

**ROLE OF MOBILE MONEY USE ON HOUSEHOLD SAVING IN KENYA:  
EVIDENCE FROM 2021 FINACCESS SURVEY**

**BY**

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## DECLARATION

### STUDENT DECLARATION

This is my original work and has not been presented for any degree award in any other university or institution

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## **DEDICATION**

I wish to dedicate this work to my parents and family. Thank you for your support throughout this journey.

## **ACKNOWLEDGEMENT**

I thank the Almighty for the gift of wisdom and knowledge, and for his ever sufficient grace, strength and providence throughout my studies and as I undertook this research work. To my parents and family, I will forever be grateful for your encouragement and support. My sincere and utmost gratitude to my supervisor, Dr. Peter Muriu, who made this work possible. His professional support, guidance, patience, input and advice inspired me through the stages of writing this project. Finally, my regards to the School of Economics, my classmates, and friends for their immense support, insights, and encouragement in my study.

## **ABSTRACT**

There is global consensus on the significance of a thriving financial sector oriented towards poverty eradication and achievement of equitable economic growth. The financial sector is an intermediary between those who save and borrow, as it enables mobilization and allocation of financial resources for investment and wealth creation. Among programs pursued in Kenya's vision 2030 is a vibrant and efficient financial sector that drives high levels of savings for financing the country's investment needs. This study sought to investigate the role of mobile money use on saving by households in Kenya, and controlled for socioeconomic and demographic factors that included internet accessibility, education levels, age, location, livelihood categories, gender and shocks that a household may have experienced, using the 2021 National FinAccess household survey. The study modelled for saving formally and saving informally using a probit regression model. The findings revealed that although current use of mobile money was not significant in the choice to save formally, it was significant in the choice to save informally. Additionally, the use of mobile money decreased the probability of informal saving, more than it decreased the probability of saving formally. Further, our findings reveal that internet access, education, age, and gender were all significant factors in determining both formal and informal saving choices by households. The study recommends for interest earning on savings accumulated through mobile money, as this would provide an incentive for individuals to save more.

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## **LIST OF ABBREVIATIONS AND ACCRONYMES**

CBK	:	Central Bank of Kenya
KNBS	:	Kenya National Bureau of Statistics
FSD	:	Financial Sector Deepening
GSM	:	Global System for Mobile Communication
GDP	:	Gross Domestic Product
KCB	:	Kenya Commercial Bank
MPC	:	Marginal Propensity to Consume
MPS	:	Marginal Propensity to Save
ASCAs	:	Accumulating Savings and Credit Associations
ROSCAs	:	Rotating Savings and Credit Associations
SACCOs	:	Savings and Credit Co-Operative Society

# CHAPTER ONE

## INTRODUCTION

### 1.1 BACKGROUND

Globally identified as an instrument for development, that allows for the attainment of sustainable, inclusive and equitable growth especially in developing economies, financial inclusion boosts shared prosperity by enabling people and businesses gain access to efficient, affordable, and convenient financial services and products for savings, credit, transactions, and payment purposes. (Demirguc-Kunt et al., 2018; World Bank, 2008). Sarma (2008) describes financial inclusivity as the ease with which services pertaining to financial products are accessed, their affordability, and availability. Aduda and Kalunda (2012) regard financial inclusion as an approach to which diverse financial services are utilized inclusively, at a substantial cost, and at the proper time. Financial inclusion consists of all initiatives that enable access to financial services and products that may be utilized and be of quality to its consumers (Alliance for Financial Inclusion).

Great progress has been made globally towards inclusivity within the financial sector. The 2017 Global Findex Database revealed that financial access had risen, with 3.8 billion adults owning deposit accounts in financial institutions, translating to a 69 percent share of adults with accounts, an uptake from 62 percent in 2014. In developed economies, the proportion of adults in ownership of accounts as of 2017 was 94 percent while 63 percent of adults in developing economies were in the ownership of accounts, a rise from 54 percent in 2014. (Demirguc–Kunt et al., 2018).

Kenya’s vision 2030 aims at accelerating the transformation of the country into an industrialized middle-income economy with better living standards for its citizens (Government of Kenya, 2008). Cognizant of the necessity of forming a national benchmark for

a financial sector that is oriented to the country's broader development goals, the programs pursued under the medium-term plans are targeted at creating a vibrant, efficient, and globally competitive financial services sector that may provide employment, drive mobilization of savings for financing investment needs and create wealth. (Government of Kenya, 2013). Kenya has made significant progress toward financial inclusion, as of 2021, formal access to financial services rose to 83.7 percent, up from 82.9 percent in 2019 (FSD Kenya, 2021; CBK, KNBS), on the other hand, informal financial access declined by 1.4 percent to 4.7 percent in 2021. From the previous survey conducted in 2019, exclusion from access to financial services rose marginally by 0.6 percent to reach 11.6 percent in 2021, which could partially be attributed to the adverse impacts of the Covid-19 pandemic on households' livelihoods and businesses; nevertheless, this was a decline from 41.3 percent in 2006.

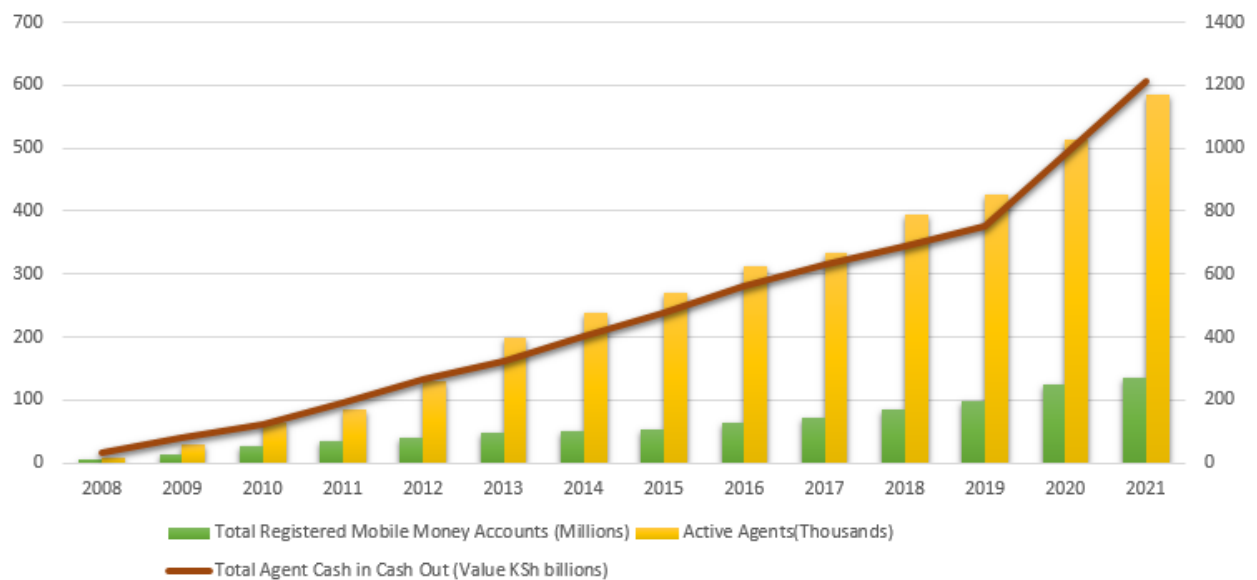
With the financial sector deepening, financial services, especially credit have become available to individuals and businesses. Likewise, advancements within the digital financial space as evidenced by mobile money have broadened the facilitation of financial systems that include savings. (Demirguc-Kunt et al., 2018). Household saving is crucial to the growth of the economy, this is often because they finance investments that could be a prerequisite for growth, and likewise, capital accumulation generates opportunities for production, which successively provides additional income streams. A country with low savings will resort to foreign financing, this fuel an increase in the current account deficit, which is detrimental when funds are not used to finance lucrative investments. When a country is unable to finance debt repayments, there is increased inflation thereby dampening sustainable economic growth. The importance of savings for economic development must be emphasized further. For any country to transition to being developed, the economy has to undergo a series of stages of growth. Rostow's model (1960) summarized the growth of the economy into five stages: traditional society, preconditions to take-off, take-off, drive to maturity, and age of high mass

consumption; among the principal strategies for takeoff include mobilization of saving to generate sufficient investment which raises the capital stock thus stimulating development (Harrod, 1939; Domar, 1946; Solow, 1956). A rational economic agent does not consume their entire disposable income but rather, sets aside some proportion mainly for investments or future emergencies (Shefrin and Thaler, 1988). Consequently, saving aids households in creating wealth by enabling households to invest in their education, and businesses and cushioning households from financial vulnerabilities such as job losses at the same time, building an asset base to scale back the risk of asset shocks, (Demirguc et al, 2018; Hulme et al, 2009). Despite the realization of the importance that savings provide to individuals and their contribution to providing funds for national development, evidence shows that the number of those who save in developing economies is 43 percent, which is quite low in comparison to 71 percent of those in developed economies (Demirguc et al, 2018).

Mobile money services are equally a crucial driver of financial inclusivity. The uptake in mobile money solutions and the easy reach of network agents has helped in spreading access and facilitation of mobile money transactions among the various socio-economic groups. Mobile money allows users to make payments and transfers conveniently and at a low cost. A case in point is the M-PESA platform in Kenya, rolled out in 2007 by tech giant Safaricom, the mobile phone-based transacting and payment system has provided remarkable development, culminating in a more accessible, effective, and efficient payment system in Kenya (Kimenyi and Ndung'u, 2009). Kenya is therefore at the center of financial transformations globally, with its digital financial service sector being the most progressive in the world (Cracknell, 2012). East Africa is fast progressing towards regional integration, as witnessed by joint infrastructural projects taking place; the overall performance of the region is dependent on Kenya (Kimenyi and Kibe, 2014). Buku and Meredith (2013) assert that the use of mobile devices provides a convenient alternative to conventional banking systems. The mobile-money-based economy in

Kenya has evolved to facilitate financial services as well as execution of financial transactions to the otherwise unbanked population (GSMA, 2022). Mobile payment platforms are employed in day-to-day activities, may it be in; transferring money in deposit accounts, withdrawals from accounts, insurance premiums, loan installments, and payment of utility bills (Buku and Meredith, 2013), this is seen in the upward trend in the number of transactions as provided by The Central Bank of Kenya data (CBK, 2021).

