The Role of Mobile Money in Women's Financial Inclusion in Kenya

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This study assesses the impact of mobile money on women's savings, access to credit and on income, and analyses the difference in savings, access to credits and the levels of income between men and women who use mobile money. The study is based on Amartya Sen's Capability Approach and uses three regression models (two logistic and OLS) to analyse the relationships between mobile money usage and savings, access to credit and level of incomes for women and men. Using a sample of 22,024 observations from household survey data for 2021, the analysis shows the drivers of savings are mobile money use, education, income, and gender, while those of credit access are mobile money use, income, and education with mobile money use having the largest impact. The findings show that predictors of income are mobile money use, savings, education while gender and rural location reveal significant disparities. These findings reaffirm the critical role of digital financial tools in advancing financial inclusion and economic empowerment, with savings playing a pivotal role in improving credit access and income levels. There are gender disparities, with women being more likely to save and access credit than men, but they earn less income on average. The study recommends expanding mobile money services through government and financial institutions while also prioritizing the expansion of mobile money infrastructure, particularly for women and in underserved rural areas as a part of a multi-dimensional approach to financial inclusion that addresses both individual behaviours of women and men. The study also proposes future studies based on a longitudinal design such as testing or piloting specific financial inclusion interventions based on digital platforms to assess gender differentiated causal relationships and investigate the role of informal financial systems.

Key words: Mobile money, financial inclusion, gender, savings, financial access and income.

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1. Introduction

1.1 Background and Context

Mobile money refers to the digital storage and transfer of monetary value via mobile devices, enabling users to perform financial transactions such as deposits, withdrawals, transfers, and payments without requiring traditional banking infrastructure. Originating in the early 2000s with platforms like M-Pesa in Kenya, mobile money has since expanded globally, particularly in developing regions such as Sub-Saharan Africa, South Asia, and Southeast Asia. Its adoption has been driven by the increasing penetration of mobile technology, even in rural and underserved areas.

Women have often faced barriers to financial inclusion and have been among the primary beneficiaries of mobile money innovations. Traditional financial systems often exclude women due to cultural norms, lack of collateral, lower literacy levels, and limited mobility. Mobile money helps bridge these gaps by offering accessible financial services that are secure, affordable, and user-friendly. For instance, women can save money securely, access micro-loans, and receive remittances directly into their mobile accounts.

Moreover, mobile money has demonstrated its ability to influence broader economic outcomes. Studies reveal that access to mobile money leads to better household financial management, improved savings habits, and enhanced income-generating opportunities. These impacts are especially pronounced among women, who often use additional income to improve their families' well-being. Thus, mobile money emerges as a critical tool in fostering women's economic empowerment, reducing gender inequalities, and promoting sustainable development.

Trends in financial inclusion in Kenya over the period 2006 to 2021, show a narrowing gap between women and men, especially with regards to utilization of mobile money services and women-focused financial products as well as in financial access. Both the government and commercial banks have implemented strategies for women's financial inclusion, with an objective of addressing structural barriers, improve digital access, and fostering inclusive financial ecosystems. The Kenyan government has prioritized bridging the digital gender divide by promoting the adoption of digital tools and promoting disbursements of affirmative action funds such as Women enterprise fund (WEF) through mobile money platforms. Commercial banks have also been bridging this gap by developing women-focused banking

solutions such as savings accounts with reduced fees, targeted loans, and asset financing designed for women entrepreneurs.

Women represent most of the unbanked population worldwide. Despite numerous financial inclusion initiatives, gender disparities persist in access to and use of financial services. Mobile money has been widely regarded as a solution to this challenge, offering opportunities for women to enhance their financial autonomy. However, there are limited detailed empirical evidence on how mobile money specifically impacts women's savings behaviours, access to credit, and income levels.

Additionally, while existing studies highlight the general benefits of mobile money, few have focused on the interplay of factors such as age, location, and gender that shape women's experiences with mobile money. Understanding these nuances is crucial for designing targeted interventions that maximize mobile money's potential to empower women. This study seeks to address these gaps by examining the extent to which mobile money enhances women's financial and economic outcomes in real-world contexts.

1.2 Objectives

The overarching aim of this study is to evaluate the role of mobile money in women's financial inclusion in Kenya. Financial inclusion is measured in terms of savings, access to credit and women's income. Specifically, the study seeks to:

i. Assess the impact of mobile money on women's savings, access to credit and on income.

ii. Analyse if there is a difference in savings, access to credits and the levels of income between men and women who use mobile money.

This study contribution is on several fronts: by focusing on women's economic outcomes, the study fills an important gap in the literature on mobile money and women-specific financial inclusion. The findings provide information to policymakers about effective strategies for leveraging mobile money to promote women's empowerment, thus contributing to broader economic development goal. The study also provides actionable insights for financial institutions and mobile money providers to improve their services, ensuring they are accessible and beneficial to women, and finally by demonstrating the economic impacts of mobile money, the study highlights the role of digitization in financial sector in reducing gender disparities and fostering inclusive economic growth.

