GENDER, ACCESS TO CREDIT AND FINANCIAL HEALTH IN KENYA: LESSONS FROM KENYA NATIONAL FINACCESS SURVEY 2019

JUNEWEENEX WAITHIRA MBUTHIA

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DECLARATION

STUDENT'S DECLARATION

This research paper is my original work and has not been presented for an award degree in any other university.

SIGN ……………………………….   **DATE…..**…………………….

NAME: JUNEWEENEX WAITHIRA MBUTHIA

REG. NO: X50/5880/2017

SUPERVISOR'S DECLARATION.

I confirm that the work in this research paper has been done by the student under my supervision.

SIGN ……………………………………………**DATE**……………………..

DR JOY MUENI KIIRU

SCHOOL OF ECONOMICS

UNIVERSITY OF NAIROBI

DEDICATION

To the *BONIFACE MBUTHIA MUHIKA* Family

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

CBK   : Central Bank of Kenya

Fin Access   : Financial Access

FSD   : Financial Sector Deepening

GDP   : Gross Domestic Product

GOK   : Government of Kenya

KNBS   : Kenya National Bureau of Statistics

MFIs   : Micro Finance banks

MTP III   : Third Medium Term Plan

ABSTRACT

Over the years, financial inclusion in Kenya has been improving and the gender gap in access to financial services has been narrowing. The finacess survey 2019 holds that despite the narrowing financial inclusion gap the national financial health has been declining, meaning that more men and women are unable to use financial products and services for daily needs, to cope up with shocks and risks, and to invest for future use. The co-existence of financial inclusion with poor household financial health forms the crust of the research problem in this study. The study has two main objectives: To analyse whether there is any relationship between sources of credit and household financial health; and to analyse the determinants of household financial health. We use Kenya National Finaccess Survey 2019 data and employ the Multinomial Probit and Probit models for analysis.

The study considered four kinds of credit sources, (Formal, Formal others, Informal, and Excluded) where formal represents formal prudential, formal others refers to formal non prudential and formal registered, informal represent informal sources while excluded refer to those who seeks credit from friends, family and neighbours.

We find that majority of the individuals seek credit from formal others. However, individuals accessing credit from formal others are less likely to be financially healthy compared those seeking credit from formal sources. Women are more likely to seek from formal other compared to men. Other findings from the study indicate that individuals with higher education and higher income are more likely to access credit from formal sources and are more likely to be financially healthy. However, we find an inconclusive result on whether gender is a determinant of the financial health of an individual. We recommend monitoring, transparency and customer protection in formal others (digital credit) market where majority of the credit consumers are financially unhealthy.

CHAPTER ONE

1.1 Background of the study

In most of the countries today, governments thrive to ensure that the poor access basic needs and services. Sub-Saharan African countries have recorded remarkable economic performance that has resulted in improving the living standards of the poor. According to World Bank Poverty report (2015), The Sub-Saharan African countries have reduced the number of people in the state of extreme poverty from 36per cent in 1990 to 10per cent in 2015. However, the progress has been uneven and the poverty levels still remains high especially to individuals living in the Sub-Saharan Africa.

In Kenya, the level of poverty in the country has been rising with lack of access to resources and poverty being more than 50per cent of its 40 million people (GOK, 2010). However, interventions such as the Poverty Reduction Strategies of 1999 - 2015 (GOK, 1999), Economic Recovery Strategy (2003-2007) and, the Kenya Vision 2030, have been put in place to address poverty and aims at transforming Kenya into an industrious country 2030 (GOK, 2010). Further, the Third Medium Term Plan (MTP III, 2018-2022), aims at the goals on gender equity and poverty elimination, inequality of opportunity to both men and women in accessing all resources and improving their living standard. To address poverty globally, financial institutions has become necessary driver in provision of financial, economic and monetary services to the poor.

Financial inclusion derives positive effect to the economy through utilization of financial goods and services by both households and firms. Demirgüç-Kunt (2008) and World Bank (2008) show that access to financial goods and services attributes greatly to reducing poverty levels and inequalities. Further, it is a driver to entrepreneurship, enhancing savings and investment to propel economic growth. Its explained by interaction of access to financial products and improving

households' direct income and welfare through increased consumption, increased productive investments and entrepreneurship among women and reduce gender income inequality (Dupas and Robinson, 2013). The experience across economies in Sub Sahara Africa (SSA) countries is unique depending on the financial characteristics of each economy. Demirguc-Kunt, (2015) reveals high level of access to financial product inclusion in Southern Africa region mainly attributed by driven by the South Africa's stable financial market while that in Eastern Africa is mainly attributed to extensive uptake of the mobile money system adoption in Kenya.

1.1.1 Financial Sector in Kenya

Financial sector in Kenya is divided broadly into formal and informal subsectors. Formal subsector is further categorized into formal Prudential Financial product and services providers which includes of the commercial banks, Micro Finance banks (MFIs), insurance providers, Deposit Taking SACCOs, and capital markets intermediaries. The formal non-Prudential Financial providers includes, money transfer services like M-Pesa, NSSF, NHIF and Postbank while formal registered comprise of Mobile Money Apps/ digital Apps, Non-deposit taking SACCOs, and Development financial institution (DFIs). The informal financial providers comprise of *chamas*, shop owners, family, shylocks, and friends. The government regulates the formal source through Central Bank of Kenya (CBK) while most of the informal institutions are unregistered but have an appropriate organizational structure (FSD, 2019).

The Kenyan financial sector has gradually transformed due to the adoption of technological innovations such as the use of Digital applications, mobile money services and automated teller machines (ATMs). These innovations have paved way to allow expansion on access to credit by individuals. The expansion has further improved the access to affordable credit and more deposit

facilities. This has therefore, increased efficiency in allocation of credit, ease transfer of money through agent and mobile banking, and hence increasing the financial inclusion, (FSD, 2016).

The Kenyan Financial sector has continued to developed through the implementation of policy reforms aimed at better provision of services to every individual even with the changes in the global and local economy. The sector also aims at achieving the goal of reducing inequalities and reducing poverty in the country as stated in the Vision 2030. In the Kenyan Vision 2030, under the Economic pillar policy it states clearly the importance of financial sector in the economy.

