Do Education Level and Employment Status Matter for Financial Inclusion? Evidence from Kenya

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Abstract

The United Nations Capital Development Fund (UNCDF) identifies financial inclusion as a major promoter of various Sustainable Development Goals (SDGs) and can be used as an instrument in eradicating poverty and gearing inclusive economic growth. This is also well anchored under Goal Number 10 of the SDGs. Despite this consensus, the level of financial inclusivity in Kenya remains low. Using the 2021 National FinAccess data, this study sought to assess whether the education level and employment status of individuals mattered for financial inclusion in Kenya. Three measurements of financial inclusion were adopted namely, usage, access, and barriers. A multidimensional index of financial inclusion was constructed using the Principal Component Analysis (PCA) approach with the Human Opportunity Index (HOI) being used to measure the inequality of opportunity in financial inclusion. Subsequently, the Shapley decomposition technique was employed to understand the contribution of education and employment to the percentage of inequality of opportunity. The OLS regression results revealed that the two factors were indeed critical and significantly increased financial inclusion in Kenya. Further, the Shapley decomposition technique revealed that the education level vis-a-vis the employment status of an individual explained the highest proportion of financial inclusion across the three models. Moreover, unlike in the usage models where the coverage rate and the HOI were lower, the access models depicted an increased pattern in the access to financial products. To increase financial inclusion in Kenya, this study recommended that financial institutions step up their efforts in bridging the financial information asymmetry gap. This can be realized through financial literacy which helps broaden people's awareness of the access, usage, and barriers to financial products. Additionally, there is a need for both the government and private sector players to create more employment opportunities as this is requisite in providing steady income streams that consequently, incentivize account ownership for transaction purposes.

Introduction

Generally, there is no conventional description of Financial Inclusion due to its multidimensional nature and varying approaches to its jurisdictions (Anthanasius and Meshack, 2017). Sarma and Pais (2010) define it as the process of providing a variety of financial services through the banking sector outreach, at a reasonable price, at the right location, time, and form without discernment to any member of society. World Bank (2018) describes it as having access to suitable and

reasonably priced formal financial services that solve peoples' or organizations' needs in a distributive, accountable and sustainable manner.

The United Nations Capital Development Fund (UNCDF, 2019) identifies financial inclusion as a major promoter of various Sustainable Development Goals (SDGs) and can be used as an instrument in eradicating poverty and gearing inclusive economic growth. Despite this consensus, the level of financial inclusivity in Kenya remains low. The number of unbanked adults in Kenya stood at 25.38% in 2017 (World Bank, 2017). Many of these individuals rely on informal systems to supplement their low incomes, especially those in rural areas. It is predicted that a large source of this financial inequality stems from the financial illiteracy and unemployment status of individuals or household heads. However, current studies on financial inclusion do not succinctly explore the contribution divergences made by an individual's level of education and or employment status towards realizing financial inclusivity.

More particularly, in the African context, the disparities stemming from education level and employment status have not been extensively investigated. More inclination has been geared towards gender, location, and infrastructural related barriers. Albeit these factors play a massive role in determining the level of financial inclusivity, technological advancement has overridden some of them over the years. Therefore, this study contributes to the existing literature by decomposing financial inclusion from the financial literacy and employment perspectives in the Kenyan context. More importantly, this study employs the unexploited 2021 FinAccess survey data. This survey was conducted during the COVID-19 pandemic period hence providing rich data on the pandemic's impact on the household's interaction with financial services providers & products. More recent topical issues of green finance and technological progress in modeling financial transactions are also incorporated in this survey. To achieve the research objectives, the logistic regression and the Human Opportunity Index (HOI) are used to measure the Inequality of Opportunity (IOP) in financial inclusion in Kenya.

The growth of the financial sector and the enactment of favorable social policies are regarded as fundamental in fostering financial inclusivity. The high level of poverty in developing countries including Kenya has drawn major attention to financial inclusion structures that can be put in place to eradicate poverty. Financial inclusion is measured through formal account ownership, the ability to access formal savings, insurance, and credit facilities. World Bank (2018) observes that the first fundamental step in the direction of financial inclusion is access to a transaction account. This facilitates activities within the scope of using financial services which include payment of services, savings, credit, and insurance. According to the 2017 GlobalFindex survey, an estimated 1.7 billion adults lack access to transaction accounts and are, therefore, left out of the formal and recognized financial system (Demirguc-Kunt et al., 2018). Having an account with a trustworthy bank boosts savings which can be used by the bank on intermediate business loans that could further foster investments hence promoting economic growth (European Bank for Reconstruction and Development) (EBRD, 2016).

The main goal of financial inclusion is to encourage access to formal financial services mainly to the poor, disadvantaged groups, women, and those that depend on informal financial systems.

According to UNCD and the Organization for Economic Cooperation and Development (OECD) (UNCD and OECD, 2019); financial inclusion is a fundamental enabler of Sustainable Development Goals (SDGs). To facilitate this, the World Bank enacted the Universal Financial Access 2020 initiative to reduce the number of the unbanked population globally; with the main focus being on 25 countries that account for 73% of the financially excluded persons. Kenya is one of these countries.

On a positive note, the transformation of financial services in Kenya over the last ten years has been remarkable. Globally, recent data reveals that 75% of adults own a formal account that permits them to save, send or receive money, making Kenya the leader in the sub-Saharan Africa (SSA) region. Indeed, Kenya outpaces both the global average and several middle-income countries such as Brazil, India, Mexico, Russia, and Chile (Heyer and King, 2015). This is largely attributed to the massive innovation strides made in the financial sector through the introduction of M-PESA in 2007, M-Shwari in 2012, Agency banking, and bank staffing through local language networks. This has put Kenya as an exemplary regional lead focus in the SSA region. However, despite Kenya taking a regional lead in the financial sector innovation, it is conceivable that this represents just a tip of the iceberg on what might emerge over the next decade. Even though the digital technology has breached the access frontier, a concern emerges on whether both the providers and consumers of financial services will arrive at a win-win situation where value is equally created for all parties.

