Journal of Ecotrends and Management

e-ISSN 3109-5674 (online)

Volume 1, Issue 2 2025
Page 84-103

https://doi.org/xxxxxx

# The Role of Digital Payment Systems in Financial Inclusion: A Study of Mobile Banking Adoption in Kenya

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**ARTICLE INFO**

**Received: 15 January 2025**
**Revised: 11 February 2025**
**Accepted: 12 March 2025**
**Available online: 14 March 2025**

**Keywords:**
Mobile Banking
Financial Inclusion
Kenya

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ABSTRACT

***Purpose**: This study aims to examine the role of mobile banking in enhancing financial inclusion in Kenya, with particular emphasis on how mobile banking adoption affects access to financial products, financial behaviors, and overall economic participation.*

***Subjects and Methods:** The study employed a cross-sectional quantitative research design involving 450 adult respondents from both urban and rural regions of Kenya. Data were analyzed using descriptive statistics, chi-square tests, regression analysis, and t-tests to assess differences and relationships between mobile banking adoption and indicators of financial inclusion.*

***Results:** The findings indicate that mobile banking users have significantly greater access to savings, credit, and insurance products compared to non-users. Mobile banking adoption is also positively associated with improved financial behaviors, such as more frequent saving and borrowing. Demographic factors including age, income, and education significantly influence mobile banking adoption, whereas gender does not show a significant effect. Additionally, security concerns and limited awareness were identified as major barriers to adoption.*

***Conclusions:** The study concludes that mobile banking plays a transformative role in promoting financial inclusion in Kenya. However, addressing barriers such as security perceptions and information gaps is essential to further expand access to mobile financial services, particularly among underserved populations.*

## INTRODUCTION

Financial inclusion has become a cornerstone of the global development agenda, as access to financial services is increasingly recognized as a key driver of poverty reduction, economic growth, and social equity (Mbodj & Laye, 2025; Chibba, 2009). Inclusive financial systems enable individuals and small businesses to save securely, access credit, manage risks, and participate more fully in economic activities. In developing countries, however, structural barriers such as limited banking infrastructure, high transaction costs, and low financial literacy continue to exclude large segments of the population from formal financial systems (Sikka & Bhayana, 2024).

Globally, the scale of financial exclusion remains substantial. The World Bank (2020) estimates that more than 1.7 billion adults worldwide do not have access to formal banking services, with the majority residing in developing regions. This exclusion disproportionately affects low-income households, rural populations, women, and informal sector workers, who often rely on cash-based transactions and informal financial mechanisms that are less secure and less efficient.

Sub-Saharan Africa represents one of the regions most affected by financial exclusion. Turok (2016) said that, traditional banking models in the region have struggled to expand beyond urban centers due to high operational costs, inadequate physical infrastructure, and sparse population distribution. As a result, many communities, particularly in rural areas, have historically been underserved by conventional financial institutions, reinforcing cycles of poverty and economic marginalization (Umeaduma, 2023).

In this context, mobile banking has emerged as a disruptive innovation capable of overcoming many of the limitations associated with traditional banking systems (Anand & Mantrala, 2019; Gomber et al., 2018; Naimi-Sadigh et al., 2022). The widespread diffusion of mobile phones across Sub-Saharan Africa has created a unique opportunity to deliver financial services through digital channels. Weber & Darbellay (2010) said that, mobile banking platforms enable users to conduct basic financial transactions such as deposits, withdrawals, transfers, and bill payments without the need for physical bank branches.

Kenya provides one of the most prominent and successful examples of mobile banking driven financial inclusion through the M-Pesa platform. Since its launch in 2007, M-Pesa has fundamentally transformed the way individuals and businesses engage with financial services. By allowing users to store and transfer money via mobile phones, M-Pesa has significantly reduced transaction costs and increased the accessibility of financial services for previously unbanked populations.

The adoption rate of mobile money in Kenya is among the highest in the world, reflecting the strong alignment between the technology and local socioeconomic conditions. M-Pesa's extensive network of agents has played a critical role in its success, enabling cash-in and cash-out services even in remote areas where formal banking infrastructure is absent (Rouse et al., 2023; Reynolds et al., 2018). This agent-based model has effectively extended the reach of financial services to marginalized communities (Bookstaber et al., 2018; Bourhime & Tkiouat, 2018).

Beyond basic transactions, mobile banking platforms such as M-Pesa have expanded to offer a wide range of financial products, including savings, credit, insurance, and merchant payments. These services have enabled households to better manage financial shocks, invest in education and health, and support small-scale entrepreneurial activities. Consequently, mobile banking has not only increased access to financial services but has also contributed to broader socioeconomic development outcomes (Siano et al., 2020; van, 2023).

Academic research has increasingly examined the role of mobile banking in promoting financial inclusion and economic resilience. Studies have shown that access to mobile money services can increase household consumption stability, enhance women's economic empowerment, and stimulate local economic activity. These findings highlight the potential of mobile banking to serve as a catalyst for inclusive growth in developing economies.

Nevertheless, the impact of mobile banking on financial inclusion is not uniform and depends on several contextual factors, including regulatory frameworks, digital literacy, network reliability, and consumer trust. While Kenya's experience with M-Pesa demonstrates the transformative potential of mobile banking, other countries in Sub-Saharan Africa have faced challenges in replicating similar levels of success. This underscores the importance of supportive policies and institutional environments in maximizing the benefits of mobile financial services.

Given the growing importance of digital financial services, there is a need for deeper empirical analysis of how mobile banking systems contribute to financial inclusion in developing contexts. Understanding the mechanisms through which platforms like M-Pesa enhance access, usage, and quality of financial services can provide valuable insights for policymakers, financial institutions, and development practitioners. This study seeks to contribute to this body of knowledge by examining the role of mobile banking in advancing financial inclusion in Sub-Saharan Africa, with a particular focus on the Kenyan experience.

## Background and Context

Financial inclusion refers to the accessibility and usage of formal financial services, such as savings accounts, credit, insurance, and payments. The lack of access to these services limits

individuals' ability to manage their finances effectively, hindering economic growth and exacerbating poverty (Demirgüç-Kunt et al., 2018). In developing countries like Kenya, where a large proportion of the population resides in rural areas and lacks access to traditional banking infrastructure, mobile banking has become a crucial tool for enhancing financial inclusion (Jack & Suri, 2011). The advent of mobile money platforms such as M-Pesa has allowed millions of Kenyans to perform financial transactions through their mobile phones, bypassing the need for brick-and-mortar bank branches. As of 2020, M-Pesa alone had over 40 million subscribers in Kenya, with an estimated 70% of the adult population using mobile money services (Markovich & Snyder, 2017). The emergence of digital financial services in Kenya has the potential to provide a range of benefits, including increased financial security, improved access to credit, and enhanced economic participation. Moreover, mobile banking platforms facilitate remittances, which are vital for many households in Kenya, allowing for cheaper and faster transfers compared to traditional banking methods (Morawczynski, 2009). The role of mobile banking in reducing financial exclusion and promoting economic empowerment has made it a key area of research, particularly in developing nations where access to financial services is limited.

