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Modelling Socio-Economic and Demographic Determinants of Financial Inclusion Among Rural Women in Kenya

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Beatrice Cheronoh

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Beatrice Cheronoh

School of Mathematics
College of Biological and Physical sciences
Chiromo, off Riverside Drive
30197-00100 Nairobi, Kenya

Master of Science in Social Statistics Project

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The Director
Graduate School
University of Nairobi

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Abstract

In this study, we consider determinants of financial inclusion among rural women in Kenya as a special interest group. More precisely, we model socio-economic determinants of financial inclusion among these rural women. In particular, we employ a multiple logistic regression model on the data from Financial Inclusion Insights (FII) 2017 survey. It is found that mobile phone ownership, identification documents, age, economic status, education, informal society membership and employment status are some of the social elements that explain financial inclusion. Ownership of a mobile for instance tremendously increases the chances of a rural woman being financially included. Those who owned a phone were 14 times more likely to be financially included (p -value= $<2e-16$). The rural women in possession of identification documents were 5 times more likely to be financially included (p -value= $8.41e-11$) while age showed a positive relationship with the outcome variable to the extent that financial inclusion increases with an additional unit of age (p value= $1.84 e-5$) until it reaches an optimal age beyond which it begins to decrease (as substantiated by a negative coefficient of the age squared variable). Regarding economic status, those from households below poverty levels were found to be less likely to be included compared to those above poverty level. On education, a rural female with higher education's probability of being financially included increases by 151 percent compared to those with no formal education. On the other hand, those with secondary education were twice more likely to be financially included than the reference group. Interestingly, those with primary education were less likely to be financially included compared to the 'no formal education' category. Being a member of an informal group like a chama, merry-go-round and VSLA increases the likelihood of a rural woman being financially included. For instance, rural women members of the informal societies were twice likely to be financially included. Finally, unemployed rural women, those seeking jobs, housewives, student, retired or the disabled were all less likely to be financially included comparatively. Specifically, housewives or students showed significant results for financial exclusion.

Declaration and Approval

I the undersigned declare that this project report is my original work and to the best of my knowledge, it has not been submitted in support of an award of a degree in any other university or institution of learning.

Signature

Date

Beatrice Cheronoh

Reg No. I56/81641/2015

In my capacity as a supervisor of the candidate, I certify that this report has my approval for submission.

Signature

Date

Dr. Isaac Kipchirchir Chumba
School of Mathematics,
University of Nairobi,
Box 30197, 00100 Nairobi, Kenya.

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BEATRICE CHERONOH

November, 2019.

Dedication

To my family but a special feeling of gratitude to my loving parents, Samwel and Ruth Mutai who have been a very huge part of my support system throughout my journey in education.

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1 Introduction

1.1 Background Information

Despite the World's general positive growth in the global economy, some segments of the population – the poor, and particularly the rural residence's wellbeing remain unchanged. One major contributor to this stagnation is lack of access to regulated financial institutions and services like borrowing, saving, investments, insurance and building of capital. This phenomenon is known as financial exclusion. Globally, 69 percent of adults in 2017– about 3.8 billion adults had an account at a bank or with a mobile money provider. Put differently, almost a third (31 percent) of the global population was financially excluded in the same year with women, rural populace and the poor being overrepresented among this group. By gender, a global 72 and 65 percent of men and women respectively were financially included in 2017.

Globally, almost a quarter (23 percent) African adults have an account. In Africa, women continue to lag behind their male counterparts reporting an inclusion rate of 20 percent compared to 29 percent for the men. In Sub-Saharan Africa, mobile money lead in driving the growing financial inclusion. Although the proportion of adults with a financial institution account (bank or Non-bank Financial Institutions) plateaued, those with a mobile money account nearly grew two-fold, to 21 percent (World Bank, 2017).

Consistent with the Global and the African trend, Kenyan financial inclusion scenario has not been different. Kenyan women's financial inclusion stood at 65 percent behind men's 72 percent. Conflated to urban women the situation for rural women was even worse. According to financial inclusion insights report, rural women reported a 61 percent inclusion compared to urban women at 73 percent (Financial Inclusion Insights Surveys, 2017). Although women have lagged behind in financial inclusion at all levels, the wide gap between Kenyan rural and urban women necessitates the need to determine and analyze the various socio-economic and demographic factors that influence financial inclusion, especially among rural women.

1.1.1 Definitions of financial inclusion

Intermedia Survey Institute defines financial inclusion as the uptake and use of own accounts with financial service providers that offer a full range of financial services – credit, savings, insurance money transfers and investment, and are regulated by the government. This implies that people must have an account solely or jointly with someone else in their

name with a legal all-service financial institution (which include banks, mobile money service providers, and nonbank financial institutions-such as deposit-taking microfinance institutions (MFIs), Savings and Credit Cooperative (SACCO), Post Banks and financial cooperatives. Everyone who own accounts in other institutions not mentioned above, those that do not have their own full-service account or those using other people's account are in this context, considered financially excluded. Additionally, those accessing services such as money guards, savings collectors, merry go round (chama) and other bank cards that are not attached to an account with any of the regulated institution are equally regarded as being excluded.

According to Global Financial index (Findex), financial inclusion encompasses individuals' and businesses' access to useful and affordable financial services and products that meet specific needs for example: – transactions, payments, savings, credit and insurance. Guaranteed access to a transaction account is regarded as an opening into a broader financial inclusion given that it catalyzes savings and enables making and reception of payments. In this regard, an account has been defined as; first, the proportion of respondents reporting individually owning an account or in collaboration with anybody else at any institution providing legal all-service financial products and secondly, those who had personally used a mobile money service within a 12 months' reference period pre survey. Financial institution on the other hand, refers to the percentage of respondents reporting account ownership (individually or in collaboration) at a bank or another type of financial institution. Lastly, Mobile money account denotes the fraction of respondents reporting personally using a mobile money service within the same reference period.

This study will utilize data from intermedia survey institute and therefore adopt intermedia's definition of financial inclusion.

1.1.2 Progress made in financial inclusion

Although account ownership has been on the rise globally, the growth has been uneven across countries, with mobile phones and the internet spurring this growth. Yet again, men retained a higher probability of having an account than women according to the 2018 World Bank report on the utilization of financial services. Globally, 69 percent of adults in 2017 (about 3.8 billion people up by 515 million adults who obtained an account within the years 2014 and 2017 period) had an account at a banking institution or with a mobile money service provider, a substantial increase from 62 percent and 51 percent in 2014 and 2011 respectively (Global Findex database).

The witnessed growth in account ownership notwithstanding, disparities persist, for instance, Kenya in 2017, 72 percent and 65 percent women held accounts respectively. What's more, an insistent 7 percentage points gender gap persists as were in the years 2014 and 2011. A wider gap between men and women existed in the low-income economies

although it remained unchanged since 2011, at 9 percent. Whilst in some economies account ownership grew strongly, elsewhere the pace has not been comparable, most likely attributable to the very large and continued disparities existing between men and women as well as the rich and the poor. Rural populace in the developing economies also showed comparatively lower propensity to own an account.

In Sub-Saharan Africa, mobile money remains to be the horsepower behind the growing financial inclusion. Although the proportion of adults with an account at a financial institution (bank or NBFIs) plateaued, those with a mobile money wallet or account nearly doubled, to 21 percent (World Bank Findex survey).

In Kenya, females make up a little over half of the population (Census, 2009), but their benefaction to measured economic activity, progress, and welfare falls far below its capacity, resulting in substantial socio-economic ramification. According to World Bank, adult female's population (+15 years) who lacked education in 2016 stood at 18.96 percent compared to the entire population that stood at 19.68 percent, with average years of total schooling being 4.41. World Bank's collection of development indicators placed Kenyan females participating in the labor force, (percentage of total labor force) at 48.5 percent in 2017. Additionally, at the household level, women in most cases tend to be solely the principal decision makers or jointly with their husbands in the day to day household expenditures, ensuring intra-household resource are wisely apportioned to meet basic needs and supplementary savings through investment so as to gather for unforeseen emergencies.