Kenya's goals and objectives for financial sector are to improve access to financial services; thus increasing the domestic savings that translates to higher investment; improved service delivery in the financial market; maintain stability in the market; favorable economic environment that will encourage uphold investor's confidence in the country and finally to make Kenya's financial market ranked the best in Africa by 2030 (Vision 2030). From the Vision 2030, through the Third Medium Term Plan (MTP III, 2018-2022), aims at improving the Financial Service Sector geared towards financing the "Big Four" Agenda on increasing the contribution of manufacturing sector up to 15per cent of the GDP; improving on the food security in the country by year 2022; achieving the universal health care by all the citizens and finally providing 500,000 affordable housing to Kenyans.

However, financial inclusion has been increasing while gender gap in accessing credit narrowing simultaneously over the years. According to World Bank report (2018) on Global Financial Inclusion, indicates that financial access has risen globally, attributed by the use mobile phones and internet, but gains have been uneven across counties. The report also reveals being a man increases the probability of owning an account. Hence, gender gap has remained to stand at 9per

cent points in most developing countries since 2011, despite the origination of new formal loans and other financial services.

The 2019 Kenya National Finacess survey reveals the financial gender gap is narrowing. Access to formal credit for male has increased by 6per cent and female by 9per cent comparing the years 2016 and 2019.This can be explained by the rapid growth of digital loans apps and use of mobile to access credit. Access of mobile money has overtime been accepted to be a formal channel of access to financial services. In addition, the survey revealed that digital apps loans rose from 0.6 per cent to 8.3per cent years show 2016 to 2019. An indication that the role of emerging unregulated loan providers is playing critical role in financial sector.

Figure 1: Access to Credit by categories (per cent) from years 2006-2019 in Kenya
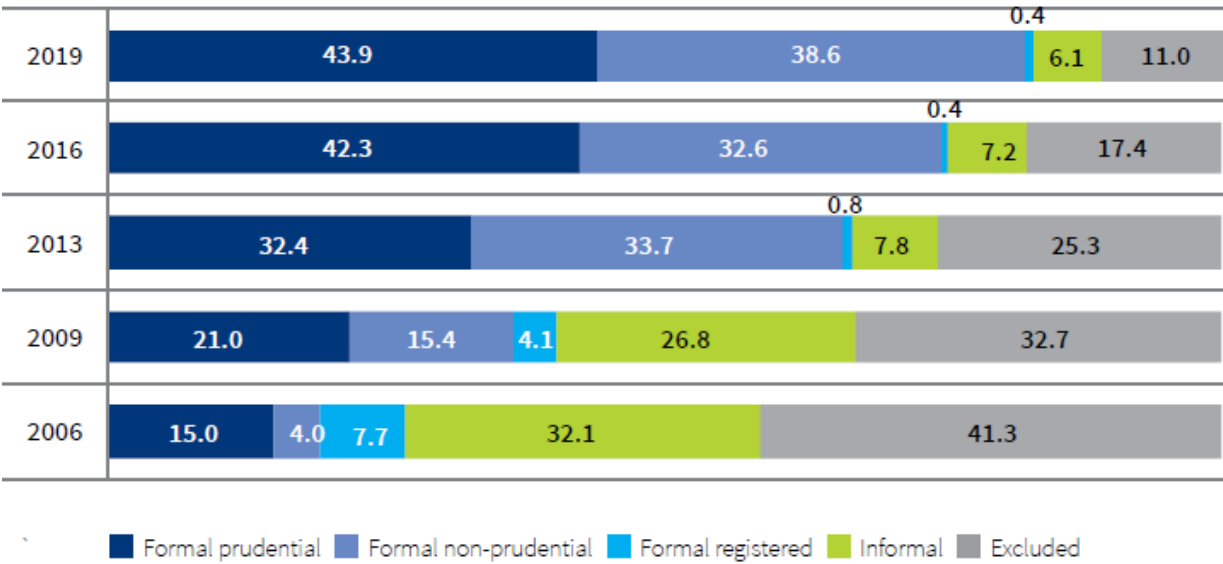
Source: The Financial Access (FinAccess) Household Survey 2019.

Figure 1 shows increasing access to credit from formal financial category over the period (2006 – 2019). Informal credit has declined from 32.1 percent in 2006 to 6.1 percent in 2019. These

dynamic changes are mainly due to the uptake of mobile and digital financial services since 2007. Partnership and innovations such as mobile and agent banking have also positively contributed to increase in access of financial services.

1.2 Statement of Problem

Financial inclusion has been increasing while gender gap narrowing simultaneously over the years. The World Bank report (2018), indicates that financial access has risen globally which is attributed to mobile phones and internet, but gains from financial inclusion have been uneven across countries. In Kenya, according to 2019 FinAccess national survey, financial inclusion has expanded from 26.7per cent in 2006 to 89per cent in 2019. The survey revealed that financial access gap between male and female has narrowed from 20 per cent in 2016 to 14 per cent in 2019 among the sampled adult population being 51per cent female and 49 per cent male, but disparities still remain. Access to formal credit for males has increased by 6per cent and female by 9per cent comparing the years 2016 and 2019.

However, 2019 FinAccess national survey, has also revealed that the national financial health has declined from the national level of 39.4per cent in 2016 to 21.7per cent in 2019. This Implyies more Kenyans are unable to use financial services for their daily needs, cope up with risks and shocks and invest in their livelihoods and future by improving their economic status. This could be attributed to emerging and rapid uptake of unregulated digital loans as an alternative source of credit. The digital and mobile platform have introduced new emerging risks with mobile money recording the highest cases of money lost in 2013, 2016 and 2019 according to the finacess survey in Kenya.

Therefore, with financial inclusion increasing and the national financial health declining, it shows clearly that the problem is no longer access to credit but the choice of credit source by both male

and female. And there are few studies conducted in Kenya on the gender, access to credit and financial health. In view of above problem, this study seeks to fill the literature gap which establish gender, access to credit and financial health in Kenya by using Kenya National Finaccess Survey 2019 dataset.