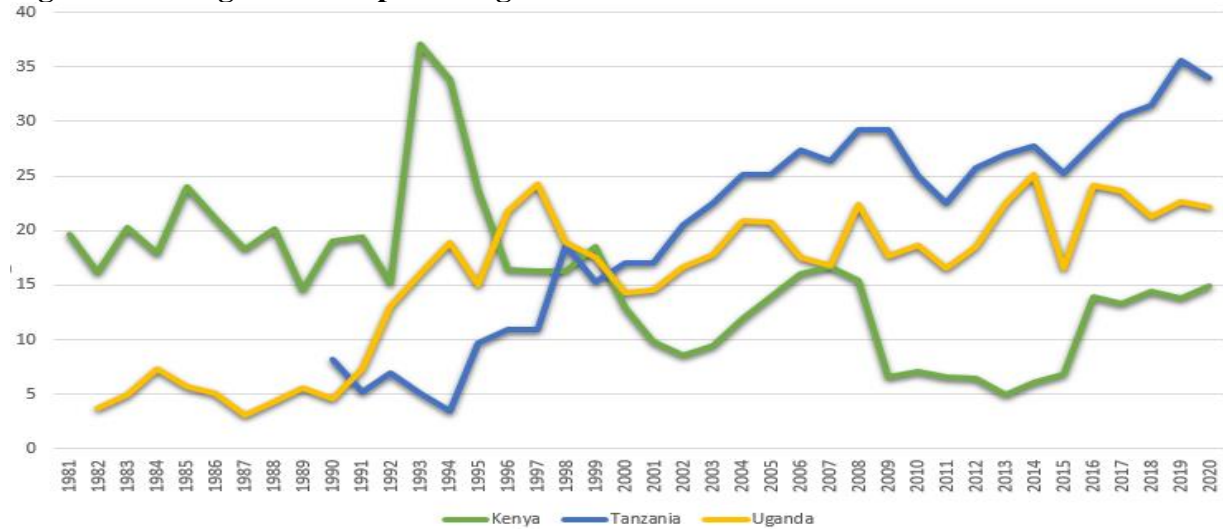
**Figure. 1 Mobile Money Transactions in Kenya (2008-2021)**



*Source: Author computations from CBK Data*

Despite Kenya being the hub of digital transformation among East African countries, and with continued increase in access to financial services, savings as a percentage of GDP in the country continues to lag behind other countries in the same region.

**Figure. 2 Savings rate as a percentage of GDP**



*Source: Author computations from World Bank data*

This further proves that there is more to financial inclusion and not just access, we need to move beyond the access strand and direct our attention to the utilization and the quality that consumers derive from the financial sector. Cognizant to 81 percent of the adult population using mobile money accounts against a backdrop of 44 percent of adults using banks (FSD Kenya, 2021; CBK, KNBS), we see a shift in preference by households in using digital financial systems. It is on this basis that we focus on how mobile money services impacts saving by households.

## **1.2 STATEMENT PROBLEM**

Financial inclusion is dynamic, a multi-dimensional concept as noted by (Beck, Demirguc-Kunt and Levine, 2007). It is a significant step toward inclusive growth as it enhances the availability of economic resources, particularly to those underserved and unbanked in society with the help of financial institutions (Ndung'u, 2017; 2019). The efficiency of inclusive financial systems depends on access and utilization of quality products and services. A growing body of research indicates the vast development potential and benefits of employing digital financial services including mobile money for financial inclusion (Demirguc et al. 2018). In developing economies, the availability of digital financial services is at the forefront of their

development agendas. Key findings from previously done research on digital financial services show that the adoption of mobile money reduces transaction costs as compared to the conventional methods of transferring money, either through transport companies or by using western union (Mbiti and Weil, 2015). Similarly, reductions in transaction cost impact remittances that consequently allow individuals to balance out their consumption and saving (Jack and Suri, 2014). Mobile money may be utilized in creating a savings account where users make deposits for their immediate needs (Klein and Mayer, 2011; Dermish et al, 2011). Mbiti and Weil (2015) further reveal that while M-Pesa is primarily used for transfer services, it could serve for the storage of value hence reduce utilizing informal financial services by users. Nevertheless, adoption of mobile money has pushed commercial banks to collaborate with mobile network operators to advance the facilitation for use of financial products, for instance, with the KCB M-Pesa and Mshwari menu in M-Pesa, users can save and acquire credit based on their savings at an interest rate (Cook and McKay, 2015). Mobile money platforms are part of the formal institutions which have oversight by government agencies (FSD Kenya, 2021), therefore, users are guaranteed not only security but also, ease convenience, and efficiency in accessing their funds at the comfort of their mobile devices, at the same time, reduce risks that come with the use of informal saving means (Prina, 2015).

Waweru and Kamau (2017) researched on the association between the introduction of mobile money and changes in saving and cash transfer practices by low-income earners in Kenya, they conducted a survey on 750 households across the country with their results indicating a positive relationship between the introduction of mobile money and an uptake in the number of low-income earners saving in formal financial institutions. Ouma, Odongo and Were (2017) sought to demonstrate a link between the use of mobile financial services and saving mobilization, their findings indicated a positive relationship between use of mobile devices in providing financial services and the likelihood of increased savings at the household level. This study



establishes a gap in the periods between when these studies were conducted and where we are now, several things have arisen, including the Covid-19 pandemic, which has had adverse effects at both national and household levels. Additionally, substantial work done has failed to capture internet accessibility as a determinant to using mobile money services while others have been specific to the case of M-Pesa despite there being other mobile money platforms such as Airtel Money, T-Kash, and Tangaza, which have joined the financial sector space. It is in this view that this study examines whether the use of mobile money influences saving behavior by households in Kenya using the 2021 FinAccess household survey, it would be crucial to focus on this period because the pandemic led to several changes in the different sectors that contribute to the economy.

### **1.3 OBJECTIVES OF THE STUDY**

This study investigated the role of mobile money use on saving by households in Kenya. The study also controlled for socioeconomic and demographic factors that include internet accessibility, education levels, age, location, livelihood categories, gender and shocks that a household may have experienced.

### **1.4 SIGNIFICANCE OF THIS STUDY**

In Kenya, the majority of studies conducted to investigate use of digital financial services, have based their work on the M-Pesa service provider (Jack and Suri, 2014; Mbiti and Weil, 2015; Demombynes and Thegeya, 2012). Others have explored the correlation between savings with economic growth at a macroeconomic level (Siaw and Pickson, 2017; Aghion et al., 2016) showing that savings not only improves the welfare of households but also, has a significant impact on the growth of the economy. (Ouma, Odongo, and Were, 2017) explored the role of mobile financial systems in augmenting inclusivity and promoting saving among households in specific Sub-Saharan African countries i.e. Kenya, Uganda, Malawi, and Zambia. However, these studies were conducted several years back, and much has changed since then. Therefore

it would be imperative to research the connection between mobile money use and saving choice by households using current national representative data as well as observe the socioeconomic determinants of savings by households in Kenya, especially at this opportune time when financial innovation has shifted as a result of the Covid-19 pandemic. This study will boost the prevailing body of knowledge as the study outcomes will be relevant to policymakers both at government and international levels to formulate appropriate policies that might encourage saving culture among the underserved population as well as the majority within the informal sector who tend to be discriminated against, by formal financial institutions thereby limiting their savings options. Nevertheless, with a choice to save using mobile money, then we are able to achieve financial inclusivity for all vulnerable groups.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This chapter reviews literature that pertinently relates to the topic of study. The first section is the theoretical literature, which explores developed models that concentrate on savings. The second section is the empirical literature that will assess studies previously done that relate to this study. The final section concludes by presenting an overview of the literature at the same time, pointing to the knowledge gap to be filled.

#### **2.2 THEORETICAL LITERATURE**

According to microeconomic principles, rational consumers would choose to consume or save their income to achieve an optimal level of utility. Various existing theories explain the motivation to save by individuals. Reviewed models include; the absolute income hypothesis (Keynes, 1936), relative income hypothesis (Duensberry, 1949), permanent income hypothesis (Friedman, 1957) and life cycle hypothesis (Modigliani, 1954; 1963).

##### **2.2.1 ABSOLUTE INCOME HYPOTHESIS**

Absolute income hypothesis is a component of the General Theory of consumption put forward by John Maynard Keynes in 1963. Consumption according to Keynes was solely based on current disposable income. An individual's rational priority is to utilize their income to satisfy their basic needs rather than for wealth accumulation, to an extent of achieving maximum satisfaction. This signifies that, as disposable income increases, a portion of it that is either consumed or saved increases. A linear consumption function as proposed by Keynes can be represented as:

$$C = a + bY$$

C representing consumption, Y is the disposable income, *a* is a constant that represents autonomous consumption, the coefficient *b* is the marginal propensity to consume (MPC)

which is expected to be less than one but greater than zero. Drawing from the fundamental psychological law of consumption, the absolute income theory hypothesizes that as income increases, so does consumption increase, but not proportionally, as part of the income is additionally saved. Saving by an individual smooths out their consumption over time so that the utility derived from consuming is maintained should future incomes decrease.

Saving is a function of disposable income represented as:  $S = f(Y)$

The Keynesian saving function is characterized by saving as a stable function of income, saving varies directly but not proportionally to income.

$$Y = C + S$$

$$S = Y - C$$

Taking the consumption function:

$$C = a + bY$$

Through substitution:  $S = -a + (1 - b)Y$ .

(1-b) is the marginal propensity to save (MPS). Both MPC and MPS should be equal to one, implying that disposable income is allocated to either saving or consumption.

### **2.2.2 RELATIVE INCOME HYPOTHESIS**

Among the earliest theories put forward, to correct some of the drawbacks within the Keynesian absolute income hypothesis is the relative income theory proposed by Duesenberry (1949). The relative income hypothesis states that, a consumer derives maximum utility from a certain level of consumption, subject to not only their current disposable income but is also relative to the income of other individuals within the particular society's income distribution. Additionally, current consumption is as well determined by their habitual consumption. By emphasizing relative income as the determinant of consumption, individuals will try to emulate the

consumption levels of others in the same society, referred to as the demonstration effect. The other significant aspect of the relative income hypothesis is the ratchet effect of consumption, when the individual's income decreases, their consumption expenditure does not decrease proportionally as the individuals will borrow or dissipate their savings to maintain their consumption at the level earlier attained. Generally, this theory implies that the saving decision of an individual is independent of their absolute level of disposable income, but rather on their relative position within the income distribution in the society. Moreover, on their previous highest level of income.

### **2.2.3 PERMANENT INCOME HYPOTHESIS**

Milton Friedman (1957) presented the permanent income hypothesis. Friedman distinguished income as either permanent ( $Y_p$ ) or transitory ( $Y_t$ ), he defined permanent income as the expected or anticipated income to be earned over a protracted period, and transitory income consisting of an unexpected increase or decrease in income (windfall). The permanent income hypothesis is a theory of consumer spending that asserts that individuals spend according to the expected long-term average income. By intuition, therefore, if an individual expects an increase in income at the end of a certain period, they may choose to consume more in anticipation of the additional income, however, it is also possible that they may forego consuming more, but instead, increase their savings or invest in a long-term income generating activity.

This model emphasizes consumption being determined by lifetime income and not current income. Contradicting the Keynesian consumption model. Therefore, according to the permanent income hypothesis, an individual can create an equilibrium between consuming and saving across time, and transitory changes would not affect an individual's consumption.

### **2.2.4 LIFE CYCLE HYPOTHESIS**

Proponents of the life cycle hypothesis, Modigliani and Brumberg (1954); Ando and Modigliani (1963) assumed that individuals maximize utility from continuous consumption

even when income from their life cycle ceases to be there, savings, therefore, finance consumption in the retirement period. According to this model, individuals seek to smooth their consumption throughout their lifetime and will therefore save when their income is high, to finance their consumption after retirement and de-save (spend previously saved money) during retirement. Consumption is therefore a function of accumulated wealth, total expected income before retirement, and the number of years until retirement.