Although financial inclusion in Kenya has gained lots of traction after the introduction of mobile money in 2007, women have persistently been about 7 percentage points behind their male counterparts (World Bank and FII). Overall in 2017, 7 in 10 (73 percent) Kenyan adults were financially included with 72 percent and 65 percent of men and women being financially included respectively. Although there is good reason to celebrate the overwhelming growth made across the financial inclusion landscape in recent years, significant opportunity for growing access and usage of financial services among women remains. Positive trends in financial inclusion has been witnessed over the last few years, although women are consistently underutilizing these services, -a facts that exacerbates their suboptimal derivation of utility from service use. In 2016, there existed a 7-percentage points gender difference in financial inclusion (65 percent of women were financially included compared 72 percent for the males).

According to Fin Access surveys, formal financial inclusion (defined as access to useful and affordable financial products and services by individuals and businesses that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way) had had a 50 percent increase since 2006 to reach 75.3 percent of Kenyans in 2016. Only 17.4 percent of adults were excluded from both the formal and

informal financial services and this proportion more than halved since 2006. While formal inclusion among men had grown steadily since 2006, for women, leapfrogged between 2009 and 2013 driven by the spread in the of mobile money accounts services. This lowered women's exclusive dependence on the use of informal services. Although compared to men, practical access to legal and prudentially regulated services such as banks remained low among women at 35 percent equated to the men's 50 percent. The rural-urban financial inclusion gap widened between 2006 and 2016, with the inclusion among the urbanites roughly doubling that of the rural residence. Thus, those living in the rural area are almost twice more likely to be excluded than those in the urban areas.

Mobile technology and the explosion in growth of mobile financial services in particular, have generated extensive attention as an engine of expanding inclusion in financial services. Mobile money service is broadly touted as the game-changer for financial inclusion and equally the growth driver for innovation in the mobile industry, particularly in Kenya. With the widespread ownership of the mobile phones and the access to financial services it provides, women have been placed nearly at par with men as statistics have shown that access to mobile money among women stands at 84 percent compared to 89 percent for men (FII 2017).

1.1.3 Barriers to financial inclusion

Although males and females face similar barriers to financial inclusion, these barriers tend to be more pronounced for women. Culture, paucity of ordinary collateral (like land or assets which are more often than not registered in men's name), lower income levels in comparison with men, lack of financial literateness and financial institutions' ineptitude to designing suitable products and outreach schemes to reach women are some of the barriers that hinder women from being financially included.

Regarding self-reported barriers to financial inclusion, poorer people have cited lack of money while the more educated adults' concern has been on cost and confidence in the banking system. On the other hand, women's facilitators of financial exclusion have been associated with lack of identification documents and or dependence on other family members for assistance on financial services.

In as much as financial inclusion offers great benefits to individuals and households, a well-functioning financial system is of benefit to the entire country. The access to financial services is highly unequally distributed, with vulnerable people – and particularly poor women – frequently being underserved by existing institutions and systems. This is so despite substantial evidence of how different types of financial inclusion plans when properly conceived, designed and implemented could enhance women's participation in economic activities and empowerment. It is against this backdrop that this study seeks to identify determinants of financial inclusion among rural women to contribute to better

design and implementation of projects aiming to foster achievement of both gender equity and poverty eradication.

1.2 Statement of Problem

In general, women continue to lag behind men when it comes to drawing benefits from financial institutions and the services they offer. Compared to urban women, the situation for rural women is dire. While 73 percent of urban women were financially involved in 2017, only 61 percent of rural women reportedly utilized formal financial services in the same year (FII 2017). Studies targeting to ease reach and access to pecuniary services for rural women are either entirely lacking in the Kenyan context, have used data that lacks external validity or are concerned only with the technical aspects of barriers to financial inclusion. There is paucity of references when it comes to understanding the socio-economic and demographic determinants of financial inclusion among rural women generally and particularly in Kenya.

1.3 Objective of the Study

The broad objective of this study is to utilize the existing logistic regression model to find out the factors that determine financial inclusion among rural women in Kenya. The Specific objectives are:

1. To determine socio–economic and demographic factors that influence financial inclusion among rural women in Kenya
2. In view of 1, suggest policy recommendations for better financial inclusion programming for rural women.

1.4 Significance of the study

There are rich evidences in the literature that financial inclusion enhances the betterment of the living standards of the less fortunate and other marginalized, underprivileged or vulnerable groups of the society by improving their access to affordable financial services. This study’s focus, however, will be the rural Kenyan women in order to add to the pool of research to the existing findings and make more specific recommendations in targeting them. As argued above, these women are the least financially included compared to the urban women yet they also are the majority of the women. This study hence seeks to contribute not only to the discourse on financial inclusion for women in Kenya but also to highlight the mentioned socio-economic and demographic determinants to facilitate better and targeted interventions for financially including rural women. This is key in an effort to contribute to financial inclusion programs targeting rural women in Kenya

as well as other African countries that bench mark the Kenyan financial sector model. Further the results of the study will contribute to tailoring of the financial products and eventually increasing the probability of financially including rural women of Kenya.

2 LITERATURE REVIEW

The role of financial inclusion in empowering women has, for a very long time been well deliberated in the literature (Karpowicz, 2014; Akudugu, 2013; The World Bank, 2015; Han and Sherraden, 2009; Mullainathan and Shafi, 2009). More particularly, evidence exist for significant benefits of financially including not only households but also businesses (Aportela (1999); Ashraf et al. (2010); Banerjee et al. (2010); Collard et al. (2003); Dabla-Norris et al. (2014); Dupas and Robinson (2009); Karlan and Zinman (2010); Kempson and Whyley (1999); Marshall (2004). Of importance as well has been the existence of a pressing need for development of an all-inclusive financial system that requires financial product designers to tailor their products in line with their customer (or potential customers) needs. Therefore, these different needs by the different user groups must be given consideration so as to guarantee financial products appreciation by all.

Importantly, determining the drivers of financial inclusion that would improve the uptake of financial products need to be explored so as to be able close the persistent gender gap with women lagging 7 percentage points behind men (Global Findex, 2018). The situation is even dire for the rural women who are 10 percentage points behind their counterparts in the urban areas. Noteworthy is the fact that the level of financial inclusion varies across regions, countries and economies and the cause of these variations can either be micro or macro in nature. There has been an increasing focus on what actually determines financial inclusion both at the national and/or regional levels that has brought forth factual evidences. Exclusion can be voluntary or otherwise (de Koker and Jentzsch, 2011; Tita and Aziakpono, 2017).

Voluntary exclusion could be driven by such social aspects as religion, culture or purely lack of interest in the services on offer. Involuntary exclusion on the other hand, would emanate from lack trust in the financial system (Dittus and Klein, 2011) or other inhibitors including poor or inappropriate product designs, stringent eligibility criteria and affordability, (European Commission, 2008). Over and above the two exclusion groups (voluntary and involuntary), Olaniyi and Adeoye (2016) identified existence of another category they called 'self-withdrawn group'. This constitutes bank customers who succeeded in scaling access barriers but, for some reason, withdraw from the financial system.

The determinants of financial inclusion broadly classify either as demand or supply side driven. Whereas demand side factors encompass individual's socio-economic features such as, age, gender, income and education, supply side aspects pivot more towards individual attitudes and perceptions which determine decision to utilize financial products

and or services. World Bank (2015) portend that besides social characteristics, financial decisions can be influenced by attitude and behavioral traits. Han and Sherraden (2009), for instance found that an individual's saving decisions were largely influenced by their attitude. Additionally, poor and low-income individuals make decisions emotionally. Mullainathan and Shafi (2009) contend that for the poverty-stricken majority, small emotional queues have the potential to hamper prudent financial decisions like useful product adoption.

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Technology enhancements have also been proven to have a positive outcome on the access to financial services. Technology catalyzes effective distribution of financial products and services to especially the remotest of areas. Duncombe and Boateng, (2009) actually portend that improvements in technology has brought about easier access to financial products for particularly the women given that it reduces on the need to travel long distances.

