

An Assessment of Fintech, Digital Finance and Financial Inclusion in Emerging Economies: Evidence from Sierra Leone

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Abstract: *This study assesses the role of fintech and digital finance in enhancing financial inclusion in Sierra Leone, an emerging economy in which formal financial infrastructure remains limited. A convergent mixed-methods design was adopted, and data were collected from 100 respondents comprising both users and non-users of digital financial services through a structured questionnaire, with quantitative and qualitative findings analysed and integrated during interpretation. The findings indicate that digital financial services have become a primary means of accessing finance, with usage exceeding formal bank account ownership and extending beyond the formally banked population. This expansion is driven overwhelmingly by mobile money, while digital banking, transfer, and credit services remain comparatively limited, and usage is concentrated in routine person-to-person transfers. The perceived impact on financial inclusion is largely positive but unevenly experienced, and the principal barriers to adoption are structural and operational rather than attitudinal, relating primarily to transaction costs, fraud and security concerns, connectivity, and electricity supply. The study concludes that financial inclusion is broad in reach but narrow in depth, and that deeper inclusion depends upon improvements in infrastructure, affordability, security, and institutional support.*

Keywords: Digital Finance, Emerging Economies, Financial Inclusion, Fintech, Sierra Leone.

I. INTRODUCTION

Rapid advancements in financial technology (fintech) have significantly transformed the delivery and accessibility of financial services globally. The digitalisation of financial systems has been driven by innovations such as mobile payments, digital wallets, electronic banking platforms, digital remittance systems, and online financial transfer services, which have enhanced the efficiency, accessibility, and inclusiveness of financial services. These developments have been particularly impactful in emerging economies, where traditional banking infrastructure remains limited [1]. Consequently, fintech, as a central component of digital finance, is widely recognised as a key driver of financial inclusion, economic participation, and sustainable development.

At the global level, digital finance has expanded access to financial services for individuals and businesses that were previously underserved or excluded. Mobile-based and internet-enabled platforms allow users to conduct transactions such as payments, savings, remittances, transfers, credit access, and online banking services in a more efficient and secure manner. The expansion of digital financial systems has reduced transaction costs, enhanced accessibility, and supported economic integration across both formal and informal sectors. As a result, fintech plays an important role in addressing financial inclusion gaps and promoting inclusive economic growth [2].

Despite these advancements, disparities persist between developed and emerging economies in access to financial services, digital infrastructure, and technological adoption. In many developing economies, a large proportion of the population remains excluded from formal financial systems due to structural barriers, including inadequate banking infrastructure, low levels of financial literacy, limited digital skills, and geographical constraints. These challenges have historically encouraged reliance on informal financial practices, such as cash-based transactions and unregulated savings mechanisms, which limit efficiency, security, and broader economic participation.

However, increasing access to mobile technologies and digital banking systems has begun to reshape financial service delivery across developing regions, particularly in Sub-Saharan Africa. Mobile money services have emerged as practical and scalable solutions for extending financial access to underserved populations. In addition, digital banking

applications, electronic transfer systems, debit and ATM card services, and online payment platforms have improved the accessibility and convenience of financial transactions. These services allow users to transfer funds, make payments, withdraw money electronically, receive remittances, and access banking services without prolonged dependence on physical banking halls [1]. Prior research highlights the rapid diffusion of mobile money and its potential to reach unbanked and low-income populations [3]. These developments also reflect broader patterns of fintech adoption across emerging economies facing similar structural constraints.

Sierra Leone provides a relevant basis for assessing the role of digital finance in advancing financial inclusion. The country's financial system has historically been characterised by limited access to formal banking services, with many individuals relying on informal financial mechanisms. Recent developments, particularly the expansion of mobile money services such as Orange Money, Afrimoney, and QMoney, have improved financial accessibility by offering convenient, secure, and relatively affordable transaction methods. Similarly, commercial banks have increasingly adopted digital banking services, including mobile banking applications, internet banking platforms, ATM card systems, and interbank electronic transfer services. International remittance platforms, including Western Union, MoneyGram, Ria, and related digital transfer systems, have also contributed to improving financial connectivity and access to cross-border financial flows. These platforms have supported individuals and small enterprises in overcoming infrastructural limitations and improving participation in formal financial systems [4]. In addition, increasing mobile network penetration and digital connectivity present new opportunities for expanding financial inclusion across both urban and rural areas, reflecting trends observed in comparable emerging economies.

Notwithstanding these developments, important empirical gaps remain. Existing studies have largely focused on the general expansion of mobile money and digital innovation, with limited attention to broader fintech services, including digital banking, electronic transfer systems, remittance platforms, and other forms of digital financial access. Limited attention has also been given to both user-level and non-user perspectives, including patterns of access, adoption, and non-adoption, as well as the measurable impacts of these services on financial inclusion in Sierra Leone. Individuals who remain excluded from digital financial systems and continue to rely on informal financial mechanisms, such as cash-based transactions and unregulated savings arrangements, represent a critical dimension of financial inclusion that has been insufficiently examined. Furthermore, challenges such as limited digital infrastructure, network reliability issues, regulatory constraints, cybersecurity concerns, and low levels of financial and digital literacy continue to affect the effective adoption and utilisation of fintech solutions. As a result, the relationship between fintech, digital finance, and financial inclusion in Sierra Leone remains insufficiently examined.