2. Literature on digitization and financial inclusion

2.1 Relevant theories

There are several theories explaining the broader context of economic empowerment, financial inclusion, and development economics. Economic empowerment theories in particular emphasize the transformative role of financial resources in improving individuals' autonomy, capacity for decision-making, and participation in economic activities. Central to these theories is the assertion that access to financial services can significantly enhance the ability of marginalized groups, particularly women, to improve their socio-economic status.

Financial inclusion, as conceptualized by theorists like Beck, Demirgüç-Kunt, and Levine (2007), refers to the availability and accessibility of financial services to underserved populations. Mobile money has emerged as a critical enabler of financial inclusion, particularly in developing regions where traditional banking systems are limited or inaccessible. By circumventing traditional banking infrastructure, mobile money allows individuals to save, borrow, and transact efficiently using mobile technology.

Amartya Sen's Capability Approach also provides a lens through which to understand the role of mobile money in women's empowerment. According to Sen, true empowerment involves expanding individuals' capabilities to make choices and pursue a life they value. Mobile money fosters such capabilities by enabling women to overcome financial barriers, access resources, and participate more actively in household and community decision-making processes.

Behavioural economic theories, such as the mental accounting framework by Thaler (1999), further explain how mobile money influences savings behaviour. The digital nature of mobile money allows users to compartmentalize and monitor their finances more effectively than with cash, promoting disciplined savings habits. Similarly, microfinance theories emphasize the role of small, accessible loans in enabling income-generating activities for women, a function increasingly facilitated by mobile money platforms.

These theoretical perspectives collectively highlight the potential of mobile money to act as a bridge between financial exclusion and economic empowerment, making it a vital tool for addressing gender disparities in economic participation.

2.2 Some relevant studies

Empirical evidence underscores the significant impact of mobile money on savings behaviour, particularly among women. Research by Jack and Suri (2014) is among the most cited studies in this domain. Their analysis of M-Pesa, Kenya's leading mobile money platform, demonstrates that mobile money users, particularly women, are more likely to save than non-users. The study attributes this to the safety, convenience, and affordability of saving via mobile money compared to traditional savings methods, such as informal savings groups or physical cash storage.

Additionally, Suri and Jack (2016) found that households using mobile money services were better able to absorb financial shocks, thanks to improved savings capacity. This resilience was especially pronounced among female-headed households, which often face greater economic vulnerabilities. The study's findings are corroborated by Johnson et al., (2017), who observed that mobile money increases women's ability to save for long-term goals, such as education and healthcare, contributing to broader household welfare.

Mobile money has also been instrumental in improving women's access to credit, a critical factor in economic empowerment. Traditional credit systems often exclude women due to lack of collateral, restrictive gender norms, and limited mobility. Mobile money platforms, however, have facilitated innovative microcredit solutions that overcome these barriers.

Aker et al., (2016) highlighted the transformative potential of mobile money in expanding access to microloans. Their study, conducted in West Africa, demonstrated that women using mobile money were more likely to secure loans for entrepreneurial activities. By leveraging mobile transaction histories as a proxy for creditworthiness, mobile money providers enable women to access credit without traditional banking credentials. Similarly, a study by Dupas and Robinson (2013) in Uganda revealed that mobile money users, particularly women, accessed small, short-term loans more frequently than non-users. This access not only supported immediate financial needs but also facilitated investment in income-generating activities, such as small businesses or farming inputs.

The relationship between mobile money usage and income levels has also been extensively studied, with consistent findings pointing to positive impacts. Blumenstock et al., (2015) explored the effects of mobile money on household income in Tanzania and found a strong positive correlation between mobile money adoption and income stability. The study suggested

that mobile money enables women to receive remittances, engage in e-commerce, and participate in savings groups, all of which contribute to improved income.

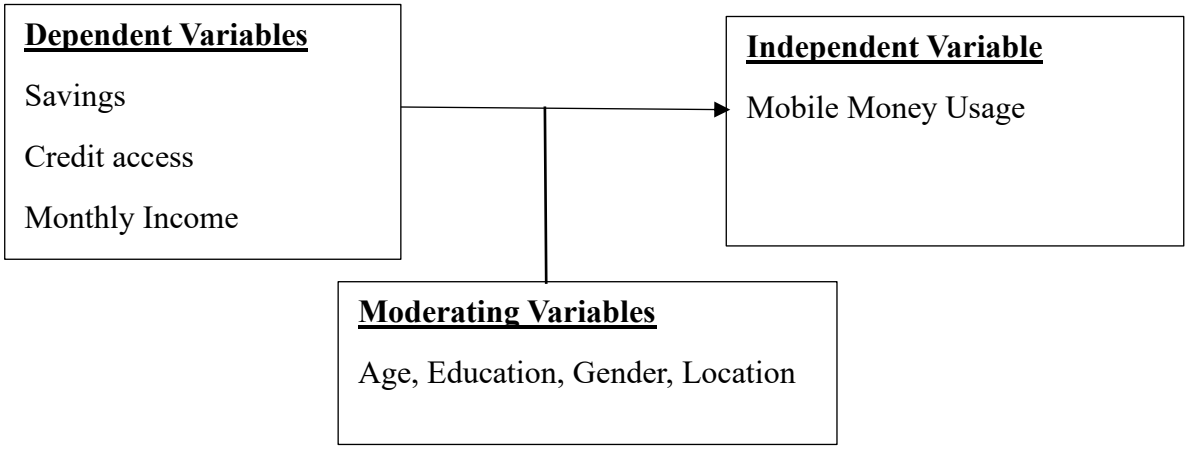
Moreover, mobile money reduces transaction costs and expands market access, empowering women to engage in economic activities previously hindered by geographic and social barriers. For instance, women entrepreneurs can now receive payments electronically and connect with suppliers and customers outside their immediate communities. In a longitudinal study, Riley (2018) observed that women using mobile money in rural India experienced a 15% increase in income over three years, attributable to their participation in digital marketplaces and enhanced financial literacy.