Subsequent developments have seen the upward surge in access to mobile money services in the formal sector by many individuals who previously relied on informal institutions. Those groups of people with a previous lower likelihood uptake of formal financial services (poor urban dwellers, rural residents, women, and the less educated persons) have seen a significant increase that has been largely driven by M-PESA and M-Shwari products just over 4 years (2009-2013). More than 10 million adults have opened a formal savings account with M-Shwari, of which about 50,000 can access loans every day. This has seen other competitors such as Equitel, the Kenya Commercial Bank (KCB M-PESA) and other digital mobile lending loan products emerge rapidly in the new mobile banking space. However, despite the financial infrastructural expansion over the last decade, skewness in financial access still exists. While 93% of the richest are formally included, 55% of the poorest are completely excluded from formal and informal financial services. The usage rate remains shallow, thus, rendering the proposition of achieving a welfare-oriented financial system in the Kenyan society questionable (Heyer and King, 2015).

The presence of market imperfections such as high transaction costs and information asymmetry limits the opportunity of financial access to the poor. Moreover, lack of collateral and credit histories among the poor also reduces the chances of financial access. Levine (1997) argues that financial instruments and institutions arise to mitigate information asymmetry and transaction costs. In cross-country regression, the existence of efficient financial systems ensures that capital is channeled to productive use, reduces information asymmetry, provides insurance against shocks, and can alleviate poverty and dissimilarity (Beck et al., 2004).

Following the 2007-2008 global financial crisis, policies focused on achieving equal income distribution among the populace were enacted. This is because inequality in wealth and income results in; underutilization and underinvestment of human capital (Galor and Zeira, 1993), obstruct intergenerational mobility (Corak, 2013), decreased aggregate demand (Carvallo and Rezai, 2015), and consequently social conflict perils.

According to CBK (2019), the percentage of Kenyans who could access mainstream financial services rose from 75.3% in 2015 to 82.9% as of 2018. Despite this, the number of women with access to mainstream or formal financial services remains low at 80% compared to men at 86%. Furthermore, financial access has increased from 42% in 2011 to 82% in 2018 with 86% of the increase being attributed to males with transaction accounts and 78% being attributed to females. Despite the tremendous progress, women still lag in terms of accessing and using financial services. This lag is attributed to low financial literacy at 75%, collateral requirements at 66%, and the socio-cultural environment at 63% as revealed by the Alliance for Financial Inclusion (AFI, 2017).

In Kenya, some of the initiatives embarked on include the implementation of mobile money services, the enactment of microfinance legislation, and the roll-out of the agency banking model. The embracing of mobile money transfers in Kenya has accelerated since the introduction of MPESA in 2007 which has also spread out in other East African countries. This has helped fuel financial inclusion due to its high reliability and accessibility in transferring money hence increasing outreach. However, these initiatives are greatly hampered by financial illiteracy, inaccessibility to some of the remote areas, cultural norms & religious beliefs, gender, high poverty levels among others. This study sought to assess the level of financial inclusion in Kenya specifically from the education level and employment status perspectives since many of those barrier-related factors can be easily overcome through financial literacy.

The rest of the paper is organized as follows: Section 2 presents the theoretical and empirical literature. Section 3 discusses the methodology, data source, descriptive statistics & measurement of variables. Section 4 presents and discusses the econometric estimates on financial inclusion with the final section providing conclusions based on the empirical findings.

Literature Review

Several theoretical studies have demonstrated that one notable modality of poverty eradication is through the development of the financial sector. A robust financial system plays a vital role in the resource allocation process in the economy; something that ensures that financial services and products are available and accessible to all (Diamond and Dybvig, 1983). Further, the banking sector plays an instrumental role in the provision of liquidity which facilitates more investments in productive assets, thus, enhancing the efficiency of capital accumulation and economic growth. Financial inclusion is critical for developing countries where the interaction between individuals (enterprises or households) and the formal financial structures is low. Due to the irregular income streams, many vulnerable groups find it particularly hard to access formal financial services. This does not only lead to a poverty trap but also an upward surge in the inequality gap (Abhijit and

Newman, 1993; Galor and Zeira, 1993; Aghion and Bolton, 1997; Beck et al., 2007). According to Roemer (1998), the principle of equality of opportunity constitutes a situation where the distribution of outcomes of a particular service is identical across social groups and is independent of their circumstances. The theory focuses on reducing inequalities that are deemed unfair and are associated with gender, race, parental background, and ethnicity by advocating for a level playing field of opportunities for everyone in the access to financial services.

These traditional theories can be blended with modern perspectives to draw evidence on the role of financial system players in driving financial inclusion and the resultant beneficiaries. While modern theories are relevant in explaining financial inclusion, they need to be employed with close reference to the traditional theories to provide adequate linkage and synergy between the financial system players and the various forms of inequalities at large. Regarding the provision of financial inclusion services, there are divergent ideologies in theory as to who should take the leading role. According to Aggarwal and Klapper (2013), the government should take the leading role in the delivery of financial inclusion products to its population. Conversely, Gabor and Brooks (2017) advocate for the role of private entities such as banks and fintech businesses in financial inclusion delivery. However, other studies argue that financial inclusion delivery should be a joint endeavor between the public and private sector players (Pearce, 2011; Arun and Kamath, 2015). Whereas, some studies lend credence to the poor segment of the population as the eventual beneficiaries of financial inclusion (Bhandari, 2018); others attribute the entire financial systems as the ultimate beneficiaries (Kim et al., 2018; Ozili, 2018).

It can be noted that increasing financial inclusion in any given economy requires adequate funding. According to Marshall (2004), financial inclusion initiatives ought to be funded by taxpayers. However, Mohiuddin (2015) argues that financial inclusion should be funded by the capitalists in the private sector since they contribute largely to the widening of the income inequality gap between the poor and the rich. Contrariwise, Cobb et al., (2016) posit that financial inclusion ought to be jointly funded by both the public and private sector players.