Addressing this gap requires a systematic assessment of how digital financial services are accessed, utilised, and experienced by users, as well as the extent to which they contribute to financial inclusion. Such an assessment provides empirical evidence on the extent to which fintech enhances financial inclusion and identifies the constraints that affect its effectiveness in emerging economies.

The aim of this study is to assess the role of fintech and digital finance in enhancing financial inclusion in Sierra Leone. To achieve this aim, the study pursues three specific objectives: to assess access to digital financial services and patterns of use and non-use; to examine the impact of digital finance on financial inclusion; and to identify the challenges affecting the adoption of digital financial services.

Accordingly, the study addresses the following research questions: What are the patterns of access, use, and non-use of digital financial services in Sierra Leone? What is the impact of digital finance on financial inclusion in Sierra Leone? and What challenges affect the adoption of digital financial services?

The significance of this study lies in its contribution to the growing body of literature on fintech and financial inclusion in emerging economies. By providing empirical insights from both users and non-users of digital financial services, including individuals using mobile money, digital banking platforms, remittance systems, and electronic payment services, as well as those relying on informal or cash-based financial mechanisms, the study offers evidence that may inform policy formulation, financial innovation strategies, and initiatives aimed at expanding inclusive financial systems. However, the findings are limited to Sierra Leone and should therefore be interpreted within the national setting, while offering insights relevant to other emerging economies with similar characteristics.

The following section critically reviews relevant literature on fintech, digital finance, and financial inclusion, with particular emphasis on their applications, opportunities, and challenges in emerging economies.

II. MATERIALS AND METHODS

2.1 Materials

The rapid expansion of financial technology (fintech) has been widely recognised as a defining feature of modern financial systems across both developed and emerging economies. Fintech is generally conceptualised as the application of digital technologies to deliver financial services in more efficient, accessible, and innovative ways. Within the literature, fintech has consistently been identified as a transformative force that enhances service delivery, reduces operational inefficiencies, and improves user experience [5, 6]. More recent contributions further highlight its role in

reshaping financial intermediation, lowering transaction costs, and increasing competition within financial markets [7]. As part of this broader transformation, digital finance has emerged as a key mechanism through which financial inclusion may be advanced, particularly in economies where traditional banking infrastructure is limited or inaccessible. Financial inclusion, defined as access to and usage of affordable and appropriate financial services, has increasingly been recognised as a critical driver of economic development and poverty reduction [1, 8].

Fintech encompasses a broad range of financial services, including digital payments, mobile money, digital banking, remittances, digital lending, savings platforms, electronic transfer systems, and emerging technologies such as blockchain-based systems. Within emerging economies, digital payments and transfer services have been identified as the most significant drivers of financial inclusion due to their accessibility and scalability [1]. The relationship between fintech and financial inclusion has largely been explained through the capacity of digital platforms to overcome traditional barriers to financial access. Conventional banking systems typically require physical presence, formal identification, and minimum balances, thereby excluding significant portions of the population. These barriers have been reduced through fintech solutions, particularly mobile-based, internet-enabled, and agent-assisted services, which enable remote access to financial services through digital interfaces. It has been demonstrated that such platforms significantly expand financial access by allowing users to conduct transactions without requiring a formal bank account [9].

Empirical evidence has consistently indicated that mobile money represents a central component of fintech-driven financial inclusion in Sub-Saharan Africa. In Kenya, the introduction of M-Pesa enabled millions of previously unbanked individuals to access financial services, with measurable improvements observed in household welfare and poverty reduction [9]. Broader global evidence further demonstrates that digital payments are strongly associated with increased account ownership and improved financial resilience, particularly among low-income populations [1]. Similar developments have been observed across Ghana, Tanzania, and Uganda, where mobile money ecosystems have expanded rapidly and contributed to financial deepening [2]. These findings indicate that mobile-based financial services remain among the most scalable and impactful fintech solutions in environments characterised by infrastructural limitations.

Beyond mobile money, digital remittance systems have also emerged as a critical component of fintech-enabled financial inclusion. Cross-border and domestic remittance platforms, including digital transfer services, facilitate the movement of funds between individuals and households, thereby supporting income stability and economic participation. In many developing economies, remittances represent a significant source of household income and play an essential role in consumption smoothing, investment, and poverty reduction. It has been demonstrated that small-scale remittance transfers contribute directly to improved household welfare and socio-economic outcomes in Sierra Leone [10]. The integration of remittance services with digital financial platforms further enhances their accessibility, reduces transaction costs, and strengthens their contribution to inclusive financial systems. These developments indicate that digital remittances, alongside mobile money, constitute an important mechanism through which fintech influences financial inclusion.

Digital banking services have also become increasingly important within fintech ecosystems. Electronic banking platforms, mobile banking applications, ATM and debit card systems, and online transfer services have expanded users' ability to access and manage financial resources conveniently. Such services reduce dependence on physical banking infrastructure and support continuous access to financial services, including withdrawals, transfers, bill payments, and account management. In emerging economies, digital banking services have contributed to greater financial accessibility, particularly among urban populations and formally employed individuals. However, adoption remains uneven due to disparities in internet access, digital literacy, and trust in electronic financial systems [1].