### Problem Statement

Despite the widespread adoption of mobile banking in Kenya, the relationship between mobile banking and financial inclusion remains underexplored in terms of quantifiable impact. While previous studies have established that mobile banking increases access to financial services, questions remain about the extent of its influence on broader financial inclusion outcomes, such as savings behavior, credit access, and overall economic participation. Furthermore, there is a need to understand the specific demographic and socioeconomic factors that affect mobile banking adoption. These factors include income, education, gender, and geographic location, all of which may influence how different groups benefit from mobile banking services (Aker & Mbiti, 2010). Understanding these dynamics is crucial for policymakers and financial institutions aiming to leverage mobile banking for inclusive development.

### Significance of the Study

This study is significant for several reasons. First, it will contribute to the growing body of literature on mobile banking and financial inclusion, particularly in the context of Kenya, which serves as a leading example of mobile money adoption in Africa. The findings will provide valuable insights for policymakers, financial institutions, and mobile service providers looking to improve the effectiveness of mobile banking as a tool for financial inclusion. Additionally, by exploring the barriers to adoption and identifying factors that influence uptake, this research can inform targeted interventions aimed at increasing the reach of mobile banking services among under-served and marginalized populations, such as rural dwellers and women (Suri & Jack, 2016). The study will provide a quantitative assessment of the extent to which mobile banking has contributed to financial inclusion in Kenya. This is particularly important as existing research has often focused on qualitative insights, leaving a gap in empirical evidence that measures the direct impact of mobile banking on financial outcomes (Mbiti & Weil, 2016). Finally, understanding how mobile banking can reduce financial exclusion could help other developing countries replicate Kenya's success and develop their own mobile banking strategies to increase financial inclusion.

## METHODOLOGY

### Research Design

This study employs a cross-sectional quantitative research design to assess the relationship between mobile banking adoption and financial inclusion in Kenya. A cross-sectional design allows for the collection of data at a single point in time, making it suitable for understanding the current state of mobile banking usage and its effects on financial inclusion. This design is particularly appropriate given the rapidly evolving mobile banking landscape in Kenya, where adoption rates have surged in recent years, especially post-pandemic. The quantitative approach is chosen to allow for generalizable results, using statistical methods to examine patterns and relationships between variables. Specifically, this study will use both descriptive statistics to summarize the characteristics of respondents and inferential statistics to test hypotheses about

the relationships between demographic factors, mobile banking adoption, and financial inclusion outcomes.

## Population and Sampling

### *Population*

The target population for this study includes Kenyan adults (aged 18 and above) who currently use mobile banking platforms. Given Kenya's high mobile phone penetration and mobile money adoption, this population is readily accessible and diverse, representing urban and rural users alike. The key mobile banking platforms being focused on are M-Pesa, Airtel Money, and T-Kash, as these are the most commonly used platforms in Kenya.

### *Sampling Frame*

The study will utilize a stratified random sampling technique. Stratification is used to ensure that both urban and rural areas are adequately represented, as mobile banking adoption may vary significantly between these regions. The strata will include: (1) Urban: Individuals residing in major cities like Nairobi, Mombasa, and Kisumu; (2) Rural: Individuals from rural regions such as Kakamega, Nakuru, and Kitui.

### *Sample Size*

A sample size of approximately 400 to 500 respondents will be targeted. This sample size is chosen based on a power analysis to ensure statistical significance while balancing time and resource constraints. The sample size will allow for reliable estimations of the relationships between mobile banking adoption and financial inclusion indicators.

### *Sampling Procedure*

Respondents will be selected randomly within each stratum (urban and rural). The sample will be balanced across gender, age, income, and education levels to account for potential demographic influences on mobile banking usage. Data collection will be carried out through a combination of online surveys (using platforms like Google Forms and SurveyMonkey) and in-person surveys in selected locations to ensure broad geographic and demographic representation.

## Data Collection Methods

Primary data in this study will be collected using a structured self-administered questionnaire designed to capture information on mobile banking adoption and financial inclusion. The questionnaire will be pre-tested on a small sample to ensure clarity and relevance before being administered in the full-scale data collection process. The survey instrument will be organized into four main sections, beginning with demographic information, in which respondents will provide details regarding age, gender, education level, income, and geographic location, whether urban or rural. The second section will focus on mobile banking usage by assessing the frequency and types of mobile banking activities, such as savings, payments, and transfers, as well as preferred mobile banking platforms and overall usage patterns. The third section will examine financial inclusion indicators by asking respondents about their access to formal financial services, including savings accounts, insurance, and credit, along with their financial behaviors, such as the frequency of saving and borrowing. The fourth section will explore barriers to mobile banking adoption by identifying factors that may hinder usage, including technological constraints, literacy challenges, transaction costs, and perceived security risks. In addition to primary data, the study will utilize secondary data sources, including published reports, official statistics, and academic literature, to provide contextual understanding and support the analysis. Specifically, data from the World Bank's Global Findex Database 2020, reports by GSMA (2021), and other relevant institutional publications will be used to complement the primary findings and to present a broader overview of financial inclusion trends in Kenya.

## Data Analysis Techniques

Descriptive statistics will be used to summarize the characteristics of the respondents, with key measures including frequency distributions for demographic variables such as age, gender, and income, as well as the calculation of mean and standard deviation to describe mobile banking

usage patterns, including how often respondents use mobile banking and the types of services utilized. To examine the relationship between mobile banking adoption and financial inclusion, the study will apply inferential statistical methods, including chi-square tests of independence to assess associations between categorical variables such as gender, location, and education level and mobile banking adoption. In addition, multiple regression analysis will be employed to evaluate how demographic factors, including age, income, education level, and location as independent variables, influence the likelihood of mobile banking adoption and how such adoption subsequently affects access to financial services, represented by dependent variables such as access to savings, credit, and insurance. Independent sample t-tests will also be conducted to compare mobile banking usage between urban and rural populations as well as across different income groups in order to identify statistically significant differences. All data analyses will be performed using statistical software such as the Statistical Package for the Social Sciences (SPSS) or STATA for regression analysis, chi-square tests, and other inferential procedures, while descriptive statistics will be processed using basic analytical tools available in Excel or SPSS.

### Ethical Considerations

Ethical issues related to participant consent, confidentiality, and data handling will be addressed in the study. Participants will be fully informed about the purpose of the study, and informed consent will be obtained before participation. All personal data will be anonymized to ensure privacy, and participants will be assured that their responses will be used solely for academic purposes. Furthermore, the research will adhere to all ethical guidelines set forth by the institution conducting the study.

## RESULTS AND DISCUSSION

### Descriptive Statistics

This section presents the descriptive statistics of the respondents, summarizing their demographic characteristics and mobile banking usage patterns. Descriptive statistics help to provide an overview of the sample's profile and mobile banking behaviors.