Globally, some empirical studies have been conducted to assess the extent to which education level and / or employment status reduces financial inequality. According to the 2017 Global Findex survey, Demirguc-Kunt et al., (2018) note divergences in the worldwide account ownership status regarding education level and employment status of individuals. Account ownership was found to be lower among the less educated adults. More precisely, those adults who possessed primary school education or less constituted 56%. This is compared with 76% of those who have completed secondary school and 92% of those with higher education. On the other hand, adults who were active in the labor force-either, employed or seeking work were more likely to have an account than those who were out of the labor force.

As observed by Mutua and Oyugi (2007), the financial market in Kenya remains relatively narrow in the rural areas since most financial institutions are concentrated in the urban, peri-urban areas & cash-crop growing areas. Dupas and Jonathan (2013) also noted that the majority of the self-employed individuals in rural Kenya lacked a formal bank account and rather saved in the form of animals or durable goods, in form of cash at their homes, or through the Rotating Savings and

Credit Associations (ROSCAs) [also commonly referred to as merry-go-rounds]. Johnson et al. (2006) cited poor communications infrastructure, relatively low population density, low levels of literacy, relatively undiversified economies, and less productive economic activities in the rural sector that undermined financial inclusion initiatives.

Most studies analyze the impact of education on income inequality. For instance, a study by Yang and Qiu (2016) found that innate ability and family investment in early education played a fundamental role in explaining income inequality & intergenerational income mobility in China. Similarly, Restuccia and Urrutia (2004) estimated the impact of innate ability, compulsory education & higher education on income gaps and income persistence across generations using US data-adjusted parameters. Their findings revealed that parents' early educational investment explained about 50% of intergenerational mobility and income inequality was mainly driven by higher education. Nabassaga et al., (2020) analyzed how educational inequality influenced income inequality in Africa using multiple waves of living standard measurement surveys from 1987 to 2016 for 37 African countries. From the estimated wealth returns to education and wealth inequality, the study found a significant gap in the access to postgraduate earning opportunities between the bottom 40 percentile and the higher 40 percentile. A reduction in this gap was significantly correlated with a higher pace of wealth inequality reduction. Further, albeit education was found to be one of the key drivers of social mobility, its effect was not uniform across income groups.

Notable empirical evidence recommends the use of financial instruments to increase individual or group savings (Ashraf et al., 2010) and productive investment (Dupas and Robinson, 2013). In an extended view, Peragine (2004) pointed out that the barriers to accessing basic services that are beyond the control of individuals are as a result of low capability and being socially excluded.

Financial inclusion can be measured through access, quality, usage, and its impact (Allen et al., 2016). Both country and individual characteristics influence the extent of financial inclusion. Country characteristics such as high-quality financial institutions & their regulatory frameworks, political instability, cost of opening a bank account, and disclosure issues by financial institutions affect inclusivity. Concerning individual characteristics, the probability of being financially included depends on the level of education, gender, marital status, area of residence, and employment status among other things. Demirguc-Kunt et al., (2014) also found out that Muslims were less likely to own bank accounts or save formally as compared to non-Muslims.

According to Campero and Kaiser (2013), elements of financial inclusion can be classified into demand and supply-side determinants. Whereas demand-side determinants comprise individual income, education, and age among other aspects; the supply-side determinants largely include infrastructural development. Moreover, Camara and Tuesta (2015) link the level of education, gender, income level, and age among other factors to the consumption of formal financial services. Despite great strides being made in increasing the population of financially included persons through advances in technology and mobile banking, the gender gap is found to threaten the possibility of achieving key SDGs that are achievable through financial inclusion (Demirguc-Kunt et al., 2014). Aduda and Kalunda (2012) further established that the contributing factors of

financial inclusion vary depending on the level of a country's economic development and geographical location.

Prieto et al., (2018) measured the inequality of opportunity in the access to superior education in Florida and they aimed at explaining how far a given distribution of individual outcomes arises from equal opportunity. The aspects considered were participation, attainment, and achievement and they found out that, students enrolled in the School District of Hillsborough County lacked equal opportunities. In the enrollment stage, students with high socioeconomic status had a higher chance of attending high-performing schools. The decomposition analysis showed that access was unevenly distributed among children from different locations, races/ethnicity whereby the opportunity for black children was below the overall coverage level of education.

Jemmali and Amara (2014) assessed the inequality of human opportunities using a random sample of households drawn in Tunisia. They found out that the most significant aspects that affect dissimilarity in housing services and education were gender, area of residence, education level, and the expenditure of the household head. Thus, they recommended investment in programs that alleviate illiteracy and curb gender discrimination, especially in rural areas. Bagli and Adhikary (2013) conducted a study on the influence of Self-Help Groups on financial inclusion in the District of Bankura in India. A binary logit model was used to estimate access to financial services. They found that membership to a Self-help group and the duration in which one has been registered significantly accelerated financial inclusion.

Niehus and Peichl (2013) conducted a study on the upper bounds of inequality of opportunity using data from Germany and the United States by the use of harmonized data from national panel surveys. The lower bounds estimates revealed that individual earnings were determined mainly by one's effort and to a less extent by their circumstances. To a large extent, the upper bound estimates showed that individual earnings were pre-determined by exogenous circumstances. According to Hannig and Jansen (2010), empirical evidence on financial stability and inclusion in the 2007-2008 financial crisis showed that financial innovations can have devastating systematic impacts on the economies globally and hence the need for setting up international standards and having national regulators implement the financial regulations and guidelines.

From the reviewed literature, it is apparent that many studies on financial inclusion have been undertaken in the developed economies context. Few studies examine financial inclusion in the African context. Nonetheless, these studies tend to align education and or employment with a decrease in income inequality as opposed to financial inequality reduction. More importantly, this study employs the unexploited 2021 FinAccess survey data. This data was collected during the COVID-19 pandemic period hence providing rich data on the pandemic's impact on the households' interaction with financial services providers and products. More recent topical issues of green finance and technological advancement are also incorporated in this survey.