Additional fintech services, including digital lending and alternative credit systems, have also been recognised as important enablers of financial inclusion, particularly for small and medium-sized enterprises. SMEs frequently encounter constraints in accessing formal finance due to lack of collateral and limited credit histories. Digital financial platforms have introduced alternative mechanisms, such as mobile-based lending and data-driven credit assessment, which enable firms to overcome traditional barriers. These innovations have been shown to support business growth and enhance productivity [11, 12]. However, their impact remains dependent on regulatory support, data availability, and user trust.

Emerging fintech innovations, including blockchain technologies, cryptocurrency-based systems, online trading platforms, and decentralised financial systems, have also been acknowledged within the literature. While these technologies offer potential benefits in terms of transparency, efficiency, and decentralisation, their contribution to financial inclusion in developing economies remains limited due to regulatory uncertainty, low adoption rates, technological complexity, and concerns relating to financial security [13, 14]. Consequently, their role has primarily been considered supplementary rather than central within inclusion-focused analyses.

The diffusion of fintech innovations has been attributed to their alignment with local economic and institutional conditions. Adoption has been shown to depend not only on technological availability but also on regulatory

frameworks, market competition, affordability, infrastructure, and user trust [3, 15]. In many developing economies, fintech solutions have been designed to complement existing informal financial systems rather than replace them. This adaptability has been identified as a key factor contributing to their widespread adoption, particularly in environments where informal financial practices remain prevalent.

Despite these contributions, the literature has identified persistent structural challenges that limit the effectiveness of fintech in promoting financial inclusion. One of the most significant constraints is the digital divide, which encompasses disparities in access to technology, digital literacy, internet connectivity, and smartphone ownership. Although mobile phone penetration is relatively widespread, access to reliable internet services and advanced digital devices remains uneven, thereby limiting both adoption and sustained usage [1]. In addition, network unreliability, transaction costs, and electricity supply challenges have been shown to reduce user confidence and hinder continued engagement with digital financial services.

Regulatory and institutional challenges have also been widely examined. Effective regulatory frameworks are required to ensure the security, stability, and inclusiveness of digital financial systems. However, in many emerging economies, regulatory development has lagged behind technological innovation, resulting in increased risks such as fraud, cybercrime, data breaches, and inadequate consumer protection [16]. At the same time, restrictive regulatory approaches may constrain innovation and limit the growth of fintech ecosystems, thereby highlighting the need for balanced regulatory strategies that encourage innovation while ensuring financial security and consumer protection.

The role of trust in fintech adoption has also been emphasised. It has been established that users' willingness to adopt digital financial services is influenced by perceptions of security, reliability, usability, and institutional credibility. Behavioural intention to adopt technology has been linked to perceived usefulness and facilitating conditions [17]. In developing economies, concerns relating to fraud, system failures, privacy protection, and transaction security may significantly hinder adoption, particularly where institutional trust is limited.

Socio-economic factors have further been shown to shape access to and use of digital financial services. Income levels, education, gender disparities, employment status, and geographical location have been identified as key determinants of financial inclusion outcomes. Women and low-income populations have been found to be less likely to use formal financial services even when access is available [1, 18]. This suggests that financial inclusion extends beyond access to encompass meaningful usage and sustained engagement, thereby requiring targeted and inclusive policy interventions.

The adoption and impact of fintech have also been examined through theoretical frameworks. The Technology, Organisation, and Environment framework suggests that technological adoption is influenced by organisational readiness, technological characteristics, and external environmental conditions [19]. Similarly, the Unified Theory of Acceptance and Use of Technology explain adoption behaviour based on user perceptions and facilitating conditions [17]. However, these frameworks have been identified as having limitations in developing economies, as they do not fully capture the complexity of structural constraints, informal economic systems, and infrastructural inequalities.

Across Africa, fintech ecosystems have developed rapidly, supported by increasing mobile connectivity and entrepreneurial activity. The expansion of innovation hubs, incubators, collaborations between financial institutions and technology firms, and investments in digital infrastructure has facilitated the growth of digital financial services. It has been observed that successful fintech innovations often emerge from coordinated interactions between public and private actors [20]. However, the effectiveness of such ecosystems varies across countries due to differences in institutional capacity, regulatory environments, and resource availability.

Sierra Leone represents an important case within this broader landscape. The financial system has historically been characterised by limited access to formal banking services, with a large proportion of the population relying on informal financial mechanisms. In recent years, mobile money services such as Orange Money, Afrimoney, and QMoney have significantly expanded access to financial services by enabling users to conduct transactions through mobile devices. It has been observed that these platforms have improved financial accessibility and supported economic activities among individuals and small enterprises [4].

In addition to mobile money, digital remittance systems and electronic banking services have played a significant role in supporting financial inclusion in Sierra Leone. International remittance platforms, including Western Union, MoneyGram, Ria, and related digital transfer systems, have improved access to domestic and cross-border financial flows. Similarly, commercial banks have increasingly introduced mobile banking applications, ATM services, debit card systems, and electronic transfer platforms that allow users to access financial services more efficiently. Small-scale remittance transfers have been shown to contribute to household consumption, investment, and financial stability, thereby improving socio-economic outcomes [10]. These findings highlight the importance of integrating multiple forms of digital financial services in understanding the broader impact of fintech on financial inclusion.