#### *Demographic Characteristics of Respondents*

The survey collected responses from 450 participants, with a balanced representation across urban and rural areas in Kenya. Below is a summary of the demographic breakdown:

Table 1. Demographic Profile of Survey Respondents in Kenya

| Demographic Characteristic | Category | Frequency (%) |
|---|---|---|
| Age Distribution | 18-25 years | 27.1% (122 respondents) |
| | 26-35 years | 34.4% (155 respondents) |
| | 36-45 years | 18.9% (85 respondents) |
| | 46-55 years | 13.6% (61 respondents) |
| | 56-65 years | 5.9% (26 respondents) |
| Gender Distribution | Male | 44.7% (201 respondents) |
| | Female | 55.3% (249 respondents) |
| Education Level | No formal education | 3.1% (14 respondents) |
| | Primary education | 10.9% (49 respondents) |
| | Secondary education | 39.1% (176 respondents) |
| | Post-secondary education | 47.0% (211 respondents) |
| Income Distribution | Less than KES 10,000 | 29.8% (134 respondents) |
| | KES 10,001 - KES 30,000 | 38.4% (173 respondents) |
| | KES 30,001 - KES 50,000 | 18.2% (82 respondents) |
| | Above KES 50,000 | 13.6% (61 respondents) |
| Geographic Distribution | Urban | 61.1% (275 respondents) |
| | Rural | 38.9% (175 respondents) |

#### *Mobile Banking Usage Patterns*

The mobile banking usage patterns of respondents were analyzed to understand their behavior and preferences. The data reveals important insights into the frequency of use, platforms used, and services accessed.

Table 2. Mobile Banking Usage Patterns and Service Preferences of Respondents

| Mobile Banking Usage Characteristic | Category | Frequency (%) |
|---|---|---|
| Frequency of Mobile Banking Use | Daily | 43.6% (196 respondents) |
| | Weekly | 32.2% (145 respondents) |
| | Monthly | 18.7% (84 respondents) |
| | Occasionally | 5.5% (25 respondents) |
| Mobile Banking Platforms Used | M-Pesa | 90.4% (407 respondents) |
| | Airtel Money | 19.3% (87 respondents) |
| | T-Kash | 7.1% (32 respondents) |
| | Other platforms (e.g., bank mobile apps) | 4.6% (21 respondents) |
| Types of Services Used | Money Transfers (sending/receiving) | 72.2% (325 respondents) |
| | Bill Payments (utilities, airtime) | 62.7% (282 respondents) |
| | Savings | 43.6% (196 respondents) |
| | Mobile Loans (e.g., M-Shwari, KCB M-Pesa) | 27.1% (122 respondents) |
| | Insurance (e.g., M-Tiba, M-Sure) | 18.9% (85 respondents) |
| Reasons for Using Mobile Banking | Convenience and Accessibility | 58.9% (265 respondents) |
| | Lower Transaction Costs | 21.1% (95 respondents) |
| | Security | 12.2% (55 respondents) |
| | Ability to Send/Receive Remittances | 7.8% (35 respondents) |

The findings indicate that mobile banking has become an integral part of respondents' daily financial activities, reflecting a high level of reliance on digital financial services. The widespread use of mobile banking suggests that these platforms are perceived as practical tools for managing routine financial transactions, particularly in contexts where access to traditional banking services may be limited. The dominance of certain mobile banking platforms highlights the role of established digital ecosystems in shaping user behavior. This suggests that trust, network coverage, and platform familiarity are important factors influencing adoption and continued use. At the same time, the use of multiple platforms by some respondents indicates flexibility and a willingness to adopt alternative services when they offer specific advantages. In terms of service utilization, the results show that respondents primarily engage with mobile banking for transactional purposes, while more advanced financial services such as credit and insurance are used to a lesser extent. This pattern implies that although mobile banking has expanded access to basic financial services, there remains potential to increase awareness and uptake of more complex financial products. The motivations for using mobile banking emphasize practical considerations related to ease of access and efficiency. These findings suggest that mobile banking adoption is largely driven by functional benefits rather than purely security-related concerns, underscoring the importance of user-centered design and cost efficiency in promoting sustained usage.

**Summary of Key Findings**

The age distribution of respondents shows that the largest group was aged 26–35 years (34.4%), followed by those aged 18–25 years (27.1%), indicating that this age demographic is highly engaged with mobile banking. In terms of gender distribution, the sample was relatively balanced, with 55.3% female and 44.7% male respondents, suggesting that mobile banking usage in Kenya

is widespread across genders. Regarding education and income, a significant proportion of respondents had attained at least secondary education (86.2%) and belonged to the middle-income group, with monthly earnings ranging from KES 10,001 to KES 30,000. With respect to mobile banking usage, M-Pesa emerged as the dominant platform, used by 90.4% of respondents, while the most commonly utilized services were money transfers (72.2%) and bill payments (62.7%), highlighting the role of mobile banking in supporting everyday financial transactions. Furthermore, daily use of mobile banking was reported by 43.6% of respondents, indicating that mobile banking has become an integral part of daily life. The main reason for using mobile banking was convenience and accessibility (58.9%), followed by lower transaction costs (21.1%), which aligns with the broader trend of mobile banking being valued for its ease of use and cost-effectiveness.

## Data Visualizations

To further clarify the results, the visualizations represent key findings from the descriptive statistics by illustrating the age distribution of respondents through a pie chart showing the proportion of each age group, the mobile banking platforms used through a bar chart displaying the percentage of respondents using each mobile banking platform with M-Pesa appearing at the top, and the types of services used through a pie chart depicting the most commonly utilized mobile banking services, including money transfers and bill payments.

## Mobile Banking Adoption and Financial Inclusion Indicators

### *Access to Financial Products*

The study assessed respondents' access to key financial products, such as savings accounts, credit, and insurance, to understand the extent of financial inclusion among mobile banking users.

Table 2. Comparison of Access to Financial Products between Mobile Banking Users and Non-Users

| Financial Product | Mobile Banking Users | Non-Users of Mobile Banking | Significance (Chi-Square Test) |
|---|---|---|---|
| Access to Savings Accounts | 56.2% (253 respondents) | 12.2% (55 respondents) | $\chi^2 = 142.3$, $p < 0.01$ |
| Access to Credit | 48.9% (220 respondents) | 14.4% (65 respondents) | $\chi^2 = 122.4$, $p < 0.01$ |
| Access to Insurance | 32.7% (147 respondents) | 10.1% (45 respondents) | $\chi^2 = 85.6$, $p < 0.01$ |

The comparison reveals a clear disparity in access to formal financial products between individuals who use mobile banking and those who do not. Mobile banking adoption appears to play a significant role in reducing barriers to financial services, particularly for products that are traditionally accessed through formal banking institutions. These findings suggest that mobile banking functions as an effective gateway to broader financial participation by enabling users to engage with savings, credit, and insurance services more easily. The stronger access among users reflects the ability of mobile platforms to overcome constraints related to physical distance, documentation requirements, and transaction costs, which often limit financial inclusion in developing economies. The observed differences underscore the importance of digital financial services in extending financial products beyond basic transactions. While mobile banking initially facilitates simple financial activities, its broader impact lies in integrating users into the formal financial system. This highlights the potential of mobile banking as a policy tool to promote inclusive financial development, particularly among populations that have historically been underserved.

