	0.160	0.196
Moderate FI					
Ghana	7	0.208	0.025	0.175	0.247
Botswana	7	0.244	0.017	0.223	0.268
Philippines	7	0.257	0.029	0.221	0.294
Bangladesh	7	0.281	0.019	0.258	0.308
Nigeria	7	0.252	0.053	0.18	0.331
China	7	0.398	0.021	0.376	0.431
Namibia	7	0.409	0.024	0.371	0.440
Malaysia	7	0.436	0.010	0.424	0.450
High FI					
Turkey	7	0.533	0.039	0.478	0.587
Samoa	7	0.538	0.043	0.481	0.594
Georgia	7	0.589	0.020	0.550	0.609
Thailand	7	0.589	0.014	0.580	0.611
Total	182	0.234	0.017	0.210	0.257

Source: Authors' elaboration.

Next, we examine the bivariate relationships among the study variables using a correlation matrix (see Table 2). A strong and statistically significant positive correlation is observed between the *HDI* and the *IFI*, suggesting that *HDI* is a major determinant of financial inclusion. The percentage of urban population (*Urban*) also displays a moderate and significant positive correlation with *IFI*.

Table 2. Correlation matrix variables

Variable	IFI	HDI	Urban	Unemp
IFI	1			
HDI	0.831***	1		
Urban	0.382***	0.584***	1	
Unemp	0.030	0.086	0.126	1

*Note: *** p < 0.01.*
Source: Authors' elaboration.

In contrast, the correlation between the unemployment rate (*Unemp*) and *IFI* is weak and statistically insignificant. Furthermore, *HDI* is positively and significantly correlated with the percentage of the urban population, implying interconnectedness between development and urbanization.

Figures 2, 3, and 4 graphically illustrate the relationships between *IFI* and its predictors (*HDI*, *Urban*, and *Unemp*), with countries categorized into the three *IFI* levels. Each scatter plot includes confidence ellipses for group dispersion and a regression line with a 95% confidence band.

In Figure 2, a clear upward trend is observed between *HDI* and *IFI* across all *IFI* levels, reinforcing the strength of this association. Figure 3 shows that countries with a higher proportion of their population living in urban areas tend to exhibit higher levels of financial inclusion. However, some degree of overlap among the confidence ellipses suggests varying degrees of distinction among the three *IFI* categories. Figure 4 illustrates a more

complex relationship between the unemployment rate and financial inclusion. Higher levels of financial inclusion are found across a wide range of unemployment rates, while low financial inclusion is more concentrated in countries with lower unemployment levels. The moderate *IFI* category shows greater dispersion, indicating a less consistent relationship with unemployment.

These findings suggest that financial inclusion is closely associated with human development and urbanization, while the role of unemployment is less straightforward. Consequently, policies aimed at enhancing financial inclusion should be tailored to the specific development and demographic contexts of each country, particularly for those falling into the low and moderate *IFI* categories.

Figure 2. Relationship between Human Development Index and Index of Financial Inclusion for different financial inclusion levels
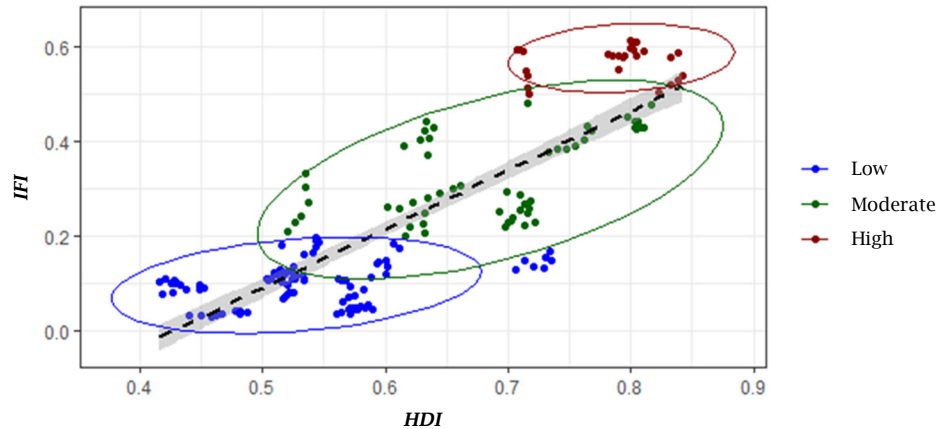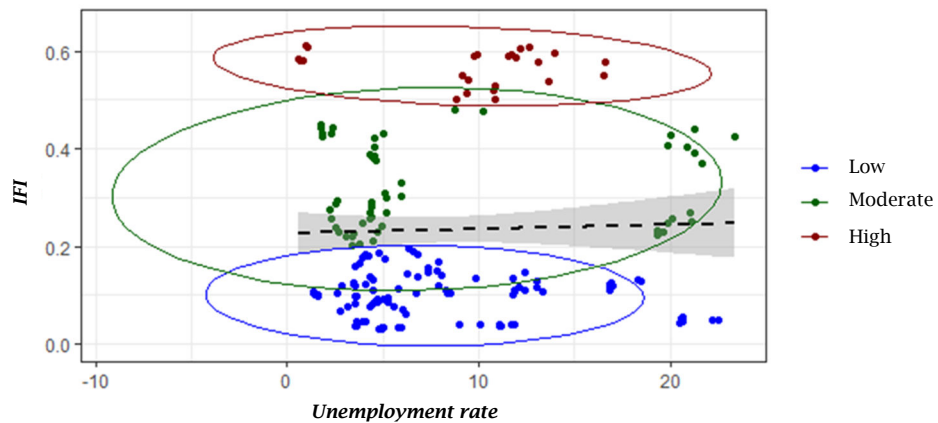