Despite these developments, important empirical gaps remain within the literature. Existing studies have largely focused on descriptive analyses of mobile money expansion, with limited attention given to broader fintech services such as digital banking, remittance systems, electronic payment platforms, ATM services, and online financial transfers. Limited attention has also been given to user-level adoption, usage patterns, behavioural experiences, and measurable impacts across multiple fintech dimensions. Critically, insufficient attention has been given to individuals who remain entirely excluded from digital financial systems and continue to rely on informal financial mechanisms such as cash-based transactions, rotating savings groups, and informal money lending arrangements. The perspectives and experiences of non-users are directly relevant to assessing financial inclusion, as their exclusion from digital finance represents one of the clearest indicators of inclusion gaps. Although valuable insights have been provided, comprehensive studies integrating access, usage, non-adoption, impact, and challenges across diverse digital financial services and both included and excluded populations remain limited.

Further gaps are evident in the measurement of financial inclusion outcomes. While the potential benefits of fintech are widely acknowledged, empirical evidence on its impact on income, savings behaviour, business performance, and financial resilience remains insufficient. In addition, the interaction between infrastructural, regulatory, technological, and socio-economic barriers has not been adequately examined.

A broader gap is also identified in comparative research across emerging economies. While individual country studies provide useful insights, limited attention has been given to cross-country analysis examining how institutional differences influence fintech adoption and financial inclusion outcomes.

Overall, the literature demonstrates that fintech and digital finance have considerable potential to enhance financial inclusion in emerging economies. However, this potential is shaped by a complex interaction of technological, institutional, regulatory, and socio-economic factors. In Sierra Leone, the expansion of mobile money, digital remittance systems, electronic banking services, and related digital financial platforms represents a significant opportunity for advancing financial inclusion, while also highlighting the need for more comprehensive empirical research.

2.2 Research Methodology

A mixed-methods research design was adopted to assess fintech, digital finance, and financial inclusion in Sierra Leone. In line with the study objectives, attention was focused on access to and use of digital financial services, the perceived impact of fintech on financial inclusion, and the challenges affecting the adoption of digital financial services. A convergent mixed-methods approach was employed, whereby quantitative and qualitative data were collected concurrently, analysed separately, and integrated during interpretation [21]. This design enabled the study to capture measurable patterns relating to the use and accessibility of digital financial services while also providing deeper insights into user experiences, perceptions, and challenges. In addition, the convergent design facilitated the systematic comparison and integration of quantitative and qualitative findings, thereby strengthening the interpretation and credibility of the results through triangulation [22].

The target population consisted of individuals aged 18 years and above across Sierra Leone with varying levels of engagement with financial services, encompassing users of digital financial services as well as individuals who had not adopted such services and continued to rely on informal or cash-based financial mechanisms. Digital financial service users included those with experience of mobile money services, digital banking platforms, electronic transfer systems, ATM and debit card services, and digital remittance platforms. Non-users included individuals who relied primarily on informal financial mechanisms such as cash-based transactions, rotating savings groups, informal money lending arrangements, or who were otherwise excluded from both formal and digital financial systems. Both formally banked and financially underserved individuals were included in order to capture the full range of experiences relating to access, usage, non-adoption, and barriers associated with digital and formal financial services. Participants included individuals engaged in small business activities, salaried employment, informal sector activities, and personal financial transactions. Although broader fintech innovations such as blockchain and cryptocurrency systems are acknowledged within the literature, the empirical focus of this study primarily centred on widely used digital financial services in Sierra Leone, including mobile money, digital banking, remittance platforms, and electronic transfer systems, alongside the experiences of those who had not adopted any such services.

A combination of purposive, convenience, and snowball sampling techniques was employed to recruit participants [23]. Purposive sampling was initially used to identify two broad groups: respondents with experience in using digital financial services through commercial banks, mobile money agents, business centres, and digital financial service networks; and individuals who had not adopted digital financial services and relied on informal or cash-based financial mechanisms. The deliberate inclusion of both groups was essential to the study, as an assessment of financial inclusion required evidence from individuals with different levels of financial inclusion. This was followed by convenience and snowball sampling to reach additional participants through personal, professional, and peer networks. A total of 100 respondents participated in the study, which was considered appropriate for an exploratory investigation of this nature. Only respondents aged 18 years and above were eligible to participate in the study. While the use of non-probability sampling may have limited statistical generalisability, it was regarded as suitable for exploratory research in

situations where a comprehensive sampling frame was unavailable and where financial service usage and non-usage extended across both formal and informal sectors. The selected approach enabled access to participants with diverse experiences relating to fintech adoption, non-adoption, and financial inclusion across different socio-economic groups. Data were collected from respondents located across several regions of Sierra Leone, primarily in major urban centres such as Freetown, Bo, Makeni, and Kenema, with a smaller number of responses from other towns. The inclusion of participants from geographically diverse locations provided broader insights into digital financial service usage and exclusion patterns across different regions of the country.

