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# Determinants of Financial Inclusion in Kenya: A Demand-Side Perspective

John K. Njenga<sup>a\*</sup> and Esther N. Irungu<sup>b</sup>

<sup>a</sup>University of Nairobi, P.O Box 13187 - 00200 Nairobi, Kenya.

<sup>b</sup>University of Nairobi, P.O Box 8894 - 00300, Nairobi, Kenya.

## Authors' contributions

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## Abstract

This study sought to analyze the underlying financial inclusion determinants in Kenya. The study applies ordinal logit regression to examine the effect of the residential area, gender, education level, marital status, and employment type on financial inclusion. Financial inclusion is measured by developing a financial inclusion index for ten binary financial services variables. From the index, three financial inclusion levels are designed. These include low financial inclusion with scores of zero to three, medium with scores of four to six, and high level with scores of seven to ten. The estimates of the ordinal model are statistically significant for all factors considered except gender. Area of residence, age, education type, income, and marital status positively affect the log odds of financial inclusion, while employment is negatively linked. Education, employment, and marital status have interaction effects on financial inclusion. This study recommends that the Kenyan government formulate and strengthen policies to tackle challenges such as gender disparity, rural bank infrastructure development, fostering an environment conducive for entrepreneurship to address unemployment and income disparities, advocating for secondary school completion, and addressing social issues impacting family stability, including separation or the absence of marriage.

\*Corresponding author: E-mail: [jnonjenga@gmail.com](mailto:jnonjenga@gmail.com);

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## 1 Introduction

### 1.1 Financial inclusion

Financial inclusion is the degree of financial services development aimed at covering an excluded population in an economy. Ozili [1], defines financial inclusion to entail every individual, especially those marginalized or economically disadvantaged, and ensuring their access to comprehensive financial services. Additionally, according to the World Bank (Demirguc-Kunt et al. [2], Demirguc-Kunt et al. [3]), financial inclusion is defined as the provision of accessible and affordable financial products and services, including transactions, payments, savings, credit, and insurance, tailored to meet the diverse needs of individuals and businesses responsibly and sustainably. Financial inclusion can thus be defined as the concerted effort to expand the availability and affordability of financial services to previously underserved populations, thereby enabling individuals and businesses, particularly those marginalized or facing economic challenges, to access a wide range of financial tools and resources essential for their financial well-being and empowerment.

Limited financial inclusion remains a pervasive challenge on a global scale, impacting millions of individuals and entire communities (Ozili [1]). Limited financial inclusion stems from various factors, including limited access to banking services, a lack of financial education, insufficient infrastructure in rural areas, and socioeconomic disparities. One major barrier to financial inclusion is the absence of formal banking services in many regions, particularly in rural and remote areas. This leaves a substantial portion of the population without access to basic financial tools such as savings accounts, loans, and insurance (Geraldes et al. [4], Berhanu and Azadi [5]). Without access to these services, individuals often resort to informal and sometimes exploitative financial channels, perpetuating cycles of poverty and inequality.

Significant strides in poverty reduction and economic advancement have been made over the years; however, a large segment of the global population in developing regions such as Africa, Asia, the Caribbean, and Latin America still grapples with attaining a basic standard of living (Omar and Inaba [6]). A study by Kim et al. [7] identifies financial inclusion as having an impact on poverty reduction and economic growth. Financial inclusion helps boost entrepreneurs' liquidity, resulting in many operational business premises that lead to employment and poverty eradication (Kim et al. [7]). Access to formal financial services, as a component of financial inclusion, is also argued to accelerate macroeconomic growth, thus alleviating poverty and fostering income equality in these regions.