Source: Authors' elaboration.

Figure 3. Relationship between the percentage of urban population and the Index of Financial Inclusion for different financial inclusion levels
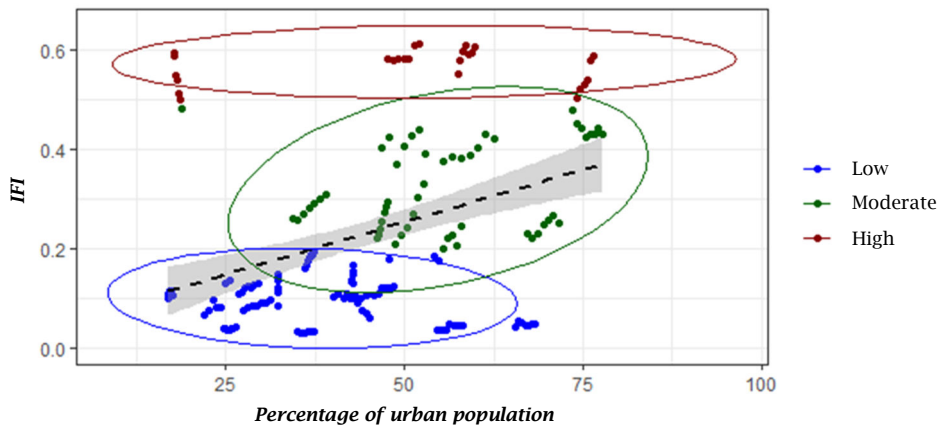
Source: Authors' elaboration.

Figure 4. Relationship between unemployment rate and the Index of Financial Inclusion for different financial inclusion levels

Source: Authors' elaboration.

The variance decomposition results, summarized in Table 3, illustrate the distribution of variability in the key variables across and within countries over the study period. The between variation reflects how much each variable differs across countries, while the within variation captures changes within countries over time. The findings indicate that for all variables: *IFI, HDI, Urban,* and *Unemp* — the between-country variation is substantially greater than the within-country variation. This suggests that differences in financial inclusion and its determinants are more pronounced across countries than over time within the same country. Such a pattern reinforces the appropriateness of applying fixed-effects panel regression models, as they account for unobserved heterogeneity across countries that remains constant over time.

Table 3. Variance decomposition of the variables

Variable	Dim.	Mean	Std. dev.	Min	Max	Obs.
IFI	Overall	0.234	0.18	0.03	0.611	N = 182
	Between		0.182	0.033	0.589	n = 26
	Within		0.02	0.161	0.313	T = 7
HDI	Overall	0.615	0.12	0.416	0.842	N = 182
	Between		0.122	0.426	0.832	n = 26
	Within		0.008	0.584	0.643	T = 7
Urban	Overall	45.184	16.377	17.004	77.696	N = 182
	Between		16.613	17.244	76	n = 26
	Within		1.171	41.599	48.611	T = 7
Unemp	Overall	8.195	6.1	0.6	23.35	N = 182
	Between		6.128	0.815	21.184	n = 26
	Within		0.95	5.55	11.202	T = 7

Source: Authors' elaboration.

4.2. Model results

The fixed effects panel regression model was employed to assess the relationship between financial inclusion and three key socioeconomic variables: the *HDI, Urban,* and *Unemp.* Table 4 presents the model estimates.

Table 4. Fixed effects panel regression results

Variable	Coefficient	Std. err.	t-stat	p-value
Ln(HDI)	2.051	0.672	3.052	0.003***
Ln(Urban)	0.760	0.365	2.084	0.039**
Ln(Unemp)	0.116	0.052	2.244	0.026**
Obs.	182			
R-squared	0.233			
Adj. R-squared	0.093			
F-statistic	15.505***			

*Note: * p < 0.1, ** p < 0.05, *** p < 0.01.*
Source: Authors' elaboration.