The life cycle model is represented by the equation:  $C = \frac{w+RY}{T}$

Where W is the initial wealth endowed, R is the number of working years remaining, Y is the income and T is the remaining years of an individual's life. This theory, therefore, posits that savings are related to the age of an individual, at the beginning and end of their lifespan, they have relatively low income. At an early age, individuals have negative savings, as they are yet to acquire stable income avenues but typically still have expenses such as incurred education debt. As they get older and secure employment thereby earning an income, savings are expected to be highest. Towards retirement, individuals' savings decrease, and upon retirement, they start to dis-save. Therefore, a country with a majority of its employed population being young and middle-aged would have a greater saving rate.

With this theory putting great emphasis on saving for retirement as the primary motive for foregoing consumption, Deaton (1989) greatly opposed it, citing that this may not be the case for households in developing countries, primarily because savings are treated as a safeguard as opposed to consumption purposes after retirement.

### **2.3 EMPIRICAL LITERATURE**

The empirical literature on financial systems has developed from simply availability of digital financial services (Demirguc-Kunt and Klapper, 2012), to usage by consumers. More recent empirical analysis focusing on financial sector penetration at the household level depicts the

adoption of mobile devices as not only simple communication devices, but whose utility can be expanded to serve for wealth storage not only by the wealthy in society but also by low-income households( Jack and Suri, 2014). Additionally, these studies also converge in demonstrating how savings by households are influenced by socioeconomic and demographic variables, this is despite the studies having different dimensions, in terms of countries of study, sample periods, estimation techniques, and models used.

Mbiti and Weil (2011) conducted a study aimed at investigating M-Pesa use and the impact it had on the economy, they conducted two waves of household data on access to financial services and products. Through a balanced panel of 190 sub-locations, their findings showed little evidence associating the use of M-Pesa accounts with wealth storage. However, the mobile money platform enhanced individual outcomes by encouraging banking and increased transactions. Additionally, the uptake in M-Pesa usage had lessened propensity to using informal saving techniques such as ASCAs and Chamas.

Jack and Suri (2014) undertook a survey on 3000 households randomly selected across a large part of Kenya, commencing in 2008, they did a follow up on the same households in the subsequent years; 2009 and 2010, their aim was to examine how lowered transaction costs on mobile money influenced risk sharing. They proceeded to do their analysis based on a balanced two-period panel. From their sample survey, mobile money adoption increased to 70 percent, up from 43 percent. Their findings revealed that M-Pesa users could absorb negative income shocks (job losses, business failure, severe illness, death of livestock, and harvest failures) without limiting their expenditure. By contrast, non-user households reduced their consumption by 7 percent.

Since the M-Pesa rollout in 2007, mobile money has revolutionized in Kenya, bringing promise to mobile savings. Demombynes and Thegeya (2012) examined the evolution of mobile

savings since its inception, employing data collected from a sample of a survey conducted on 6,083 individuals in 2010. They incorporated bank-integrated mobile savings to their study. Their results indicated that a majority of the M-Pesa users fell under the middle and upper income class, with the use of bank-integrated mobile savings products being limited to the relatively wealthy class in the sample population, those that were married and of the male gender in rural areas were more likely to save. Their findings showed that registered M-Pesa account owners were 32 percent more plausible to have savings, attributed to the convenience and security provided by mobile money, despite there being no accruing interest.

Adopting a household approach to study the factors determining savings by smallholder farmers, teachers and entrepreneurs in parts of Nakuru County in Kenya, (Kibet et al., 2009) used a multistage sampling technique to collect data on 359 individuals in Uasin Gishu. Their study concluded that household saving behavior was positively influenced by income, occupation, and the level of education, therefore, savings increased as the levels of income rose. Households of entrepreneurs saved more than those of farmers and teachers, this is because of the frequent expenditure and revenue turnovers, given the nature of their economic activity. However, savings were negatively affected by access to credit, age, and dependency ratio. Households with easy access to credit did not save as much as they did not heavily rely on their savings to fund their economic activities. The aging also had low savings as their productivity and earning potential declined as they approach retirement. Expenditure also increased with a rising dependency ratio thereby reducing the amount saved by households.

Nandhi,(2012) used primary data from interviews conducted in 2011 with users and officials of EKO mobile banking to examine the effects that mobile money accounts had on saving practices by low-income earning users in the urban metropolis of Delhi, India. Key findings that emerged were that mobile money was valued as an aid to users who depended on informal saving practices, in particular, the majority of users who saved for emergencies. To add to this,



mobile money was considered a substitute for informal savings mechanisms as well as bank accounts. Innovations in mobile money, therefore, encouraged households to save as they lowered transaction costs and the risks of saving through informal practices.

Kikulwe, Fischer, and Qaim (2013) used a panel regression model to analyze the effect of mobile money use by households categorized as smallholder farmers. They used primary data gathered using structured questionnaires presented to household heads, the survey was done in two rounds. Employing a balanced panel comprising 640 observations from 320 households. Their findings showed that mobile money use had a significant influence on household's welfare and it increased total income by 40 percent on average. Mobile money use as well lowered transaction costs substantially, in contrast to conventional cash transfer mechanisms. Additionally, mobile money services contributed more to farming for commercial reasons and provided incentives for households to save. Remittances also increased by 66 percent. Further, mobile money users were able to purchase more farming inputs because of lowered transaction costs, increased remittances, and savings, all of which reduced risk and liquidity constraints contributing to higher market participation.

Batista and Vicente (2013) intended to distinctively analyze the outcomes that were related to the use of mobile money, particularly, outcomes on savings and transfers, and information and trust outcomes from the dissemination trials conducted in the rural parts of Mozambique. Since mobile money had at the time just been launched in the country, the study sample provided a pure control group. Their data comprised both primary and secondary sources. They argued that an individual's inclination to send remittances, especially from those with migrant family members increased to 7 percent. Additionally, the findings showed a preference for using mobile money for both saving and remitting purposes as an alternative to conventional channels. Overall, their study pointed to a high possibility of adopting mobile money in rural

parts of Mozambique to ameliorate financial literacy, increase remittances and provide substitute means of saving and remitting.

Lwanga and Adong (2016) conducted a study in Uganda that provided a micro-level outlook on the influence that mobile money systems had on households' saving behavior employing the 2013 Finscope survey dataset. They used quasi-experimental methods and instrumental variables to assess the impact. Findings from the study showed that although mobile money-saving technique had not been fully integrated in the whole region because of income disparities and poor infrastructure in some areas, being a registered mobile money user increased the likelihood of using a mobile money platform to save. Further, lack of interest payments was a deterrent to individuals saving through mobile money.

Ky, Rugemintwari, and Sauviat (2018) investigated whether using mobile money could aid individuals to accumulate savings to provide a buffer against both foreseeable and emergency occurrences. They conducted their study in Burkina Faso using primary data collected in 2014. Analysis was performed employing a logistic regression model and an instrumental variable. The results revealed that although there was no correlation between mobile money application and saving for any foreseeable events, using mobile money provided safety and convenience, which enhanced individuals' inclination to save for medical emergencies, particularly among females, the less educated, those in rural areas, and individuals without regular sources of income. In general, their findings showed that digital financial technology aided in bridging the gap between the different income classes in society, therefore fostering financial inclusion.

Holding constant other factors that influence households (Ouma, Odongo, and Were, 2017) conducted an analysis to demonstrate the link between mobile money use and savings mobilization. Their study hypothesized that savings were encouraged by mobile money usage encourages savings. Using secondary data from FinAccess and finscope surveys done in

Kenya, Uganda, Zambia, and Malawi, they adopted a logistic regression model that used the maximum likelihood method to analyze the probability that the respondents either saved or not. Their results revealed that access of mobile devices to render financial services promoted the probability of saving by households, as well as a significant influence on the amount saved through digital financial services.

Waweru and Kamau (2017) sought to find out, whether a shift in money transfer and saving applications particularly by the low-income class in Kenya could be ascribed to the inception of mobile money. This study used primary data from a cross section of 750 households across the country, all of whom were above the age of 18 years, as well as adults living below the poverty line. Their findings disclosed a positive association linking the introduction of mobile money to saving in formal financial institutions by low-income households. Notably, there was a significant shift away from informal saving mechanisms.

Kimosop and Cheboi (2019) examined factors determining the mobilization of domestic savings mobilization among the rural indigent in Uasin Gishu County, Kenya, and that engaged in table banking. A general notion is that subsistence farmers are not able to save because of being too poor. Applying the ordinary least squares regression approach to quantitatively analyze these factors influencing savings mobilization among the subjects in the study sample, their results signified that household income had a positive and significant effect on saving mobilization, implying a direct relationship between income and saving. Additionally, household size was negative and significant, meaning that smaller household sizes saved more while larger households saved less. The dependency ratio was negative and significant, meaning that a high number of dependents increase expenditure hence no savings. However, this study excluded important socio-economic demographic characteristics such as age and gender, further, this study could not be said to be nationally representative as it was conducted on households in only one county.

## **2.4 OVERVIEW OF LITERATURE**

Theoretically, the origin of the propensity to save began with Keynes; however, saving behavior by individuals is built on neo-classical theories. There are two main reasons why individuals save. First, in the long run, they can maintain consumption even after retirement, second, are precautionary savings due to uncertainties. The life cycle hypothesis argues that individuals maximize utility by balancing out their consumption and their future incomes.

Prevailing output on the adoption of mobile money and savings behavior converge in demonstrating socioeconomic characteristics as being crucial in determining saving behavior by households (Ky et al.,2018; Kimosop and Cheboi, 2019; Kibet et al.,2009; Ouma et al.,2017; Demombynes and Thegeya, 2012).

This study focuses on the Kenyan context. According to the literature reviewed (Demombynes and Thegeya, 2012) found a positive relationship between registered M-Pesa users and savings. More recently, (Waweru and Kamau, 2017) sought to investigate mobile money and domestic saving practices among low-income earning households, they found an absolute association connecting mobile money adoption to saving in formal institutions. Kimosop and Cheboi (2019) investigated factors influencing the mobilization of domestic saving among the rural poor, their results showed that household income had positive consequential effects on saving. Ouma, Odongo, and Were (2017) employed the national FinAccess household survey data to establish a relationship linking the adoption of mobile financial services to savings mobilization, their results showed that the likelihood of households saving could be promoted by the use of mobile devices. However, they used data collected in 2013, and therefore, their results are not relevant in providing predictions at the current time.

Most of these studies fail to capture internet accessibility as a dimension in analyzing mobile money usage and saving by households in Kenya. Practically, an individual may have access to a mobile device or be in ownership of one, but not unless the device is in proximity to a

reliable network, then the individual is not able to perform some transactions. With innovations in the financial sector, financial services have shifted digitally to operating over the internet; therefore, reliable internet connectivity is an important tool for the application of mobile financial services and products. On account of all literature presented, this study intends to contribute to the existing research by empirically analyzing for the effect of mobile money use on saving by households in Kenya using the national representative 2021 FinAccess survey dataset.

## CHAPTER THREE

### METHODOLOGY

#### 3.1 Introduction

This chapter illustrates the analytical approach for the effect of mobile money on household saving behavior. It elaborates the research methodology to be employed for the analysis of data, and the data sources.