Corinne et al. (2018) in their quest to find what drives women's financial inclusion across countries using the Global Findex dataset of 2014, found that the individual's background characteristics, for example, gender, educational attainment, age and income level were strongly related to an individual's financial inclusion status. There existed a strong negative nexust between being female and financial inclusion.

Allen et al. (2012) using World Bank Global Findex Data to analyze some of the individual attributes on a global scale. They found that the poorer, less educated, younger, rural, not formally employed, individuals that are not married or separated had a lesser likelihood of account ownership and saving formally with legal prudentially regulated financial institution. At the same time, the chances of borrowing formally tended to increase for the older, educated, richer and married men.

Fungáčová and Weill (2015) in a study aimed at understanding financial inclusion in China utilized the same dataset. They also concluded that the richer, the more educated, older

men were more likely to be financially included than their respective counterparts. Women on the other hand were less likely to be financially included due to lack of documentation or because another member of the family had an account. They also concluded that advanced education, higher income, being a man and older significantly influenced the level of being financially included. Working with the Argentina country level data the same authors also concluded that the income, age and level of education were the notable determinants of financial inclusion on the demand-side whereas low income and age were the bottlenecks when it came to involuntary exclusion.

Demirgüç,-Kunt et al. (2013a) in a study done in 64 economies with a total sample of 65,000 adults, tested the significance of being from the Muslim religion on owning a formal account, saving, credit, and barriers to financial inclusion. They found that Muslims resorted considerably less to formal account ownership and saving than non-Muslims. Nonetheless, they would not be less likely to borrow, either formally or informally, than non-Muslims. The less fortunate, the those with little education, women and rural adults were excluded from formal financial systems and this was regardless of their religion. Religion was however more cited as a hurdle to financial inclusion among Muslims.

Sanderson et al. (2018) while evaluating determinants of financial inclusion in Zimbabwe established that it is driven by education, financial literacy, age, distance to access points of financial services, income, proper documentation and connectivity to the internet as shown by their positive relationship to financial inclusion.

Soumaré et al. (2016) did a study in Central and West Africa on the factors that determine financial inclusion using the Global Financial Inclusion database (Global Findex). They singled out drivers of inclusion to be education, sex, age, income, marital status, urbanity, employment status and household size. The implication here is that in the Central and West African countries, financial inclusion is mostly influenced by individual's characteristics. Whereas gender was a positive significant determinant of financial inclusion in Central Africa, in West Africa, it was income.

Lianto et al. (2017) working in the Philippines, gathered evidence from a National Baseline Survey in an effort to espouse determinants of financial inclusion. They demonstrated that socio-demographic characteristics (sex, civil status, age, education, employment and income) were significantly associated with the access to various financial products and services.

Robin et al. (2016) while brainstorming on ways of bridging the gender gap, concluded that there are some major factors driving financial inclusion gender gap. They singled out low financial literacy levels among the women.

Clamara et al. (2014) in a Peruvian study pinpointed some of the socio-economic and locational factors that distinguish households using formal financial system. Their estimated

findings pointed out that the probability of using formal financial products and services tended to be lower with individuals possessing characteristics such as low education level, individual's marital status (being single), source of income (wages), gender (being female), low earnings and type of residence (rural area or small town). The same conclusions were made by Pena et al. (2014) who conducted a study that looked at the determinants of inclusion in Mexico and used the country's 2012 National Financial Inclusion Survey. Using regression analysis, education, employment and marital status were found to be positively explain usage of financial products and services.

Similarly, Akudugu (2013) conducting an analysis in Western Africa with a focus in Ghana, concluded that literacy, wealth class, age, distance, a lack of documentation, lack of trust for formal financial institutions, money poverty and social networks as reflected in family relations were the significant determinants of financial inclusion in Ghana. Using binary logit model, individual adult's age was positively influenced the propensity to be included in the Ghanaian formal financial market. In fact, the positive influence of age was statistically significant at 1 percent. Nevertheless, the impact of age reduces as one approach old age. This was captured in the age squared variable which was negatively related to the probability of inclusion. (significant at 1 percent). The inference here is that age assumes a quadratic function in explaining inclusion.

Arindam and Pravat (2011) studying financial inclusion determinants in some select districts of West Bengal in India, found that economic status of the household, level education and non-farm employment were significant predictors of financial inclusion. Economic status of the household was found to be positively and significantly correlated with the degree of financial inclusion while the level of education measured by the number of years of schooling was found to be statistically significant at 1 per cent level of significance.

Bhanot et al. (2012) while studying the phenomenon of financial inclusion in north-east India's two-states (Assam and Meghalaya), attempted to explore the various critical factors that influence financial inclusion in remote areas of India. The authors concluded that financial inclusion in these areas was very low with the income levels, awareness of financial products, and education levels of the respondents being found to be influential in determining financial inclusion. These same conclusions were also made by Kohli (2013) that the socio-economic factors such as income levels among individuals were found to have a significant influence on the level of financial inclusion in India.

Nandru et al. (2016) undertook a study, in an attempt made to explore the determinants of financial inclusion as measured by the account ownership in Pondicherry region in India. This research aimed to fill the gap by using primary data collected from Pondicherry region to examine the status of financial inclusion. The authors used a binary logistic regression model to analyze the data. Gender dimension, income levels, age, education

level and employment status were employed as independent variables. The results however indicated that only income and education levels had a significant impact on financial inclusion as measured by the ownership of bank account.

Tuesta et al. (2015) in their study which adopted three dimensional (supply side factors, individual factors and factors affecting perception) factors of financial inclusion in Argentina, reported a person's level of education, income and age as the significant cross cutting financial inclusion aspects. Put differently, these were factors at play from both an individual's perception and supply side perspectives.

Musa et al. (2015) in their investigation of drivers of financial inclusion and gender gap in Nigeria, used The Global Findex 2011 dataset. Binary Probit Model and Fairlie decomposition methodology was deployed. Youthful age, better education and high income turn out to be the factors that power inclusion in the Nigerian setting. On the contrary, female, old age and low income were the promoters of shrinking likelihoods for households to be financially included. The decomposition results confirmed existence of a gender inclusion gap favoring the male households.

The literature is vast with pointers to demographic and socio-economic characteristics such as age, level of education, financial literacy, employment status, income status of the households and marital status as the factors that influence financial inclusion. However, there is a dearth of studies when it comes to analysis of these factors in relation to financial inclusion among rural women. This gap therefore motivates this study to not only contribute to the discourse on financially including rural women but also to highlight socio-demographic factors that determine financial inclusion among rural women in Kenya. Most of the highlighted studies were not necessarily context specific and drew their analysis for wide ranging data. This study seeks to analyze the socio-economic and demographic determinants of financial inclusion among specifically rural women who are locality disadvantaged alongside all other barriers to financial inclusion for women. Additionally, majority of the studies have utilized probit models. This study makes use of logit models given its ease of estimation and interpretation.

3 METHODOLOGY

3.1 Data

This study will utilize the data from Financial Inclusion Insights Surveys. Specifically, the fifth survey (Wave 5) that was conducted in the year 2017. The surveys, since 2013, have been measuring the national trends on key indicators of financial inclusion with adults aged 15+ residing in households being targeted. The sample was drawn using multi stage cluster sampling from the fifth National Sample Survey and Evaluation Programme (NASSEP V) master sample drawn by the Kenya National Bureau of Statistics (KNBS) from the list of enumeration areas (EAs) created for the 2009 Kenya Population and Housing Census. One adult member of the household who would then be the respondent is randomly selected with the help of an automated Kish grid and the interview is administered face-to-face using a handheld tablet computers (CAPI). For the purpose of this study, the data was filtered to only include women aged 18 years and above and the final sample size was 1, 202 rural women.

In order to fully understand and enhance the ability to interpret the results from the modelling of the data to determine the socio-economic determinants of financial inclusion, the following key aspects would be key; odds and odd ratios. These are further explained below.