Data were collected using a structured questionnaire administered electronically through Google Forms. This method was selected due to its efficiency, standardisation, and suitability for reaching geographically dispersed respondents [24]. The questionnaire was designed in alignment with the study objectives and research questions and included both closed-ended and open-ended questions. For respondents who used digital financial services, closed-ended items were used to measure levels of access, frequency of usage, perceived impact on financial inclusion, user satisfaction, and challenges associated with fintech adoption. For respondents who did not use digital financial services, questions focused on awareness of available digital financial tools, reasons for non-adoption, reliance on informal financial mechanisms, and perceived barriers to accessing digital financial services. Demographic variables such as age, gender, education level, employment status, and location were also collected from all respondents to support the interpretation of fintech usage, non-usage, and financial inclusion patterns. Open-ended questions allowed respondents to provide additional insights into their financial experiences, perceived benefits or concerns, infrastructural challenges, security concerns, and barriers affecting access or adoption. Conditional branching was incorporated within the questionnaire to ensure that respondents were directed only to questions relevant to their profile, thereby distinguishing between sections for digital service users and non-users.

In situations where respondents experienced difficulties completing the electronic questionnaire independently due to literacy, language, or technological limitations, researcher-assisted questionnaire administration was employed. Under this approach, questions were read and explained verbally where necessary, and responses were entered into the Google Form on behalf of participants while ensuring that responses accurately reflected participants' views and experiences. This approach improved inclusiveness and minimised the exclusion of respondents with limited digital literacy or limited familiarity with electronic survey platforms.

Prior to the main data collection process, a pilot test of the questionnaire was conducted with three respondents possessing characteristics similar to the target population. The pilot test was undertaken to assess the clarity, relevance, and structure of the questionnaire items. Feedback obtained during the pilot stage was used to refine the wording, sequencing, and overall structure of the instrument in order to enhance validity and reliability. In addition, the questionnaire was developed based on concepts and constructs identified within existing literature relating to fintech, digital finance, and financial inclusion, thereby further strengthening content validity.

Quantitative data were analysed using descriptive statistical techniques, including frequencies, percentages, and cross-tabulations, to identify patterns relating to access, usage, perceived impact, and challenges associated with digital financial services. Statistical Package for the Social Sciences (SPSS) was utilised for data organisation, descriptive statistical analysis, tabulation, and graphical presentation to support interpretation of the findings. Qualitative data obtained from open-ended responses were analysed using thematic analysis [25]. This process involved systematic coding, identification of recurring themes, and interpretation of patterns relating to financial inclusion, fintech adoption, user experiences, and structural barriers affecting digital financial service utilisation. The integration of quantitative and qualitative findings enabled triangulation and strengthened the overall interpretive depth and validity of the study.

Ethical considerations were strictly observed throughout the research process. Participation was voluntary, and informed consent was obtained prior to data collection. Participants were provided with clear information regarding the purpose of the study and the intended use of their responses. No personally identifiable information was collected, and confidentiality was maintained throughout all stages of the research process [26]. Participants were also informed of their right to withdraw from the study at any stage without any adverse consequences.

Despite these measures, certain limitations should be acknowledged. The use of non-probability sampling techniques may have introduced sampling bias and limited the generalisability of the findings. In addition, persistent network instability and limited mobile internet infrastructure in certain parts of Sierra Leone may have affected the successful completion of electronically administered questionnaires, including in instances where researcher-assisted administration was employed, as connectivity constraints could affect the submission environment regardless of who was operating the device. Furthermore, reaching non-users of digital financial services presented practical challenges, as this group was less likely to be accessible through digitally connected networks and may therefore have been underrepresented relative to digital service users. Although researcher-assisted data collection improved inclusiveness by supporting respondents with literacy, language, or technological limitations, some individuals located in remote or inaccessible areas may still have been excluded where direct researcher assistance could not reasonably be provided. Consequently, respondents with limited literacy, limited digital skills, or restricted access to digital infrastructure may

have been underrepresented within the study. Nevertheless, these limitations were considered acceptable given the exploratory nature of the study and the structural challenges associated with conducting research within an emerging economy. The study therefore provides exploratory and context-specific insights rather than statistically generalisable findings.

III. FINDINGS AND DISCUSSIONS

3.1 Demographic Characteristics

A total of 100 respondents participated in the study, comprising users and non-users of digital financial services drawn from major urban centres across Sierra Leone. The demographic profile establishes the structure of the sampled population and provides a basis for interpreting the patterns examined in the subsequent sections.

With regard to gender, the sample was predominantly male (62%), while female respondents accounted for 38%. The comparatively lower representation of women is consistent with documented gender disparities in the usage of formal and digital financial services in Sub-Saharan Africa, where women have been found to be less likely to use such services even where access exists [1, 18], suggesting that gender-related disparities may continue to shape inclusion outcomes within the population examined.

The age distribution indicates a predominantly young population, with 43% aged between 18 and 24 years and 35% between 25 and 34 years, while respondents aged 35 years and above accounted for the remaining 22%. This concentration within younger cohorts reflects a digitally exposed population that is generally more receptive to mobile-based and internet-enabled financial services, thereby supporting the high levels of usage reported in subsequent section.