#### 3.2 Theoretical Framework

A theoretical framework that this study will employ to analyze saving decisions by households is the life cycle model, the model is inferred from the consumption by households, it considers saving as a decision on the allocation of resources over time. Developed in the 1950s, the original life cycle model had a drawback which posed a problem in deriving closed form solutions, and if under restrictive assumptions, and they became available, data on expected incomes was unavailable, Hall (1978) and MaCurdy (1981) provided a solution to this by equalizing the marginal utility of consumption across periods, referred to as the Euler equation. This study will adopt the model employed by Rogg (2000). Equalizing the marginal utility of consumption over time drives individuals to save.

Maximizing utility is a function of current consumption

$$\text{Max. } U = f(C_t)$$

..... (i)

Assuming utility is constant in each time period and the households' problem is to maximize

$$V = E_t \sum U(C_t)$$

..... (ii)

Where  $E_t$  is the expected value at time period  $t$ .

Subject to the budget constraint where lifetime consumption should not exceed lifetime income

$$C \equiv \sum_{t=0}^{T-1} \frac{C_t}{1+r^t} \leq \sum_{t=0}^{T-1} \frac{Y_t}{1+r^t} \equiv Y \text{ ..... (iii)}$$

Where C and Y are the aggregate lifetime consumption and income from time of birth (t=0) to time period before death (T-1).  $C_t$  and  $Y_t$  indicate consumption and income respectively in time period t.

So as to get the equilibrium of a household's intertemporal marginal utility of consumption, maximizing eqn ii subject to eqn iii yields a households' optimal consumption choice across time represented by Euler's equation:

$$U'(C_t) = \left[ \frac{1+r}{1+\delta} \right] E_t U_t (C_{t+1}) \dots \dots \dots (iv)$$

From equation IV, household optimal intertemporal consumption choice depends on the interest rate (r), future expectations ( $E_t$ ) and the rate of time preference ( $\delta$ )

For purposes of adopting a savings theory in context of a developing country, the model further assumes that households in a developing country face borrowing constraints. Informal financing institutions such as ROSCAs and table banking associations, popularly referred to as chamas facilitate borrowing especially by low-income households, however, if we assume high interest rates so that households cannot borrow at all, then

$$C_t \leq A_t + Y_t \dots \dots \dots (v)$$

Where  $C_t$  is, consumption at time t,  $A_t$  is the sum of assets accumulated and  $Y_t$  is income at time t.

Current saving enables households transfer assets to the consequent period to supplement their consumption, as represented by;

$$A_{t+1} = (1 + r)[ A_t + Y_t - C_t ] \dots \dots \dots (vi)$$

By assuming that a household is not able to borrow, assets from the previous period are positive, that is  $A_t \geq 0$ . This indicates that while the household is not able to borrow, they can

save. Hence, if household were risk averse, they could accumulate assets to buffer any shortfalls in future consumption.

Introducing the constraints to Euler’s equation of optimal intertemporal consumption gives;

$$U'(C_t) = \max U' \left[ A_t + Y_t, \frac{1+r}{1+\delta} \right] E_t U_t (C_{t+1}) \dots\dots\dots (vii)$$

Therefore, in addition to interest rate, future expectations and the rate of time preference, the marginal utility of consumption also depends on  $(A_t + Y_t)$  which is commonly defined as ‘cash-on-hand’. If consumers were not constrained in saving but only on borrowing, the constraint would be irrelevant if  $r > \delta$  as the household would be saving.

### 3.3 Empirical Model

This study employs an empirical analysis to establish whether using mobile money has an impact on saving by households, while controlling for other socioeconomic characteristics for purposes of accounting for the diversity among the different households. Literature previously reviewed shows fundamental socioeconomic factors that influence saving by households, they include sources of livelihood, age, education level attained, gender and geographical location, additionally, this study introduces accessibility to reliable internet among the control variables for analysis.

This study therefore models the saving behavior of household as a function of mobile money usage, internet access, gender, age, age squared, livelihood category, education, shocks and location.

$$savings = f(\text{mobile money, internet, education, age, age squared, location, livelihood category, gender and shock})$$



$$S_i = \beta_0 + \beta_1 MM_i + \beta_2 int_i + \beta_3 educ_i + \beta_4 age_i + \beta_5 agesqd_i + \beta_6 c.t_i + \beta_7 l.c_i + \beta_8 gen_i + \beta_9 shock_i + \varepsilon_i$$

Where:

$S_i$  is the probability of saving by households,  $MM_i$  is mobile money use,  $int_i$  represents internet accessibility by the household,  $age_i$  and  $agesqd_i$  are the respective ages and squared age of the respondent (age-squared is included in the model to test for the non-linear effects),  $c.t_i$  represents the location of the household,  $l.c_i$  is the livelihood category,  $gen_i$  is the identity of the respondent,  $shock_i$  is if a household experienced any shock and  $\varepsilon_i$  is the error term.

### **3.4 Definition and Measurement of variables**

This paper analyzed the effect of mobile money use on savings at the household level in Kenya.

The response variable is saving usage, which is a binary variable specified by 1 if the household currently has a saving product and 0 otherwise (do not have). The independent variable, mobile money use is classified under, current mobile money use, previous mobile money use and having never used mobile money. The control variables include socioeconomic characteristics to account for the household differences and are controlled for in the empirical model.

<b>VARIABLE</b>	<b>DEFINITION</b>	<b>MEASUREMENT</b>	<b>PREDICTED EFFECT</b>	<b>DATA SOURCE</b>
Mobile Money	Mobile money usage	Categorical Variable where 1= current use, 2= previously used, 3= never used	Positive	FinAccess 2021 Household Survey
Internet Accessibility	Whether the household is in proximity to an internet network	Dummy Variable where 1= yes, 0= no	Positive	FinAccess 2021 Household Survey
Education Level	Education level attained by the respondent	Dummy variable where 1= at least secondary level, 0= otherwise	Positive/Negative	FinAccess 2021 Household Survey
Age	Refers to the number of years lived by the respondent	Number of years	Positive	FinAccess 2021 Household Survey
Age Squared	Refers to the squared age of the respondent	Number of years	Negative	FinAccess 2021 Household Survey
Cluster Type	Refers to the Location in which the household resides	Dummy Variable where 1= urban and 0= rural	Positive	FinAccess 2021 Household Survey
Livelihood Category	Refers to activities by the respondent of securing the basic necessities of the household	Dummy variable where 1= agriculture, 2= employed, 3= casual, 4= own business, 5= dependent	Positive/Negative	FinAccess 2021 Household Survey
Gender	Gender of the respondent	Dummy Variable where 1= female and 0= male	Positive/Negative	FinAccess 2021 Household Survey
Shock	If the respondent experienced any shocks	Dummy Variable where 1= yes and 0= no	Negative	FinAccess 2021 Household Survey

### **3.5 Econometric Approach**

A probit regression model will be employed for this study given the binary form of the household saving variable; the variable is defined by the use of a savings product at the time of data collection. The dependent variable of the econometric model is a binomial variable of saving by households coded as  $Y_i = 1$  for those households that were saving at the time of data

collection and  $Y_i = 0$ , otherwise. This regression will indicate whether respondents using mobile money were more likely to save than those that did not. Even if both logit and probit models provide approximately similar results and follow the same estimation procedure, the probit model is preferred to the logistic regression model as the former takes the error terms in the dataset to be normally distributed and that probit models are correlated across the choices thereby offsetting the Independence of Irrelevant Alternatives (IIA) assumption.

The likelihood of a household saving provided a set of explanatory variables could be represented by:

$$E(Y|X) = P(Y = 1|X) = \Phi(X\beta) \dots\dots\dots (viii)$$

$\Phi(\cdot)$  is the cumulative distribution function (CDF) of the standard normal distribution.

$$\text{Consider a latent variable } Y_i^* = X_i\beta + \mu \dots\dots\dots (ix)$$

where  $\mu \sim N(0,1)$ .  $Y$  is observed as an indicator for the benefits of saving in comparison to not saving,  $X$  represents the set of explanatory variables and  $\beta$  is a set of parameters to be estimated.

The dependent variable  $Y$  relates to the latent variable by the expression:

$$Y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \dots\dots\dots (x)$$

We have that:

$$P(Y_i = 1|X_i) = P(y_i^* > 0|X_i) \dots\dots\dots (xi)$$

$$= P(X_i\beta + \mu_i > 0|X_i) \dots\dots\dots (xii)$$

$$= P(\mu_i > -X_i\beta|X_i) = 1 - \Phi(-X_i\beta) \dots\dots\dots (xiii)$$

$$= P(\mu_i \leq -X_i\beta|X_i) \text{ (by symmetry of the normal distribution) } \dots\dots\dots (xiv)$$

$$= \Phi(X_i\beta) \dots\dots\dots (xv)$$

For an  $i^{\text{th}}$  observation subject to the vector of the explanatory variable, we have:

$$P(Y_i = 0|X_i) = 1 - \Phi(X_i\beta) \dots\dots\dots (xvi)$$

Integrating equations (xv) and (xvi) results in the likelihood of an  $i^{\text{th}}$  observation ( $Y_i | X_i$ ):

$$F ( Y|X_i ) = \{ \phi(X_i\beta) \}^y \{ 1 - \phi(X_i\beta) \}^{-y} \dots\dots\dots (xvii)$$

The logarithmic function for the  $i^{th}$  observation is given as:

$$\ln \mathcal{L}(\beta) = Y_i \ln \phi(X_i\beta) + (1 - Y_i) \ln(1 - \phi(X_i\beta)) \dots\dots\dots (xviii)$$

Maximum likelihood estimation technique is used to derive estimated parameters for the vector of coefficients  $\hat{\beta}$  that maximize the log likelihood for the  $i^{th}$  observation.

The probability that the response variable  $Y_i$  equals to 1 given the independent variables  $X_i$  is:

$P_i = P_r ( Y_i = 1|X_i ) = \phi ( \beta_0 + \beta_0 X_i )$ . Where  $P_i$  is the probability that a household is saving,  $Y_i$  is the response variable, current household saving and  $X_i$  is set of independent variables for the households selected.

### 3.6 Data Sources

The paper employed the 2021 Kenya national FinAccess survey data that designed a cross-sectional survey at the household level across forty-seven counties. The survey sample was sourced from the Kenya Household Master Frame that included 10,000 clusters developed from the 2019 Kenya Census; a multi-stage stratified cluster procedure was used to provide estimates for the survey. Out of all the potential respondents, eligible individuals aged 16 years and above were randomly selected in each household. Households eligible for interviews were 25,724; however, only 22,024 were successfully interviewed, representing an overall response rate of 85.6 percent. Out of all successfully interviewed respondents, 51.3 percent were female, and 48.7 percent were male. In terms of location, 63.5 percent of the household's responses were from rural locations, while 36.5 percent of responses were from urban households. This study accounted for the availability of an internet network.

### **3.7 Pre-Estimation Tests**

#### *Multicollinearity*

Multicollinearity exists when the explanatory variables in the model are correlated. This problem among the explanatory variables results in unreliable statistical inferences. The study employed a pairwise correlation matrix to test for multicollinearity

## CHAPTER FOUR

### EMPIRICAL FINDINGS

#### 4.1 INTRODUCTION

This chapter provides detailed empirical findings of the variables analyzed under the study, using secondary data obtained from CBK and KNBS databases on the most recent FinAccess Household Survey data, to enable us capture the effect of mobile money use on saving by households.

This chapter is organized into; descriptive statistics, correlation analysis and inferential statistics derived from the regression.