Access to formal financial services is a component of financial inclusion. Access to formal financial services accelerates macroeconomic growth, alleviates poverty, and fosters income equality. Limited financial inclusion persists due to limited financial literacy prevalent in developing nations, where many individuals have a low understanding of basic financial concepts (Giron et al. [8], Nnaomah et al. [9]). This knowledge gap can lead to poor financial decisions and susceptibility to scams. Inadequate infrastructure, particularly in rural areas, hampers access to banking services, exacerbating the issue. Additionally, socioeconomic disparities, including gender and income inequalities, further marginalize certain groups, such as women. These disparities limit access to financial services and hinder economic empowerment. Addressing limited financial inclusion requires a multi-faceted approach involving governments, financial institutions, non-profit organizations, and other stakeholders. Initiatives such as mobile banking, microfinance, financial literacy programs, and regulatory reforms have expanded access to financial services and empowered marginalized communities (Jubril et al. [10], Ansong et al. [11], Danladi et al. [12]). Leveraging technology, such as mobile money and digital banking platforms, plays a crucial role in bridging the gap and reaching underserved populations (Bailey et al. [13]). Ultimately, achieving meaningful financial inclusion is not only essential for reducing poverty and promoting economic development but also for fostering social inclusion and empowering individuals to participate fully in the economy. By addressing the systemic barriers to financial access and promoting financial education and inclusion initiatives, societies can work towards building more equitable and sustainable financial systems for all.

Financial inclusion determinant analysis is approached from two sides, the supply and the demand side. The supply-side approach considers the banking sector infrastructure to analyze financial services provision, while the demand-side approach uses household socio-economic characteristics obtained from surveys. Using an ordinal regression model, this article uses a financial inclusion demand-side approach to determine socioeconomic factors that determine financial inclusion in Kenya. This is achieved by assessing the linkage between financial inclusion level and socio-economic factors, namely age, income, gender, marital status, employment type, and area of residence. For this study, a financial inclusion level is developed from the financial inclusion index, a sum of ten binary formal financial services factors.

## 1.2 Literature review

Several empirical studies have used the demand-side approach to analyze socioeconomic factors that contribute to the rate of financial inclusion in an economy. Factors such as gender, religion, urbanization, age, financial literacy, income, level of education, and marital status, among others, significantly affect financial inclusion, varying from one country or region to another. Rural population as a proxy for an area of residence has a significant negative effect on financial inclusion (Wokabi and Fatoki [14], Bashiru et al. [15]). Gender has a significant effect on financial inclusion. Being male increases the likelihood of higher financial inclusion (Ozsuca [16]). The higher the level of income, the higher the level of financial inclusion (Altarawneh et al. [17], Badar et al. [18]). Higher education level is attributed to high chances of financial inclusion (Yangdol and Sarma [19], Mhlanaga and Denhere [20]). Financial inclusion has been proven to increase with an increase in age (Rashdan and Noura [21], Gautier et al. [22]). Marital status influences financial inclusion. Unmarried persons tend to have a low interest in financial products compared to married people (Martin-Oliver [23]).

Income and rural population significantly contribute to financial inclusion in East African countries, while the effect of interest rates and unemployment are not significant (Wokabi and Fatoki [14]). The association of individual characteristics, namely; income, age, gender, and education, was proven to affect the usage of financial services products in Turkey. A man who is wealthier, more educated, and older has a higher likelihood of utilizing financial services (Ozsuca [16]). Research conducted in Spain shows that marital status has a significant influence on financial inclusion. Unmarried people tend to have a low interest in financial products relative to married people (Martin-Oliver [23]).

Education and income have a significant effect on financial inclusion in Brazil and Romania. An educated individual with a higher income has a higher chance of having a formal account (Altarawneh et al. [17]). Age, education, financial situation, use of mobile phones, and working type were proven to be associated with financial inclusion in Bangladesh, India, and Pakistan. A relatively older male who is wealthier, a regular employee, and educated has a higher likelihood of being financially included (Badar et al. [18]). A cross-country examination of financial inclusion based on demand-side factors reveals that economic circumstances and individual characteristics have a significant role in financial inclusion. A woman who is jobless, less educated, and poor has a low likelihood of being financially included (Yangdol and Sarma [19]).

In South Africa, it has been proven that education, income, marital status, age, and race drive financial inclusion positively, while gender has a negative effect (Mhlanaga and Denhere [20]). Age, education level, workforce, and household income quantiles have a significant relationship with financial inclusion. However, gender has no significant effect on the level of financial inclusion. A wealthy person who is older and more educated is highly likely to be included in the financial system (Rashdan and Noura [21]). Education negatively drives financial inclusion indicators in Cameroon, while income exhibits a positive effect (Gautier et al. [22]). From the demand side of financial inclusion, financial literacy exhibits a significant positive effect in Kenya and Tanzania (Fanta and Mutsonziwa [24]).