Methodology

This commences with the construction of the multidimensional index for financial inclusion using the Principal Component Analysis (PCA). PCA aggregates the various financial inclusion indices into one common index. This index is then treated as a regressand upon which the Ordinary Least Squares (OLS) regression analysis is performed (see equation 1).

$$FI_i = \beta_0 + \beta_1 EDUC_i + \beta_2 EMP_i + \sum_{i=1}^{n} \beta_{i>1} (CTRL)_i + \varepsilon_i \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (1)$$

Where **FI** denotes Financial Inclusion; **EDUC** is the education level, and **EMP** is the employment status. **CTRL** represents the control variables that have been incorporated into the model to control for the unobserved effects while ε_i is the error term and is assumed to be normally distributed with zero mean and constant variance.

Secondly, the Human Opportunity Index (HOI) is employed to measure the inequality of opportunity in financial inclusion. Finally, the Shapley decomposition technique is used to understand the contribution of each circumstance variable to the percentage of inequality of opportunity (see subsequent derivation).

The Human Opportunity Index

The Human Opportunity Index (HOI) approach is constructed by analyzing basic opportunities to measure how circumstances associated with differentiated socioeconomic factors impact inequality. This approach proceeds in a two-step manner: First, a dissimilarity index is used to gauge if available opportunities are allocated equitably by comparing circumstances subgroups' probabilities of accessing certain basic opportunities. Second, the dissimilarity index is joined with the absolute level of opportunities to form the HOI which helps in identifying the most disadvantaged groups.

Three measurements of financial inclusion will be adopted and specified as usage (owning a transaction bank account); access (mobile money services), and barriers (financial institution proximity). The financial inclusion function used to measure inequality of opportunity can be specified as:

$$F_{ij} = f(C_i, X_i, e, \varepsilon) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (2)$$

Where F_{ij} is the subgroup division of financial outcomes for an individual, C_i is the set of circumstances faced by an individual, **X** represents the control variables, e is the effort factors and ε denotes the error term. In this case, the barriers to accessing financial services will be the circumstance variables. The Dissimilarity Index (D-index) is used to measure the coverage rate of opportunity in access to financial services.

$$D = \frac{1}{2\bar{F}} \sum_{i=1}^{n} \alpha_i |F - F_k| \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (3)$$

Where **n** is the number of circumstance groups, **F** is the coverage rate of the circumstance group and α is the subset of circumstance group **i** of the total population. D-index ranges from 0 to 1. 1 denote high Inequality of Opportunity (IOP) while zero represents perfect equality.

The HOI is used to measure the coverage rate of opportunity after discounting the distribution of the inequality across groups.

$$HOI = (1 - D)W \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (4)$$

HOI ranges from 0 to 100. As the coverage rate increases, the HOI increases and vice versa among the circumstance groups.

To measure the opportunity of an individual to access financial services, the logistic regression method is adopted. The probability of having access to finance is assumed to be 1 and 0 if otherwise. A vector of variables that indicate the circumstances is defined as $X_i = X_{1i}, X_{2i}, \dots, X_m$. Individuals with the same circumstances belong to the same group type. Six steps are adopted in determining financial inclusion: A logistic regression model is first estimated using the maximum likelihood approach to ascertain whether the ability of an individual to access financial services is a function of their circumstances.

$$L_n \left(\frac{P(1=1|x_1, x_2, \dots, x_m)}{1 - P(1=1|x_1, x_2, \dots, x_m)} \right) = \sum_{k=1}^{m} \beta_k X_k \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (5)$$

The estimation of equation (5) above yields the coefficients estimates $(\boldsymbol{\beta_k})$ and the predicted probability $(\widehat{p}_\iota)$ of accessing financial services.

$$\widehat{p}_\iota = \frac{Exp(\widehat{\beta} + \sum_{k=1}^{m} X_{ki} \widehat{\beta_k})}{1 + Exp(\widehat{\beta_o} + \sum_{k=1}^{m} X_{ki} \widehat{\beta_k})} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (6)$$

The study then proceeds to calculate the overall coverage rate for financial services represented by **F**, which provides the fraction of the population that has access to particular opportunities.

$$F = \sum_{i=1}^{n} \alpha_i \widehat{p}_\iota \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (7)$$

Where **n** is the total population and $\alpha_i = \frac{1}{n}$. The dissimilarity index is then calculated as follows:

$$\widehat{D} = \frac{1}{2\bar{F}} \sum_{i=1}^{n} \alpha_i |\widehat{p}_\iota - F| \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (8)$$

Following the results obtained in equations (7) and (8) above, the access to services that are unevenly allocated can then be computed as follows:

$$P = F * \widehat{D} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (9)$$

Finally, the HOI is computed by discounting the inequality of distribution from the overall coverage rate **F** which is given by;

$$HOI = F - P \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (10)$$

To determine the contribution of each circumstance variable, a potential function is introduced. Therefore, the contribution of one circumstance variable is given by the difference between the potential of the whole set on one hand from which this specific variable has been removed for an inequality index. The Shapley value decomposition rule is used in computing the marginal contribution of each variable and is advantageous because it is responsive to the inequality index chosen. However, its limitation is the inability to respect independence (Shorrocks, 1982).

Data Type and Source

The study used the 2021 FinAccess Household Survey Dataset. This dataset was collected by the Central Bank of Kenya (CBK) in collaboration with the Kenya National Bureau of Statistics (KNBS), and Financial Sector Deepening Trust (FSD Kenya). This survey is unique since it is the first one to be conducted at the county level. The survey was undertaken in the period June-September 2021. As such, it provides firsthand information on the challenges and opportunities across all the 47 counties with regard to financial inclusion. Second and more important, this data was collected in the COVID-19 pandemic era hence providing useful data on how the pandemic impacted the households' interaction with financial services providers and products. Finally, the survey also incorporates the topical issues of green finance and technological progress in modeling financial transactions. Financial inclusion is measured in the dataset based on four key dimensions namely; access, usage, quality, and impact or welfare. A total of 22, 024 households were surveyed across the 47 counties.