The evidence collectively demonstrates that mobile money is not merely a transactional tool but a catalyst for economic empowerment, enabling women to save, borrow, and earn in ways previously inaccessible.

2.3 Conceptual Framework

The conceptual framework for this study is rooted in the interplay between mobile money usage and women's economic outcomes. The dependent variables—savings, access to credit, and income—serve as indicators of economic empowerment, while mobile money usage acts as the primary independent variable. Moderating variables such as age, gender, and location are incorporated to capture the heterogeneity of women's experiences with mobile money.

Figure 1: Conceptual Framework



This framework illustrates how mobile money can directly influence economic outcomes while recognizing the moderating effects of demographic and contextual factors. It provides a structured approach for analysing the mechanisms through which mobile money empowers women economically.

2.4 Research gap

The literature on mobile money and women's economic empowerment highlights its transformative potential in fostering savings, access to credit, and income generation. Several consistent themes emerge: In terms of savings mobile money platforms provide a secure and convenient way for women to save, reducing reliance on informal and risky savings methods. However, the literature often focuses on specific regions, such as Sub-Saharan Africa, limiting the generalizability of findings. In terms of access to credit Mobile money addresses traditional barriers to credit by enabling innovative microloan solutions. Yet, studies rarely explore the long-term impacts of such credit access on women's entrepreneurial success or household dynamics. Finaly evidence shows a positive correlation between mobile money adoption and income levels, but few studies examine the specific pathways through which this occurs, such as market access or remittances.

Despite these insights, gaps remain in understanding how gender and demographic factors such as age, education, and location impact on experiences with mobile money, and if there are gender differentiated impacts specific financial inclusion indicators. Furthermore, most studies employ descriptive or correlational methods, underscoring the need for advanced econometric analyses to establish causal relationships. This study seeks to address these gaps by integrating demographic variables into the analysis and employing robust statistical techniques to provide a more nuanced understanding of the role of mobile money on women's financial inclusion.

In summary, the existing literature underscores the transformative potential of mobile money while highlighting areas for further research. By focusing on women and incorporating

demographic moderating factors, this study contributes to the growing body of knowledge on technology-driven women's economic empowerment through financial inclusion.

3. Study methodology

3.1 Theoretical framework and econometric model specification

The study is based on Amartya Sen's Capability Approach, which provides a lens to understanding the role of mobile money in expanding economic choices and freedom contributing to women's empowerment.

The study employs three regression models to examine the relationships between mobile money usage and the dependent variables. Two logistic regressions are used for binary outcomes (savings and access to credit), and an OLS model is used for the continuous outcome (income).

Model 1: Logistic Regression for Savings

The probability of saving using mobile money is modelled as:

$$Saving = \frac{1}{1 + e^{-(\beta_0 + \beta_1 Mobile\ money + \beta_2 Age + \beta_3 Gender + \beta_4 Income + \beta_5 Education + \beta_6 Location + \varepsilon)}} ..eq\ 1$$

Model 2: Logistic Regression for Access to Credit

The probability of accessing credit through mobile money is modelled as:

$$Credit\ access = \frac{1}{1 + e^{-(\beta_0 + \beta_1 Mobile\ money + \beta_2 Age + \beta_3 Gender + \beta_4 Income + \beta_5 Education + \beta_6 Location + \varepsilon)}} ..eq\ 2$$

Model 3: OLS Regression for Income

The relationship between mobile money usage and income is modelled as:

$$Income = -(\beta_0 + \beta_1 Mobile\ money + \beta_2 Age + \beta_3 Gender + \beta_4 Education + \beta_5 Location + \varepsilon) \ldots\ldots eq\ 3$$

Where in the three equations, ε presents an error term.

3.2 Study data and sources

This study uses data from the Fin Access Household Survey 2021, a nationally representative dataset that examines financial inclusion trends in Kenya. Conducted by the Central Bank of Kenya, Kenya National Bureau of Statistics, and Financial Sector Deepening (FSD) Kenya, the survey collects extensive information on financial behaviours, access to financial services, and socio-economic characteristics of individuals and households.

The Fin Access 2021 dataset is ideal for this study as it includes detailed questions on mobile money usage, saving behaviours, access to credit, and income levels. It also captures demographic variables such as age, gender, education, and location, enabling the analysis of how these factors interact with mobile money to influence women's economic outcomes. The dataset covers rural and urban households, providing a balanced perspective on financial inclusion trends across diverse settings.