3.2 Odds and Odds Ratio

Odds is defined as the probability, chance or likelihood of an event occurring. The odds of the dependent variable, given some linear combination of regressors) can be equated to the exponential function of the linear regression expression. This is a clear illustration of how the logs serves as a link function between the probability and the linear regression expression. Given that the logit ranges between negative and positive infinity, it provides an adequate criterion upon which to conduct linear regression and the logit is easily converted back into the odds.

$$ODDS = \frac{\text{Probability of an event occurring}}{\text{Probability of an event not occurring}} \quad (3.1)$$

Odds ratio is a measure of the odds of an event occurring/happening in one group compared to the odds of a similar event occurring in another group and is equal to $\exp()$. They

are critical in comparing relative odds of event of interest occurring. For a categorical predictor variable, one level of the variable is selected as a reference and the other levels compared to it. It is given by the formula below.

$$O.R. = \frac{\text{ODDS of event occurring in group A}}{\text{ODDS of event occurring in group B}} \quad (3.2)$$

For interpretation we can classify the possible values into three categories:

- Values less than one; an odds ratio of less than one means that the event of interest is less likely to occur for the group in the numerator compared to the group in the denominator.
- The value one; an odds ratio of one means that both groups had the same odds of the event of interest occurring.
- Values greater than one; an odds ratio of greater than one means that the event of interest is more likely to occur for the group in the numerator compared to the group in the denominator.

3.3 Multiple Logistic Regression Model

This is a statistical tool used in analyzing the relationship between binary (dichotomous) categorical outcome variable and a set of predictors. It is represented by a mathematical equation. The model can either be simple (one predictor variable) or multiple (two or more predictors) logistic regressions. This model also can either be unconditional or conditional model. Conditional logistic regression (CLR) is a specialized type of logistic regression usually employed when the data one wants to analyze using binary logistic regression model are from a when matched case-control study design. On the other hand, when no matching is required, unconditional logistic regression model is used.

In this study we shall utilize the multiple unconditional logistic regression model. Multiple Logistic Regression Model is used in testing association between one dependent variable and two or more independent variables. This model can be specified as follows:

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \mu \quad (3.3)$$

(Where, p = probability of event occurring and $1-p$ = probability of event not occurring, β_0 is the intercept, β_k are coefficients of the predictors (x_k) and x_k are the independent or predictor variables of $\left(\frac{p}{1-p}\right)$. The transformed log value of the coefficient is an odd ratio.

For the multiple logistic regression model, the odds ratio is an adjusted odds ratio since we adjust (control) for all other predictors when assessing the effect of one predictor on the response variable.

This means that the probability that Y equals 1 is twice as likely (2.72 times to be exact) as the value of x is increased one unit. An odds ratio of .5 indicates that $Y = 1$ is half as likely with an increase of x by one unit (so there is a negative relationship between x and Y). An odds ratio of 1.0 indicates there is no relationship between x and Y .

Statistical significance of each of the regression coefficients, which implies a statistical association between the response and the predictor while adjusting for all other predictors, will be determined using two approaches:

- Use the confidence interval obtained for odds ratio: by testing the following hypotheses: $H_0 : O.R = 1$ vs. $H_1 : O.R \neq 1$. The predictor whose coefficient is being tested is statistically significant if the value 1 is not included in the interval, i.e. if the lower confidence limit is greater than 1 or the upper confidence limit is less than 1.
- Use z-test statistic for the regression coefficient corresponding to the predictor being considered: Test the hypotheses $H_0 : \beta = 0$ Vs $H_1 : \beta \neq 0$

$$Z = \frac{\hat{\beta}}{s.e(\hat{\beta})} \quad (3.4)$$

The test statistic is: the said predictor is statistically significant if the p-value is less than the chosen level of significance.

In order to establish the presence or lack of association, a statistical significance of the model has to be tested by comparing the fitted model with saturated and null models.

Hypothesis is stated in such a way that the null hypothesis considers the null model (one with the intercept only or does not contain any predictor variables) to be a better fit than the fitted model.

3.3.1 Likelihood Ratio Statistic

This is used such that, the chi square distribution has number of degrees of freedom equal to number of predictors in the fitted model. When comparing fitted mode to the null model, the hypotheses are:

H_0 : the null model is a better fit than the fitted model

H_1 : the fitted model is a better fit than the null model

If the p-value is smaller than the significance level, it implies that the model is statistically significant.

Also, in null hypothesis fitted model is assumed to be a better fit than the saturated model (has as many parameters as data values. It is said to be a perfect fit). Where LRT is the likelihood ratio statistic, L_s is the simpler model and L_g is the general (saturated) model, the formula for deriving LRT is therefore:

$$LRT = -2\log_e \left(\frac{L_s(\hat{\theta})}{L_g(\hat{\theta})} \right) \quad (3.5)$$

$$= 2\log L_g - 2\log L_s \quad (3.6)$$

3.3.2 Deviance Statistics

Deviance is a goodness-of-fit statistic for a statistical model; it is often used for statistical hypothesis testing. It has a chi square distribution with number of degrees of freedom equaling to the sample size minus the number of parameters in the fitted model. It is the fit of the observed values (Y) to the expected values (\hat{Y}). The larger the difference (or "deviance") of the observed values viz a vis the expected values, the poorer the fit of the model. So, at all times a smaller chi-square is ideal if possible. It is expected therefore that as more variables are added to the equation the deviance should get smaller, indicating an improvement in fit. The hypothesis to be tested would be:

H_0 : the fitted model is a better fit than the saturated model

H_1 : the saturated model is a better fit than the fitted model

Deviance is calculated using the below general formula:

$$D^* = 2\ln \left(\frac{L_f}{L_c} \right). \quad (3.7)$$

Where L_f the log-likelihood of the full model and L_c is the log likelihood of the model with a subset of terms from the full model. For a binomial :

$$D^* = 2 \sum_{N_i=1} y_i \left[\log_e \left(\frac{y_i}{\hat{y}_i} \right) + (n_i - y_i) \log_e \left(\frac{n_i - y_i}{n_i - \hat{y}_i} \right) \right] \quad (3.8)$$

Where D is deviance, L_i and $L_e y_i$ are the number of events for the i th row, y_i is the estimated mean response of the i 'th row and n^i is the number of trials for the i th row.

A small p-value means we reject the null hypothesis therefore implying a lack of fit. If results are non-significant, then the null hypothesis is true (meaning the fitted model is statistically significant).

- For positive regression coefficient, the transformed value of log will be greater than one to imply that event of interest is more likely to occur.
- For negative regression coefficient, the value of the antilogarithm will be less than one to imply that event of interest is
- Zero regression coefficients will be transformed to one, to be interpreted that the coefficient does not change odds of event in either way.

3.4 Software

R-programming will be used in the regression analysis, SPSS (Statistical Package for the Social Sciences) will be used in the production of the descriptive statistics and more specifically the cross tables while latex will be used for writing the entire document.

R is preferred for regression analysis in this study over other analytic software because of a number of qualities it has. R enables editing of the script thus change in output without straining. It also enables the user to design a model relevant for regression. The software is also locally available and free, thus accessible by any reader of the study who may be interested in re-running the codes that will have been used in the analysis. Lastly, R is very suitable for data management.

SPSS on the other hand is a preferred tool of analysis for the descriptive statistics because it provides flexibility in choosing whichever variable is needed in the x-axis and has no limit on the number of categories for the dependent variable. Further, though SPSS allows you to calculate and choose which percentages to display for all three (row, column and total), thus avoiding production of a cluttered output which makes it easier to interpret.

Since the study is scientific in its nature, it will be prudent to prepare it in latex. It comes in very handy when dealing with mathematical notation (Layout and entry are generally easier using LaTeX than some other sort of equation editor), Consistent handling of intra-document references and bibliography, Separation of content and style, and is better at preparing complex tables and illustrations.

4 DATA ANALYSIS

4.1 Descriptive Analysis

For the purpose of this study, the variables to be used are described explicitly in table 1.