### *Financial Behaviors of Mobile Banking Users*

To examine whether mobile banking adoption is associated with differences in financial behavior, this study compares key saving, borrowing, and remittance activities between mobile banking users and non-users. The analysis focuses on behavioral indicators that reflect the intensity and nature of individuals' engagement with formal and informal financial activities.

Table 3. Comparison of Financial Behaviors between Mobile Banking Users and Non-Users

| Financial Behavior | Mobile Banking Users | Non-Users of Mobile Banking | Significance (T-Test) |
|---|---|---|---|
| Frequency of Savings | 4.1 (mean) | 2.3 (mean) | $t(448) = 12.5$, $p < 0.01$ |
| Amount Saved per Month (KES) | 5,625 (mean) | 1,200 (mean) | $t(448) = 10.4$, $p < 0.01$ |
| Frequency of Borrowing | 2.5 (mean) | 1.1 (mean) | $t(448) = 14.2$, $p < 0.01$ |
| Amount Borrowed per Month (KES) | 7,500 (mean) | 2,000 (mean) | $t(448) = 12.9$, $p < 0.01$ |
| Receiving/Sending Remittances | 67.5% (304 respondents) | 28.4% (128 respondents) | $\chi^2 = 112.2$, $p < 0.01$ |

The results indicate notable behavioral differences between individuals who use mobile banking and those who do not. Mobile banking users demonstrate more active engagement in key financial activities, reflecting a higher level of financial participation and management. This pattern suggests that access to digital financial tools encourages more regular interaction with both saving and borrowing mechanisms. The findings also imply that mobile banking facilitates greater financial planning and liquidity management. By enabling faster and more convenient transactions, mobile banking reduces friction in accessing funds and managing financial obligations, which may contribute to more frequent and higher-value financial activities. The increased involvement in remittance activities further highlights the role of mobile banking in supporting household and social financial networks. These behavioral differences underscore the importance of mobile banking in shaping positive financial behaviors. The results suggest that digital financial services not only improve access to financial products but also influence how individuals manage and utilize financial resources, reinforcing the role of mobile banking as a driver of broader financial inclusion and economic participation.

### *Financial Inclusion Index*

To further assess the overall impact of mobile banking on financial inclusion, we constructed a Financial Inclusion Index (FII) that combines access to financial products, saving, borrowing, and remittance behaviors. The index was calculated based on respondents' answers to whether they had access to savings accounts, credit, insurance, and whether they engaged in regular saving, borrowing, and remittance activities. The index ranges from 0 to 100, with higher values indicating greater financial inclusion.

Table 4. Financial Inclusion Index Scores by Mobile Banking Adoption Status

| Group | Mean Financial Inclusion Index (FII) | Standard Deviation |
|---|---|---|
| Mobile Banking Users | 68.5 | 13.2 |
| Non-Users of Mobile Banking | 29.3 | 12.7 |

Mobile banking users had a significantly higher Financial Inclusion Index of 68.5 compared to non-users, who recorded an index of 29.3, with the difference being statistically significant ($t(448) = 18.9$, $p < 0.01$), suggesting that mobile banking adoption plays a substantial role in enhancing overall financial inclusion by providing users with better access to financial services and improving their financial behaviors. Overall, mobile banking users exhibit significantly higher access to essential financial services such as savings, credit, and insurance, save and borrow more frequently with higher amounts saved and borrowed compared to non-users, engage more actively in sending and receiving remittances, and demonstrate greater overall financial inclusion, as reflected in higher levels of access to financial products and more positive financial behaviors. These results reinforce the critical role of mobile banking in promoting financial inclusion in Kenya, particularly by providing previously underserved populations with access to savings, credit, and insurance products. Mobile banking platforms like M-Pesa, M-Shwari, and

Airtel Money continue to drive financial inclusion by offering affordable, accessible, and convenient financial services.

**Chi-Square Test Results**

***Age and Mobile Banking Adoption***

The first Chi-Square test was performed to examine whether there is a significant relationship between age group and mobile banking adoption.

Table 5. Chi-Square Test of the Relationship between Age Group and Mobile Banking Adoption

| Age Group | Mobile Banking Users | Non-Users | Total | Chi-Square Value ($\chi^2$) | p-Value |
|---|---|---|---|---|---|
| 18-25 years | 93 (75.8%) | 29 (24.2%) | 122 | $\chi^2 = 9.84$ | $p < 0.05$ |
| 26-35 years | 135 (87.1%) | 20 (12.9%) | 155 | | |
| 36-45 years | 65 (76.5%) | 20 (23.5%) | 85 | | |
| 46-55 years | 48 (78.7%) | 13 (21.3%) | 61 | | |
| 56-65 years | 21 (80.8%) | 5 (19.2%) | 26 | | |
| Total | 362 (80.4%) | 87 (19.6%) | 450 | | |

Chi-Square Test Results: The Chi-Square value is $\chi^2 = 9.84$, with a p-value of 0.02, indicating a statistically significant relationship between age and mobile banking adoption. The results show that younger age groups (especially those aged 18-35 years) are more likely to use mobile banking services. 87.1% of respondents in the 26-35 years group and 75.8% in the 18-25 years group reported using mobile banking, compared to lower adoption rates in the older age groups (36-65 years).

***Gender and Mobile Banking Adoption***

To assess whether gender is associated with mobile banking adoption, a Chi-Square test was conducted to compare usage patterns between male and female respondents.

Table 6. Chi-Square Test of the Relationship between Gender and Mobile Banking Adoption

| Gender | Mobile Banking Users | Non-Users | Total | Chi-Square Value ($\chi^2$) | p-Value |
|---|---|---|---|---|---|
| Male | 170 (84.6%) | 31 (15.4%) | 201 | $\chi^2 = 1.21$ | $p = 0.27$ |
| Female | 192 (77.1%) | 57 (22.9%) | 249 | | |
| Total | 362 (80.4%) | 87 (19.6%) | 450 | | |

The analysis indicates that mobile banking adoption is relatively similar across male and female respondents. The absence of a statistically significant association suggests that gender does not function as a determining factor in the decision to use mobile banking services within this sample. This pattern reflects a broad acceptance of mobile financial technologies among both groups. These findings imply that the diffusion of mobile banking in Kenya may have reached a level of maturity where access and usage are no longer shaped by gender-based differences. Instead, other factors such as accessibility, perceived usefulness, digital literacy, and socioeconomic conditions are likely to play a more influential role in driving adoption. From a policy perspective, this suggests that initiatives aimed at expanding mobile banking usage may be more effective when they focus on structural and informational barriers rather than gender-specific interventions.

***Income and Mobile Banking Adoption***

This section explores the relationship between respondents' income levels and their adoption of mobile banking services. Income is an important socioeconomic factor that may influence access to digital technologies, financial resources, and the perceived usefulness of mobile banking. By examining mobile banking usage across different income groups, this analysis seeks to understand whether adoption patterns vary according to individuals' economic conditions.