Educational attainment was notably high, with 48% holding an undergraduate degree, 18% a postgraduate qualification, and 23% a professional qualification or diploma, while only small proportions reported secondary education (7%) or no formal education (2%). Although the sample is relatively educated, education alone has been shown to be insufficient for sustained financial inclusion, as meaningful usage also depends upon infrastructure, affordability, and trust [1].

In terms of employment, students constituted the largest group (46%), followed by government employees (17%), self-employed individuals (14%), unemployed respondents (11%), and private sector employees (10%). The prominence of students and the limited formal private sector employment suggest a population characterised by relatively low and frequently irregular income, with implications for the affordability and frequency of transactions.

Respondents were geographically concentrated in Freetown (54%), followed by Bo (18%), Makeni (15%), and Kenema (9%), with smaller numbers in Kabala, Kambia, and Moyamba. The locations in which transactions were primarily conducted closely mirrored places of residence. The dominance of Freetown reflects its position as the capital and principal economic hub, suggesting that access to digital financial services is unevenly distributed and favours urban populations.

Regarding income, 27% reported earning below NLe1,250 per month and 19% between NLe 1,250 and NLe2,500, while only small proportions reported higher brackets and 31% preferred not to disclose their income. The data nonetheless indicate a largely low-income population, consistent with the affordability concerns identified later.

With respect to formal financial inclusion, 66% of respondents reported holding a formal bank account, while 34% did not. Importantly, the proportion using digital financial services (92%) substantially exceeded the proportion holding a bank account, indicating that such services extend access beyond the formally banked population and that a meaningful share of users operate, at least in part, outside the traditional banking system. This is consistent with evidence that mobile-based and agent-assisted services enable financial access without requiring a conventional bank account [9].

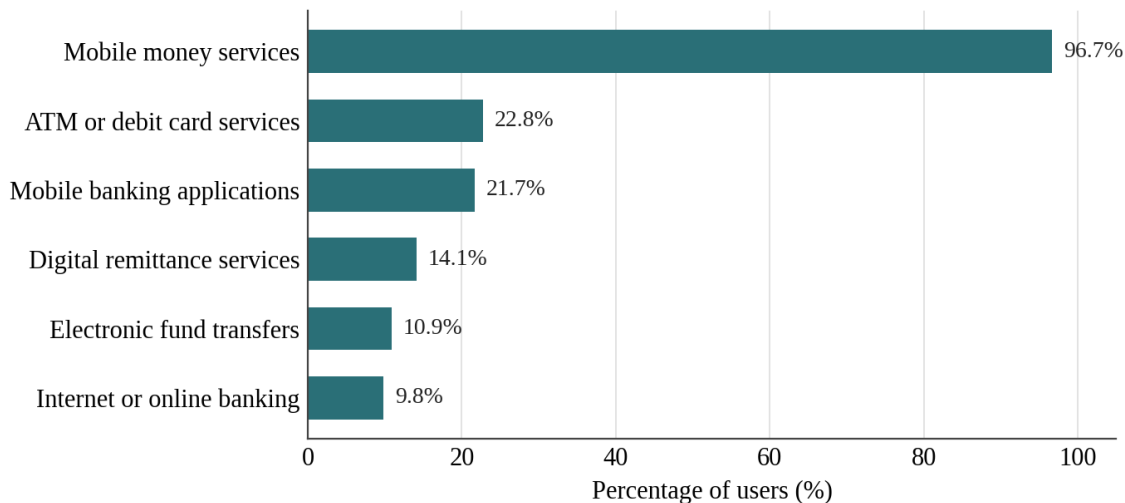
Overall, the demographic profile reveals a young, relatively educated, and predominantly urban population with comparatively low income and moderate levels of formal banking. While these characteristics suggest considerable potential for digital engagement, they are accompanied by structural limitations relating to income and uneven geographical access, providing a useful basis for understanding the patterns examined below.

A. RQ1. What are the patterns of access, use, and non-use of digital financial services in Sierra Leone?

The findings indicate widespread access to and use of fintech-enabled digital financial services. The vast majority of respondents (92%) reported using at least one such service, while only 8% reported non-usage. As noted, this level exceeded formal bank account ownership, indicating that fintech-enabled services have become a primary, and in many instances the principal, means of accessing financial services. This finding highlights the growing role of fintech in extending financial access beyond the traditional banking sector within Sierra Leone.

Usage was heavily concentrated in mobile money services (96.7% of users), followed at considerably lower levels by ATM or debit card services (22.8%), mobile banking applications (21.7%), digital remittance services (14.1%), electronic fund transfer services (10.9%), and internet or online banking (9.8%). The dominance of mobile money confirms its role as the principal gateway to digital finance, while bank-centred services remain limited in reach, consistent with evidence identifying mobile money as the most scalable and impactful component of digital finance in Sub-Saharan Africa [2, 9].