To investigate the impact of mobile money on women's economic outcomes, three dependent variables and four independent variables are used:

Table 1: Variable definition and measurements

Variables	Definition and measurements
Outcome variables	
Credit access	Dummy variable where 1 represents an individual who have access to credits =1 otherwise 0
Saving	Dummy variable where 1= saving (an individual has a saving culture) otherwise 0
Income	This is monthly income of the respondent from all sources.
Explanatory variable	Dummy variable where 1 represents an individual as a mobile money user otherwise 0
Mobile money	
Individual characteristics	Describes the respondent's age
Age	Dummy variable 1 represents female, otherwise male 0.
Gender	Categorical variable, describes respondent's level of education: 1 represent None, 2 is Primary, 3 represents Secondary and 4 represents Tertiary education
Education	Dummy variable 1= rural (respondent resides in rural setting) otherwise 0
Location	

3.3 Econometric issues and tests

To ensure the reliability and validity of the regression results, potential econometric issues are addressed as follows: heteroscedasticity, a situation when variance of error terms may not be

constant, leading to inefficient estimates was addressed through use robust standard errors to correct for heteroscedasticity in the OLS model. Autocorrelation occurs when residuals in the OLS model may be correlated, violating independence assumptions are solved by the Durbin-Watson test, which was applied to detect autocorrelation. Adjustments were therefore made as necessary. Multicollinearity, which occurs when high correlation between independent variables and which can inflate standard errors and distort significance tests was solved by computing Variance Inflation Factors (VIF) with variables with high multicollinearity either transformed or excluded from the model.

4. Results and discussion

Table 2 presents the descriptive statistics of the variables used in the study.

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Mobile money use	22024	0.77	0.42	0.00	1.00
Savings	22024	0.71	0.45	0.00	1.00
Age	22024	38.90	17.21	16.00	116.00
Female respondent	22024	0.58	0.49	0.00	1.00
Income (KES)	22024	7395.13	12184.36	0.00	400000.00
Education	22024	0.82	0.39	0.00	1.00
Rural location	22024	0.66	0.47	0.00	1.00
Credit access	22024	0.53	0.50	0.00	1.00

The dataset used in the study is for a sample of 22,024 observations, offering a comprehensive overview of various socio-economic and demographic characteristics. The analysis highlights key metrics such as the mean, standard deviation, minimum, and maximum values for each variable, revealing insights into the population's financial behaviour, demographic composition, and living conditions.

Mobile money use emerges as a prominent feature, with 77% of respondents reportedly utilizing mobile money services. This high mean value, coupled with a standard deviation of 0.42, indicates widespread adoption with some variation among the population. The binary nature of this variable, with values of either 0 or 1, reflects the distinct divide between users and non-users.

Similarly, savings behaviour demonstrates a mean of 0.71, suggesting that 71% of the population has some form of savings. This finding points to a relatively high propensity to save, albeit with moderate variability (standard deviation of 0.45). As with mobile money use, the binary coding underscores the clear differentiation between those with and without savings.

Turning to demographic characteristics, the age distribution reveals a diverse sample, with an average age of 38.9 years and a standard deviation of 17.2 years. While the youngest respondent is 16 years old, the oldest respondent is recorded at 116 years, an unusually high figure that may warrant further scrutiny to confirm data accuracy. Additionally, gender composition shows a slight female majority, as indicated by a mean of 0.58 for the binary variable representing female respondents. This value implies that 58% of the sample consists of women, reflecting a relatively balanced gender distribution.

The dataset also captures substantial economic diversity through the variable income (in Kenyan Shillings). The average income stands at KES 7,395, but the high standard deviation of KES 12,184 K suggests significant disparities among respondents. While some individuals report no income at all, others earn as much as KES 400,000, showcasing a wide economic spectrum for the respondents.

Educational attainment is another critical aspect of the dataset, with 82% of respondents reportedly having some form of education. This finding, reflected by a mean of 0.82, suggests that the majority of the population possesses basic educational qualifications, contributing to their ability to engage with financial tools like mobile money and credit. Notably, rural versus urban residence is also documented, with 66% of respondents living in rural areas. This rural majority, combined with the binary nature of the variable, provides important context for understanding the socio-economic challenges faced by rural populations.

Finally, the dataset highlights credit access, with 53% of respondents indicating they have access to credit. While this figure reflects significant access to financial services, the variability (standard deviation of 0.50) suggests disparities in credit availability within the population. This finding aligns with broader themes of economic inequality observed in the income and rural residence variables.

In conclusion, the dataset offers valuable insights into the financial and demographic characteristics of the population. High adoption rates of mobile money and savings behaviour indicate growing financial inclusion, while disparities in income, credit access, and rural versus urban residence point to persistent challenges. The demographic diversity, coupled with substantial variation in economic metrics, underscores the need for targeted policies to address inequality and enhance financial access for underserved groups. This analysis serves as a foundation for further exploration into the factors influencing financial behaviour and well-being within the population.