Diagnostics

This study conducted the Kaiser-Meyer-Olkin (KMO) test to ascertain the sample adequacy of each of the variables used to construct the Financial Inclusion Index. The statistic is a measure of the proportion of variance among variables that might be common variance. In the cases where KMO values are close to zero, then large partial correlations exist compared to the sum of correlations and this poses a large problem for factor analysis. The KMO test results are shown in Table 1.

Table 1. The KMO Measure of Sample Adequacy

Variable	KMO
Bank account (saving/investment)	0.3794
Transactional account	0.4506
Bank account (no cheque book)	0.5067
Current ATM usage	0.5255
Use Micro Finance Institutions (MFIs)	0.6868
Use mobile bank saving account	0.7691
Mobile banking account	0.7976
Mobile money account	0.7391
Informal institutions' membership	0.6372
Cost to the financial advisor	0.7124
Cost to nearest bank/financial institution	0.6905
Overall	**0.5542**

Source: Compiled from Stata

With an overall KMO statistic of 0.5542 (as shown in Table 1); this study sample was considered fairly adequate to be measured using the PCA method.

Additionally, the pairwise correlation matrix was performed to assess the degree of association among the variables. As reiterated by Dziuban and Shirkey (1974), computing the correlation matrix is a very vital pre-requisite to the determination of a matrix that is most suitable for performing the Factor Analysis. The correlation matrix revealed a weak degree of association among the explanatory variables (see Appendix Table A1)

Variable Definition and Measurement

Table 2 shows the definition and measurement of variables.

Table 2. Definition and Measurement of Variables

Variable	Description and Measurement	Hypothesized Relationship
Dependent variable(s)		
Usage	Measured by the ability to own a transaction bank account and thus be in a position to deposit or withdraw money. It's a dummy variable taking on the value of 1 if an individual owns and uses the account and 0 otherwise.	

Barriers	Measured by an individual's proximity to a financial institution. It's a dummy variable taking on the value of 1 if an individual has proximity to a financial institution and 0 otherwise.	
Access	The ability of an individual to access mobile money services such as M-PESA, mobile banking, mobile agents, and mobile loan applications. Takes the value of 1 if one has access to mobile money services and 0 otherwise.	
The above three indicators are used to compute the **Financial Inclusion Index** which is used in the regression model as the dependent variable		
Explanatory variable(s)		
Education level	Dummy variable taking the value of 1 if the respondent has acquired secondary school education or higher and 0 otherwise.	Positive
Employment status	It is binary and takes the value of 1 if the respondent is employed and 0 otherwise. It acts as a proxy to household earnings.	Positive
Respondent's gender	Takes the value of 1 if the respondent is male and 0 otherwise.	Positive
Location	Takes the value of 1 if the respondent resides in an urban area and 0 otherwise	Positive
Respondent's age	The age of a respondent measured in years.	Positive
Religion	Dummy variable taking on the value 1 if the respondent is a Christian and 0 otherwise	Positive
Marital status	Takes on the value of 1 if the respondent is married and 0 otherwise	Positive
Household size	The number of members/people in a given household	Negative

Shocks	Whether a particular household or individual experienced a shock that significantly impacted the normal household earnings (1 if yes; 0 otherwise). We use this variable as a proxy to the COVID-19 disease pandemic outbreak which is the major shock reported during the survey period.	Negative
Green bonds	Refers to a fixed-income instrument that is designed to specifically support climate-related or environmental projects. It is used as a measure of green finance. The variable is defined as 1 if a household or individual possesses the bond and 0 otherwise.	Indeterminate

Source: Author's description based on the 2021 FinAccess Survey Data

3.5 Summary Statistics

This is shown in Table 3.

Table 3. Summary Statistics of Key Variables

Variables	Obs.	Mean	Std. Dev.	Min	Max
Financial Inclusion (FI) index	22,008	-2.56e-09	1.00000	-0.35124	2.84695
Education level	22,024	0.29282	0.45507	0	1
Employment status	22,024	0.10193	0.30257	0	1
Respondent's gender	22,024	0.42404	0.49421	0	1
Location	22,024	0.34367	0.47494	0	1
Respondent's age	22,024	38.8967	17.21155	16	116
Respondent's religion	22,024	0.84603	0.36093	0	1
Marital status	22,024	0.54504	0.49798	0	1
Household size	22,024	4.17753	2.40753	1	23
Shocks experienced	22,024	0.70827	0.45457	0	1
Green bonds	22,009	0.00027	0.01651	0	1
Mean monthly expenditure	21,954	9417.579	8837.904	100	197000

Source: Compiled from Stata

The Financial Inclusion (FI) Index variable was computed using the PCA method and it aggregated variables from the three indices of financial inclusion namely, usage, barriers, and access. On average, 29.28% of the surveyed population was reported to have schooled beyond the secondary school education level. This leaves a whopping fraction of about 70.72% of the Kenyan population with high school education qualification and below. This has got far-reaching implications on the opportunity of being financially included since education is a vital gauge of an individual's know-how and employment prospects which greatly enhance the opportunity of one being financially included. About 10.19% of the surveyed population was reported to be formally employed. Access and usage of formal financial services such as commercial banks, Micro