Variable	Description of variable	Measurement of the variable
Age	The age of the respondent in completed years	Age (18+)
Age squared	The age squared of the respondent in years	
Economic status	Adults living on less than Kshs 250 and more than Kshs 250 per day are classified as below and above poverty line respectively, classification by the Grameen PPI.	1= Below poverty line 0, Otherwise
Employment status	Activity mainly involved within the past 12 months	Unemployed/seeking jobs (1=Yes 0, Otherwise) Housewife or student (1=Yes 0, Otherwise) Retired or disabled or other (1=Yes 0, Otherwise) Gainfully employed (1=Yes 0, Otherwise) [Reference category]
Marital status	Current marital status of the respondent	Married (1=Yes 0, Otherwise), Separated/widowed/divorced (1=Yes 0, Otherwise), Single/never married (1=Yes 0, Otherwise) [Reference category]
Financial Literacy	Is measured by the Standard and Poor's Rating Service's Global Financial Literacy Survey as basic knowledge of four principles concepts in regards to decisions around finances (interest rates, interest compounding, inflation, and risk diversification)	1=Yes 0, Otherwise
Identification Ownership	Respondent in possession of an accepted identification document necessary for registration for formal financial services i.e National ID and passport	1=Yes 0, Otherwise

Table 4.1. Description of the variables

Variable	Description of variable	Measurement of the variable
Phone ownership	Respondent owns a phone personally	1=Yes 0, Otherwise
Education level	The highest level of education attained	Primary education (1=Yes 0, Otherwise) Secondary education (1=Yes 0, Otherwise) Higher education (1=Yes 0, Otherwise) No formal education (1=Yes 0, Otherwise) [Reference category]
Literacy	Able to read and write	1= Basic literacy 0 Otherwise
Numeracy	The ability to perform simple mathematics, which includes counting, addition, division, multiplication and computation of short- and long-term interest rates.	1= Basic numeracy 0, Otherwise
Household Head	Whether the respondent is the main decision maker in the respective households	1=Yes 0, Otherwise
Informal Group	Belong to any informal groups or Chama	1=Yes 0, Otherwise
Household size	The number of household members	

Table 4.2. Description of the variables

Overall, 69.6 percent of the surveyed respondents were financially included. While 67 percent of the financially included were above poverty levels, only 41 percent of the financially excluded made that cut. Out of the financially excluded, 75 percent were 35 years and below while only 25 percent were above 35 years. Additionally, 91 percent and 95 percent of the financially included rural women owned a phone and an identification document respectively as compared to only a third and 58 percent among the excluded in the same order. Households domiciling the respondents had members ranging from 1 to 11. The nexus between HH size and financial inclusion is shown in the discussions on household size variable as one of the financial inclusion determinants in the next section.

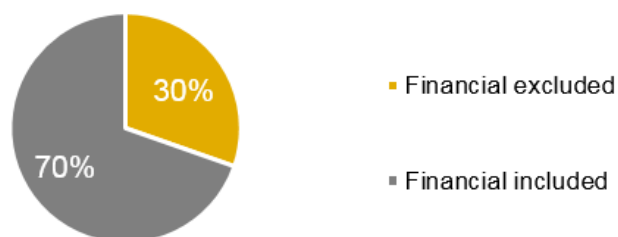


Figure 4.1. Financial Inclusion among rural women

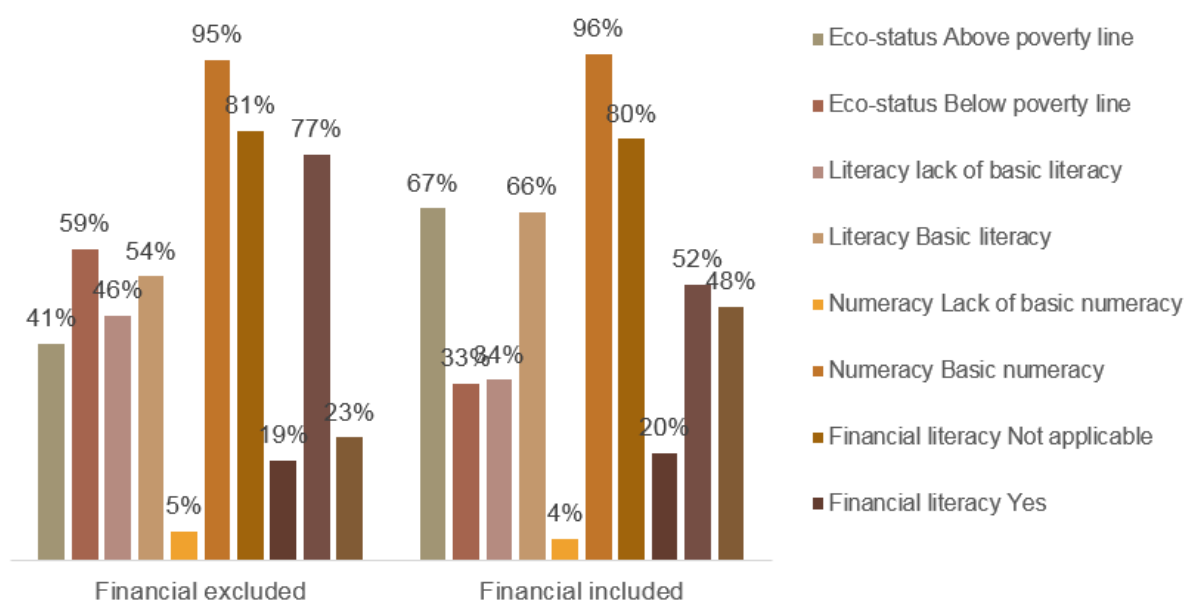


Figure 4.2. Financial inclusion by demographics

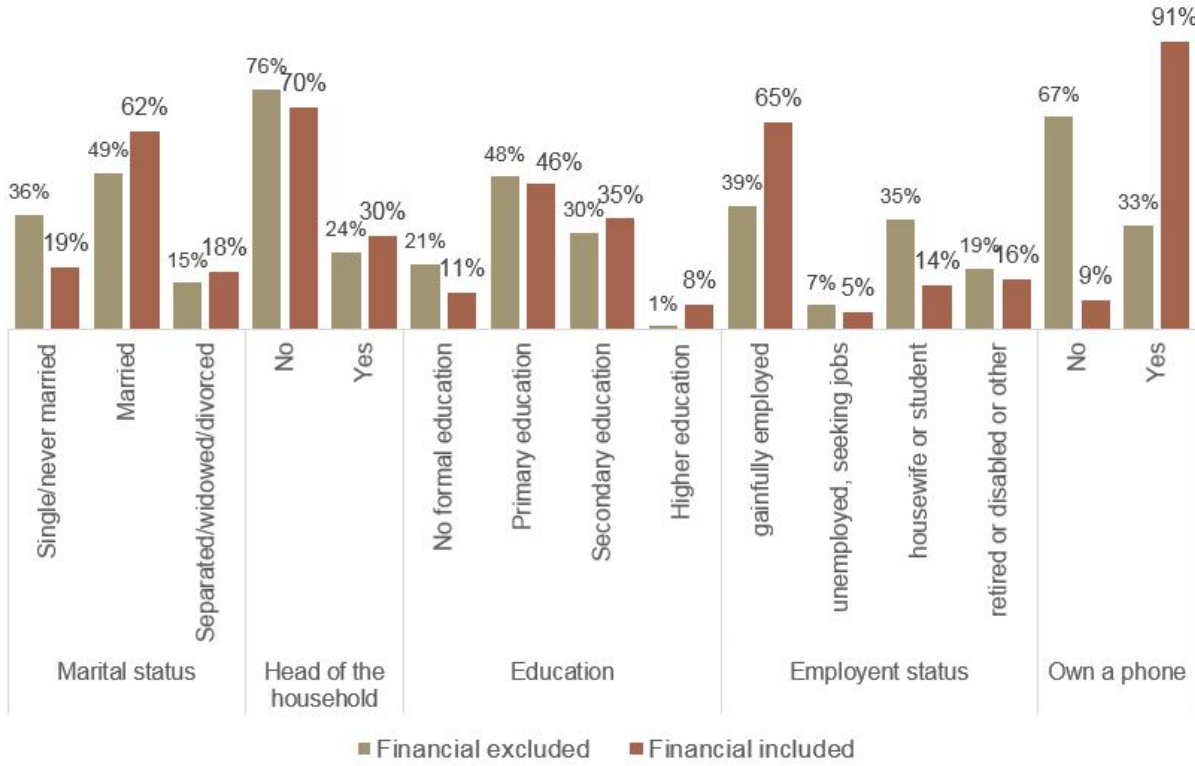


Figure 4.3. Financial Inclusion by demographic variables

Additionally, correlation analysis of the explanatory variables was done. This revealed a positive correlation between education level and literacy (ability to read and write). And although literacy was significant in predicting financial inclusion, this was removed from the final model simply because the education level could explain the ability to read and write on its own. The correlation matrix is as shown in figure 6.4 below.