Table 3: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Mobile money use	1.00							
(2) Savings	0.40	1.00						
(3) Age	0.04	0.05	1.00					
(4) Female respond~t	-0.04	0.00	0.02	1.00				
(5) Ln Income (KES)	0.17	0.13	-0.02	-0.07	1.00			
(6) Education	0.19	0.16	-0.31	-0.12	0.05	1.00		
(7) Rural location	-0.15	-0.04	0.17	0.00	-0.09	-0.14	1.00	
(8) Credit access	0.24	0.28	0.00	0.02	0.11	0.07	-0.03	1.00

The correlation matrix provides valuable insights into the relationships between various socio-economic and demographic variables in the dataset. These correlations, ranging between -1 and 1, indicate the strength and direction of linear relationships between variables. The analysis reveals significant connections that help explain patterns in financial behaviour, demographic characteristics, and access to resources.

Mobile money use, a key variable in the dataset, exhibits a moderate positive correlation with savings (0.40), indicating that individuals who use mobile money are more likely to save. This relationship underscores the potential role of digital financial services in promoting savings behaviour. Additionally, mobile money use correlates positively, though weakly, with income (0.17) and education (0.19), suggesting that individuals with higher income and education levels are more inclined to adopt mobile money. Conversely, its negative correlation with rural location (-0.15) indicates that mobile money use is less prevalent in rural areas, likely due to infrastructural and technological limitations.

Savings, another critical financial behaviour, also shows meaningful correlations with other variables. Its moderate positive relationship with credit access (0.28) highlights that individuals with savings are more likely to access credit, reflecting a broader connection between financial security and resource availability. Similarly, a weak positive correlation between savings and education (0.16) suggests that higher education levels may foster better financial habits. Interestingly, savings correlates weakly with income (0.13), indicating that while income contributes to savings, other factors such as financial literacy or access to savings tools might play a significant role.

The demographic variable age reveals unique patterns. It has a negligible correlation with most variables, including mobile money use (0.04) and savings (0.05), indicating little to no relationship between age and financial behaviours in this dataset. However, its moderate negative correlation with education (-0.31) suggests that younger individuals are more likely to attain higher levels of education, reflecting generational shifts in access to schooling. Additionally, age correlates weakly and positively with rural location (0.17), implying that older individuals are slightly more likely to reside in rural areas.

The relationship between gender and other variables appears minimal. For instance, the correlation between female respondents and mobile money use is weak and negative (-0.04), suggesting that gender has little influence on digital financial adoption. Similarly, the correlation between female respondents and savings is effectively zero (0.00), indicating no meaningful gender disparity in saving behaviour. However, a weak negative correlation with income (-0.07) and education (-0.12) suggests that women in the dataset may experience slightly lower levels of income and education.

Income, measured as the natural logarithm of Kenyan Shillings (KES), correlates positively with mobile money use (0.17), savings (0.13), and credit access (0.11), emphasizing the role of financial resources in enabling access to financial services. However, its weak negative correlation with rural location (-0.09) suggests that individuals in rural areas tend to have lower income levels. Education, on the other hand, shows a weak positive correlation with income (0.05), highlighting that while education contributes to earning potential, the relationship might not be as strong in the context of this dataset.

Education itself plays a significant role in shaping financial behaviour. Its moderate positive correlations with mobile money use (0.19) and savings (0.16) indicate that more educated individuals are more likely to adopt digital financial tools and save. However, its weak negative correlation with rural location (-0.14) reflects the challenges faced by rural populations in accessing education. Education's weak positive correlation with credit access (0.07) also suggests that educational attainment may facilitate better access to financial resources.

Finally, credit access emerges as a key variable linked to financial inclusion. It exhibits a moderate positive correlation with both mobile money use (0.24) and savings (0.28), indicating that individuals who use digital financial services or save are more likely to have access to credit. Weak positive correlations with income (0.11) and education (0.07) further reinforce the idea that economic resources and educational attainment contribute to better credit availability.

Conversely, the negligible negative correlation between credit access and rural location (-0.03) reflects that rural residents may face marginally lower access to credit services.

In conclusion, the correlation matrix highlights critical patterns in financial behaviour, demographics, and resource accessibility. Mobile money use and savings are strongly interconnected, with both showing moderate relationships with credit access, income, and education. Rural location, meanwhile, exhibits negative correlations with income, education, and mobile money use, pointing to persistent disparities in resource access for rural populations. These findings emphasize the need for targeted interventions to bridge gaps in financial inclusion, particularly for rural and less-educated groups. This analysis provides a foundation for exploring causal relationships and developing policies to foster equitable access to financial resources. Table 4 shows the model results on predictors of saving.

Table 4: Model 1: Logistic Regression for Savings

Variable	Logit estimates	Marginal effects
Mobile money use	2.27***	0.41***
	(0.04)	(0.01)
Age	0.00*	0.00*
	(0.00)	(0.00)
Female respondent	0.11***	0.02***
	(0.04)	(0.01)
Ln Income (KES)	0.04***	0.01***
	(0.01)	(0.00)
Education	0.33***	0.06***
	(0.06)	(0.01)
Rural location	0.02	0.00***
	(0.04)	(0.01)
_cons	-2.06***	
	(0.15)	
Observations	22024	
Pseudo R^2	0.25	

Robust standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1*

The regression analysis examines the factors influencing the likelihood of individuals having savings, with the results presented as both logit estimates and marginal effects. The logit estimates measure the impact of each independent variable on the log-odds of saving, while the marginal effects indicate the average change in the probability of saving for a unit change in the independent variable. The analysis provides a detailed view of how demographic,

economic, and contextual factors shape financial behaviour.