#### 4.2 DESCRIPTIVE STATISTICS

The summary statistics of the variables employed for this empirical study are presented in Table 1.

**Table 1: Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Formal Saving	22024	.564	.496	0	1
Informal Saving	22024	.271	.444	0	1
Current MM Use	22024	.775	.418	0	1
Previous MM Use	22024	.037	.189	0	1
Never Used MM	22024	.188	.391	0	1
Internet Access	22024	.401	.49	0	1
Secondary Education	22024	.417	.493	0	1
Agriculture	22024	.211	.408	0	1
Employed	22024	.093	.291	0	1
Casual	22024	.276	.447	0	1
Own business	22024	.148	.355	0	1
Dependent	22024	.272	.445	0	1
Urban	22024	.344	.475	0	1
Female	22024	.576	.494	0	1
Age	22024	38.897	17.212	16	116
Experienced Shock	22024	.708	.455	0	1

From the number of respondents observed for this study, 56.4 percent of the households had formal savings at the time when data was being collected while 27.1 percent had informal

savings, this implies that a large percentage of Kenyans are saving through formal means. The age of selected respondents, ranges from 16 to 116 years while the average age of selected respondents was 38 years. The graph representing the life cycle hypothesis is a hump-shaped pattern, which shows that individuals' prime working years start at the age of 20, and they retire at 65 years, at 40 years, the curve is at its peak. This implies therefore, with an average age of 38 years, when respondents are highly productive, we expect to see high saving rates. Additionally, 77.49 percent of respondents were in use of mobile money services and products. On average, 41.7 percent of respondents had at least attained secondary school education, 34.4 percent of the respondents lived in urban areas while 57.6 percent of the respondents were females.

Figure 2 shows the two forms in which individuals could keep their savings, there are those who save in formal institutions, which comprise of; banks, SACCOs, microfinance institutions, among others, while there are individuals who save informally, for example, through small groups locally referred to as chamas, and having secret hiding places. We can see that saving through formal institutions is significantly higher at 67.57 percent.

Figure 3 shows that in terms of gender, females have higher saving rate than their male counterparts, however, the majority save informally. Interestingly, as shown on Figure 4, those residing in rural areas have higher saving rates than those in urban areas, both formally and informally.

As shown on Table 2, there is a gap in saving patterns between both genders, 57.56 percent of females were saving in comparison to the male, with 42.44 percent. Additionally, more females did not also have savings in comparison to males

**Table 2: Household saving by gender**

Saves	Gender		
	male	female	Total
Does Not	2667	3637	6304
	42.31%	57.69%	100.00
Currently have savings	6672	9048	15720
	42.44%	57.56%	100.00
Total	9339	12685	22024
	42.40%	57.60%	100.00

Among selected categories from which different households earn their living, as represented in Table 3, business owners have the highest savings rate at 87.67 percent, closely followed by those employed at 87.03 percent, individuals who earn from agriculture have a savings rate of 75.80 percent, casual workers have a rate of 69.97 percent, while dependents have the lowest savings rate at 55.14 percent, this can be explained by the fact that this group is comprised of those who do not earn a living and therefore are reliant on members of their households that do. As for not saving, dependent respondents lead at 44.86 percent, followed by casual workers at 30.33 percent. Business owners have the lowest rate of not having savings, at 12.33 percent.

**Table 3: Saving according to source of livelihood**

Saves	Livelihood					Total
	Agriculture	Employed	Casual	Own business	Dependent	
Do Not	1122	267	1825	402	2688	6304
	24.20%	12.97%	30.03%	12.33%	44.86%	28.62%
Currently have savings	3515	1791	4252	2858	3304	15720
	75.80%	87.03%	69.97%	87.67%	55.14%	71.38%
Total	4637	2058	6077	3260	5992	22024
	100.00	100.00	100.00	100.00	100.00	100.00

Table 4 shows that, only 22.51 percent of the selected respondents were not in use of mobile money services and products at the time of data collection, this is a positive representation of the wide adoption of advanced technology in the financial sector by households across the country.



**Table 4: Saving and mobile money usage**

Saves	Mobile Money Usage			
	Currently have	Used to have	Never had	Total
Do Not	3202 50.79%	504 7.99%	2598 41.21%	6304 100.00
Currently have savings	13864 88.19%	317 2.02%	1539 9.79%	15720 100.00
Total	17066 77.49%	821 3.73%	4137 18.78%	22024 100.00

**Table 5: Current Mobile Money Use and Internet Access**

Current MM Use	Internet		
	Otherwise	Can access	Total
Otherwise	2047 49.10%	2122 50.90%	4169 100.00
Mobile Money	9761 63.18%	5689 36.82%	15450 100.00
Total	11808 60.19%	7811 39.81%	19619 100.00

Table 5 shows that a higher percentage of households were unable to have internet connectivity, of these, 63.18 percent of the mobile money users within this cluster were unable to gain access to the internet through their mobile devices.

From the literature overview, the two main reasons as to why individuals save are for retirement and for precaution due to uncertainties, however, this household dataset reveals that, a majority of households save in order to meet their day-to-day household needs, as shown in Table 6.

**Table 6: Household Saving Purposes (%)**

<b>Reasons for Saving</b>	<b>Percentage (%)</b>
Day to day Needs	26.26
Emergencies	22.14
Education	20.29
Retirement	6.44
Start new Business	3.99
Expand Business	3.14
Acquire Household Goods	3.12
Personal Use	2.38
Purchase Land	1.79
Inheritance	1.59
Purchase Livestock	1.49
Purchase Agricultural Inputs	1.44
Purchase/ Build House	1.39
To Improve House	1.28
Others	0.67
Invest In Business Premise	0.65
Buy Car or Motorcycle	0.44
Pay Farm Labour	0.32
Social Use	0.30
Agricultural Improvements	0.26
Don't Know	0.18
Invest in Others Business	0.14
Purchase Agriculture Implements	0.11
For Produce Transport	0.11
Fishing Equipment	0.04
Refused to answer	0.02
<b>TOTAL</b>	<b>99.98%</b>

### 4.3 CORRELATION ANALYSIS

A correlation analysis was carried out to establish the strength and degree of association between the explanatory variables. The correlation matrix tests for the presence of multicollinearity which affects the regression coefficients and the p-values, high intercorrelation among the explanatory variables results in less reliable statistical inferences. As a rule of thumb for interpreting the magnitude of a pairwise correlation as stated by Gujarati (2003), a dataset presents a severe problem if any of the correlation coefficients is greater than 0.8(in absolute value). Table 7 shows that there is no high correlation from the coefficient results therefore ruling out the possibility of a multicollinearity problem in the study.

Additionally, multicollinearity is not a problem in this model since the expected signs are consistent with theory.

**Table 7: Matrix of Correlation**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Formal saving	1.00														
Informal saving	0.23***	1.00													
Current MM use	0.58***	0.21***	1.00												
Previous MM use	-	-	-	1.00											
Internet Access	0.02***	-	-	-	1.00										
Secondary Education	0.18***	0.02***	0.13***	-	0.31***	1.00									
Agriculture	0.01	0.05***	0.02**	-0.01	-	-	1.00								
Employed	0.16***	0.04***	0.14***	-	0.15***	0.14***	-	1.00							
Casual	-0.01	-	0.07***	0.04***	-	-	-0.32***	-0.20***	1.00						
Own business	0.14***	0.04***	0.13***	-	0.10***	0.08***	-0.22***	-0.13***	-	1.00					
Dependent	-	-	-	0.02**	0.07***	0.04***	-0.32***	-0.20***	-	-	1.00				
Urban	0.22***	0.15***	0.29***	-	0.06***	0.04***	-0.32***	-0.20***	0.38***	0.25***	-	1.00			
Female	0.11***	-	0.15***	-	0.21***	0.24***	-0.28***	0.15***	0.06***	0.15***	-0.03***	-	1.00		
Age	-	0.03***	-	0.03***	-	-	-0.03***	-0.10***	-	0.05***	0.17***	-0.00	-	1.00	
Experienced any shock	0.05***	0.16***	0.04***	0.00	-	-	-0.03***	-0.10***	-	0.13***	-	-	-	-	1.00
	0.01	0.08***	0.04***	0.05***	-	-	0.20***	-0.06***	-	-0.02*	-0.03***	-	0.02**	-	1.00
	0.09***	0.09***	0.06***	0.01	0.17***	0.30***	-	-	0.10***	-	-	0.17***	-	0.02**	0.08***
					0.06***	0.03***	0.06***	0.00	0.01	0.04***	-0.09***	-	0.02**	0.08***	1.00
											0.05***				

Note \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## 4.4 MODEL ESTIMATION

**Table 8: Probit Regressions**

VARIABLES	(1) Formal saving	(2) Formal saving	(3) Informal saving	(4) Informal saving
Current MM Use	-0.00458 (0.0453)	0.0528 (0.0378)	-1.636*** (0.0455)	-1.444*** (0.0385)
Previous MM Use	-2.365*** (0.0973)	-2.309*** (0.0939)	-2.162*** (0.0705)	-1.970*** (0.0660)
Never Used MM	-2.543*** (0.0610)	-2.493*** (0.0563)	-2.487*** (0.0523)	-2.308*** (0.0466)
Internet Access	0.280*** (0.0241)	0.279*** (0.0241)	0.0774*** (0.0221)	0.0704*** (0.0221)
Secondary Education	0.268*** (0.0231)	0.265*** (0.0230)	0.111*** (0.0221)	0.0932*** (0.0220)
Agriculture	0.196*** (0.0310)	0.202*** (0.0309)	0.417*** (0.0299)	0.433*** (0.0298)
Employed	0.489*** (0.0416)	0.497*** (0.0417)	0.540*** (0.0381)	0.550*** (0.0382)
Casual	0.0901*** (0.0288)	0.0954*** (0.0290)	0.346*** (0.0289)	0.346*** (0.0291)
Own business	0.430*** (0.0338)	0.437*** (0.0339)	0.748*** (0.0316)	0.756*** (0.0317)
Urban	-0.0874*** (0.0231)	-0.0879*** (0.0231)	-0.229*** (0.0223)	-0.234*** (0.0223)
Female	-0.0481** (0.0211)	-0.0480** (0.0211)	0.581*** (0.0206)	0.577*** (0.0205)
Age	0.00283*** (0.000669)		0.00719*** (0.000624)	
Age-squared		2.80e-05*** (7.00e-06)		5.50e-05*** (6.48e-06)
Experienced Shock	0.199*** (0.0222)	0.200*** (0.0222)	0.208*** (0.0220)	0.212*** (0.0219)
Observations	22,024	22,024	22,024	22,024

*Standard errors in parentheses*

*\*\*\* significant at 0.01, \*\* significant at 0.05, \* significant at 0.1*

## 4.5 ESTIMATION RESULTS

Table 8 above presents the regression results of the probit model with savings as our response variable, under savings; we have two replicates of the predictor variables representing the two categories that have been estimated: formal saving and informal saving. Because of the high bivariate correlation between age and age-squared, the study fitted four different regressions.

The number of observations used for the analysis are 22,024. Our probit regressions employ a maximum likelihood estimation, which is an iterative process, from the results; our model converges on the fifth iteration. The log likelihood test has the value of -10258.385 for formal saving and -11432.638 for informal saving,  $\chi^2$  is associated with a p-value of 0.0000, which means that the regression coefficients are jointly statistically significant.