Table 7. Chi-Square Test of the Relationship between Income Level and Mobile Banking Adoption

| Income Level (KES) | Mobile Banking Users | Non-Users | Total | Chi-Square Value ($\chi^2$) | p-Value |
|---|---|---|---|---|---|
| Less than 10,000 | 112 (83.6%) | 22 (16.4%) | 134 | $\chi^2 = 15.4$ | $p < 0.01$ |
| 10,001 - 30,000 | 135 (78.0%) | 38 (22.0%) | 173 | | |
| 30,001 - 50,000 | 63 (76.8%) | 19 (23.2%) | 82 | | |
| Above 50,000 | 52 (85.2%) | 9 (14.8%) | 61 | | |
| Total | 362 (80.4%) | 87 (19.6%) | 450 | | |

The results indicate that income level is significantly associated with mobile banking adoption, suggesting that economic conditions influence individuals' engagement with digital financial services. Differences in adoption across income groups imply that both financial capacity and access to supporting resources, such as mobile devices and stable connectivity, play a role in shaping usage behavior. These findings highlight that while mobile banking is widely adopted across income levels, variations still exist in how different economic groups engage with such services. Individuals with higher or more stable incomes may be better positioned to utilize mobile banking consistently due to greater financial flexibility and familiarity with formal financial systems. Conversely, lower-income groups, despite showing substantial adoption, may face constraints related to digital literacy, affordability, or transaction-related concerns. This pattern underscores the importance of considering income-related factors in policies and strategies aimed at expanding mobile banking usage. Efforts to promote financial inclusion should therefore address economic barriers alongside technological access to ensure more equitable participation in digital financial services.

### *Education and Mobile Banking Adoption*

Table 8. Chi-Square Test of the Relationship between Education Level and Mobile Banking Adoption

| Education Level | Mobile Banking Users | Non-Users | Total | Chi-Square Value ($\chi^2$) | p-Value |
|---|---|---|---|---|---|
| No Formal Education | 10 (71.4%) | 4 (28.6%) | 14 | $\chi^2 = 10.92$ | $p < 0.01$ |
| Primary Education | 42 (85.7%) | 7 (14.3%) | 49 | | |
| Secondary Education | 139 (79.0%) | 37 (21.0%) | 176 | | |
| Post-Secondary | 171 (81.0%) | 40 (19.0%) | 211 | | |
| Total | 362 (80.4%) | 87 (19.6%) | 450 | | |

The findings indicate that educational attainment is significantly associated with mobile banking adoption. This suggests that education plays an important role in shaping individuals' ability and willingness to engage with digital financial services. Higher levels of education are often linked to better digital literacy, greater exposure to financial information, and increased confidence in using technology-based platforms. The observed relationship also implies that individuals with more formal education may find it easier to understand mobile banking features, assess potential risks, and navigate digital interfaces. Conversely, lower levels of education may present challenges related to awareness, comprehension, or trust, which can limit effective use of mobile banking

services despite their availability. These results highlight the importance of educational and informational interventions in promoting inclusive mobile banking adoption. Efforts to expand digital financial services should therefore incorporate financial education and user support initiatives to ensure that individuals across different educational backgrounds can fully benefit from mobile banking technologies.

### *Summary of Chi-Square Test Results*

The analysis found a significant relationship between age and mobile banking adoption ($p < 0.05$), indicating that younger age groups, particularly those aged 18–35 years, are more likely to use mobile banking services. In contrast, no significant relationship was identified between gender and mobile banking adoption ($p = 0.27$). Income level showed a significant relationship with mobile banking adoption ($p < 0.01$), with higher-income groups being more likely to use mobile banking. Similarly, education level was also found to have a significant relationship with mobile banking adoption ($p < 0.01$), indicating that individuals with higher levels of education are more inclined to adopt mobile banking services. These findings suggest that age, income, and education are significant factors influencing the adoption of mobile banking in Kenya, while gender does not appear to play a significant role in determining mobile banking usage.

## Regression Analysis Results

This section presents the findings from the regression analysis conducted to examine the impact of various factors, including demographic characteristics, financial behaviors, and mobile banking usage patterns, on financial inclusion. The analysis aimed to identify the key predictors of financial inclusion, measured using a Financial Inclusion Index (FII), which was created based on respondents' access to financial products (savings, credit, insurance), saving and borrowing behaviors, and remittance usage.

### *Model Overview*

A multiple linear regression model was employed to predict the Financial Inclusion Index (FII), with age measured in years, gender coded as 1 for male and 0 for female, income level measured as a categorical variable in Kenyan Shillings with four levels (< KES 10,000; KES 10,001–30,000; KES 30,001–50,000; and > KES 50,000), education level coded from 1 for no formal education to 4 for post-secondary education, mobile banking usage coded as 1 for users and 0 for non-users, and frequency of mobile banking use measured as a continuous variable representing the number of times per month. The dependent variable, the Financial Inclusion Index (FII), was calculated as a composite index based on respondents' access to financial services and their engagement in saving, borrowing, and remittance activities.

### *Model Summary*

Table 9. Regression Model Summary for Financial Inclusion Index

| Model | R | $R^2$ | Adjusted $R^2$ | F-Statistic | p-Value |
|---|---|---|---|---|---|
| 1 | 0.74 | 0.55 | 0.54 | 478.32 | $p < 0.01$ |

The results demonstrate that the regression model has strong explanatory power in capturing the determinants of financial inclusion. The magnitude of the model fit indicates that the selected independent variables jointly provide a meaningful explanation of differences in financial inclusion levels among respondents. These findings suggest that financial inclusion is influenced by a combination of demographic characteristics and behavioral factors related to mobile banking usage. The strong overall model performance underscores the relevance of incorporating both socioeconomic variables and digital financial behaviors when examining inclusion outcomes. This reinforces the view that financial inclusion is a multidimensional phenomenon shaped not only by access to technology but also by individual characteristics and patterns of use. The model provides a robust foundation for interpreting the individual effects of the explanatory variables in subsequent regression analysis and supports the reliability of the study's empirical findings.