	Eco-status	Literacy	Numeracy	Education	Age	Own a phone	Employment status	Have necessary ID	Financial literacy	Marital status	Head of the household
Eco-status	Pearson corr	1.00	-.298	-.437	-0.04	-.240	-.086	-.04	-.095	-1.23	0.06
	Sig. (2-tailed)		0.00	0.00	0.21	0.00	0.00	0.19	0.00	0.00	0.06
Literacy	Pearson Corr	-.298**	1	.537**	-.329**	.141**	-.039	-.089**	.135**	-.288**	-.179**
	Sig. (2-tailed)		0	0	0	0	0.175	0.002	0	0	0
Numeracy	Pearson Corr	-.104**	.243**	.229**	-.122**	0.018	-.083**	-.044	.110**	-.045	-.100**
	Sig. (2-tailed)	0	0	0	0	0.527	0.004	0.126	0	0.122	0.001
Education	Pearson Corr	.437**	.537**	1	.277**	.169**	.102**	0.055	.161**	.283**	-.142**
	Sig. (2-tailed)	0	0	0	0	0	0	0.055	0	0	0

Table 4.3. Correlation matrix for the explanatory variables.

	Eco-status	Literacy	Numeracy	Education	Age	Own a phone	Employment status	Have necessary ID	Financial literacy	Marital status	Head of the household
age	Pearson Corr	-.036	-.329**	-.277**	1	.155**	-.076**	.330**	-.066*	.416**	.354**
	Sig. (2- tailed)	0.212	0	0		0	0.009	0	0.022	0	0
Own a phone	Pearson Corr	-.240**	.141**	.169**	.155**	1	-.152**	.344**	0.027	.064*	.066*
	Sig. (2- tailed)	0	0	0	0		0	0	0.342	0.027	0.022
employment_stat: Employment status	Pearson Corr	.086**	-.039	-.102**	-.076**	-.152**	1	-.198**	-.022	-.043	-.081**
	Sig. (2- tailed)	0.003	0.175	0.004	0.009	0		0	0.439	0.138	0.005
Have the neces- sary ID	Pearson Corr	-.038	-.089**	-.044	.330**	.344**	-.198**	1	0	.279**	.119**
	Sig. (2- tailed)	0.189	0.002	0.126	0	0	0		0.996	0	0

Table 4.4. : Correlation matrix for the explanatory variables

		Eco-status	Literacy	Numeracy	Education	Age	Own a phone	Employment status	Have necessary ID	Financial literacy	Marital status	Head of the household
Financial literacy	Pearson Corr	-.095**	.135**	.110**	.161**	-.066*	0.027	-.022	0	1	-.026	0.019
	Sig. (2-tailed)	0.001	0	0	0	0.022	0.342	0.439	0.996		0.372	0.5
Marital status	Pearson Corr	.123**	-.288**	-.045	-.283**	.416**	.064*	-.043	.279**	-.026	1	.303**
	Sig. (2-tailed)	0	0	0.122	0	0	0.027	0.138	0	0.372		0
Head of the household	Pearson Corr	0.055	-.179**	-.100**	-.142**	.354**	.066*	-.081**	.119**	0.019	.303**	1
	Sig. (2-tailed)	0.056	0	0.001	0	0	0.022	0.005	0	0.5	0	

Table 4.5. : Correlation matrix for the explanatory variables.

** Correlation is significant at the 0.01 level (2-tailed) and * Correlation is significant at the 0.05 level (2-tailed).

4.2 Multiple Logistic Model

In order to evaluate the determinants of financial inclusion among rural women in Kenya, we performed a logistic regression estimation by use of the following equation:

$$\begin{aligned} \log \frac{p}{1-p} = & -5.80 + 0.14 \text{ Age} - 0.71 \text{ Economic status} \\ & - 0.34 \text{ Unemployed} - 0.57 \text{ Housewife or student} \\ & - 0.26 \text{ retired or disabled} - 0.18 \text{ Financial Literacy} \\ & + 1.66 \text{ Identification Ownership} + 2.66 \text{ Phone ownership} \\ & - 0.08 \text{ Primary Education} + 0.45 \text{ Secondary Education} \\ & + 1.52 \text{ Higher Education} - 0.001 \text{ Age squared} \\ & + 0.49 \text{ Married} + 0.47 \text{ Separated or widowed or divorced} \\ & + 0.47 \text{ Literacy} - 0.44 \text{ Numeracy} - 0.09 \text{ Household Head} \\ & + 0.54 \text{ Informal Group} + 0.14 \text{ Household size} \end{aligned} \quad (4.1)$$

Where age is represented in two measures: that is; one with the number of years (Age) and secondly, the square of age in order to control for possible non-linear relation between age and being financially included. Income is a dummy variable equal to 1 if a given household is above poverty line and zero otherwise. To take education level into account, we have used three dummy variables (primary education, secondary education and higher education). Primary education is a dummy variable equivalent to one if education is in the first education level and zero otherwise. Similarly, secondary and higher education dummies take the integer 1 for any levels reached and zero otherwise. 'No formal education' will be the reference level.

The results showed that those who owned a mobile phone were 14 times more likely to be financially included compared to those who did not have while controlling for all other factors. Additionally, numeracy, financial literacy and household headship were found to be insignificant. Stepwise selection was then employed to select the most important factors to be included in the final model.

Results of the estimation of the determinants of financial inclusion among rural women using logit model are presented in Table 6.

Coefficients:	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	-5.80357	0.8029537	-7.228	4.91E-13	***
Below poverty line	-0.7094821	0.2279633	-3.112	0.001857	**
age	0.1384225	0.0305546	4.53	0.00000589	***
age_squared	-0.0012353	0.0003313	-3.728	0.000193	***
Basic Literacy	0.4735694	0.2288568	2.069	0.03852	*
Lack baic Numeracy	-0.4414295	0.4135399	-1.067	0.285773	
Primary Education	-0.0808588	0.2827166	-0.286	0.774873	
Secondary education	0.4485157	0.3552497	1.263	0.206756	
Higher education	1.5191128	0.7114976	2.135	0.032753	*
own_phone; Yes	2.6631471	0.1939555	13.731	< 2e-16	***
financial_literacy; Yes	-0.181441	0.2311397	-0.785	0.432463	
Unemployed/seeking jobs	-0.3425353	0.3707171	-0.924	0.355497	
Housewife or student	-0.568102	0.2476246	-2.294	0.021779	*
Retired or disabled or other	-0.2597132	0.2505294	-1.037	0.299895	
household_size	0.1353074	0.055258	2.449	0.014339	*
hh_head	-0.0849883	0.2787137	-0.305	0.760419	
ID; Yes	1.6590671	0.2544992	6.519	7.08E-11	***
informal_society; Yes	0.5350163	0.204798	2.612	0.008991	**
Married	0.489015	0.2516659	1.943	0.052003	
Separated/widowed/divorced	0.4680254	0.3361954	1.392	0.163885	