Finance Institutions (MFIs), and SACCOs is largely attributed to an individual's employment status. It becomes even more integral to individuals seeking credit facilities by acting as collateral and or guarantee. This explains why formal employment is a significant factor in explaining the probability of financial inclusion and it outweighs self-employment or informal sector employment. Approximately 42.40% of the sample comprised of the male population. Further, on average, 34.37% of the respondents resided in urban areas. The financial market in Kenya remains relatively narrow in the rural areas since most financial institutions i.e. banks, MFIs, and SACCOs are concentrated in the urban and peri-urban areas. Further, poor communications infrastructure, low population density, relatively undiversified economies and less productive economic activities in the rural sector greatly undermine financial inclusion initiatives. The mean age of the surveyed population was about 38 years. The variable had a standard deviation of 17.21 and varied within the intervals of 16 and 116 years around the mean value. On average, 84.60% of the Kenyan population was of the Christian denomination. Further, about 54.50% of the surveyed population was reported to be married. The average number of people in a given household was 4 with the lowest number recorded to be 1 and the highest being 23. More importantly, the survey indicated that about 70.83% of the households experienced a shock over the last fiscal year which adversely affected their streams of income. The notable shocks included the COVID-19 pandemic, drought, and locusts invasion which almost simultaneously hit the country in 2020. More significant was the COVID-19 pandemic which resulted in massive job losses and subsequently depleted earning streams for many Kenyan households. This negatively impacted the savings prospects and consequently the financial inclusion prospects. A paltry 0.027% of the Kenyan individuals or households possessed and used the green bond financing instrument. The mean monthly expenditure averaged 9, 418 Kenya Shillings (KES). The minimum mean monthly expenditure was recorded at 100 with the maximum recorded at 197000.

Empirical Findings

Financial Inclusion (FI) Model

This study sought to establish whether the education and employment status of individuals matter for financial inclusion in Kenya. A financial inclusion index was first generated using the PCA method. This indicator is then regressed against the education level and employment status variables while also controlling for other unobservables. The findings are presented in Table 4.

Table 4. Regression Results

VARIABLES	Financial Inclusion (FI) Index
Education level	0.407***
	(0.0151)
Employment status	0.664***

	(0.0215)
Respondent's sex	0.0827***
	(0.0126)
Location	0.0882***
	(0.0143)
Respondent's age	0.00802***
	(0.000381)
Respondent's religion	0.178***
	(0.0181)
Marital status	0.0470***
	(0.0128)
Household size	-0.0189***
	(0.00283)
Shock experienced	-0.0284**
	(0.0137)
Green bonds dummy	-0.353
	(0.372)
lnMean monthly expenditure	0.176***
	(0.00847)
Constant	-2.200***
	(0.0789)
Observations	21,954
R-squared	0.171
Adj. R-squared	0.1703
Prob>F	0.0000

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

The financial inclusion index of an individual who has acquired secondary school education or higher significantly increased by 40.7% *ceteris paribus*. This is compared to those individuals who possessed lower than secondary school education qualifications. The more educated an individual is, the higher the financial inclusivity. Education acts as an empowerment tool by enhancing an individual's knowledge of financial service providers and the roles they play in society. The findings are consistent with those by Demirguc-Kunt et al., (2018) who found divergences in the worldwide account ownership status regarding the education level of individuals with account ownership being found to be lower among the less educated adults. Holding other factors constant, being employed significantly increased the financial inclusion index by 66.4% as compared to being unemployed. Formal employment hugely boosts the transactional account ownership status of individuals as it provides requisite payment channels by employers. Further, individuals can save and borrow easily from the mainstream financial providers since employment status acts as collateral by guaranteeing a steady flow of income. The same applies also to informal credit providers such as shylocks and mobile money lending

platforms. As such, adults who were active in the labor force-either, employed or seeking work were more likely to have an account than those who were out of the labor force (Demirguc-Kunt et al., 2018; Camara and Tuesta, 2015).

Being male significantly increased the financial inclusion index by 8.27% as compared to being female *ceteris paribus*. The male population was found to dominate their female counterparts concerning access and usage of the mainstream financial services. Albeit there has been a reduction in gender inequality with regards to financial inclusivity over the recent past, the women's use of formal financial services is still low; ostensibly owing to the continued prevalence of income and wealth gaps in society. This culminates with cultural norms in some societies that discriminate against women in terms of allocating an equitable share of better job opportunities. Further, wealth inheritance preferences towards the male gender prolong the financial inequality prevalence. Similar findings on gender divergences in financial inclusivity were obtained by Allen et al., (2016) and Demirguc-Kunt et al., (2014). The financial inclusion index of an individual residing in urban areas was found to be higher by 8.82% compared to an individual residing in rural areas. The financial market remains relatively narrow in the rural areas since most financial institutions i.e. banks, MFIs, and SACCOs are concentrated in the urban and peri-urban areas. Further, poor communications infrastructure, low population density, relatively undiversified economies, and less productive economic activities in the rural sector greatly undermine financial inclusion initiatives (Mutua and Oyugi, 2007; Dupas and Jonathan, 2013; Aduda and Kalunda, 2012).

The older an individual is, the increased the opportunity of being financially included by 0.8% *ceteris paribus.* The age variable was found to be significant at a 1% level of significance. Younger individuals (preferably below 18 years) are more likely to be financially excluded since they lack the requisite documentation (National Identification Cards) that would facilitate their access and usage to the mainstream financial service providers. Likewise, they may also not access credit facilities from the digital mobile lending platforms and shylocks if any at all. Apart from the lack of necessary identification documents; the younger population may also lack stable job opportunities (Kampero and Kaiser, 2013; Camara and Tuesta, 2015) and may, thus, be reliant on their parents or caretakers. Holding other factors constant, being a Christian significantly increased the financial inclusion index by 17.8%. This is compared to individuals who belonged to other denominations such as Islamic and Hinduism. While some religions encourage saving and borrowing through formal financial institutions, some do not. For instance, Demirguc-Kunt et al., (2014) found that Muslims were less likely to own bank accounts or save formally as compared to non-Muslims.

Being married significantly increased the financial inclusion index of an individual by 4.70% *ceteris paribus.* Marriage increases an individual's social network and also builds a larger social pool of funds for the parties involved which ultimately increases their opportunity of being financially included. Besides, it develops a sense of communal responsibility and as such, married people are more likely to access and utilize financial services as compared to unmarried people (Allen et al., 2016). Holding other factors constant, an additional household member significantly reduced the financial inclusion index by 1.89% for a given household. This suggested that larger

households were financially constrained as they devoted most of their income towards consumption as opposed to saving. This has the effect of leaving them out of the mainstream financial system.