1.3 Research Objectives

The overall objective of the study is to analyze the relationship between sources of credit by households and household financial health, and to estimate the determinants of household financial health. Specific objectives are;

    i.   Analyse the relationship between household credit sources and household financial health.

    ii.   Analyse the determinants of household financial health.

    iii.   Disaggregate access to credit by source and gender.

1.4 Study Hypothesis

- The choice of credit source by both men and women contributes to individuals' financial health.

1.5 Significance of the Study

This study will be beneficial to the Central Bank and other policy analyst who formulate and implement policies mostly those geared towards Gender equality, financial access, use, utilization, financial health and economic growth. All Financial institutions in understanding important factors to consider when formulating requirements for accessing financial services especially credit. Lastly, given the limited knowledge in the same field, this study however, will be of importance to the academicians as they seek to increase their knowledge on Gender and access to quality credit Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Access to credit is an important aspect in the growth of economy and sustainable development of a country. This has received huge focus by academician, researchers and policy makers. This research focuses on access to credit by gender and source, and the influence of mobile and digital loans on the financial health on both male and female. Hence, this chapter entails theoretical foundation of the study, empirical studies on access to credit and finally the literature overview that will point out clearly the literature and empirical gap.

2.2 Theoretical Literature

Theories on access to credit emerges from the market interaction in the financial setup. Where there is the demand and supply of goods and services at a price. The demand side constitutes of individuals, households of firms who are the users of the financial goods and services. The supply side constitutes of institutions, both formal and informal that provides financial goods and services. Financial good and services includes insurance, credits, payment and savings which are exchanged at a price. The market is set to operate efficiently at equilibrium where demands equals supply, otherwise it operates inefficiently given the resource allocation leading to a deadweight loss on the welfare of the consumers.

According to Levine (2005), inefficiency in the financial market is believed to be caused by information asymmetry and transaction cost. For an efficient financial market helps in wealth creation by mobilizing savings and increasing investments that leads to better allocation of wealth in the society. Therefore, for efficiency, financial markets need to efficiently allocate financial

goods and services between demand side and supply side. Further, a seminal literature by (Rajan and Zingales, 1996 and Apergis 2007), reveals that increase in access and use of financial products and services impacts countries economy positively. However, an increase may not necessarily translate to fair, equitable and desirable distribution of income and wealth among different groups in the population. This means that the economic growth may increase significantly in a country and the same time resulting to increase inequalities between rich and poor in financial market.

According to Stiglitz and Weiss (1981) on the Credit Rationing Theory, it focuses on financing gap. The authors argued that there is the problem of information asymmetries between the agency and the shareholders of the organizations. The problem leads to major constrains when it comes to access to finance. They argued that only the borrower knows their real financial structure and strength in repayment of a loan hence the borrower has a superior private information that leads to information asymmetry. This will force the lender to operate under a situation of moral hazard and adverse selection. The lenders, therefore imposes both quantitative and qualitative restrictions on loan borrowed by and individual, called "equilibrium quantity rationing of credit". Hence, higher interest rates lead to more adverse selection and risks involved. The bases of the model are the concept on imperfect financial markets which is characterized by adverse selection and information asymmetry. The financial market failure can be explained by the two concepts where the banks finds it difficult and costly to obtain borrowers accurate information and to monitor their actions. Hence, financial institutions structured their financial products basing on the risk of the target group as well as competition.

According to McKinnon and Shaw (1973), the interference of a government is what causes inefficiencies in the financial market. They argued that this led to undesirable low economic

growth from the financial markets in the country. Matheison (1980), and Fry (1999) later reinforced the argument by indicating that the economic growth can be enhanced by eliminating government interference in the existence of the financial market. The interference lead to emergence of parallel markets as economic agents that sought to evade government controls and regulations, (Jones, *et. al,* 1991). It is the proponents of this school of thought that resulted to the liberalization of the financial system. This is because market failure in financial markets created gaps in formal financial system forcing individuals to switch between alternatives hence the existence informal credit providers alongside formal credit providers which includes mobile and digital platforms.

According to Demirguc-Kunt et al (2015), reveals that for a country to improve access and utilization of the financial products and services, especially to developing countries, there is need to adoption of mobile and digital banking services. The mobile money services have a positive influence in the economy given that it has helped increase the number of credit users by offering an alternative to the traditional financial serviced nonusers.

2.3 Empirical Literature

Kunt, Klapper, Singer &Oudheusden (2015) identified the role of the financial service sector to economic growth. Access to more and better credit by households and firms gives the ability to start and expand businesses, increase Marginal Prosperity to Save, boost investments, increase the purchasing power, acquire quality education, manage shock and risk emanated by external shocks. Hence, increased access to financial services may be used as a driver of reducing inequalities and accelerating growth and development in the economy. Rojas-Surez (2010), explained the determinants of access to credit, insurance, savings, and other financial products and services. The

study desegregated the factors into macro and micro levels. Micro economic factors included individuals' age, gender, level of education, employment, and other demographic characteristics. Macroeconomics factors include; interest rate, inflation, government expenditure, exogenous shocks and other macroeconomic factors. The author identified further other factors to be state of financial market characterized by the number of financial service providers in a country and the individual institutional framework and structure.

According to Zins & Weill (2016), focused on the determinants of financial inclusion in Africa. The study used the World Bank's Global Findex database of 37 African countries. probit model was employed to estimate access to formal financial services on various regressors. The results revealed that being a man, attaining higher education, older, richer, favors access to credit with a higher influence of training and employment status. In addition, Mobile and digital banking has led to more individuals to access credits than usual banking. The study also found that being a woman has a negative correlation with formal account ownership, savings and credit. Being woman increased the likelihood of using informal saving compared to formal financial institution. The results illustrated how women in Africa have resorted more to informal finance which has however seemed not to bridge gender gap in formal credit.

Akudugu (2013) investigated the determinants of access of financial product and services in Western Africa, Ghana. The dataset used sampled 1000 individual across different regions in Ghana who had different characteristics on employment status, age, gender, and place of residence. The results revealed that out of every five individuals only two can access credit and other financial products from the formal financial providers in Ghana. The study showed that besides individuals' education, employment status and age, there other factors that determine access to financial products and services. Those factors include; the distance to the source of financial good and

services, inadequate documentation, of individuals, and level of trust by the individuals in Ghana. The study showed no gender effect, however the study had employed data that do not give adequate information on the gender and effect to access and use of credit. Similarly, according to Hoyo and Tuesta (2014), found out that there is no conclusive effect of Gender on access to financial products and services in a study on analyzing drivers of financial inclusion in Mexico. The results may be due to the dataset employed that have limited information on women and the interaction to financial market.