Table 4.6. Estimation of determinants of financial inclusion among rural women

.Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. (Dispersion parameter for binomial family taken to be 1): Null deviance: 1475.90 on 1201 degrees of freedom, Residual deviance: 827.24 on 1182 degrees of freedom, AIC: 867.24

4.2.1 Reduced Logistic Model Using Stepwise Selection

$$\begin{aligned}
\frac{P}{1-p} = & -5.54 + 0.13 \text{ age} - 0.49 \text{ economic Status} - 0.35 \text{ Unemployed} \\
& - 0.50 \text{ Housewife or student} - 0.23 \text{ retired or disabled} \\
& + 1.66 \text{ identification ownership} + 2.66 \text{ phone ownership} \\
& + 0.14 \text{ Primary Education} + 0.78 \text{ Secondary Education} \\
& + 1.81 \text{ Higher Education} - 0.001 \text{ age squared} + 0.49 \text{ Married} \\
& + 0.27 \text{ Separated or widowed or divorced} + 0.56 \text{ informal group}
\end{aligned} \tag{4.2}$$

With the use of step wise selection, the data was modeled and resulted in the above reduced model and was found to be more robust than the saturated model as the latter's residual deviance was higher than the former at 980.24 and 840.0 respectively. The p-value was found to be 0.03 and we therefore concluded that the reduced model was a better fit than the saturated model. The results from this reduced model are as in table below.

Coefficients:	Estimate	Std.Error	zvalue	Pr(> z)	OR	0.025	0.975
(Intercept)	-5.5422443	0.7056177	-7.854	4.02e-15***	0.003917724	0.000957843	0.01528052
own_phone; Yes	2.6636979	0.1911488	13.935	<2e-16***	14.34925293	9.923525362	21.01005532
ID; Yes	1.6553763	0.2549456	6.493	8.41e-11***	5.235049589	3.189473355	58.67721617
informal_society; Yes	0.5558442	0.2021323	2.75	0.005961**	1.743412156	1.176053165	2.60042234
Below poverty line	-0.4873446	0.2004105	-2.432	0.015027*	0.614255327	0.414282961	0.90974709
age	0.126318	0.029487	4.284	1.84e-05***	1.134642931	1.071128103	1.20284471
age_squared	-0.0011499	0.0003206	-3.586	0.000335***	0.998850798	0.998217459	0.99947887
Primary education	0.1445984	0.260798	0.554	0.579274	1.155575373	0.692116676	1.92639734
Secondary education	0.7836677	0.3171195	2.471	0.013466*	2.189487851	1.178773333	39.09294077
Higher education	1.8086676	0.6937565	2.607	0.009132**	6.102311352	2.769766404	28.93801817
Married	0.4893086	0.2324808	2.105	0.035315*	1.631188062	1.031468106	2.56939142
Separated	0.2711555	0.3118149	0.87	0.384517	1.311478982	0.711972209	2.42139857
Unemployed, seeking jobs	-0.3497995	0.3625629	-0.965	0.334647	0.704829415	0.349034035	1.44905642
Housewife or student	-0.5026136	0.2425066	-2.073	0.038212*	0.604947486	0.376718957	0.97587755
Retired or disabled	-0.2335906	0.2466446	-0.947	0.343601	0.791685895	0.4898041	1.28963266

Table 4.7. Estimation of determinants of financial inclusion among rural women

.Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. (Dispersion parameter for binomial family taken to be 1): Null deviance: 1475.9 on 1201 degrees of freedom, Residual deviance: 840.0 on 1187 degrees of freedom, AIC: 870. Number of Fisher Scoring iterations: 6

From the above results, we reject the null hypothesis (H_0 : the null model is a better fit than the fitted model) and fail to reject the alternative (H_1 : the fitted model is a better fit than the null model). Put differently, the variables in the fitted model best explain financial inclusion among rural women in Kenya. The association between the said variables and financial inclusion among rural women is explored in the next section. Unless stated, all individual variable interpretations are given at 95 percent CI while keeping all other variables constant and variables are considered significant where the CI is exclusive of 1.

Phone Ownership

Rural women who owned a mobile phone were 14 times more likely to be financially included compared to those who do not own. Mobile phone ownership has been found to be an important enabler of financial inclusion especially in settings where mobile money has taken root. It enhances mobile money accessible and use. Additionally, mobile money particularly in Kenya continues to drive expanded financial inclusion (similar results as in FinAccess 2019).

Identification Documents Ownership

One of the know your customer (KYC) documents required when opening any financial account in Kenya is an identification document (which could either be a national identification card or passports (Kenyan or International)). This study found that, women with requisite identification documents were 5 times more likely to be financially included compared to those without.

Age

The results showed a positive relationship between age and financial inclusion. The inference is that financial inclusion increases with additional unit of age until it reaches an optimal age beyond which it begins to decrease. This is substantiated by the negative coefficient of the age squared variable. This result is similar to a number of other studies, example (Peña et al., 2014; Hoyos et al., 2013). Simply put, as rural women age, they become aware of the various financial products and services and are likely to start using them. This continues until they reach a certain phase (probably towards retirement age) when their chances of using the various financial services begin to diminish. In a nut shell, rural women are more likely to be financially included, but after a certain age, the probability of inclusion shrinks.

Economic Status

Economic status of a household was found to be a significant factor in determining financial inclusion among rural women in Kenya. Those from households below poverty level were less likely to be financially included compared to those who were in households above poverty levels. As people move out of poverty therefore, financial inclusion tend to increase.

Highest Educational Level

For a rural female who has higher education, the probability of being financially included increases by 151 percent compared to those with no formal education. On the other hand, those with secondary education were also found to be twice more likely to be financially included than the reference group. Interestingly, those with primary education were less likely to be financially included compared to no formal education category. As earlier explained, education will be used as a proxy for measuring literacy and the assumption here is, a rural woman with at least a primary education knows how to read and write. That said, literacy is often an invisible obstacle in the effort towards expanding financial inclusion to the unbanked group. Systems that theoretically work, often do not especially when poor people (below poverty levels) are incapable of mastering their use . If one cannot read or understand their receipts or mobile money text messages, confidence that they have received the correct amount of money goes down. Almost 40 percent of the rural women were found to be illiterate and in most cases these women, even when financially included, relied on other parties to help them with registration and undertaking transactions. Trust also becomes an issue and therefore some end up being excluded involuntarily. This study found that, those who were literate (defined as those with the ability to read and write), were found to be almost twice more likely to be financially included compared to the illiterates.

Informal Society

Being a member of an informal group like a chama, merry-go-round and VSLA increases the likelihood of a rural woman being financially included. Rural women who were members of the informal societies were twice likely to be financially included compared to non-informal group members.

Employment status

Rural women who were unemployed, seeking jobs, housewives, student, retired or disabled were all less likely to be financially included as compared to those who were gainfully employed (salaried, self-employed or seasonal worker). Specifically, those who were housewives or students showed significant results for financial exclusion.

5 CONCLUSION AND RECOMMENDATION

The value of financial inclusion for a sustainable development and economic growth as well as being a key element in increasing prosperity (by increasing accessibility to financial services e.g savings and credit) and reducing poverty is a proven fact (D. Sharma, 2016). Although financial inclusion in Kenya is remarkably high compared to most of the East African communities, women in Kenya have continued to lag behind their male counterparts for the longest time. As earlier observed, even among women themselves disparities are seen for the urban and rural women. In addition, the gender gap in formal financial inclusion, has been attributed to, in most times, to the inability of women to show collateral, their poor awareness on financial education and lower business experience.

In line with this study's objective (to determine the socio-economic and demographic factors that influence financial inclusion among rural women in Kenya), it has demonstrated that financial inclusion among rural women is driven by most importantly mobile phone ownership. Owning a mobile phone tremendously increases the chances of one being financially included.

The findings further showed that, as the level of education increases, the individual rural woman is more likely to be financially included. The probable logic for this observation may be undoubtedly associated with the financial capability of educated rural women to not only afford holding a financial account and present personal guarantees when required but also being aware of financial products and services. Education level has also been established to go parallel with income levels which is a vital ingredient of inclusion (Demirgüç-Kunt et al.). These findings further supports the view that strategic policies favoring financial inclusion should target rural women in Kenya in order to reduce the persisting gender gap.