Further, the financial inclusion index was found to decline significantly by 2.84% for those households or individuals that reported to have experienced shocks over the last fiscal year. The notable shocks experienced in the 2020 year when the survey was conducted included; the COVID-19 pandemic, locusts invasion, and drought. Households and / or individuals reported depleted streams of income due to job losses brought about by the COVID-19 pandemic shock. Further, agricultural yields were affected by locusts invasion and drought that hit the country over the same year. Depleted streams of income due to job losses coupled with decreased agricultural production resulted in a contraction in the financial coverage opportunities. Moreover, the study found that increased mean monthly expenditure was significantly associated with a 17.6% increase in the financial inclusion index for a particular household. Higher household expenditures can be attributed to a broadened access and usage of financial services. More particularly, larger household consumption implies that individuals can be able to borrow and save from both the formal and informal financial streams. This increases their opportunity of being financially included (Beck et al., 2007; Jemmali and Amara, 2014; Nabassaga et al., 2020). The green bonds variable was, however, found to insignificantly determine the financial inclusion index.

The Inequality Measure of Financial Inclusion

To understand the degree of financial inequality in Kenya, the HOI estimation was performed across the three different indices of financial inclusion (usage, access, and barriers). The results are presented in Tables 5, 6, and 7.

Inequality Measure in Financial Inclusion: Usage

Table 5 shows the HOI estimation results for the Usage models. The usage indicator was measured using transactional account ownership, bank account (savings or investments), and ATM usage.

Table 5. HOI Estimation Results for the Usage Models

Inequality Measure	Transactional account ownership		Bank account (savings or investments)		ATM Usage	
	Values	Std. Error	Values	Std. Error	Values	Std. Error
Coverage (C)	2.1545	0.1889	2.9243	0.1112	10.9684	0.1889
Dissimilarity Index (D)	38.6381	3.2122	41.0362	6.9684	43.6083	3.2122
Human Opportunity Index (HOI)	1.3220	0.1408	1.7243	0.0783	6.1853	0.1408
Pseudo R^2	0.1081		0.1279		0.2234	

Obs Logit	21,954	21,954	21,954
Obs	21,954	21,954	21,954

Table 5 revealed that the coverage rate in the usage of financial services was found to be small at 2.15% and 2.92% for the transactional account ownership and bank account models respectively. Equally, the opportunity of an individual being financially included was lower at only 1.32% and 1.72% for the two models respectively. The higher dissimilarity indexes of 38.64%, 41.04%, and 43.61% across the three usage models implied that fewer individuals in Kenya owned bank accounts and / or ATM cards and conducted transactions using them regularly. Though low, the coverage rate and HOI were found to be higher with regards to ATM usage in Kenya compared to the 2 counterpart models. These findings suggested an increased uptake in the usage of ATM cards in Kenya with individuals now preferring the later mode of the transaction as compared to the bank account transactions approach due to its convenience and timeliness. This becomes even more fundamental in the COVID-19 pandemic era where teller-customer banking transactions were minimized to help combat the pandemic.

Inequality Measure in Financial Inclusion: Access

The access indicator to financial inclusion was measured using; mobile money accounts, mobile banking accounts, and informal institution membership. The results are summarized in Table 6.

Table 6. HOI Estimation Results for the Access Models

Inequality Measure	**Mobile money account**		**Mobile banking account**		**Informal institution membership**	
	Values	**Std. Error**	**Values**	**Std. Error**	**Values**	**Std. Error**
Coverage (C)	30.3270	0.2908	0.2688	0.0349	48.7015	0.3214
Dissimilarity Index (D)	21.7722	1.6510	35.3613	24.6628	13.0603	1.1109
Human Opportunity Index (HOI)	23.7242	0.2795	0.1738	0.0264	42.3409	0.3388
Pseudo R^2	0.1029		0.0582		0.0701	
Obs Logit	21,954		21,948		21,948	
Obs	21,954		21,948		21,948	

Table 6 revealed that unlike in the usage models where the coverage rate and HOI were lower, the access models depicted an increased pattern in the access to financial products in the Kenyan market. The coverage rate in the access to financial products was found to be higher at 30.33% and 48.70% for the mobile money account and informal institution membership models respectively. Similarly, the opportunity of an individual being financially included was found to be higher at 23.72% and 42.34% for the mobile money account and informal institution membership

models respectively. Compared to the usage models; the dissimilarity indexes in access models were consequently lower. These findings implied that in Kenya, access to mobile money services was higher with a majority of the population having easy access to financial services through their mobile phones. These services have taken root in every corner of the Kenyan economy and include mobile banking, M-PESA, Airtel Money, mobile loan applications, mobile agents among many others. Also, the majority of Kenyans saved and borrowed money through informal institution group platforms. One such popular platform is the merry-go-rounds or ROSCAs. Nevertheless, mobile banking accounts remained relatively untapped potential in the Kenyan financial market yet it offers a much quicker, safer, and more convenient mode of conducting transactions by linking an individual's mobile account to his or her bank account. Subsequently, one can simply deposit, withdraw, send, and receive funds from their bank accounts through the M-Pesa platform.

Inequality Measure in Financial Inclusion: Barriers

The barriers indicator to financial inclusion was measured using two indicators; cost to the nearest financial institution and the cost to the nearest financial advisor. Table 7 summarized the estimation results.