Fungáčová, & Weill (2015) selected China to analyze determinants of financial inclusion in the country, including comparisons to other BRICS Countries. The study found out that gender had no significance to selection of the type of financial service provider between formal and informal sources. Women borrowed and saved more from the informal sources compared to men, this means that women are less likely to borrow from formal credit to offset their disadvantage in informal credit. Other factors that influence credit access are individuals' level of income, education, and age. More emphasis was given to income and the level of education explaining that lack of money dictates the choice of source of financial goods and services especially loans.

Aterido (2013) analyzed issues of gender gap in nine countries in Africa countries. The results revealed there is no significant discrimination in gender. Therefore, gender gap in Africa seems to be associated with women participation in others sectors besides the financial sector. women would be discriminated in other areas of the economy such as formal education and employment, Moreover, the study confirmed women in Africa mostly rely on informal financial services for loans.

Demirguc-Kunt et al. (2013), analyzed financial inclusion alongside gender dimensions among different countries. The study used combination of Global Findex and World Bank Women Business and Law and Institution Development Database. The study indicates that women are more financially excluded and that this is mainly explained with the aid of differences in educational attainment, earnings and employment stages. The study also established that the government regimes where the legal framework is not efficient enough to protect women from early marriages and discrimination when it comes to inheritance among other, women tend to be constrained to access formal credit.

According to the 2016 Kenya National Finacess survey report, it revealed that men are highly likely to accessing credit facilities from formal banks, SACCOs, and Employers compared to women. Contrary, women had more chance of accessing credit facilities from MFIs, local shops and friends. This can be explained by the constrains by women in accessing credit from the formal bank and poor performance in women owned businesses. Therefore, women's lower access to finance has led many researchers to question whether women are discriminated in credit markets and whether gender plays a role in access to finance services.

Lenka and Barik (2018), analysed the relationship between increase in the access to financial products and services and the adoption of internet and mobile phones in SAARC countries. Results indicated that there is a positive relationship where more use of mobile phone and in internet leads to expansion of financial services. similarly, Kabakova and Plaksenkov (2018) identified three factors that affects the access of financial products and services, they include economic, technological and social factors. Hence, increase in use of digital and mobile phone to access credit had a significant positive effect on the overall financial inclusion. In addition, Ouma et al. (2017)

also revealed that an increase in use of mobile phones in accessing credit, increases income and savings among people living in poverty especially in Sub-Saharan Africa.

Abor et al. (2018) investigated the interaction of improved financial services and use of digital and mobile banking to the household livelihood. The study used probit model to assess the objectives. The findings indicate that increased access to financial services and adoption of mobile telephony increase the households' livelihood increasing the overall per capita consumption.

Similarly, according to Evans (2018), internet and use of mobile phones have a positive effect on financial inclusion. This means the increased uptake of internet and mobile phones translates to increased access to financial goods and services and positively leads to economic growth in the country. The World Bank report (2018) on Global Financial Inclusion, indicates that financial access has risen globally been accelerated by mobile phones and internet, but gains have been uneven across counties. The report also reveals that men remain at a higher chance to own an account to a woman. Financial gender gap in developing economies have remained unchanged since 2011, at 9per cent points despite the origination of new formal loans and other financial services.

According to Francis et al (2017), digital credit has significantly accelerated access to financial services. However, the this can be viewed in a two sided way, on one way is increase in financial health while the other way being that the target individuals do have little or no financial literacy on digital platforms. According to focus groups run by Consultative Group to Assist the Poor (CGAP) in 2015, showed that most of the respondents had little awareness of the products, terms and condition of the loans and fee charged. Individuals end up over borrowing loans especially when the only thing required is dialing for request by use of a mobile phones, and thereafter it

become difficult to repay the loan (McKee et al 2015). In addition, Caliskan et al (2017), revealed that digital credit products have raised host of privacy issues. Most borrowers do not have full understanding on how private information is being used as data to determining loan eligibility by loan providers.

However, 2019 Finacess survey reveals that financial gender gap closing. Access to formal credit for male has increased by 6per cent and female by 9per cent comparing the years 2016 and 2019.This can be explained by the increasing uptake of digital loans apps and use mobile money to credit access. The access of mobile money has overtime been accepted to be formal channel of access financial services. In addition, the survey revealed that there is a strong growth in uptake of digital apps loans from 0.6 percent in 2016 to 8.3 percent in 2019, an indication that the role of unregulated service providers is playing in financial services space.

2.4 Summary of Reviewed literature

This chapter has highlighted the studies done on gender and access to credit and the influence of digitalization to financial sector. The chapter has also highlighted the various determinants of credit access which are financial literacy, income levels, gender, age, education levels, availability of financial institutions and collateral. From the studies highlighted it is evident that there is an increase in the financial inclusion over the years and the gender gap has narrowed. The increase has been majorly attributed by the emerging uptake of digital loans and mobile money in the global world and specifically in Kenya. However, there is still a difference between how men and women use the digital credit. Despite the increased access to credit by both genders, most of the borrowers' report having been late in repaying the loans in time. This means that the financial health is declining as more individual's access credit in the country. This could be explained by looking further from just the access to credit, but question the quality of the credit accessed and how its

utilized. The quality in this case can be proxy by the source and amount given to an individual. For this, this study sought to fill the literature gap which establish gender, access to credit and financial health in Kenya by focusing on the determinants of choice of credit source and financial health using most recent dataset the 2019 Finaccess Household Survey.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter has 4 sections on methodology of the study. The first section comprises of the theoretical framework which explains the economic theory as a basis of the model. Section two comprise of model identification and estimation. The third section gives the econometric approach that is employed on the variables. Lastly, the fourth section gives the source of data that are used.