Among the variables analysed, mobile money use emerges as the most significant predictor of savings. The logit estimate of 2.27 indicates a substantial positive relationship between mobile money use and the log-odds of saving. Moreover, the marginal effect of 0.41 shows that individuals who use mobile money are, on average, 41 percentage points more likely to save. This strong and highly significant finding ($p < 0.01$) underscores the transformative role of digital financial tools in fostering savings behaviour, likely by providing users with secure, convenient, and accessible platforms for managing their finances.

Age also influences the likelihood of saving, albeit to a much smaller extent. The logit estimate (0.00) suggests a minimal positive effect, and the marginal effect confirms that each additional year of age slightly increases the probability of saving. However, this relationship is only weakly significant ($p < 0.1$), indicating limited confidence in its practical importance. While age alone may not strongly predict savings, it could reflect broader lifecycle trends, where individuals accumulate more resources or prioritize savings as they grow older.

Gender, represented by the variable female respondent, shows a positive and significant association with savings. The logit estimate (0.11) and marginal effect (0.02) reveal that being female increases the likelihood of saving by 2 percentage points on average. This statistically significant finding ($p < 0.01$) highlights small but notable gender differences in financial behaviour, potentially tied to women's roles in household financial management or their cautious approach to finances. These results suggest that gender dynamics could be an important consideration for policies aimed at increasing savings.

Income, measured as the natural logarithm of Kenyan Shillings (KES), is another significant predictor. The logit estimate (0.04) and marginal effect (0.01) indicate that a 1% increase in income raises the probability of saving by 1 percentage point. This statistically significant relationship ($p < 0.01$) reinforces the role of financial stability in enabling individuals to save. Higher income levels may provide greater flexibility for discretionary savings, emphasizing the importance of economic growth in improving financial security.

Education emerges as one of the most influential factors in the analysis. The logit estimate of 0.33 and marginal effect of 0.06 show that individuals with higher levels of education are 6

percentage points more likely to save, on average. This highly significant relationship ($p < 0.01$) underscores the critical role of education in promoting financial literacy and informed decision-making. Educated individuals are better equipped to understand the benefits of saving and to access formal financial services, highlighting education as a key driver of financial inclusion.

Interestingly, rural location does not show a meaningful effect on savings in this analysis. The logit estimate (0.02) is statistically insignificant, indicating no substantial impact of rural residence on the log-odds of saving. While the marginal effect (0.00) is statistically significant, the effect size is negligible, suggesting that rural location has little practical relevance in influencing savings behaviour. This finding may reflect a balance of factors, where limited financial infrastructure in rural areas is offset by informal savings mechanisms or lower living costs.

The constant term (-2.06) is negative and highly significant ($p < 0.01$), indicating that in the absence of mobile money use, education, income, or other predictors, the likelihood of saving is very low. This baseline emphasizes the importance of the independent variables in explaining savings behaviour.

The model is robust, with 22,024 observations providing a reliable sample size. The pseudo R^2 value of 0.25 indicates that the model explains 25% of the variation in the likelihood of saving, which is reasonable for a logistic regression and suggests that other unobserved factors may also influence savings behaviour.

In conclusion, the analysis identifies key drivers of savings, including mobile money use, education, income, and gender. Mobile money use stands out as the most influential factor, with a significant positive impact on savings probability. Education and income further enhance the likelihood of saving, reflecting the importance of financial literacy and stability. While age and gender play smaller roles, they remain statistically significant, highlighting demographic influences. The negligible impact of rural location suggests that other variables may be more critical in shaping financial behaviour. These findings underscore the need for targeted policies that expand access to mobile money services, promote education, and improve income opportunities to foster a culture of saving and financial inclusion.

Table 5 shows the results of the Logit model analyzing the predictors of access to credit.

Table 5: Model 2: Logistic Regression for Access to Credit

Variables	Logit estimates	Marginal effects
Mobile money use	1.35***	0.34***
	(0.04)	(0.01)
Age	-0.00**	-0.00**
	(0.00)	(0.00)
Female respondent	0.18***	0.05***
	(0.03)	(0.01)
Ln Income (KES)	0.05***	0.01***
	(0.00)	(0.00)
Education	0.16***	0.04***
	(0.05)	(0.01)
Rural location	-0.00	-0.00***
	(0.03)	0.01
_cons	-1.44***	
	(0.13)	
Observations	22024	
Pseudo R^2	0.13	

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

The logistic regression analysis investigates the factors influencing individuals' access to credit, focusing on demographic, economic, and contextual predictors. The results, presented as logit estimates and marginal effects, reveal important relationships between key variables and access to credit. Logit estimates indicate the effect of each variable on the log-odds of accessing credit, while marginal effects quantify the average change in the probability of accessing credit for a unit change in each variable. The findings provide significant insights into the determinants of credit access.