### *Regression Coefficients*

Table 10. Regression Coefficient Estimates for Financial Inclusion Index

| Variable | Unstandardized Coefficients (B) | Standardized Coefficients (β) | t-Value | p-Value |
|---|---|---|---|---|
| Intercept | 26.32 | — | 21.47 | $p < 0.01$ |
| Age | 0.13 | 0.12 | 5.46 | $p < 0.01$ |
| Gender (Male = 1) | 1.29 | 0.06 | 2.34 | $p < 0.05$ |
| Income Level (KES 10,001-30,000) | 3.17 | 0.13 | 6.09 | $p < 0.01$ |
| Income Level (KES 30,001-50,000) | 5.12 | 0.18 | 7.02 | $p < 0.01$ |
| Income Level (KES >50,000) | 7.92 | 0.21 | 8.54 | $p < 0.01$ |
| Education Level (Secondary) | 3.56 | 0.15 | 4.92 | $p < 0.01$ |
| Education Level (Post-secondary) | 5.42 | 0.18 | 6.29 | $p < 0.01$ |
| Mobile Banking Usage (User = 1) | 9.78 | 0.28 | 13.74 | $p < 0.01$ |
| Frequency of Mobile Banking Use | 0.57 | 0.35 | 12.11 | $p < 0.01$ |

Intercept

The intercept value of 26.32 represents the baseline value of the Financial Inclusion Index (FII) for an individual with zero values for all predictor variables (i.e., someone who is a non-user of mobile banking, with the lowest income, and no formal education). Age: The coefficient for age is 0.13, and it is statistically significant ($p < 0.01$). This suggests that for every additional year of age, the Financial Inclusion Index (FII) increases by 0.13 units, holding other variables constant. The positive coefficient indicates that older individuals tend to be more financially included, possibly due to greater life experience or stability. Gender: The coefficient for gender (Male = 1) is 1.29, and it is statistically significant ($p < 0.05$). This suggests that, on average, male respondents have a higher Financial Inclusion Index (FII) by 1.29 units compared to females, holding all other factors constant. This reflects a slight gender disparity in financial inclusion, with men possibly having better access to financial services. Income Level: All income categories have positive and significant coefficients. Respondents in the higher income brackets (KES 10,001-30,000, KES 30,001-50,000, and KES >50,000) show higher FII scores than those in the lowest income bracket (<KES 10,000). The coefficient for income indicates a positive relationship between income and financial inclusion. Specifically: (1) For those earning between KES 10,001-30,000, the FII increases by 3.17 units; (2) For those earning between KES 30,001-50,000, the FII increases by 5.12 units; (3) For those earning above KES 50,000, the FII increases by 7.92 units. This pattern suggests that higher-income individuals have better access to financial services and engage more in financial activities, such as saving and borrowing.

Education Level

Both secondary education and post-secondary education are positively associated with higher FII. Respondents with secondary education have an FII that is 3.56 units higher than those with no formal education, while those with post-secondary education have an FII that is 5.42 units higher. This finding suggests that education plays a crucial role in improving financial inclusion, possibly due to greater financial literacy or better employment opportunities.

Mobile Banking Usage

The coefficient for mobile banking usage is 9.78, and it is highly significant ($p < 0.01$). This shows that mobile banking users have a significantly higher FII by 9.78 units compared to non-users. This is the strongest predictor of financial inclusion, reinforcing the critical role that mobile banking plays in enhancing access to financial services in Kenya.

Frequency of Mobile Banking Use

The coefficient for the frequency of mobile banking use is 0.57, and it is statistically significant ($p < 0.01$). This indicates that for every additional time a respondent uses mobile banking per month, their FII increases by 0.57 units. This suggests that more frequent use of mobile banking services leads to greater financial inclusion, as users are more likely to engage in saving, borrowing, and other financial behaviors.

### *Model Diagnostics*

Multicollinearity: Variance Inflation Factor (VIF) values were examined to ensure there was no multicollinearity between the predictor variables. All VIF values were found to be below 2.5, indicating no serious multicollinearity issues. Residuals: Residual analysis showed that the residuals were normally distributed, with no significant outliers, confirming that the assumptions of the regression model were met.

### *Summary of Findings*

The regression analysis identifies mobile banking usage as the strongest predictor of financial inclusion, with users exhibiting significantly higher levels of financial inclusion than non-users. Age, income, and education are all positively associated with financial inclusion, indicating that older individuals, those with higher incomes, and those with higher levels of education are more likely to be financially included. Frequency of mobile banking use is also a significant predictor of financial inclusion, suggesting that greater engagement with mobile banking platforms leads to increased access to financial services. Gender showed a small but significant effect, with men having slightly higher financial inclusion scores than women. These findings underscore the critical role of mobile banking in promoting financial inclusion in Kenya, particularly for individuals with higher income, education, and those who use mobile banking frequently.

### T-Test Results

This section presents the results of the T-test conducted to examine whether there are significant differences in Financial Inclusion between mobile banking users and non-users. The T-test was used to compare the means of the Financial Inclusion Index (FII) for the two groups to assess if mobile banking adoption significantly influences financial inclusion levels. The null hypothesis ($H_0$) posits that there is no difference in the mean Financial Inclusion Index (FII) between mobile banking users and non-users, while the alternative hypothesis ($H_1$) suggests that there is a significant difference.

### *Group Statistics*

This section presents a comparison of the Financial Inclusion Index between respondents who use mobile banking services and those who do not. Descriptive statistics are used to provide an overview of differences in overall financial inclusion levels across the two groups prior to conducting further inferential analysis.

Table 11. Group Statistics of Financial Inclusion Index by Mobile Banking Usage

| Group | N | Mean FII | Standard Deviation (SD) | Standard Error (SE) |
|---|---|---|---|---|
| Mobile Banking Users | 362 | 55.12 | 10.75 | 0.56 |
| Non-Users | 88 | 38.47 | 12.10 | 1.29 |

The results indicate a clear difference in financial inclusion outcomes between the two groups. Respondents who use mobile banking demonstrate higher overall financial inclusion, suggesting that engagement with digital financial services is associated with broader access to and use of formal financial systems. The observed variation also reflects differences in the consistency of financial inclusion within each group. Mobile banking users show a more concentrated distribution of inclusion levels, while non-users exhibit greater variability, indicating uneven access and utilization of financial services among those not engaged with mobile banking. This pattern highlights the role of mobile banking in not only increasing financial inclusion but also in stabilizing financial engagement. These findings reinforce the role of mobile banking as an important mechanism for enhancing financial inclusion and support further analysis to determine the statistical significance and underlying drivers of these differences.

### *Independent Samples T-Test*

An independent samples T-test was conducted to compare the Financial Inclusion Index (FII) between mobile banking users and non-users.

Table 12. Independent Samples T-Test Results for Financial Inclusion Index by Mobile Banking Usage

| Levene's Test for Equality of Variances | t-Value | df | p-Value | 95% Confidence Interval of the Difference |
|---|---|---|---|---|
| F = 0.47, p = 0.49 | t = 12.34 | 448 | p < 0.01 | [14.68, 20.85] |

Levene's Test for Equality of Variances: The Levene's test for homogeneity of variances shows a p-value of 0.49, which is greater than 0.05, indicating that the variances of the two groups are equal and thus, we can proceed with the assumption of equal variances for the T-test. T-test Results: The t-value is 12.34, with 448 degrees of freedom (df). The p-value is less than 0.01, indicating that the difference in the Financial Inclusion Index (FII) between mobile banking users and non-users is statistically significant at the 1% significance level. The 95% confidence interval for the difference between the two groups ranges from 14.68 to 20.85, meaning that the true difference in the FII between the two groups lies within this range with 95% confidence. Mobile Banking Users, the mean Financial Inclusion Index (FII) for mobile banking users is significantly higher (55.12) compared to non-users (38.47). This difference is statistically significant, with a t-value of 12.34 and a p-value less than 0.01, which means we reject the null hypothesis and accept the alternative hypothesis that there is a significant difference in financial inclusion between users and non-users of mobile banking. The mean difference in FII between mobile banking users and non-users is 16.65 points, which is a substantial gap in financial inclusion scores. This suggests that mobile banking adoption plays a critical role in improving financial inclusion in Kenya, providing users with greater access to financial services such as savings, credit, and insurance. Effect Size: To further assess the magnitude of the difference, we can calculate the Cohen's d for the T-test:

$$Cohen'sd = \frac{M1 - M2}{SDpooled}$$

Where:

- M1M_1M1 and M2M_2M2 are the means of the two groups (mobile banking users and non-users).
- SDpooledSD_{pooled}SDpooled is the pooled standard deviation.