3.2 Theoretical framework

The basis for theoretical framework is motivated by Walker and Akiva (2002) Random Utility Model (RUM). An individual is faced with various credit alternatives. This is with the assumption that consumers seek to maximize their utility given their budget constraint. But since, consumers are said to be rational, they end up choosing the alternative that has a higher utility. Therefore, the consumers choose the alternative from the various credit sources for the source that derive the highest utility. Utility, however, is described to be a latent variable and can only be observed through revealed preferences of the consumers.

The Utility function can be as follows;

$$U_{ij}(X_{ij;}\ Z_{ij}) = V_j(X_{ij}\ ;\ \beta) + \varepsilon_j \tag{1}$$

Where;

$i = 1, 2, 3, \ldots\ldots N$

$j = 1, 2, 3, \ldots\ldots M$

$U_{ij}(X_{ij;}\ Z_{ij})_j =$ individuals i's derived utility from credit choice of alternative j

$X_{ij=}$ observed characteristics of individual i and credit choice of alternative j

$Z_{ij=}$ unobserved characteristic of individual i and credit choice of alternative j

$V_j (X_{ij} ; \beta)$= deterministic component of the utility

ε_j= utility random component of the utility

There alternative j is categorized as follows;

Formal; commercial banks including mobile banking, microfinance banks, insurance providers, capital markets, deposit taking SACCOs

Formal others; mobile money, NSSF, NHIF, Postbank, mobile money Apps, Hire Purchase, Non-deposit taking SACCOs, Development financial institutions (DFIs) such as HELB, and credit only microfinance (MFIs)

Informal; groups such as *chamas,* employer, shopkeepers, shylocks

Excluded; friends, family, neighbors or not using any alternative of financial products and services.

3.3 Model Estimation and Econometric model

To analyze the determinates of choice of credit sources in Kenya. This study employs a multinomial probit model. The model is ideal over multinomial logit model due to its critic on Independence of Irrelevant Alternative (IIA) property. The dependent variable which is the credit source, takes four alternatives where: 0 represents if excluded, 1 if individual choses Formal, 2 for alternative formal others, and 3 if an individual choses informal. In multinomial probit, there are alternatives (N) that gives N probabilities. The purpose is to test the relationship among the probabilities of the alternatives. Then use estimated coefficients to generate the probabilities of individual choosing one of the four alternatives.

Given that y represents the financial status, and there are 4 alternatives to choose from taking on the values $\{j = 0,1,2,3.\}$ then, the probability of individual i choosing alternative j is defined as;

$$Prob(y_i = j), j = 0,1,2,3. \ i = 1, \dots, n \tag{2}$$

If for every observation y we introduce 3 binary variable, then;

$$p1 = pr[y = 1] = \int_{-\infty}^{-v31} \int_{-\infty}^{-v21} f(\varepsilon21, \varepsilon31) d\varepsilon21 d\varepsilon31| \tag{3}$$

Where: $f(\varepsilon21, \varepsilon31)$ is bivariate normal that has two free co-variance parameters. The normal integral used is evaluated numerically. For simplicity, we employ simulation to approximate P_1 by fractions of $(\varepsilon21, \varepsilon31)$ less than (-v21, -v31). It will yield boundary values of $P_1 = 0$ or 1.

Considering covariate matrix Σ and parameter β the study uses maximum simulated likelihood estimator to estimate the following equation.

$$\ln L_N (\Sigma, B) = \sum_{i=1}^{N} \sum_{j=1}^{m} yij \ln pij \quad j = 0,1,2,3. \ i = 1,2,3, \dots, n \tag{4}$$

Hence for each ith individual observation on Y there will be exactly one non-zero of $Y_{i1}, Y_{i2} \ or \ Y_{i3}$.

From the above we can specify our regression model as;1 if individual choses Formal, 2 for alternative formal others, and 3 if an individual choses informal.

According to Cameron and Trivedi (2005), N is the number of observation, X is a set of explanatory variables and G is normal cumulative distribution function. The above model is a multinomial probit model that has been derived from a latent variable model that assumes the error term is independent of the explanatory variables and has a standard normal distribution.

Hence, the specific econometric model is given as follows;

$$Credit \ Source(CS) = \beta_0 + \beta_1 gender + \beta_2 education + \beta_3 age + \beta_4 age2 +$$
$$\beta_5 marital_{status} + \beta_6 income + \beta_7 mobileownership + \cdots \dots \dots \dots \dots \dots \dots + \mu \tag{5}$$

To analyse determinants of individual financial health. According to 2019 Kenya FinAccess survey, Financial health is measured as multidimensional financial health index from three dimensions; ability to cope risks and shock, to manage daily needs and to invest for the future. Therefore, the study will employ probit model for the variable financial health gives probabilities of two outcomes, which is, individual being financially health or not.

This study employs a discrete choice model either logit or probit model. The decision logit and probit model relies on the distribution of the disturbance term. If logistic distribution is assumed, then a logit model is estimated, instead if a normal distribution is assumed, then probit model is to be estimated.

$$yi = B_{0+}B_I X_i + \varepsilon i \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (6)$$

Using a Probit model, in equation 6 y_i is financial health which is the dependent variable, *B's* are the parameters while X (X=1, 2,…....k) are the independent variables.

Following Cameron and Trivedi (2005), an individual being financially healthy or not is observed conditional on the independent variables X. The outcome if an individual is financially healthy is y=1 and y=0 otherwise.

$$Y= \begin{cases} 1 \ if \ financially \ healthy \\ 0 \ otherwise \end{cases} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (7)$$

However, the study aims at estimating probability (*Pi*) that an individual is financially health given the explanatory variables using probit model. The probability is given as;

$$p_i = pr[yi = 1 \mid xi] = \phi(B_{0+}B_I X_i) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (8)$$

Where $\phi(.)$ is defined as the standard normal cumulative distribution function. Where y_i is financial health while x_i are the explanatory variables. Hence, the associated log-likelihood function is given as;

$$\ln L = \sum_{yi=0} \ln[1 - \emptyset(B_0 + B_1 x_1)] + \sum_{yi=1} \ln[\emptyset(B_0 + B_1 x_1)] \ldots \ldots \ldots \ldots \ldots \ldots (9)$$

The study estimate equation 9 using maximum likelihood estimation (MLE) technique. To interpret the results this study, estimate the marginal effects where it measures the effect of one explanatory variable on the dependent variable while holding all the other covariates constant. The marginal effect shows the change in probability of y=1 per unit change in the independent variable X.