## 2 Methodology

### 2.1 Data

#### 2.1.1 Data sampling

This study used the FinAccess Household Survey (2021), conducted by the Kenya National Bureau of Statistics (KNBS). The survey aims at assessing financial inclusion dimensions, namely: access, usage, quality, and impact. Financial access and usage dimensions were considered a financial utility for the previous 12 months. The survey was conducted in September 2021 during the COVID-19 pandemic period. It covered a total of 47 counties that form devolved government system units in Kenya.

#### 2.1.2 Independent variables

This study considered two continuous variables and five categorical variables. The continuous variables include age and monthly income. The categorical variables are area, gender, education, marital status, and employment, with their respective level as indicated below

- area (=1 if urban otherwise zero)
- gender (=1 if male otherwise zero)
- education (=1 if none, =2 if primary, =3 if secondary, =4 if post-secondary)
- marital status (=1 if divorced, =2 if married, =3 if single, =4 if widowed)
- employment (=1 if formal, =2 if informal, =3 if others)

#### 2.1.3 Financial inclusion level index

The dependent variable in this research is the financial inclusion level, which is ordinal with three levels.

$$Y = \begin{cases} 1, & \text{low} \\ 2, & \text{medium} \\ 3, & \text{high} \end{cases}$$

The individual financial inclusion index score is obtained by summing the score for ten binary variables. The variables are indicators of financial inclusion, including; access to a bank account, credit card, debit card, share or stock investments, bill or bond investment, life insurance, non-life insurance, mobile banking, mobile money, and current loans. These variables take the value 1 if yes, otherwise zero. The financial inclusion index ranges from 0 to 10, and the financial inclusion level is obtained as shown in Table 1.

**Table 1. Dependent variable**

Financial inclusion score	Financial inclusion level
0- 3	low level
4-6	medium level
7 -10	high

#### 2.1.4 Descriptive statistics

The survey was administered to personnel aged 16 and above; however, for the analysis, only those above 18 years were considered as per Kenya’s legal framework. The descriptive statistic results are shown in Table 2. The mean age is 39.84 with a standard deviation of 16.61. To control for the outlier effect in monthly income and dampen its variance, a log transformation was conducted. The monthly mean income is 8.47 with a spread

of 1.08. The majority of the people live in towns, with a percentage of 65 as compared to 35 for rural areas. Primary school, the most populated education level, has the highest proportion at 40%. The majority of Kenyans also engage in the informal sector as a major source of livelihood.

**Table 2. Descriptive statistic results**

a Categorical variables frequency distribution					
variable	Category	Total(%)	FIL		
			Low	Medium	High
area	rural	12183 (65.23)	10690(87.75)	1454 (11.93)	39 (0.32)
	urban	6495 (34.77)	4804 (73.96)	1636 (25.1927)	55 (0.85)
gender	female	10770 (57.66)	9300 (86.35)	1432 (13.31)	38 (0.35)
	male	7908 (42.34)	6194 (78.33)	1658 (20.97)	56(0.71)
education	none	3443 (18.43)	3369 (97.85)	73 (2.12)	1 (0.03)
	primary	7564 (40.50 )	6827 (90.26)	731 (9.66)	6 (0.08)
	secondary	5371 (28.76)	4187 (77.96)	1159 (21.58)	25 (0.46)
	post-secondary	2300 (12.31)	1111 (48.30)	1127 (49.00)	62 (2.70)
status	Divorced	1457 (7.80)	1253 (86.00)	201 (13.79)	3 (0.21)
	Married	10823 (57.95)	8749 (80.84)	2001 (18.49)	73 (0.67)
	Single	4119 (22.05)	3430 (83.27)	679 (16.48)	10 (0.25)
	Windowed	2279 (12.20)	2062 (90.48)	209 (9.17)	8 (0.35)
employment	formal	1945 (10.41)	939 (48.28)	949 (48.49)	57 (2.93)
	informal	12576 (67.33)	10790 (85.80)	1755 (13.75)	31 (0.25)
	others	4157 (22.26)	3765 (90.57)	386 (9.29)	6 (0.14)