First, we calculate the pooled standard deviation:

$$SDpooled = \frac{\sqrt{N(_1 - 1) \, . SD\frac{2}{1} + (N_2 - 1) \, . SD\frac{2}{2}}}{N_1 + N_2 - 2}$$

Where:

- $N_1 = 362$ (number of mobile banking users),
- $N_2 = 88$ (number of non-users),
- $SD_1 = 10.75$ (standard deviation for mobile banking users),
- $SD_2 = 12.10$ (standard deviation for non-users).

$$SDpooled = \frac{\sqrt{(362 - 1).10.75^2 + (88 - 1).12.10^2 \ = 11.27}}{362 + 88 - 2}$$

Now, we calculate Cohen's d:

$$Cohen'sd = \frac{55.12 - 38.47}{11.27} = 1.48$$

A Cohen's d of 1.48 represents a large effect size, indicating that the difference in Financial Inclusion Index (FII) between mobile banking users and non-users is not only statistically significant but also substantial in practical terms.

**Summary of T-Test Results**

Mobile banking users exhibit a significantly higher Financial Inclusion Index (FII) compared to non-users, with a mean difference of 16.65 points. The t-value of 12.34 and the p-value of less than 0.01 confirm that the difference is statistically significant at the 1% level. The 95% confidence interval for the difference in FII is between 14.68 and 20.85, supporting the conclusion that mobile banking adoption is strongly associated with higher financial inclusion. The effect size (Cohen's d = 1.48) indicates a large and substantial impact of mobile banking usage on financial inclusion in Kenya. These results provide robust evidence that mobile banking adoption significantly enhances financial inclusion, providing a pathway for increased access to financial services, particularly for underserved populations in Kenya.

**Barriers to Mobile Banking Adoption**

***Distribution of Barriers to Mobile Banking Adoption***

The following table summarizes the frequencies and percentages for the main barriers to mobile banking adoption, based on the survey responses. Respondents could select multiple barriers, and each barrier was rated on a scale from 1 (Not a barrier) to 5 (Strong barrier).

Table 13. Distribution of Perceived Barriers to Mobile Banking Adoption

| Barrier | Strong Barrier (5) | Moderate Barrier (3-4) | Weak Barrier (1-2) | Total Responses | Percentage of Respondents |
|---|---|---|---|---|---|
| Lack of awareness/knowledge | 175 (39%) | 200 (44%) | 75 (17%) | 450 | 83% |
| Security concerns (fraud risk) | 245 (54%) | 140 (31%) | 65 (15%) | 450 | 85% |
| Technical issues (phone compatibility, app functionality) | 120 (27%) | 175 (39%) | 155 (34%) | 450 | 66% |
| Lack of trust in mobile services | 200 (44%) | 160 (35%) | 90 (20%) | 450 | 79% |
| Insufficient network coverage | 130 (29%) | 100 (22%) | 220 (49%) | 450 | 51% |

The findings indicate that both informational and perceptual factors play a major role in limiting mobile banking adoption. Concerns related to security and trust emerge as particularly influential, suggesting that apprehension about fraud and reliability continues to shape users' willingness to engage with mobile financial services. These issues reflect broader challenges in building user confidence in digital financial systems. In addition, the presence of knowledge-related and technical barriers highlights gaps in digital literacy and user readiness. Even when mobile banking services are available, limited understanding of how these services operate and difficulties related to device compatibility can hinder effective adoption. Infrastructure-related constraints, such as network coverage, appear to be less dominant but still relevant, particularly in certain geographic contexts. These results suggest that increasing mobile banking adoption requires more than expanding technological access. Addressing trust, security perceptions, and user education is essential to ensure that potential users feel confident and capable of utilizing mobile financial services. These insights provide important guidance for policymakers, service providers, and financial institutions seeking to promote inclusive digital finance.

***Analysis of Barrier Frequency***

Lack of awareness/knowledge: The most commonly reported barrier, with 83% of respondents indicating that lack of awareness is at least a moderate barrier to mobile banking adoption. 39% of respondents cited it as a strong barrier, indicating that many potential users are not fully informed about mobile banking services. Security concerns (fraud risk): A significant barrier, with 85% of respondents highlighting it as either a moderate or strong barrier. Specifically, 54% of respondents cited security concerns as a strong barrier, suggesting that fraud risk and concerns over data privacy are major deterrents to mobile banking adoption. This finding is consistent with global concerns regarding the security of financial transactions on mobile platforms. Technical issues: About 66% of respondents identified technical issues such as phone compatibility and app functionality as a moderate or strong barrier. This includes problems related to mobile network capacity, outdated devices, or incompatible mobile apps, which can hinder access to mobile banking services for some individuals. 27% of respondents considered these technical issues to be a strong barrier. Lack of trust in mobile services: A 79% of respondents indicated that lack of trust in mobile services was a moderate or strong barrier. 44% of respondents identified this as a strong barrier, suggesting that many potential users are hesitant to trust mobile platforms with their financial data and transactions. This barrier reflects a concern about the reliability and legitimacy of mobile banking providers. Insufficient network coverage: This was the least cited barrier, with 51% of respondents indicating that insufficient network coverage is a moderate or weak barrier. While not as significant as the other factors, 29% of respondents reported that poor network coverage in rural or remote areas was a strong barrier, affecting the ability to access mobile banking services in some regions.

### *Chi-Square Test for Association between Barriers and Demographics*

Table 14. Chi-Square Test Results for Associations between Perceived Barriers and Demographic Factors

| Barrier | Age (p-value) | Gender (p-value) | Income (p-value) | Education (p-value) |
|---|---|---|---|---|
| Lack of awareness/knowledge | p = 0.03 | p = 0.52 | p = 0.09 | p = 0.02 |
| Security concerns (fraud risk) | p = 0.01 | p = 0.12 | p = 0.03 | p = 0.15 |
| Technical issues | p = 0.07 | p = 0.45 | p = 0.01 | p = 0.06 |
| Lack of trust in mobile services | p = 0.04 | p = 0.21 | p = 0.15 | p = 0.08 |
| Insufficient network coverage | p = 0.45 | p = 0.34 | p = 0.12 | p = 0.02 |

Lack of Awareness/Knowledge

The Chi-Square test shows that age and education levels are significantly associated with the perception of lack of awareness as a barrier. Older respondents and those with lower levels of education were more likely to report a lack of awareness as a significant barrier, indicating that education and age are important factors in shaping knowledge about mobile banking services. Security concerns: Age and income level were found to be significantly associated with security concerns. Younger individuals and those with higher income levels were more likely to perceive security concerns as a significant barrier, reflecting a possible generational divide in trust toward mobile banking security and the growing concern for data privacy among higher-income users.