Figure 1: Adoption of Digital Financial Services by Type (Percentage of Users, n = 92)



Source: Field Data, May 2026

As shown in Figure 1, mobile money services were used by almost all users (96.7%), far exceeding every other service. Bank-centred services, including ATM or debit card services (22.8%) and mobile banking applications (21.7%), were used by approximately one fifth of users, while digital remittance services (14.1%), electronic fund transfers (10.9%), and internet or online banking (9.8%) remained comparatively marginal. The figure confirms that mobile money operates as the principal gateway to digital finance within the population examined. While a broader range of fintech services, including digital banking applications, electronic fund transfers, internet banking, and digital remittance platforms, is available, their adoption remains substantially lower. This suggests that financial inclusion in Sierra Leone is currently driven primarily by mobile money rather than by the wider fintech ecosystem.

Usage was well established rather than recent, as approximately 72.8% of users reported at least three years of experience, comprising 39.1% with between three and five years and 26.1% with between five and ten years, while only 5.4% reported less than one year. This suggests a maturing pattern in which digital financial services have become embedded in everyday financial behaviour. The smartphone was the dominant point of access (79.3%), followed by mobile money agents (13.0%) and bank branches or automated teller machines (6.5%), underscoring the dependence of digital finance upon personal devices and, by extension, upon reliable connectivity and affordable data.

Usage was oriented primarily towards person-to-person transfers. Sending or receiving money was reported by 82.6% of users, followed by paying for goods, services, or bills (33.7%), saving money digitally (28.3%), making business payments (21.7%), receiving salary or business income (18.5%), and sending or receiving remittances (17.4%), while the use of digital credit or loans remained marginal (4.3%). Digital financial services are therefore used predominantly for transactional purposes, while more advanced functions such as credit remain underdeveloped, reflecting the limited maturity of digital lending ecosystems [11, 12]. Frequency of use was high, as approximately 62.0% of users transacted at least several times per week, comprising 33.7% daily and 28.3% several times weekly, suggesting integration into routine economic activity.

Prior financial behaviour provides further insight into the inclusionary role of these services. Before adoption, users reported reliance upon a formal bank account (30 respondents), self-custody of money (21 respondents), exclusively cash-based transactions (20 respondents), informal savings groups such as osusu (18 respondents), and keeping money with trusted individuals (17 respondents), while 15 reported no formal arrangement. This indicates that digital financial services have drawn in a substantial number of individuals who previously relied upon informal or cash-based mechanisms [3].

The patterns among non-users, although based upon a small number of respondents (8), are instructive. Awareness within this group was limited, as only one respondent reported full awareness while five reported being unaware and the remaining two reported being partially aware, and their practices were dominated by keeping cash

savings at home (6 respondents) and exclusively cash-based transactions (2 respondents). Limited awareness was the most frequently cited reason for non-usage (4 respondents), followed by isolated mentions of poor connectivity, security concerns, unreliable service, and the lack of a suitable device. Unmet demand was nonetheless high, as the majority expressed interest in future usage and identified improved awareness and education as the factors most likely to encourage adoption, suggesting that knowledge-related barriers rather than outright rejection constitute the primary constraint for this segment.

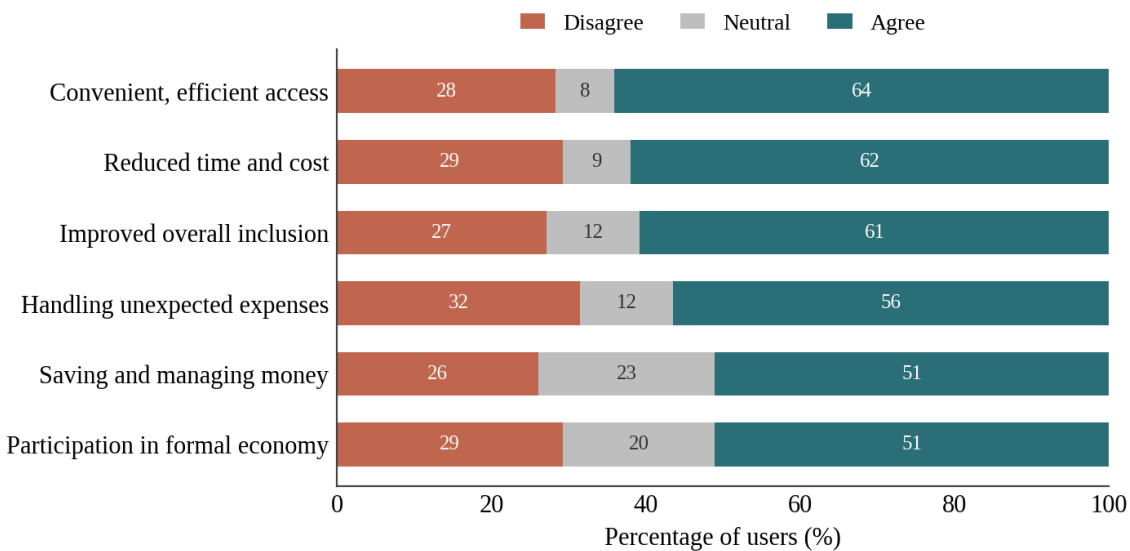
Overall, fintech-enabled digital financial services are widely accessed and frequently used, with mobile money functioning as the dominant gateway and person-to-person transfers as the principal application. Usage extends beyond the formally banked population, indicating a meaningful inclusionary effect. However, the findings also reveal uneven development across the broader fintech ecosystem, as bank-centred, transfer, and credit services are adopted far less widely. Together with the persistence of a small but poorly informed non-user segment, this suggests that while access has expanded considerably, the depth and diversity of fintech-driven financial inclusion remain uneven.