Other than the coefficient of current mobile money use under the formal savings category, all other coefficients are statistically significant. For the informal saving, all coefficients are statistically significant.

Current mobile money use does not significantly influence a household's choice of saving through formal means. The probability to save both formally and informally decreased with a shift to using a mobile money service. An increase in the current use of mobile money by an individual, decreased their probability of having either formal or informal saving. However, the probability of an individual who's currently using mobile money, to save formally, is not as low, as compared to an individual saving informally, holding other factors constant. Likewise, for an individual who had previously shifted from not using mobile money to having used it, the probability of them having both formal and informal savings decreased. These results contradict findings by (Ouma, Odongo and Were, 2017) who found that use of mobile devices to provide financial services increased the likelihood of households to save.

The age variable is significant in influencing whether individuals in the country are saving. Equations (2) and (4) represent age-squared, and are the only ones relevant for the life-cycle hypothesis as they demonstrate the non-linear effect under formal and informal saving. For every additional year in the age of an individual, the probability of them saving formally increased by 0.00283, and the probability of them saving informally increased by 0.00719, up until a certain level, beyond which, an additional year in the age of an individual lowers their probability to save. Consistent with findings by (Ouma, Odongo and Were, 2017) who found

a significant impact of age on savings. An alternative way of viewing the age and age-squared variables is by computing their coefficients into our economic model.

$$Savings = \beta_4 age + \beta_5 age^2$$

$$\frac{d savings}{d age} = \widehat{\beta}_4 + 2\widehat{\beta}_5 age$$

$$\widehat{\beta}_4 + 2\widehat{\beta}_5 age = 0$$

$$\frac{2\widehat{\beta}_5 age}{2\widehat{\beta}_5} = \frac{-\widehat{\beta}_4}{2\widehat{\beta}_5}$$

Formal Saving

$$|age| = \left| \frac{-\widehat{\beta}_4}{2\widehat{\beta}_5} \right| = \left| \frac{-0.0053187}{2(-0.0000266)} \right|$$

$$= 99.97$$

$$\equiv 99 \text{ years}$$

Informal Saving

$$|age| = \left| \frac{-\widehat{\beta}_4}{2\widehat{\beta}_5} \right| = \left| \frac{-0.0553578}{2(-0.0005129)} \right|$$

$$= 53.97$$

$$\equiv 53 \text{ years}$$

Our results indicate that, at the ages of 99 years and 53 years for formal saving an informal saving respectively, an individual's saving inclination turns around and starts to de-save, this under the life cycle theory would be our turning point, looking at our dataset; the maximum number of years recorded for individuals that were interviewed is 100 years. In Kenya, the mandatory retirement age is 60 years, therefore, an individual with informal saving could choose not to de-save before retirement and accumulate more for consumption after retirement until the end of their lifespan.

Educated respondents in our study exhibited having a higher probability of having formal savings than those with lower levels of education, for the purpose of this study, we define higher education levels among respondents as those that were at least able to complete their secondary school education, this is on the assumption that, at this particular level, an individual has basic understanding and relevant knowledge on saving practices. An individual with at least secondary school level of education has a higher probability of saving formally by 0.268; likewise, an individual with at least secondary school level of education has an increased

probability of saving informally by 0.111, compared to those with lower levels of education. These findings are in line with those by Kibet et al.,(2009); Ouma, Odongo and Were, (2017). With regard to an individuals' economic activity, the livelihood variable is categorized under agriculture, employed, casual, and business owner. From the regression results, we see that all livelihood categories are positive and significant at 1% significance level. Individuals that are employed have the highest probability of having formal savings by 0.489 as compared to the other livelihood categories. Business owners have the highest probability of having informal saving by 0.748.

Concerning gender, the results show that a male respondent has a higher probability of having formal saving to a female. While a female respondent has a higher probability of having informal saving. The findings show that being a female lowers their probability to save formally by 0.0481, but increases their probability to save informally by 0.581.

If the respondent were to increase their access to the internet by one unit, the probability of having informal saving increases by 2.4 percent, additionally, a unit increase in access to the internet further increases the probability of having formal saving by 11.1 percent,

The study found that, residing in rural areas increased the probability of individuals to saving both formally and informally. The probability of urban dwellers having formal saving and informal saving decreased by 3.5 percent and 6.9 percent respectively. This is probably because of the high costs associated with living in towns, in comparison to those in the rural areas.

From the study findings, experiencing shocks does not negatively influence where people keep their savings. In fact experiencing shocks increased the probabilities of individuals having informal saving by 0.208, while the probability of having formal savings as well increased by 0.199.

## 4.6 MARGINAL EFFECTS

Table 9 shows the marginal effects on both formal saving and informal saving. Under the formal saving category, the marginal propensity to save is highest among those employed. The use of mobile money does not increase an individuals' propensity to save through formal means, additionally, the male gender is more likely to save formally as compared to their female counterparts. As for informal saving, the propensity to save is highest among those owning businesses, with females having a higher probability of having informal savings

**Table 9: Marginal Effects after Probit**

Marginal effects after probit

$Y = \text{Pr}(\text{Formal saving})$  (predict)

= .50925591

Variable	dy/dx	Std.Err.	z	P>z	[	95%	C.I.	]	X
Current MM use	-0.002	0.018	-0.100	0.919	-0.037	0.034	0.775		
Previous MM use	-0.532	0.005	-99.590	0.000	-0.543	-0.522	0.037		
Never used MM	-0.671	0.006	-118.880	0.000	-0.682	-0.660	0.188		
Internet Access	0.111	0.010	11.710	0.000	0.093	0.130	0.401		
Secondary Education	0.106	0.009	11.660	0.000	0.088	0.124	0.417		
Agriculture	0.078	0.012	6.370	0.000	0.054	0.102	0.211		
Employed	0.189	0.015	12.550	0.000	0.159	0.218	0.093		
Casual	0.036	0.011	3.140	0.002	0.013	0.058	0.276		
Own business	0.168	0.013	13.270	0.000	0.143	0.193	0.148		
Urban	-0.035	0.009	-3.780	0.000	-0.053	-0.017	0.344		
Female	-0.019	0.008	-2.280	0.023	-0.036	-0.003	0.576		
Age	0.001	0.000	4.230	0.000	0.001	0.002	38.897		
Experienced Shock	0.079	0.009	8.950	0.000	0.062	0.096	0.708		

(\*) dy/dx is for discrete change of dummy variable from 0 to 1

Marginal effects after probit

$Y = \text{Pr}(\text{Informal Saving})$  (predict)

= .23876185

Variable	dy/dx	Std.Err.	z	P>z	[	95%	C.I.	]	X
Current MM use	-0.571	0.014	-40.910	0.000	-0.598	-0.544	0.775		
Previous MM use	-0.262	0.003	-82.720	0.000	-0.268	-0.256	0.037		
Never Used MM	-0.401	0.004	-94.990	0.000	-0.409	-0.393	0.188		
Internet Access	0.024	0.007	3.480	0.001	0.011	0.038	0.401		
Secondary Education	0.035	0.007	5.010	0.000	0.021	0.048	0.417		
Agriculture	0.139	0.011	13.220	0.000	0.119	0.160	0.211		
Employed	0.189	0.014	13.080	0.000	0.161	0.218	0.093		
Casual	0.113	0.010	11.510	0.000	0.093	0.132	0.276		
Own business	0.265	0.012	22.150	0.000	0.242	0.289	0.148		
Urban	-0.069	0.007	-10.550	0.000	-0.082	-0.056	0.344		
Female	0.173	0.006	29.830	0.000	0.162	0.185	0.576		
Age	0.002	0.000	11.570	0.000	0.002	0.003	38.897		
Experienced Shock	0.062	0.006	9.820	0.000	0.050	0.075	0.708		

(\*) dy/dx is for discrete change of dummy variable from 0 to 1



## **CHAPTER FIVE**

### **CONCLUSIONS**

#### **5.1 INTRODUCTION**

This chapter focuses on the summary of findings from the study, policy implications, conclusions, and areas for further research.

In the East African community, Kenya's gross savings as a percentage of GDP are lower than its sister countries. Cognizant of the importance of having a higher savings rate, the government purposes to drive for a retirement savings plan. So far, according to FinAccess household surveys, formal financial inclusion measured by access to financial services and products has continued to increase from 26.7 percent, according to the baseline survey conducted in 2006, to 83.7 percent in 2021. This has majorly been attributed to the adoption of advanced technology in the financial sector. However, money transfer and payment products take the major share in the usage dimension of financial inclusion.

#### **5.2 SUMMARY OF THE KEY FINDINGS**

This study therefore aimed at analyzing whether the use of mobile money would influence saving options, either formal or informal, by individuals at the household level. The study used the 2021 Kenya National FinAccess Survey data. The dependent variables were saving formally and saving informally, and were explained by mobile money use, internet access, education, livelihood categories, location, gender, age and shocks. The regression analysis made use of the probit model, and employed maximum likelihood estimation techniques. This research's key findings were that mobile money use decreased the probability of formal saving by 0.2 percent, and saving informally by 57.1 percent, the impact of saving formally is not as low as compared to saving informally, and this therefore is a positive shift towards the use of formal institutions for saving purposes. Female respondents had a higher probability of saving

informally, these informal means of saving are the chamas where majority of members are women. While, a male respondent had a higher probability of saving formally.

Households that work in the informal sector had the lowest probability of saving both formally and informally in comparison to those in agriculture, those employed and business owners. With urban dwellers, there is a decrease in the probability of having both formal and informal savings in comparison to those residing in rural areas.

### **5.3 CONCLUSIONS**

Based on the key findings, this research concluded on current use of mobile money not having significant effects on the choice of formal saving, additionally, mobile money use decreased the chances of a household saving through formal means. However, mobile money use was significant in the choice to save informally, but it also lowered the probability of households saving in informal channels. Nevertheless, we are cognizant of the fact that, the dataset was collected during the Covid-19 pandemic period, this circumstance led people and the world at large to adopt to the use of technology in their day to day activities, but based on our findings, the same cannot be said in the case of saving, and therefore we can assume that a majority of the households prioritized catering for their basic needs as opposed to saving, with chances of a majority using mobile money to acquire mobile loans such as fuliza. Further, study findings reveal that internet access, education, age, and gender were all significant factors in determining both formal and informal saving choices by household.

### **5.4 POLICY IMPLICATIONS**

Savings are an important financial instrument and are increasingly being recognized as a tool for poverty reduction. If more households were to save in formal institutions, these resources would translate to domestic lending, which in turn facilitates financial institutions to provide credit to businesses and firms. Therefore, investment in the economy would spur and there

would be growth in the overall money supply in the economy. This demonstrates a circular economy.

There need to be frameworks implemented by mobile network operators in conjunction with formal financial institutions and with oversight from the government that enable mobile money users to earn interest on their savings. Interests provide an incentive for individuals to save more; this is because savers anticipate greater returns on savings.

The Covid-19 pandemic proved that the internet is becoming a necessity. However, access, in particular, through mobile devices remains a challenge to a majority, especially those marginalized in society. Therefore, the government with support from key stakeholders should implement a network expansion strategy that provides quality and affordable internet across the country.