  

b Continuous variable				
variable	Minimum	mean	maximum	sd
age	18	39.84	116	16.61
log(income)	4.61	8.47	9.21	1.08

## 2.2 Ordinal regression model

Consider an ordinal response variable  $y$  with  $j$  level and  $k$  set of explanatory variables, the functional form is given as;

$$y = f(X_k) \tag{2.1}$$

If the response variable and the explanatory variable have more than two levels, then dummy variables are created to cater to the higher levels. A dummy variable is always binary with all cases falling in a specific level assigned one and all other cases not in that particular level assigned zero. If a variable has  $m$  level, for  $m$  greater than two, then  $m-1$  number of dummy variables are created selecting one of the levels as the reference level. For  $k$  explanatory variables, ordinal regression involves simultaneously fitting the  $k-1$  ranked logistic model as shown below;

$$\ln\left(\frac{Pr(y \leq 1)}{Pr(y \geq 1)}\right) = \beta_{01} + \beta_{11}x_1 + \beta_{11}x_2 + \dots + \beta_{k1}x_k + \epsilon \tag{2.2}$$

$$\ln\left(\frac{Pr(y \leq 2)}{Pr(y \geq 2)}\right) = \beta_{02} + \beta_{12}x_1 + \beta_{22}x_2 + \dots + \beta_{k2}x_k + \epsilon \tag{2.3}$$

⋮

$$\ln\left(\frac{Pr(y \leq j - 1)}{Pr(y \geq j - 1)}\right) = \beta_{0,j-1} + \beta_{1,j-1}x_1 + \beta_{2,j-1}x_2 + \dots + \beta_{k,j-1}x_k + \epsilon \tag{2.4}$$

If the explanatory variable is not dependent on the categories of the response variable, this type of model is referred to as a proportional odd model. The proportional odd model in reduced form is expressed as (Agresti [25], Agresti [26], Brant [27], Harrell [28], Liao [29], McCullagh [30], Winship and Mare [31]);

$$\ln\left(\frac{Pr(y \leq i)}{Pr(y \geq i)}\right) = \beta_{0i} + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k + \epsilon \quad (2.5)$$

For  $i= 1,2,3, \dots, j-1$

There may exist interactions in the explanatory variable set, {which are accommodated in the ordinal model as expressed in equation (2.6).

$$\ln\left(\frac{Pr(y \leq i)}{Pr(y \geq i)}\right) = \beta_{0i} + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k + \beta_{k+1}x_m * x_n + \epsilon \quad (2.6)$$

For  $m$  and  $n$  members of set  $k$

The ordinal model parameters are estimated using maximum likelihood estimators. The odds ratio (OR) of an event for any given responsible variable is expressed as in equation (2.7).

$$OR = exp(\beta_k) \quad (2.7)$$

For  $k= 1,2,3, \dots, k+1$

OR is defined as the ratio of odds of an event happening for the exposed group versus the control group. If an explanatory variable is continuous, OR measures the ratio of odds of the exposed group versus the control group for unit increase in the continuous variable. Otherwise, for categorical variables, OR measures the ratio of the odds of the exposed group versus the control group relative to the levels of the explanatory variable.

The value of OR is always a positive numeric value. If the OR value is less than 1, it implies that there is less likelihood of the occurrence of the event under consideration. If the OR value is greater than 1, the likelihood of the event under consideration increases. The odd of the exposed group is equal to the odd of the control group if the OR value is equal to 1

Suppose the categories of the response ordinal variable have probabilities  $\phi_j(x)$  for given values of the explanatory variables, then the probability functions for the level of the variable are expressed as follows;

$$\phi_1(x) = \frac{exp(\beta_{01} + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k)}{1 + exp(\beta_{01} + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k)} \quad (2.8)$$

$$\phi_i(x) = \frac{exp(\beta_{0i} + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k)}{1 + exp(\beta_{0i} + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k)} - \frac{exp(\beta_{0i-1} + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k)}{1 + exp(\beta_{0i-1} + \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k)} \quad (2.9)$$