All three independent variables (*HDI*, percentage of *Urban* and *Unemp*) are statistically significant at the 5% significance level, suggesting that they are important factors in explaining variations in the *IFI*. The *HDI* exhibits the largest coefficient ($\beta = 2.051$, p < 0.01), suggesting that higher levels of human development are strongly associated with greater financial inclusion. *Urban* is also positively associated with financial inclusion ($\beta = 0.760$, p < 0.05), while *Unemp* has a smaller yet significant positive effect ($\beta = 0.116$, p < 0.05).

The model explains approximately 23.3% of the variance in financial inclusion, as indicated by the R-squared value. However, the adjusted R-squared value is low (9.3%), implying that much of the variation remains unexplained, possibly due to omitted variables or unobserved heterogeneity. The F-statistic of 15.505 (p < 0.001) indicates that the model is statistically significant overall.

To validate the model choice, the Hausman test was conducted to compare fixed versus random effects. The test yielded a Chi-square statistic of 9.681 with a p-value of 0.021, as shown in Table 5.

Since the p-value is below the 5% significance level, the null hypothesis (H_0) of the random effects model is consistent is rejected in favor of the fixed effects model. This suggests that unobserved country-specific factors are correlated with the predictors, justifying the use of the fixed effects estimator.

Table 5. Hausman test results

Test statistic	Value
Chi-square	9.681
df	3
p-value	0.021**

*Note: ** ** p < 0.05.*
Source: Authors' elaboration.

5. DISCUSSION

The discussion elaborates on how HDI, urbanization, and unemployment relate to financial inclusion, reinforcing findings with recent literature (Ozili, 2024; Mani et al., 2024). It emphasizes policy relevance and aligns with current debates on inclusive economic development.

The positive and significant coefficient of the urban population variable indicates that urbanization facilitates financial inclusion, likely due to greater proximity to financial institutions, digital infrastructure, and mobile banking services in urban centers. This aligns with the hypothesis that urban residents are more likely to be integrated into the formal financial sector than their rural counterparts.

Interestingly, the unemployment rate also shows a positive relationship with financial inclusion. This may initially appear counterintuitive, as unemployed individuals are generally expected to have less interaction with financial systems. However, this finding could reflect the inclusion of unemployed individuals through government welfare programs, unemployment benefits, or social safety net schemes that require bank accounts for disbursements. It may also indicate that financial services are increasingly being extended to marginalized populations, including the unemployed.

Overall, the results emphasize that enhancing human development and expanding urban financial infrastructure should be central to financial inclusion strategies. At the same time, the observed

association with unemployment signals that inclusive financial services must be designed to accommodate vulnerable and underserved populations, contributing to more equitable and sustainable economic development. These findings align with recent literature (Singer et al., 2015; Ozili, 2021), which emphasizes the importance of socioeconomic development in promoting financial inclusion. Compared to studies using cross-sectional or pooled OLS methods, this paper's fixed effects approach provides more robust insights by accounting for unobserved heterogeneity. The study contributes to the ongoing policy dialogue on inclusive finance in the post-pandemic recovery era.

6. CONCLUSION

Human development, urbanisation, and unemployment are important macroeconomic factors that influence financial inclusion in 26 emerging nations, according to this study. The results highlight the necessity of inclusive development policies that give equitable urban growth and human capital investment top priority. Specifically, the positive correlation between financial inclusion and the HDI implies that enhancing institutional capacity, health, and education are key factors in increasing financial access.

These observations have real-world applications. Strategies for financial inclusion should be created by policymakers with consideration for regional differences, context-specificity, and integration with more general development objectives. Priorities should include expanding banking services to neglected areas, integrating financial access mechanisms with employment support programs, and increasing mobile and digital finance infrastructure. These results are consistent with previous research that highlights the relationship between inclusive finance and development (Ozili, 2024; Mani et al., 2024). Countries can attain greater involvement in the financial system by tackling both socioeconomic and infrastructure issues. Despite its contribution, the study presents several limitations. This study relied predominantly on supply-side and leaves out several nations because of insufficient data. The analysis's depth is limited by the short time frame and absence of demand-side metrics. The dataset should be expanded in future studies to include characteristics like internet infrastructure, financial literacy, and outreach for microfinance. Furthermore, more investigation into non-linear effects and interaction terms will improve comprehension of the intricate relationships between financial inclusion and socioeconomic progress. This study adds cross-national, macro-level empirical evidence on structural drivers of financial inclusion to the expanding corpus of work on inclusive finance. It provides a foundation for academics and policymakers aiming to build equitable financial systems, especially in the post-pandemic period of economic recovery and digital change.

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