3.4 Data description and sources

The study employs the Kenya National Financial Access (Fin Access) Household Survey 2019 conducted by the Financial Sector Deepening (FSD) Kenya, the Central Bank of Kenya and the Kenya National Bureau of Statistics (KNBS). The survey sampled 11,000 households with 89 per cent response rate of 9,709 households. The sample represented individuals aged 16 years and above out of which 51 per cent were female while 49 percent were male. This study uses multinomial probit model to predict the determinants on choice of credit source and probit model to predict determinants of financial health.

Table 1: variable definition and measurement

variable	description and measure	predicted effect
financial Health	financial health index, measured by multidimensional health index it's a dummy variable where 1 represent financial health.	_
Credit Source	where individuals get credit from; it's a categorical variable that takes 0 "excluded", 1 "formal", 2 "formal others', 3 "informal"	_
Gender	individual's sex; dummy variable where 1 represent for male	Positive
Age	respondents age in years	Positive/ Negative
Age Squared	square of respondent age	Negative
Education	highest level of education attained; categorical variable 0 "primary', 1 "secondary", 2 "tertiary"	Positive
marital status	respondent marital status; dummy variable where 1 represent married, 0 otherwise	Positive/ Negative
income	Amount received by individual as income	Positive
Mobile ownership	Where an individual own a mobile phone	Positive/ Negative

Source: Author

3.5 Econometric issues

3.5.1 Normality test

The Shapiro-Wilk W test is used to the distribution of the error term. According to Mukras (1993),

the stated null hypothesis states that error terms is normally distributed while alternative hypothesis

states that error terms are not normally distributed. Therefore, if the W statistics is significant then

reject the null hypothesis.

3.5.2 Multicollinearity

According to Gujarati (2003), multicollinearity exist when an explanatory variable is correlated

with another explanatory variable. The presence leads to unreliable estimates and spurious results.

Variance inflation factor will be employed to testing the presence of multicolliearity and if present

the study will drop one correlated variable.

3.5.3 Heteroscedasticity

Heteroscedasticity exists when the variance of error terms is unequal throughout the observations

which results to biased estimates. This study will employ Breush-Pagan test to check for presence

of heteroscedasticity by rejecting the null hypothesis of homoscedasticity if the P-value is less than

0.05. If present, the study will use robust standard errors.

CHAPTER FOUR

EMPIRICAL FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents empirical analysis of gender, access to credit and financial health in Kenya. This includes descriptive statistics, correlation matrix and regression results using various probit models.

4.2 Descriptive statistics

Table 2 shows the summary statistics. The data set indicates that out of the sampled 11,000 households there was 89per cent response rate of 9,709 households. The sample represented individuals aged 16 years and above out of which 51per cent were females while 49 per cent were male. The average age of the household was 39 years and 58.25per cent were married. 89per cent are reported to access financial goods and services in the country. The proportion of 38.17per cent access credit from formal credit, 40.28per cent access credit from formal others, 7.14per cent use informal credit while 14.41per cent were excluded from financial services. We observe that 42.98per cent had attained primary level of education, 29.78 had attained secondary education while 12.00per cent had attained higher level of education. There were 5 quintiles for income level which are combined to 3 level of income due to less differences across the groups. Poor income level was highest at 47.49per cent followed by high level income at 33.86per cent and finally middle income level at 18.65per cent.

Table 2: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Mobile Ownership	8669	0.8872	0.3164	0	1
Excluded	8669	0.1441	0.3512	0	1
Formal Credit	8669	0.3817	0.4858	0	1
Formal others	8669	0.8056	0.9810	0	1
Informal	8669	0.2142	0.7725	0	1
Marital Status	8669	0.5825	0.4932	0	1
Sex	8669	1.5775	0.4940	0	1
No Education	8669	0.1505	0.3576	0	1
Primary Education	8669	0.4298	0.4951	0	1
Secondary Education	8669	0.5957	0.9147	0	1
Higher Education	8669	0.3602	0.9752	0	1
Low income level	8669	0.4749	0.4994	0	1
Middle income level	8669	0.1865	0.3896	0	1
High income level	8669	0.3386	0.4732	0	1
Age	8669	39.2937	17.1036	16	95
Age squared	8669	1836.50	1618.24	256	9025

Source: Author

Table 3 shows disaggregated summary statistics for credit sources and gender. It indicates that an average of 57.74per cent of female access credit in the Kenya. Out of 8669 respondents, 40per cent access credit from formal others thus the combination of formal registered and formal Non-prudential, 38per cent source credit from formal prudential, 7per cent from informal sources while 14per cent are excluded from credit access. Majority of the female access more credit from formal others 62.71per cent and informal 72.8per cent while majority of the male access credit from

formal Prudential sources by 50.29per cent. However, approximately 57.64per cent of female are excluded from accessing financial goods and services.

Table 3: Summary Statistics for Credit Sources and Gender

Credit Source	Summary of sex(Female=1)				
	Mean	**Std. Dev.**	**Male**	**Female**	**Freq.**
Excluded	0.57646	0.49432	529	720	1249
Formal Credit	0.49713	0.50007	1,664	1,645	3309
Formal others	0.62715	0.48363	1,302	2,190	3492
Informal	0.72859	0.44504	168	451	619
Total	**0.57746**	**0.49399**	**3,663**	**5,006**	**8669**

Source: Author

4.3 Correlation analysis

This study employed correlation matrix to measure the existing relationship in terms of magnitude and direction among independent variables. Table 4 shows no high correlation that may invalidate the study estimates since most of the correlation coefficients of correlation matrix are less than $|0.5|$. High correlation is only found between age and age squared which is meant to capture non-linear effect of age.