For  $i= 2,3, \dots, j-1$

$$\phi_j(x) = 1 - \sum_{i=1}^{j-1} p_i \quad (2.10)$$

To test the model performance and the significance of the explanatory variable, a likelihood ratio test was performed. The test follows a chi-square distribution with  $k$  degrees of freedom for the overall model,  $w-1$  degrees of freedom for the  $w$ -level explanatory categorical variable, and 1 degree of freedom for a continuous explanatory variable.

**Table 3. Variables likelihood ratio test results**

variable	LR statistic	Df	pvalue
area	18.04	1	0.0001
gender	1.54	1	0.2149
age	58.56	1	0.0001
education	36.30	3	0.0001
log(income)	793.69	1	0.0001
status	15.67	3	0.001
employment	19.88	2	0.0001
education:status	62.97	9	0.0001
education:employment	27.62	6	0.0001

### 3 Empirical Results

Model parameter estimates are as shown in Table 2. The estimated ordinal model is significant at a 5% level with a likelihood ratio statistic of 4711.184 with 27 degrees of freedom. Independent diagnostic tests are shown in Table 3, where overall all are significant at 5% level except gender. The study provides evidence to conclude that education level, age, monthly income, marital status, employment type, education/status interaction, and education/employment interaction are significant determinants of financial inclusion in Kenya.

Controlling for the other five variables and considering location area, an urban resident is 23% more likely to be in the low financial inclusion level as compared to rural residents. It also holds that an urban resident is 23% more likely to be in the low or medium financial inclusion level as compared to a rural resident.

**Table 4. Ordinal regression results**

a					
parameters					
parameter	estimate	odd ratio	parameter	estimate	odd ratio
Intercept (Low—Medium or high)	9.6137		primary/married	0.1598	1.1732
Intercept (low or medium—high)	13.9481		secondary/married	-0.2772	0.7579
area(Urban)	0.2086	1.2319	post-secondary/married	0.0063	1.0063
gender(Male)	0.0604	1.0622	primary/single	-2.1209	0.1199
age	0.0148	1.0149	secondary/single	-2.4373	0.0874
log(income)	0.7461	2.1088	post-secondary/single	-1.4993	0.2233
education (primary)	0.9951	2.7049	primary/widowed	-0.2774	0.7578
education (secondary)	2.0492	7.7613	secondary/widowed	-0.3778	0.6853
education (post-secondary)	2.1565	8.6408	post-secondary/widowed	0.0506	1.0519
status( married)	0.3018	1.3522	primary/informal	0.9791	2.6620
status (single)	1.8166	6.1507	secondary/informal	1.1629	3.1991
status (widowed)	0.7110	2.0360	post-secondary/informal	1.4699	4.3487
employment (informal)	-2.0394	0.1301	primary/other	0.6694	1.9530
employment (other)	-2.1761	0.1135	secondary/other	1.0178	2.7671
			post secondary/other	1.5792	4.8510
b Overall model					
AIC	13252.04		LR test statistic	4711.184	
Df	17		pvalue	0.0001	
Residual Deviance	13194.04				

Accounting for other explanatory variables, for every unit increase in age, a person is 1.5% more likely to be at a low financial inclusion level as opposed to a medium or high level. Similarly, for every unit increase in age, a person is 1.5% more likely to have a low or medium financial inclusion level as opposed to a high level.

Considering education level and accounting for other explanatory variables, an individual with primary education as the highest level is 2.7 times more likely to have a low financial inclusion level (as opposed to a medium or high financial inclusion level) compared to a person with other informal education. It also holds that a person with primary education is 2.7 times more likely to be in a low or medium financial inclusion level (as opposed to a high financial inclusion level) compared to a person with other informal education. A person with secondary education as the highest level is 7.7 times more likely to be in a low financial inclusion level (as opposed to a medium or high financial inclusion level) compared to a person with other informal education. It also holds that a person with secondary education is 7.7 times more likely to be in a low or medium financial inclusion level (as opposed to a high financial inclusion level) compared to a person with other informal education. Any person with post-secondary education as the highest level is 8.6 times more likely to be in a low financial inclusion level (as opposed to a medium or high financial inclusion level) compared to a person with other informal education. It also holds that a person with post-secondary education is 8.6 times more likely to be in the low or medium financial inclusion level (as opposed to a high financial inclusion level) compared to a person with other informal education.