Among the variables examined, mobile money use emerges as the most influential predictor of access to credit. The logit estimate of 1.35 indicates a strong positive relationship, while the marginal effect of 0.34 shows that individuals who use mobile money are, on average, 34 percentage points more likely to have access to credit. This result is highly significant ($p < 0.01$), underscoring the critical role of digital financial tools in expanding credit access. Mobile money platforms likely facilitate credit by enabling users to build financial histories, interact with formal financial institutions, and access digital credit products. This finding highlights the transformative potential of mobile technology in improving financial inclusion.

Age, however, exhibits a small negative association with access to credit. The logit estimate (-0.00) and marginal effect (-0.00) indicate that older individuals are slightly less likely to have credit access, though the impact is negligible in practical terms. This relationship is statistically significant ($p < 0.05$), suggesting that while age plays a minor role, it may reflect generational differences in familiarity with or access to formal credit systems. Younger individuals, who are more likely to adopt digital financial tools, may have greater opportunities to engage with credit services.

Gender, represented by the variable female respondent, is positively associated with access to credit. The logit estimate (0.18) and marginal effect (0.05) suggest that women are 5 percentage points more likely to access credit than men, on average. This relationship is highly significant ($p < 0.01$), highlighting the increasing financial empowerment of women. It may also reflect targeted credit programs and microfinance initiatives that prioritize female borrowers, given their reputation for reliable repayment.

Income, measured as the natural logarithm of Kenyan Shillings (KES), has a positive and significant effect on access to credit. The logit estimate (0.05) and marginal effect (0.01) show that a 1% increase in income raises the probability of accessing credit by 1 percentage point, on average. This finding, statistically significant at the 1% level ($p < 0.01$), reinforces the importance of financial stability in obtaining credit. Higher-income individuals are likely considered less risky by lenders and have greater capacity to repay loans, making them more eligible for credit access.

Education also plays a significant role in access to credit. The logit estimate (0.16) and marginal effect (0.04) indicate that individuals with higher levels of education are, on average, 4 percentage points more likely to access credit. This relationship is statistically significant ($p < 0.01$), emphasizing the role of education in improving financial literacy and access to formal financial systems. Educated individuals may better understand loan requirements, navigate financial products, and build creditworthiness, thereby increasing their likelihood of obtaining credit.

Interestingly, rural location does not show a meaningful relationship with access to credit in the logit model (logit estimate = -0.00, statistically insignificant). However, the marginal effect is significant ($p < 0.01$) but practically negligible, indicating that rural residence has little to no

real impact on credit access. This finding suggests that geographic disparities in credit access may have diminished, potentially due to the spread of mobile financial services and government-led initiatives aimed at rural financial inclusion.

The constant term (-1.44) is negative and highly significant ($p < 0.01$), indicating that, in the absence of other predictors, the likelihood of accessing credit is very low. This baseline highlights the importance of variables such as mobile money use, income, and education in explaining credit access.

The model is based on a robust sample size of 22,024 observations, enhancing the reliability of the findings. The pseudo R^2 value of 0.13 indicates that the model explains 13% of the variation in access to credit. While this suggests that other unobserved factors may also influence credit access, the identified predictors provide valuable insights.

In conclusion, the analysis identifies mobile money use, income, and education as key drivers of credit access, with mobile money use having the largest impact. Gender also plays a significant role, with women being slightly more likely to access credit than men. While age shows a small negative effect, rural location appears to have little practical influence. These findings underscore the importance of digital financial tools, education, and economic stability in improving credit access. Policymakers and financial institutions can leverage these insights to design targeted interventions, such as expanding mobile financial services, enhancing financial literacy, and tailoring credit products to meet the needs of underserved populations.

Table 6 shows the results of the model analyzing the predictors of income.

Table 6: Model 3: OLS Regression for Income

	Lincome
Savings	0.50***
	(0.06)
Mobile money use	1.17***
	(0.06)
Age	-0.00
	(0.00)
Female respondent	-0.48***
	(0.05)
Education	0.31***
	(0.08)
Rural location	-0.50***
	(0.05)
_cons	6.51***
	(0.22)

Observations	22024
R-squared	0.11

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

The OLS regression analysis explores the determinants of income, measured as the natural logarithm of income (lincome), using a range of socio-economic and demographic predictors. The results provide insights into how variables such as savings, mobile money use, age, gender, education, and rural location influence income levels. The coefficients indicate the magnitude and direction of the relationship between each independent variable and income, while the statistical significance of the results sheds light on the reliability of these relationships.

Among the variables analysed, savings shows a strong positive relationship with income. The coefficient of 0.50 indicates that individuals with savings have, on average, a 50% higher income compared to those without savings, controlling for other factors. This finding is highly significant ($p < 0.01$), highlighting the importance of savings in enhancing financial stability and economic opportunities. Savings may reflect an individual's financial discipline and ability to accumulate wealth, which in turn correlates with higher income levels.