While previous literature indicates to mobile money being mainly used for transactions and payment services, households should be encouraged to also use the mobile money platform for savings mobilization. Additionally, it is quite evident that a fair percentage of the households still use informal means of savings, therefore, this study recommends for easier access to formal institutions, for all, so as to channel more savings to formal conventions.

There is also a need for a conducive environment that enables the private sector to flourish, from where, more employment opportunities are created and more people are able to earn an income, which would result in increased savings. This study as well recommends a campaign that targets those working in the informal sector, with the aim of encouraging saving in formal institutions.

## **5.5 AREAS FOR FURTHER RESEARCH**

This study employed cross-sectional data to analyze for factors determining saving at the household level, therefore, these results only reflect the state of saving in the short-run. There

have been 6 Financial Access Surveys that have been conducted in Kenya, starting from 2006 to 2021 with 3-year intervals, a similar study employing panel data analysis would better establish a trend on household saving behavior in the country.

Additionally, this study can be furthered by analyzing the saving behavior among households across counties, since the 2021 FinAccess household survey was conducted in all 47 counties.

## REFERENCES

- Aduda, J., & Kalunda, E. (2012). Financial inclusion and financial sector stability with reference to Kenya: A review of literature. *Journal of Applied Finance and Banking*, 2(6), 95.
- Aghion, P., Comin, D., Howitt, P., & Tecu, I. (2016). When does domestic savings matter for economic growth?. *IMF Economic Review*, 64(3), 381-407.
- Ando, A., & Modigliani, F. (1963). The " life cycle" hypothesis of saving: Aggregate implications and tests. *The American economic review*, 53(1), 55-84.
- Batista, C., & Vicente, P. C. (2013). Introducing mobile money in rural Mozambique: Evidence from a field experiment. *NOVAFRICA Working Paper Series No. 1301*
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of economic growth*, 12(1), 27-49.
- Buku, M. W., & Meredith, M. W. (2013). Safaricom and MPESA in Kenya: Financial Inclusion and Financial Integrity. *8WashJLTech&Arts0375*
- Cracknell, D. (2012). Policy innovations to improve access to financial services in developing countries: Learning from case studies in Kenya. *Centre for global development*.
- Cook, T., & McKay, C. (2015). How M-Shwari works: The story so far. *Consultative group to assist the poor (CGAP) and financial sector deepening (FSD)*.
- Deaton, A. (1989). Savings in developing countries: Theory and review. *Proceedings of the World Bank Annual Conference on Development Economics*, (pp.61-108)
- Deaton, A. (2005). Franco Modigliani and the life cycle theory of consumption. *Available at SSRN 686475*.
- Demirgüç-Kunt, A., & Klapper, L. F. (2012). Measuring financial inclusion: The global finindex database. *World Bank policy research working paper*, (6025).
- Demirguc-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2018). *The Global Finindex Database 2017: Measuring financial inclusion and the fintech revolution*. World Bank Publications.
- Demombynes, G., & Thegeya, A. (2012). Kenya's mobile revolution and the promise of mobile savings. *World Bank policy research working paper*, (5988).
- Dermish, A., Kneiding, C., Leishman, P., & Mas, I. (2011). Branchless and mobile banking solutions for the poor: A Survey. *innovations*, 6(4).
- Duesenberry, J. S. (1949). *Income, saving, and the theory of consumer behavior*.
- FSD Kenya, Central Bank of Kenya and Kenya National Bureau of Statistics (2021). *FinAccess Household Survey*. Nairobi, Kenya: FSD Kenya.
- FSD Kenya, Central Bank of Kenya and Kenya National Bureau of Statistics (2019). *2019 FinAccess Household Survey*. Nairobi, Kenya: FSD Kenya.

- FSD Kenya and Central Bank of Kenya. (2006). 2006 FinAccess Household Survey. Nairobi, Kenya: FSD Kenya.
- Gujarati, D. (2003). Basic econometrics, 4<sup>th</sup> Edition. New York: *McGraw-Hill Higher Education*.
- Gujarati, D. M. (2022). *Gujarati: Basic Econometrics*. McGraw-hill.
- Hulme, D., Moore, K., & Barrientos, A. (2015). Assessing the insurance role of microsavings. *Financing for overcoming economic insecurity*, 149.
- Jack, W., & Suri, T. (2011). Mobile money: The economics of M-PESA (No. w16721). *National Bureau of Economic Research*.
- Jack, W., & Suri, T. (2014). Risk sharing and transactions costs: Evidence from Kenya's mobile money revolution. *American Economic Review*, 104(1), 183-223.
- Keynes, J. M. (1936). The General Theory of Employment. *Interest and Money*, *McMil'lan, London*.
- Kibet, L. K., Mutai, B. K., Ouma, D. E., Ouma, S. A. and Owuor, G. (2009). Determinants of household saving: Case study of Smallholder farmers, entrepreneurs and teachers in rural areas of Kenya. *Journal of Development and Agricultural Economics*, 1(7), 137-143.
- Kikulwe, E. M., Fischer, E., & Qaim, M. (2014). Mobile money, smallholder farmers, and household welfare in Kenya. *PloS one*, 9(10), e109804.
- Kimenyi, M. S., & Kibe, J. (2014). Africa's powerhouse. *The Brookings Institution*.
- Kimenyi, M., & Ndung'u, N. (2009). Expanding the financial services frontier: Lessons from mobile phone banking in Kenya. *Washington, DC: Brookings Institution*, October.
- Kimosop, J., & Cheboi, J. (2019). Determinants of Domestic Savings Mobilization Among the Rural Poor: The contribution of Table Banking in Kenya. *Preprints*, 2019030040
- Klein, M. U., & Mayer, C. (2011). Mobile banking and financial inclusion: The regulatory lessons. *World Bank Policy Research Working Paper*, (5664).
- Ky, S., Rugemintwari, C., & Sauviat, A. (2018). Does mobile money affect saving behaviour? Evidence from a developing country. *Journal of African Economies*, 27(3), 285-320.
- Lwanga Mayanja, M., & Adong, A. (2016). A pathway to financial inclusion: Mobile money and individual savings in Uganda. *Economic Policy Research Center*, (No. 676-2016-46605).
- Mbiti, I., & Weil, D. N.,(2011),“Mobile Banking: The Impact of M-PESA in Kenya”. *African Successes*.
- Mbiti, I., & Weil, D. N. (2015). Mobile banking: The impact of M-Pesa in Kenya. In *African successes, Volume III: Modernization and development* (pp. 247-293). University of Chicago Press.

- Milton, F. (1957). Introduction to A Theory of Consumption Function. *National Bureau of Economic Research (NBER)*.
- Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. *Franco Modigliani, 1*(1), 388-436.
- Nandhi, M. A. (2012). Effects of mobile banking on the savings practices of low income users—The Indian experience. *Institute for Money, Technology and Financial Inclusion, University of California, Irvine*.
- Ndung'u, N. (2017). M-Pesa-a success story of digital financial inclusion. *Practioner's Insight. University of Oxford, UK*.
- Njuguna Ndung'u, 2019. "Digital Technology and State Capacity in Kenya." CGD Policy Paper 154. Washington, DC: *Center for Global Development*
- Ouma, S. A., Odongo, T. M., & Were, M. (2017). Mobile financial services and financial inclusion: Is it a boon for savings mobilization? *Review of Development Finance, 7* (1), 29–35.
- Prina, S. (2015). Banking the poor via savings accounts: Evidence from a field experiment. *Journal of development economics, 115*, 16-31.
- Rogg, C. S. (2000). The Impact of access to credit on the saving behavior of micro-entrepreneurs: evidence from three Latin American Countries. *A paper on a Thesis submitted to the University of Oxford*.
- Sarma, M. 2008. "Index of financial inclusion". *Indian Council for Research on International Economic Relations Working Paper No. 215*.
- Shefrin, H. M., & Thaler, R. H. (1988). The behavioral life-cycle hypothesis. *Economic inquiry, 26*(4), 609-643.
- Siaw, A., Enning, K. D., & Pickson, R. B. (2017). Revisiting domestic savings and economic growth analysis in Ghana. *Theoretical Economics Letters 7*, 1382-1397
- Waweru, K. M., & Kamau, J. W. (2017). The effect of mobile money on saving and money transfer practices for low-income earners in Kenya.
- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

## APPENDIX:

Figure 3. Saving Usage by Institutions (%)