Table 4: Correlation Matrix

	Credit Source	Financial health	Mobile Ownership	Income	sex	Education	Marital status	Age	Age squared
Credit Source	1								
Financial health	-0.1365	1							
Mobile Ownership	0.1958	0.1898	1						
Income	-0.1599	0.4042	0.3194	1					
Sex	0.1031	-0.0624	-0.0467	-0.0751	1				
Education	-0.179	0.3122	0.2466	0.512	-0.1363	1			
Marital status	0.132	0.0672	0.1859	0.016	-0.0503	-0.0516	1		
Age	0.0609	-0.0568	-0.036	-0.1573	-0.0251	-0.3254	0.0877	1	
Age squared	0.0238	-0.0729	-0.1007	-0.1726	-0.0178	-0.3313	0.0128	0.9783	1

Source: Author

4.4 Estimation Results

In this section, the study presents two sets of estimated results to address objective 1 and objective 2 from multinomial probit model and probit model respectively.

4.4.1 Multinomial Probit model estimation results

The estimates of the multinomial probit model for which credit source is the dependent variable are presented in the appendix (see Table A1) while marginal effect are reported in table 5. The results reveal that model is fit since the overall p value (0.000) is less than 0.05 implying that gender and other independent variables jointly explain credit source significantly. The log likelihood ratio test has the value -7259.9085 which is associated with a Chi^2 whose probability is significant at 1per cent level of significance.

The interpretation is based on marginal effects since it's easy to compute and interpret. Where the depend variable is (credit Source), exclude is the bench mark category. From table 5, women are found to be more likely to use credit from the formal others and informal credit sources. For instance, the probability of having accessing credit from formal others for women is 8.44per cent higher and informal credit is 2.37per cent higher than for men. However, women are less likely to access credit from the formal credit compared to men by 9.42per cent. This finding corroborates with Demirguc-Kunt et al. (2013) who established existence of gender gaps in access of credit from formal credit with significant variations across countries.

Age is positively and significantly correlated with formal credit while negatively and significantly correlated with formal others credit. An increase of one year is expected to increase the probability of accessing credit from formal credit by 1.29per cent. However, this probability reduces as age increases since the coefficients of age squares (see table A1) has a negative sign. Similar results have been found by Allen et al. (2016) and Tuesta (2014).

27

Table 5: Marginal Effects for Multinomial Probit Model

Variables	Formal Credit	Formal Others	Informal credit	Credit Source (1=Access, 0=Excluded)
Sex	-0.09422*** (0.01247)	0.084420*** (0.0122)	0.023794*** (0.00457)	-0.01399** (0.00745)
Age	0.012925*** (0.00196)	-0.00099*** (.)	0.00755 (0.00068)	-0.01269*** (0.00103)
Age Squared	-0.000091*** (0.00002)	-0.0000055 (0.00002)	0.0000175** (0.00001)	0.000115*** (0.00001)
Marital Status	0.028985** (0.01354)	0.011901 (0.01299)	0.005744 (0.00486)	-0.04663*** (0.0078)
Education Level (No Education-Reference)				
Primary Level	0.103792*** (0.0214)	-0.04468** (0.01932)	-0.03649*** (0.00605)	-0.02262** (0.010616)
Secondary Level	0.121318*** (0.01173)	-0.07015*** (0.01103)	-0.3273*** (0.00432)	-0.01844*** (0.00604)
Higher Level	0.186073*** (0.00998)	-0.10688*** (0.01006)	-0.03334*** (0.0055)	-0.04585** (0.00795)
Wealth Index (Low Income-reference)				
Middle income	0.176061*** (0.01701)	-0.11732*** (0.01613)	-0.02613*** (0.00485)	-0.03261*** (0.00831)
High income	0.171622*** (0.00755)	-0.13771*** (0.00789)	-0.02107*** (0.00338)	-0.01285*** (0.0048)
Mobile Ownership	0.288571*** (0.01286)	0.388616*** (0.01184)	-0.20441*** (0.01417)	-0.47277*** (0.0162)
Observations	8660	8660	8660	8660

Notes: ***, **, * 1per cent, 5per cent, 10per cent level of significance respectively

standard errors are in parentheses

Marital status is positively and significantly associated to accessing credit from formal credit while positively and insignificants to accessing credit from formal others and informal credit. Being married has a higher probability of accessing credit from formal sources by 2.90per cent compared to individuals who are not married and are excluded from the accessing credit. Rojas-Surez (2010), found similar results were marital status being one of demographic factors that significantly influences the credit access.

The level of education has a significant effect on the credit source of an individual. In this study, no education is the reference category. The probability of accessing formal credit is higher for individuals who have attained primary, secondary and higher education by 10.37per cent, 12.13per cent and 18.60per cent respectively compare to individuals with no education and excluded from the credit access. However, primary, secondary and higher level of education is negatively and significantly correlated to accessing credit from formal others, informal and excluded. This results indicates that education is important in accessing credit from formal sources. Therefore, increasing education will result to more people accessing credit form the formal credit. This finding corroborates with Hoya and Tuesta (2014) who indicated that level of education is fundamental in accessing formal credit in Mexico.

Low income level is used as the reference category. An individual whose income is classified as middle or high is more likely by 17.60per cent and 17.16per cent respectively than a low income individual to access credit from formal sources. However, individuals whose income is classified as middle or high are less likely by 11.73per cent and 13.77per cent respectively than a low income individual to access credit from formal others. Also individual whose income is classified as middle or high are less likely by 2.61per cent and 2.10per cent respectively than a low income individual to access credit from formal sources. All the coefficients are significant at 1per cent.

The results are in line with existing literature by Fungáčová, & Weill (2015) for a case in China where income is positively and significantly correlated to formal credit.

Mobile ownership is positively and significantly correlated with accessing credit from formal credit and formal others while negatively and significantly correlated with informal credit. Specifically, an individual who owns a mobile is more likely to access credit from formal credit by 28.85per cent and from formal others by 38.86per cent compared to those who don't own a mobile phone. The results are significantly important because of the use of mobile phone to access credit through mobile credit and digital apps. This finding is corroborated with Lenka and Barik (2018), Ouma et al. (2017), and Abor et al. (2018) who found positive and significant effect of mobile to accessing credit from formal sources.