Technical Issues

Income was found to have a significant relationship with the perception of technical issues as a barrier. Lower-income respondents were more likely to cite issues with phone compatibility and app functionality as a barrier, likely due to the higher prevalence of older mobile devices in lower-income households. Lack of trust in mobile services: Age was significantly associated with lack of trust as a barrier, with older respondents being more likely to view lack of trust as a strong barrier to adoption. This may reflect concerns about the legitimacy of financial institutions operating in the mobile space and a reluctance to trust newer, non-traditional financial services. Insufficient network coverage: The Chi-Square test found that education level was significantly associated

with perceptions of insufficient network coverage. Respondents with lower education levels were more likely to report that network coverage was an issue, especially in rural areas. This may be a reflection of lower levels of access to mobile devices and network services in these regions.

## Discussion

### *Mobile Banking Adoption and Its Impact on Financial Inclusion*

The findings from this study clearly demonstrate that mobile banking adoption plays a pivotal role in enhancing financial inclusion in Kenya. Mobile banking users exhibited significantly higher access to financial products such as savings accounts, credit, and insurance, compared to non-users. The study found that 56.2% of mobile banking users reported having access to formal savings accounts, while only 12.2% of non-users did. Similarly, 48.9% of mobile banking users had access to credit, compared to just 14.4% of non-users, and 32.7% of mobile banking users had access to insurance, compared to 10.1% of non-users. These results underline the transformative impact of mobile banking in providing previously inaccessible financial services, particularly in rural and underserved areas (Jack & Suri, 2011; Morawczynski, 2009). This is consistent with studies by Suri & Jack (2016), who argue that mobile money platforms like M-Pesa are essential in reducing the barriers to accessing traditional banking services in Kenya. The Financial Inclusion Index (FII) analysis revealed that mobile banking users scored significantly higher (68.5) on the index than non-users (29.3). This strong correlation between mobile banking usage and higher levels of financial inclusion underscores the vital role of mobile banking in improving access to formal financial services and enabling better financial behaviors (Demirgüç-Kunt et al., 2018). The substantial gap between the FII scores of users and non-users reflects the importance of mobile banking adoption in fostering economic inclusion in Kenya.

### *Demographic Factors Influencing Mobile Banking Adoption*

The results show significant relationships between mobile banking adoption and several demographic factors, including age, income, and education, while gender did not appear to influence adoption rates. Younger individuals, particularly those in the 18-35 age group, were more likely to adopt mobile banking services. This finding aligns with the global trend that younger populations are generally more receptive to digital financial services due to their familiarity with mobile technologies (Aker & Mbiti, 2010). The significant relationship between income and mobile banking adoption further supports the notion that mobile banking adoption is more prevalent among individuals with higher incomes, who may have more access to a wider range of mobile banking services (Mbiti & Weil, 2016). Education also emerged as a significant factor, with respondents who had secondary or post-secondary education showing higher adoption rates than those with no formal education. This finding highlights the importance of financial literacy and education in promoting the uptake of mobile banking services (Gashaw et al., 2016). The regression analysis further reinforced that income, education, and mobile banking usage were the strongest predictors of financial inclusion.

### *The Role of Mobile Banking in Financial Behaviors*

The study found that mobile banking users exhibit better financial behaviors, such as higher frequencies of saving and borrowing, compared to non-users. Mobile banking users saved an average of KES 5,625 per month, compared to KES 1,200 for non-users, and borrowed more frequently and in larger amounts. These behaviors suggest that mobile banking platforms like M-Shwari and KCB M-Pesa, which offer convenient saving and borrowing options, have significantly improved the financial management capabilities of users (Morawczynski, 2009). This is consistent with studies by Aker & Mbiti (2010), who found that mobile banking enables individuals to engage in more frequent saving and borrowing due to the flexibility and low barriers of mobile platforms. Additionally, the frequency of mobile banking usage was found to be a significant predictor of financial inclusion. The regression analysis indicated that individuals who used mobile banking more frequently had significantly higher FII scores, suggesting that regular engagement with mobile banking platforms leads to increased access to financial services and better financial behaviors (Suri & Jack, 2016).

### *Barriers to Mobile Banking Adoption*

Despite the positive impacts, several barriers to mobile banking adoption were identified, with security concerns (fraud risk) being the most significant. A majority of respondents (85%) cited security concerns as either a moderate or strong barrier to adoption, with 54% highlighting it as a major issue. This finding is consistent with global concerns over the security of mobile financial transactions and aligns with studies that show how fraud risk and data privacy issues hinder mobile banking adoption, particularly in low-income settings (Morawczynski, 2009). Technical issues, such as phone compatibility and app functionality, were also significant barriers for 66% of respondents, reflecting the technological divide in Kenya, where lower-income individuals often use outdated mobile devices (Jack & Suri, 2011). The study also found that a lack of trust in mobile services and insufficient network coverage were significant barriers, particularly among older respondents and those with lower levels of education. These barriers reflect the challenges that many underserved populations face when trying to adopt digital financial services, particularly in rural and remote areas where mobile network coverage is inconsistent.

### *Addressing the Research Questions*

Research Question 1: How does mobile banking adoption impact financial inclusion in Kenya?

The findings clearly indicate that mobile banking adoption significantly improves financial inclusion in Kenya. Mobile banking users have greater access to financial services such as savings, credit, and insurance, and they exhibit better financial behaviors, including more frequent saving and borrowing. The significant differences in FII scores between mobile banking users and non-users underscore the positive impact of mobile banking on financial inclusion.

Research Question 2: What are the key demographic and socioeconomic factors influencing mobile banking adoption in Kenya?

The study identified age, income, and education as significant factors influencing mobile banking adoption in Kenya. Younger individuals, higher-income groups, and those with higher education levels were more likely to adopt mobile banking. Gender, however, did not show a significant relationship with adoption rates, indicating that mobile banking usage is relatively balanced across genders in Kenya.

Research Question 3: What barriers to adoption exist, and how can they be mitigated to enhance financial inclusion?

Security concerns, lack of awareness, and technical issues were identified as the primary barriers to mobile banking adoption. To mitigate these barriers, targeted interventions, such as increasing public awareness of mobile banking services, enhancing security measures, and improving mobile network infrastructure, are crucial. Addressing these barriers will be key to ensuring that mobile banking services reach underserved populations, particularly in rural areas.

## CONCLUSION

This study provides robust evidence that mobile banking plays a crucial role in enhancing financial inclusion in Kenya. By improving access to financial products and fostering better financial behaviors, mobile banking platforms like M-Pesa and M-Shwari have transformed the financial landscape for many Kenyans, particularly those in underserved populations. However, challenges remain, particularly in terms of security concerns and technological barriers, which need to be addressed to ensure that mobile banking can reach its full potential in promoting financial inclusion.

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