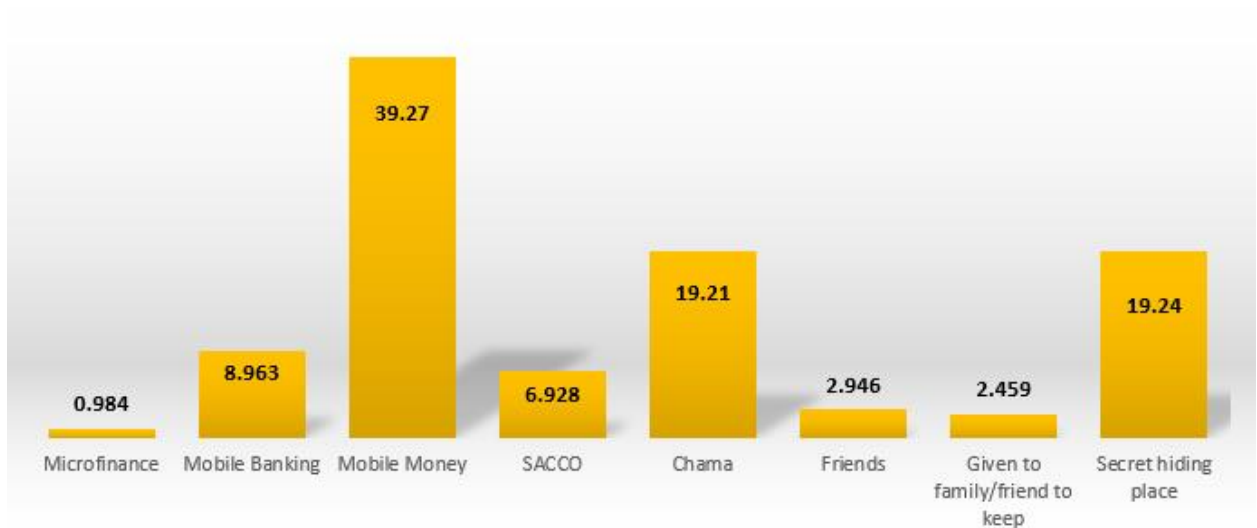
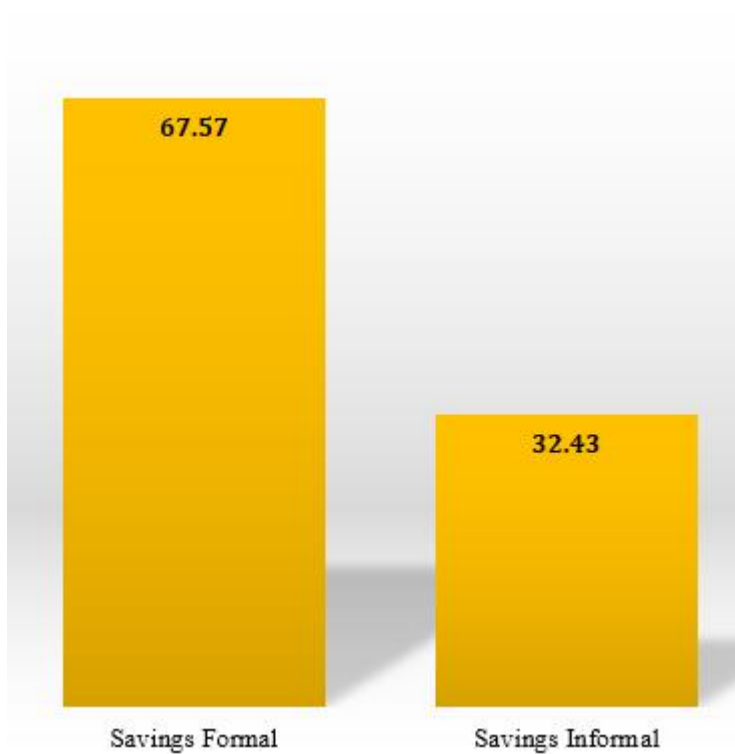
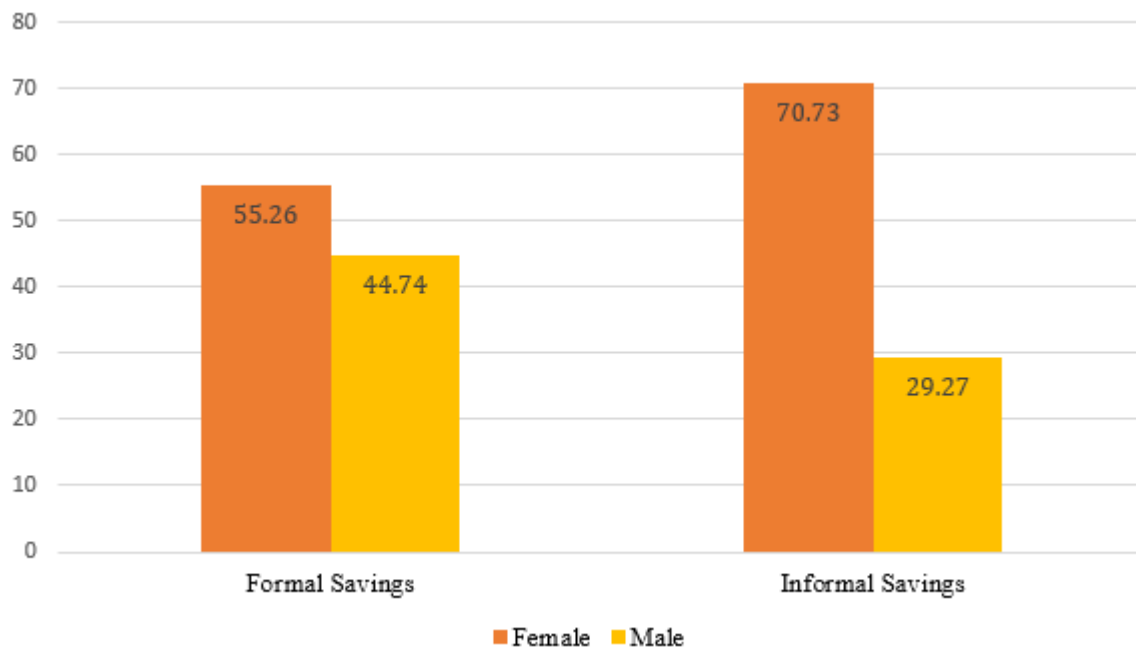


Figure 4. Saving Forms (%)

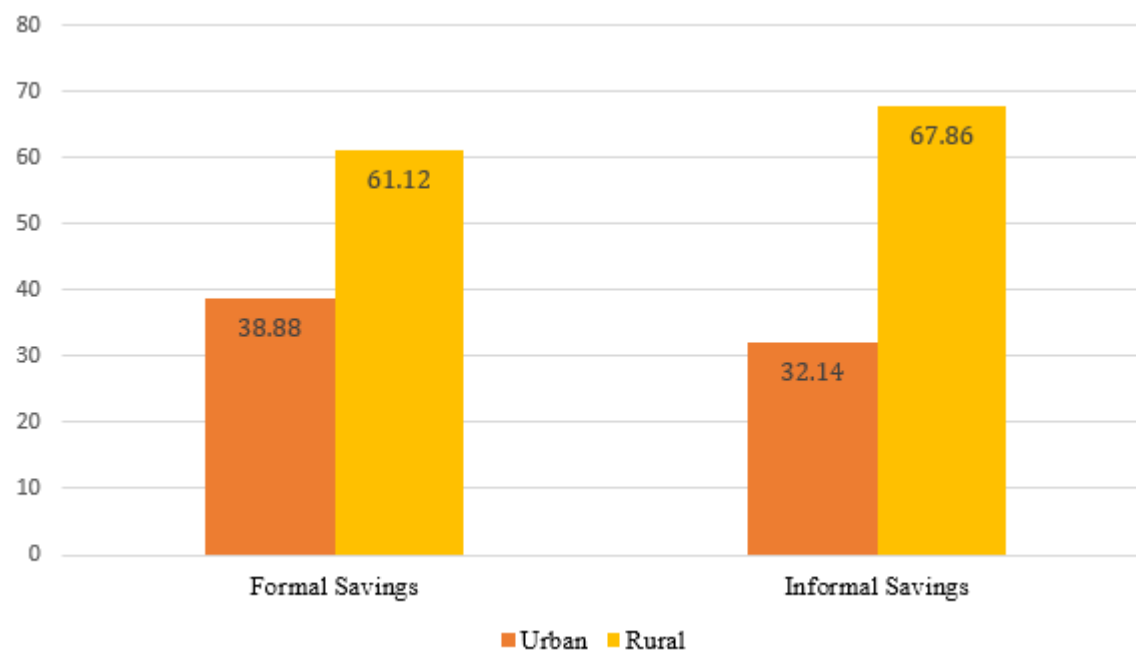




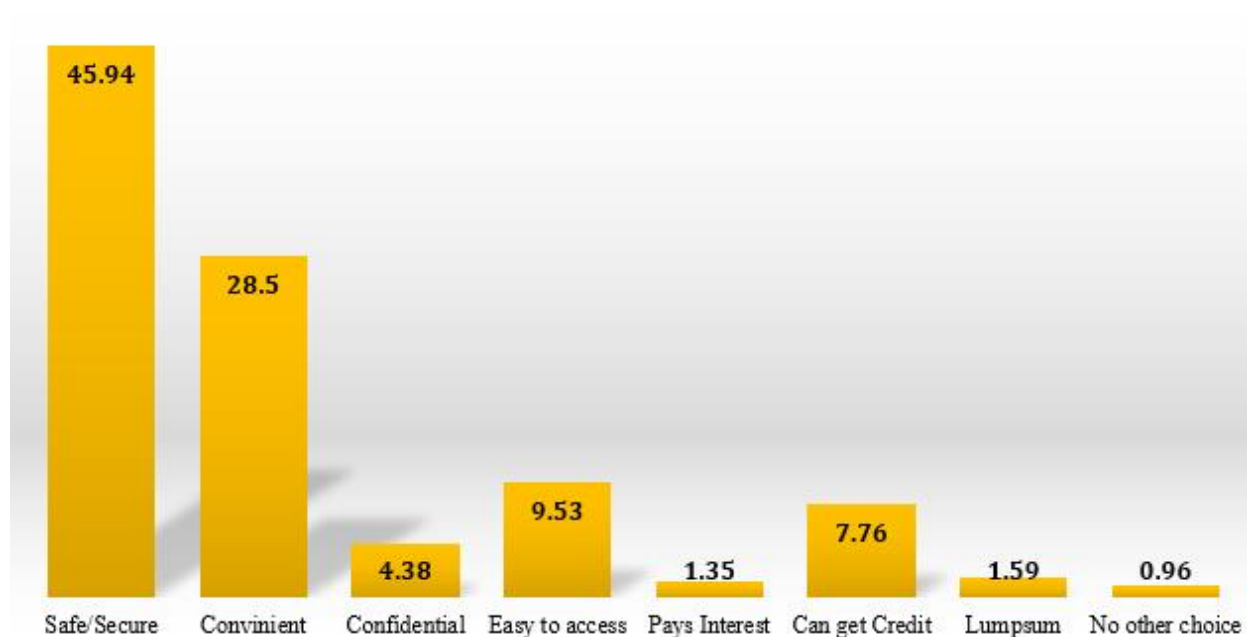
**Figure 5. Saving Forms by Gender (%)**



**Figure 6. Saving Forms by Location (%)**



**Figure 7. Reason for Choosing Saving Product (%)**



**Table 10. Saving Usage and Education Level**

Saves	Education level of Respondent					Total
	None	Primary	Secondary	Tertiary	Other	
Do not	1752 27.79%	2430 38.55%	1791 28.41%	322 5.11%	9 0.14%	6304 100.00
Currently have savings	2235 14.22%	6416 40.81%	4840 30.79%	2213 14.08%	16 0.10%	15720 100.00
<b>Total</b>	<b>3987 18.10%</b>	<b>8846 40.17%</b>	<b>6631 30.11%</b>	<b>2535 11.51%</b>	<b>25 0.11%</b>	<b>22024 100.00</b>

**Table 11. Mobile Money Usage and Education Level**

Mobile Money Usage	Education level of Respondent					Total
	None	Primary	Secondary	Tertiary	Other	
Currently have	14.21%	40.55%	30.63%	14.48%	0.13%	100.00
Used to have	28.75%	52.74%	16.69%	1.83%	0.00%	100.00
Never had	32.05%	36.06%	30.63%	1.18%	0.07%	100.00
<b>Total</b>	<b>18.10%</b>	<b>40.17%</b>	<b>30.11%</b>	<b>11.51%</b>	<b>0.11%</b>	<b>100.00</b>

**Table 12. Mobile money usage and Age group**

Mobile Money Usage	Age Group						Total
	16-17yrs	18-25yrs	26-35yrs	36-45yrs	46-55yrs	>55yrs	
Currently have	15.78%	70.54%	87.81%	88.49%	86.40%	70.29%	77.49%
Used to have	1.43%	2.94%	3.90%	3.74%	3.20%	5.25%	3.73%
Never had	82.78%	26.52%	8.29%	7.77%	10.40%	24.45%	18.78%

**Table 13. Saving Usage and Age group**

Saves	Age Group						Total
	16-17yrs	18-25yrs	26-35yrs	36-45yrs	46-55yrs	>55yrs	
Does not	761	1466	1438	857	541	1241	6304
	12.07%	23.26%	22.81%	13.59%	8.58%	19.69%	100.00
Currently have savings	354	2916	4584	3208	1863	2795	15720
	2.25%	18.55%	29.16%	20.41%	11.85%	17.78%	100.00
Total	1115	4382	6022	4065	2404	4036	22024
	5.06%	19.90%	27.34%	18.46%	10.92%	18.33%	100.00

**Table 14. Frequency of Mobile Money Use**

K8. Mobile Money Frequency of Use	Freq.	Percent
Daily	3529	20.38
Weekly	6648	38.39
Monthly	5249	30.31
Once every 3 months	1061	6.13
Once every 6 months	302	1.74
Once between 6 months and one year	144	0.83
Not used it in the last one year	229	1.32
Don't know	146	0.84
Refused to Answer	9	0.05
Total	17317	100.00