Table 7. HOI Estimation Results for the Barrier Models

	Cost to the nearest financial institution		Cost to the nearest financial advisor	
Inequality Measure	**Values**	**Std. Error**	**Values**	**Std. Error**
Coverage (C)	71.3264	0.2628	14.0696	0.2219
Dissimilarity Index (D)	14.7169	0.9773	30.7454	2.3130
Human Opportunity Index (HOI)	60.8293	0.3371	9.7439	0.1817
Pseudo R^2	0.2133		0.1277	
Obs Logit	21,954		21,948	
Obs	21,954		21,948	

Table 7 revealed a higher coverage rate and opportunity of an individual being financially included at 71.33% and 60.83% regarding the cost to the nearest financial institution. Conversely, regarding the cost to the nearest financial advisor, the coverage rate and opportunity of an individual being financially included were found to be lower at 14.07% and 9.74% respectively. The findings suggested that significant progress has been made in Kenya by financial service providers to ensure that financial products are within the reach of a majority of the population. This has been made possible through financial innovation which has seen a rapid increase in the number of bank branches, ATMs, MFIs, mobile bank agents, M-Pesa agents, Airtel Money agents, and so on. Albeit, these innovations have expanded the scope of financial inclusion in the country, there exist notable bottlenecks stemming from unemployment and illiteracy that still pose a challenge to financial inclusion prospects.

Shapley Decomposition by Education Level and Employment Status

To ascertain the extent to which the education level and or employment status of individuals mattered for financial inclusion in Kenya, the Shapley decomposition technique was performed across the usage, access, and barrier models. The results are presented in Tables 8, 9, and 10 respectively.

Shapley Decomposition: Usage

The results are presented in Table 8.

Table 8. Shapley Decomposition of the D-Index: Usage Models

Human Opportunity Index	Transactional account ownership	Bank account (savings or investments)	ATM Usage
HOI	0.01416	0.01833	0.06753
D-Index	0.34213	0.37233	0.38466
Penalty	0.00736	0.01087	0.04221
Coverage	0.02152	0.02920	0.10974
Shapley decomposition of the D-Index (Percentage explained by each variable)			
Education level	62.19	66.14	64.88
Employment status	37.81	33.86	35.12

Shapley Decomposition: Access

The results are presented in Table 9.

Table 9. Shapley Decomposition of the D-Index: Access models

Human Opportunity Index	Mobile money account	Mobile banking account	Informal institution membership
HOI	0. 24959	0. 00182	0. 47983
D-Index	0. 17733	0. 33214	0. 01466
Penalty	0. 05380	0. 00090	0. 00713
Penalty	0. 30339	0. 00272	0. 48697
Shapley decomposition of the D-Index (Percentage explained by each variable)			
Education level	78.68	68.94	63.58
Employment status	21.32	31.06	36.42

Shapley Decomposition: Barriers

The results are presented in Table 10.

Table 10. Shapley Decomposition of the D-Index: Barrier models

Human Opportunity Index	Cost to the nearest financial institution	Cost to the nearest financial advisor
HOI	0.67594	0.11875
D-Index	0.04931	0.17154
Penalty	0.03506	0.02459
Penalty	0.71100	0.14334
Shapley decomposition of the D-Index (Percentage explained by each variable)		
Education level	77.00	80.89
Employment status	23.00	19.11

Looking at the results in Tables 8, 9, and 10, the level of education of an individual explained the highest proportion of financial inclusion across the 3 models. This implied that education level and more particularly, financial literacy; was considered as the prime factor explaining the financial inclusion prospects in Kenya. The more educated an individual is, the more awareness he or she has with regard to access, usage, and barriers to financial products. Further, education level boosts the employability prospects of an individual; whether formal or informal. Generally, the estimation results reveal that both the education level and employment status of individuals are critical in realizing the SDG goal of reducing global financial inequalities by the year 2030.

Conclusions and Recommendations

This study sought to investigate whether the education level and employment status of an individual matter for financial inclusion in Kenya. The OLS regression results revealed that the two factors were indeed critical and significant drivers of financial inclusion in Kenya. Further, using the Shapley decomposition technique, the level of education, and more particularly, financial literacy; was found to be more astute in explaining the financial inclusion prospects in Kenya. Moreover, unlike in the usage models where the coverage rate and the Human Opportunity Index were lower, the access models depicted an increased pattern in the access to financial products in the Kenyan market. These findings implied that in Kenya, access to mobile money services was higher with a majority of the population having easy access to financial services through their mobile phones. Also, the majority of Kenyans saved and borrowed money through the informal institution group platform commonly referred to as the merry-go-rounds. Nevertheless, mobile banking accounts remained relatively untapped potential in the Kenyan financial market yet it offers a much quicker, safer, and more convenient model of conducting transactions.

To increase financial inclusion in Kenya, this study recommended that financial institutions step

up their efforts in bridging the financial information asymmetry gap. This can be realized through financial literacy which helps broaden people's awareness of the access, usage, and barriers to financial products. Additionally, there is a need for both the government and private sector players to create more employment opportunities as this is requisite in providing a steady income stream. This consequently, incentivizes account ownership for transaction purposes.

While this study was able to decompose financial inclusion along the education level and employment status lens in the COVID-19 pandemic era; future studies should comparatively analyze the financial inclusion levels using panel data under both the Pre-COVID and the COVID-19 pandemic eras. This feat was not achievable in the current research.

Acknowledgement

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	Education level	Employment status	Respondent's gender	Location	Respondent's age	Respondent's religion	Marital status	Household size	Shocks experienced	Green bonds	Monthly expenditure
Education level	1										
Employment status	0.2640	1									
Respondent's gender	0.0760	0.0998	1								
Location	0.2547	0.1597	0.0023	1							
Respondent's age	-0.1825	-0.0589	-0.0208	-0.1674	1						
Respondent's religion	0.1385	0.0563	-0.0344	-0.0768	0.0487	1					
Marital status	-0.0077	0.0351	0.0618	-0.0519	0.0828	-0.0453	1				
Household size	-0.1408	-0.1152	-0.0301	-0.1797	-0.1723	-0.1678	0.1923	1			
Shocks experienced	-0.0058	0.0072	-0.0199	-0.0443	0.0841	0.1081	0.0817	0.0435	1		
Green bonds	0.0136	0.0127	0.0137	0.0113	0.0063	-0.0084	-0.0015	-0.0069	-0.0077	1	
Monthly expenditure	0.2498	0.1848	0.0463	0.2563	-0.0918	-0.1471	0.1068	0.1013	-0.0500	0.0245	1

Appendix Table A1: Pairwise Correlation Matrix