Ownership of an identification document (National Identification Card and/or passports (Kenyan or International) was also found to increase the likelihood of a rural woman being financially included. Additionally, belonging to an informal society/chama as has been established in this study, increases the chances of a rural woman being financially included. In this regard, it is important for the financial institutions to leverage this and develop products that would incentivize informal group members to take up formal financial services. One way to explore this would be by making products and services more affordable and convenient. Additionally, financial education should be done targeting the rural women to improve their financial capability and knowledge with the aim of improving them and as a result increase in their ability to make informed financial decisions.

In summary, overall, this study has established that financial inclusion is driven by mobile phone ownership, identification card ownership, economic status, highest education level, belonging to informal society and age. This implies that an increase in variables like economic status, employment, identification ownership and mobile phone ownership among rural women will most likely increase the level of financial inclusion among them and drive economic empowerment among the rural women.

REFERENCES

AKUDUGU *The determinants of financial inclusion in Western Africa: Insights from Ghana. Research Journal of Finance and Accounting*, 4(8), 1-10.

ALLEN, FRANKLIN; DEMIRGUC-KUNT, ASLI; KLAPPER, LEORA; PERIA, MARIA SOLEDAD MARTINEZ *The Foundations of Financial Inclusion: Understanding Ownership and Use of Formal Accounts. Policy Research Working Paper; No. 6290. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/12203> License: CC BY 3.0 IGO.*

“*Studying financial inclusion in north-east India*”. *International Journal of Bank Marketing*, 30(6), 465-484.

CHITHRA, N., SELVAM, M. *Determinants of financial inclusion: An empirical study on the inter-state variations in India. Available from: <https://www.ssrn.com/abstract=2296096>. [Last accessed on 2016 Nov 17]*

CLAMARA, N., X. PENA, AND D. TUESTA. 2014 *Factors that Matter for Financial Inclusion: Evidence from Peru*. BBVA Working Paper 14/09.

DEKOKER, L., JENTZSCH, N. (2011) *Financial Inclusion and Financial Integrity: Aligned Incentives? In: Shadow 2011: The Shadow Economy, Tax Evasion and Money Laundering: Proceedings of the 2011 Shadow Conference, University of Münster, Münster, Germany. p1-28.*

DELECHAT, C CORINNE ;NEWIAK, MONIQUE ; XU, RUI ; YANG, FAN ; ASLAN, GOKSU (2018) *What-is-Driving-Womens-Financial-Inclusion-Across-Countries. Working Paper No.*

DEMIRGÜC, KUNT, A., KLAPPER, L., RANDALL, D., 2013 *Islamic Finance and Financial Inclusion: Measuring Use of and Demand for Formal Financial Services among Muslim Adults (Policy Research Working Paper No. 6642). The World Bank, Washington, DC.*

DITTUS, P., KLEIN, M. (2011) *On Harnessing the Potential of Financial Inclusion,*” *BIS Working Papers No. 347. Available from: <http://www.treasury.nl/files/2011/06/On-harnessing-the-potential-offinancial-inclusion.pdf>.*

DUNCOMBE, R., BOATENG, R. (2009) *Mobile phones and financial services in developing countries: A review of concepts, methods, issues, evidence and future research directions*. *Third World Quarterly Journal*, 30(7), 1237-1258.

Financial Services Provision and Prevention of Financial. Available from: <http://www.ec.europa.eu/social/BlobServlet?docId=7611&langId=en>.

HAN, C.K., SHERRADEN, M. (2009) *Attitudes and saving in individual development accounts: Latent class analysis*. *Journal of Family and Economic Issues*, 30(3), 226-236.
<https://blogs.worldbank.org/endpovertyinsouthasia/enabling-digital-financial-inclusion-rural-women-emerging-findings-india>
<https://www.brookings.edu/blog/techtank/2016/04/01/bridging-the-financial-inclusion-gender-gap/>

ISSOUFSOUMARÉ, FULBERTTCHANATCHANA AND THIERRY MARTIAL KENGNE (2016) *Analysis of the determinants of financial inclusion in Central and West Africa*, *Transnational Corporations Review*, 8:4, 231-249, DOI: 10.1080/19186444.2016.1265763.

KARPOWICZ I. 2014 *Financial Inclusion, Growth and Inequality: A Model Application to Colombia*. *IMF Working Papers*, WP/14/166. Available from <https://www.imf.org/external/pubs/ft/wp/2014/wp14166.pdf>

KHOLI N. 2013 "Financial Inclusion and its Impact on Banking Sector in India". *Tecnia Journal of Management Studies*, 7(2).

KUMAR N.). "Financial inclusion and its determinants: Evidence from India". *Journal of Financial Economic Policy*, 5 (1), pp. 4-19

L, FUNGACOVA. AND L. WEILL, (2014) *Understanding Financial Inclusion in China*. *BOFIT Discussion Papers*, 10/2014. 8.4.2014. Download: [dp 10141.pdf](#)

LLANTO, GILBERTO M., AND MAUREEN ANE D. ROSELLON (2017) *What Determines Financial Inclusion in the Philippines? Evidence from a National Baseline Survey*. No. DP 2017-38

MULLAINATHAN, S., SHAFIR, E. (2009) *Savings Policy and Decision making in Low-Income Households*. In: Blank, R.M., Barr, M.S., editors. *Insufficient Funds: Savings, Assets, Credit, and Banking amongst Low-Income Households*. New York: Russell Sage

MUSA, A., ABDULLAHI, B., IDI, A., TASIU, M. (2015) *Drivers of financial inclusion and gender gap in Nigeria. The Empirical Econometrics and Quantitative Economics Letters*, 4(4), 186-199

NANDRU, PRABHAKAR AND ANAND, BYRAM AND RENTALA, SATYANARAYANA. (2016) *Determinants of financial inclusion: Evidence from account ownership and use of banking services. International Journal of Entrepreneurship and Development Studies*. 4. 141-155

OLANIYI, E., ADEOYE, B. (2016) *Determinants of financial inclusion in Africa: A dynamic panel data approach. University of Mauritius Research Journal*, 22, 310-336

Peña, P., Hoyo, C., Tuesta, D. (2014) *Determinants of Financial Inclusion in Mexico based on the 2012 National Financial Inclusion Survey (ENIF). Working Paper N° 14/15 BBVA Research. Available from: [http://www.scirp.org/\(S\(czeh2tfqyw2orz553k1w0r45\)\)/reference/ReferencesPapers.aspx](http://www.scirp.org/(S(czeh2tfqyw2orz553k1w0r45))/reference/ReferencesPapers.aspx)*

SANDERSON ABEL AND LEARNMORE MUTANDWA AND PIERRE LE ROUX, 2018 "A Review of Determinants of Financial Inclusion," *International Journal of Economics and Financial Issues, Econjournals*, vol. 8(3), pages 1-8.

SILVA, A.K.C. AND ABEYWARDANA, N.L.E. 2016 *Determinants of the Financial Inclusion in Sri Lanka. 4th Students' International Conference on Business (SICB 2016), Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka. p 09.*

SOUMARÉ, I., TCHANA, F.T., KENGNE, T.M. (2016) *Analysis of the determinants of financial inclusion in Central and West Africa. Journal of Transnational Corporations Review*, 8(4), 231-249.

TITA, A.F., AZIAKPONO, M.J. (2017) *The effect of financial inclusion on welfare in sub-Saharan Africa: Evidence from Disaggregated Data. ERSA Working Paper 679. Available from: https://www.econrsa.org/system/files/publications/working_paper <https://www.cgap.org/blog/literacy-hidden-hurdle-financial-inclusion>*

DIPASHA SHARMA (2016) "Nexus between financial inclusion and economic growth", *Journal of Financial Economic Policy*, Vol. 8 No. 1, pp. 13-36