Mobile money use emerges as the most influential predictor in the model, with a coefficient of 1.17. This result indicates that individuals who use mobile money have, on average, 117% higher income than those who do not, holding other factors constant. This relationship is statistically significant at the 1% level ($p < 0.01$), underscoring the transformative impact of digital financial tools on economic outcomes. Mobile money services likely facilitate income growth by providing users with access to financial services, enabling entrepreneurship, and supporting financial transactions in both formal and informal economies.

Age, however, shows no significant relationship with income in this analysis. The coefficient of -0.00 suggests that age has no meaningful impact on income levels. This result contrasts with traditional economic theories suggesting that income typically increases with experience and age. The lack of significance in this model may reflect a diverse sample where factors such as technology adoption, education, and financial inclusion play a more prominent role than age.

Gender, represented by the variable female respondent, has a significant negative relationship with income. The coefficient of -0.48 indicates that, on average, women earn 48% less than men, controlling for other variables. This finding is highly significant ($p < 0.01$) and highlights persistent gender disparities in income, which may be driven by structural inequalities such as

limited access to high-paying jobs, unpaid caregiving responsibilities, or discrimination in the labour market. These results underscore the need for policies aimed at addressing gender wage gaps and promoting economic equity.

Education also has a positive and significant effect on income, with a coefficient of 0.31. This indicates that individuals with higher levels of education earn, on average, 31% more income than those with lower education levels, holding other factors constant. The relationship is highly significant ($p < 0.01$), reflecting the critical role of education in improving human capital, productivity, and access to higher-paying employment opportunities. This finding underscores the importance of investments in education to enhance income potential and reduce economic disparities.

Rural location is negatively associated with income, as indicated by the coefficient of -0.50. This means that individuals living in rural areas earn, on average, 50% less than their urban counterparts, controlling for other factors. This result is highly significant ($p < 0.01$) and highlights the economic challenges faced by rural populations, such as limited access to markets, infrastructure, and formal employment opportunities. Addressing these challenges through targeted rural development initiatives could help reduce income disparities between rural and urban areas.

The constant term (6.51) is positive and highly significant ($p < 0.01$), representing the baseline log-income when all other variables are zero. While not directly interpretable in practical terms, the constant provides a reference point for the model.

The model is based on 22,024 observations, providing a robust sample size for analysis. The R-squared value of 0.11 indicates that the independent variables explain 11% of the variation in income. While this value suggests that additional unobserved factors influence income, the identified predictors offer valuable insights into key drivers of economic outcomes.

To sum up, the analysis highlights several important determinants of income. Mobile money use and savings have the strongest positive effects, emphasizing the importance of financial tools and habits in driving economic success. Education also plays a critical role in enhancing income potential, while gender and rural location reveal significant disparities that warrant policy attention. These findings underscore the need for targeted interventions to address structural inequalities, expand access to financial services, and promote education as a pathway to economic empowerment. By addressing these factors, policymakers and stakeholders can foster more equitable and inclusive economic growth.

5. Conclusions

The findings reveal significant gender disparities in mobile money usage and inclusion of women and men in 3 financial inclusion dimensions. Women are 2 percentage points more likely to save than men, aligning with evidence that women often prioritize household savings (Duflo, 2012). Women are 5 percentage points more likely to access credit, possibly reflecting the success of microfinance initiatives targeting female borrowers. Mobile money's widespread adoption bridges gaps in formal financial infrastructure, particularly in rural and underserved areas. By enabling secure transactions and access to financial services, mobile money promotes savings, facilitates entrepreneurship, and enhances financial resilience. These findings reaffirm the critical role of digital financial tools in advancing financial inclusion and economic empowerment. Savings are shown to play a pivotal role in improving credit access and income levels. Individuals with savings were 28 percentage points more likely to access credit and earned 50% higher income on average. These results suggest that policies promoting savings, such as financial literacy programs and savings incentives, could have far-reaching impacts on economic stability and growth. The results revealed notable gender disparities, with women being more likely to save (2 percentage points) and access credit (5 percentage points) than men, but they earned 48% less income on average.

Mobile money use remains the most transformative factor, significantly enhancing financial inclusion and economic outcomes especially for women. Savings are a critical enabler of financial security and credit access, while education consistently improved financial and economic prospects. However, persistent gender disparities highlight structural inequalities that require targeted interventions.

6. Recommendations

The findings of this study underscore the need for a multi-dimensional approach to financial inclusion, addressing both individual behaviours of women and men and systemic gender barriers. These include expanding mobile money services through government and financial institutions while also prioritizing the expansion of mobile money infrastructure, particularly for women and in underserved rural areas. This can be done by encouraging partnerships between mobile money providers and microfinance institutions as well as government financial

services provided under affirmative action programs, to develop innovative products such as savings and credit-linked services, including products that target women.

This study is based on a particular point in time dataset, which precludes causal inferences. Additionally, variables such as informal savings mechanisms or cultural factors, were not analysed although they may significantly influence financial behaviour of both women and men. Future research could explore longitudinal data to assess causal relationships and investigate the role of informal financial systems. Studies could also focus on testing or piloting specific interventions which target women and men subgroups such as women entrepreneurs for better distinction of gender differentiated impacts financial inclusion through mobile money services utilization.

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