4.4.2 Probit model estimation results

Table 6: Probit Regression Results and Marginal Effect (Dep.- Financial Health)

VARIABLES	Probit Results	Std error	Marginal Effect	Std error
Sex	-0.0292	0.0375	-0.0053	0.00682
Education Level (No Education-Reference)				
Primary level	0.0249	0.0820	0.004507	0.01491
Secondary level	0.0833*	0.0437	0.015069*	0.0079
Higher level	0.192***	0.0313	0.034808***	0.00572
Age	0.00121	0.00704	0.000219	0.00127
Age squared	-3.23e-05	7.68e-05	-5.85E-06	0.00001
Marital status	0.187***	0.0422	0.033168***	0.00739
Wealth Index (Low Income-reference)				
Middle Income	0.490***	0.0591	0.106579***	0.01469
High Income	0.509***	0.0261	0.09206***	0.00466
mobile ownership	0.384***	0.0872	0.060226***	0.01145
Credit Source (Excluded-reference)				
Formal Credit	0.452***	0.0916	0.087725***	0.01923
Formal Others	-0.198**	0.0929	-0.03505**	0.01599
Informal Credit	-0.134	0.139	-0.02247	0.02149
Constant	-2.292***	0.153		
Wald chi2(30) =1558.86				
Prob > chi^2 = 0.0000				
Log pseudo likelihood = -7259.9085				
Pseudo R2=0.2522				
Number of observation=8660				
Notes: ***, **, * 1per cent, 5per cent, 10per cent level of significance respectively *Robust standard errors are in parentheses*				

Source: Author

The estimates and marginal effects of the probit model for which Financial health is the dependent variable are presented in table 6. The number of observations are 8660. The Log Pseudo Likelihood test has the value -7259.91 whose Chi^2 is associated with P value 0.000. This means the probit model is valid.

The probit estimations that explain financial health indicates that education, marital status, income, credit source and mobile ownership are positively and significantly correlated. However, we interpret the marginal effects. Individuals who have attained primary and secondary education are more likely to be financially healthy by 1.51per cent and 3.49per cent respectively compared to individual who have no education. The probability of a person being married is more likely than a person who is not married to be financially health is 3.32per cent. Middle income and high income individual probability to be financially healthy compare to low income individuals is 10.66per cent and 9.21per cent higher respectively. The probability of a person who owns a mobile is 6.02per cent to be financially healthy compared to those that do not own mobile. An individual who access credit from formal credit is more likely by 8.77per cent to be financially healthy compared to those that are excluded. Finally, individuals who source credit from formal others are less likely by 3.51per cent to be financially healthy compared to those individuals that are excluded. This finding is similar to Francis et al (2017), that digital credit (formal others) has significantly accelerated access to financial services but individual financial health is decreasing. However, we find no differences between men and women's probability to be financially healthy as shown by the coefficient on sex which is not significant.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Introduction

The chapter focuses on the summary of findings, conclusion, policy recommendations and areas for further studies.

5.2 Summary and Conclusion of the Findings

This study examined Gender, Access to credit and Financial health in Kenya using 2019 Kenya National Financial Access (Fin Access) dataset. Specifically, the study aimed to analyze the relationship between sources of credit by households and household financial health, to estimate the determinants of household financial health, and to disaggregate access to credit by source and gender in Kenya. The findings show that more men than women access credit from formal credit while more female than male access credit from formal others and informal sources. The study shows the main determinants of choice of credit source in Kenya are sex, age, marital status, education, income and mobile ownership while the main determinants of financial health is education, income and credit source.

We also found out that majority of the individuals' access credit from formal others. Individuals who are men, old married, high income, higher education level are more likely to access credit from formal credit in Kenya. Also individuals who have secondary and higher education, middle and high income, and access credit form formal credit are more likely to be financially healthy. Finally, the probability of an individual accessing credit from formal others is less likely to be financially healthy compared to the other sources of credit.

5.3 Policy Implication

Education and income levels have been found important in explaining the choice of credit source and individual's financial health. Policies aiming at increasing income and education level of individuals may help more individuals in using formal credit source which has the probability of being financial healthy unlike the alternative credits. Female empowerment should be considered.

There is need for monitoring transparency and consumer protection in formal others (digital credit) market where majority source credit from but are financially unhealthy. There are many unregistered players who do not respond to any law and regulations. Further, we encourage development of better tools to track credit unworthiness and multiple borrowing that may lead to declining financial health where most of the consumers cut consumption to repay the loan and hence reduce savings.

5.4 Area for Further Research

The analysis was carried on 47 counties in Kenya using 2019 Kenya National Financial Access (Fin Access) dataset. This study can be extended by looking at specific counties or regions for the geographical scope. Further studies could also investigate more socioeconomic and demographic characteristics among the determinants of financial health in Kenya such as technological dynamics.

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APPENDIX

Table A1: Multinomial Probit Regression Results (Dep.- Credit Source)

VARIABLES	Formal Credit	Formal Other	Informal
Sex	-0.0991	0.246***	0.412***
	(0.0645)	(0.0624)	(0.0769)
Primary level	0.391***	0.0968	-0.323***
	(0.0998)	(0.0865)	(0.0945)
Secondary level	0.410***	0.0332	-0.263***
	(0.0566)	(0.0515)	(0.0624)
Higher level	0.735***	0.156**	-0.0927
	(0.0719)	(0.0715)	(0.106)
Age	0.0990***	0.0723***	0.0810***
	(0.00951)	(0.00867)	(0.0105)
Age squared	-0.000821***	-0.000659***	-0.000848***
	(0.000101)	(9.09e-05)	(0.000109)
Marital status	0.379***	0.341***	0.389***
	(0.0675)	(0.0631)	(0.0782)
Middle income	0.602***	0.0399	-0.163
	(0.0887)	(0.0864)	(0.111)
High income	0.450***	-0.154***	-0.181***
	(0.0412)	(0.0418)	(0.0561)
mobile own	2.560***	2.755***	0.244***
	(0.0781)	(0.0727)	(0.0795)
Constant	-4.591***	-2.954***	-2.212***
	(0.219)	(0.197)	(0.233)
Wald chi2(30) =4305.93			
Prob > chi^2 = 0.0000			
Log pseudo likelihood = -7259.9085			
Number of observation=8660			

*Notes: ***, **, * 1per cent, 5per cent, 10per cent level of significance respectively*
Robust standard errors are in parentheses