Accounting for other explanatory variables, for every unit increase in income, a person is 2 times more likely to have a low financial inclusion level as opposed to a medium or high level. Similarly, for every unit increase in income, a person is 2 times more likely to have a low or medium level of financial inclusion as opposed to a high level.

Considering marital status and controlling for other explanatory variables, a married person is 35% more likely to be in the low financial inclusion level (as opposed to medium or high financial inclusion level) compared to a divorced person. It also holds that a married person is 35% more likely to be in a low or medium financial inclusion level (as opposed to a high financial inclusion level) compared to a divorced person. A single person is 6 times more likely to be in a low financial inclusion level as compared to a divorced person. It also holds that a person with a single marital status is 6 times more likely to be at a low or medium financial inclusion level (as opposed to a high financial inclusion level) compared to a divorced person. A widowed person is 2 times more likely to be at a low financial inclusion level (as opposed to a medium or high financial inclusion level) compared to a divorced person. Also, a widowed person is 2 times more likely to be in the low or medium financial inclusion level (as opposed to a high financial inclusion level) compared to a divorced person.

Finally, controlling for the other five variables, an informal sector person is 87% less likely to be in a low financial inclusion level (as opposed to a medium or high financial inclusion level) compared to a person in a formal sector. Also, an informal sector person is 87% less likely to be in a low or medium financial inclusion level (as opposed to a high financial inclusion level) compared to a person in a formal sector. A person who has another form of employment is 89% less likely to be in a low financial inclusion level (as opposed to a high or medium financial inclusion level) compared to a person in the formal sector. Also, a person who has another form of employment is 89% less likely to be in a low or medium financial inclusion level (as opposed to a high financial inclusion level) compared to a person in the formal sector.

The interaction of education level and marital status level, except for the interaction between the secondary school level and widowed personnel, has odd ratios of less than 1. This indicates a lower likelihood of being in low financial inclusion as compared to medium or high. The interaction of education and employment tends to increase the likelihood of being in a low financial inclusion level.



## 4 Conclusions

The objective of the study was to identify determinants of financial inclusion from a demand-side perspective. The independent variable was the financial inclusion level, an ordinal variable with three levels: low, medium, and high. These categories were derived from the financial inclusion score index, which ranged from 0 to 10. The explanatory socioeconomic factors considered were: area, gender, education, age, monthly income, marital status, and employment. The linkage of the explanatory factors was assessed using an ordinal regression model that proved to be statistically significant at a 5% level. Except for gender, all the other socio-economic factors were significant at 5%. The study also provided evidence of significant education-employment and education-marital status interactions.

In Kenya, area of residence, the highest level of education attained, number of years, average monthly income, marital status, and the type of employment involved are determinants in accessing and utilizing financial services such as having a bank account, credit card, debit card, share or stock investments, bill or bond investment, life insurance, non-life insurance, mobile banking, mobile money, and current loan. They all have a positive effect on the log-odd of higher financial inclusion levels, except for the type of employment. A male living in urban areas who is more educated and otherwise not divorced will be favored in financial inclusion as he ages. The interaction of education and marital status reduces the likelihood of financial inclusion, excluding people in the divorced category. Employment type is dependent on education level, which increases the log-odd of financial inclusion.

To enhance financial inclusion in Kenya, this study recommends the Kenyan government strengthen policies tackling gender disparities, improve rural banking infrastructure, foster an environment conducive to entrepreneurship for employment and income generation, advocate for secondary school completion, and address social challenges affecting families, such as marital instability. These initiatives aim to mitigate poverty and societal inequality, thereby fostering financial and economic growth in the long term.

## Competing Interests

Authors have declared that no competing interests exist.

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