B. RQ2. What is the impact of digital finance on financial inclusion in Sierra Leone?

The findings indicate that digital financial services have made a positive contribution to financial inclusion in Sierra Leone, although the extent of the perceived benefits varied across respondents. A majority of users agreed that such services had improved their ability to access financial services conveniently and efficiently (64.1%), reduced the time and cost involved in transactions (62.0%), and improved their overall level of financial inclusion (60.9%). Positive perceptions were also recorded in relation to handling unexpected expenses (56.5%), saving and managing money more effectively (51.1%), and participating more fully in the formal economy (51.1%), consistent with evidence that digital financial services enhance convenience, reduce transaction costs, and strengthen financial resilience among lower-income populations [1, 16].

Notwithstanding this favourable assessment, a consistent minority of users, ranging between approximately one quarter and one third, expressed disagreement across these statements, with a sizeable proportion expressing strong disagreement. This pattern indicates that the benefits of digital finance, while real for many, are unevenly experienced and conditional upon factors such as service reliability, affordability, and security. Levels of neutrality were also relatively high in relation to saving behaviour (22.8%) and participation in the formal economy (19.6%), implying that the effect upon longer-term financial behaviour is less clearly perceived than the effect upon immediate transactional convenience.

Figure 2: Perceived Impact of Digital Finance on Financial Inclusion (Percentage of Users, n = 92)



Source: Field Data, May 2026

Figure 2 presents the distribution of responses across the six impact statements, ordered by the level of agreement. While agreement exceeded one half for every statement, a consistent block of disagreement, and in particular strong disagreement, is visible across all items. The figure illustrates the polarised pattern described above, in which favourable perceptions coexist with a sizeable minority of users reporting no improvement, alongside relatively high neutrality in relation to saving behaviour and participation in the formal economy.

Among users engaged in business or self-employment activities, the perceived impact was likewise positive, as a majority agreed that digital financial services had improved their ability to make and receive business payments (63.5%)

and had supported the growth of their business or economic activities (60.9%). This indicates that digital finance contributes not only to individual access but also to enterprise-level activity [12]. The qualitative responses reinforced these findings, as many respondents described mobile money in particular as having made it easier to send and receive money quickly, pay bills, and support family members without travelling long distances, thereby reducing both time and transportation costs. The role of these services during emergencies and in receiving funds from relatives elsewhere was also frequently noted, reflecting their contribution to resilience and consumption smoothing, consistent with evidence on the welfare-enhancing effects of small-scale and remittance-related transfers in Sierra Leone [10].

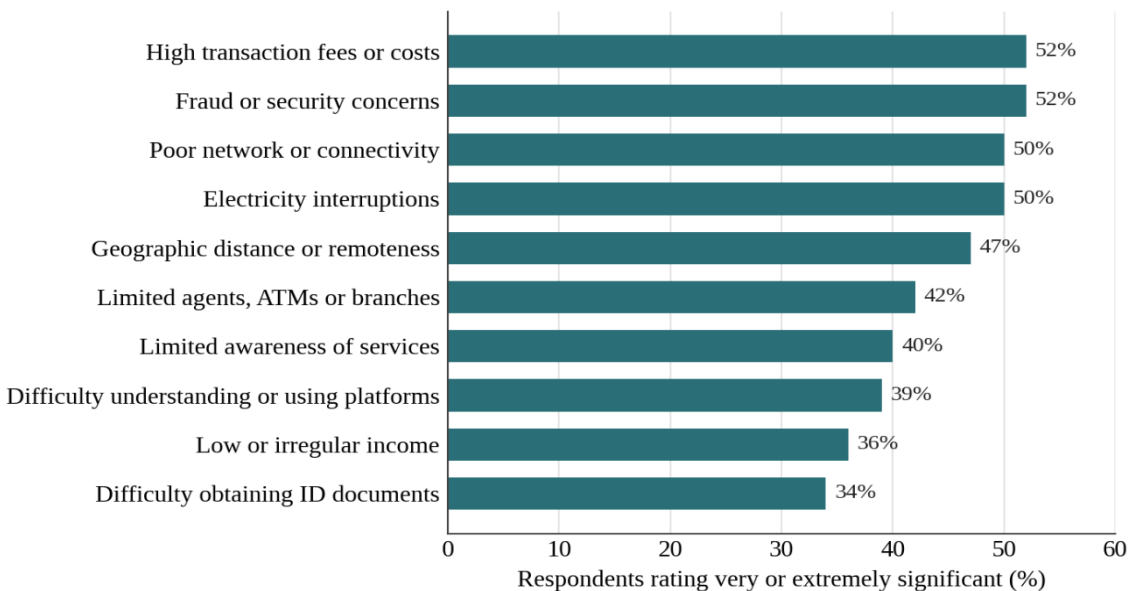
Considered collectively, respondents were broadly positive about the wider contribution of digital financial services to national financial inclusion, as a majority rated this contribution as good or excellent (59%), while 26% rated it as fair and 15% as poor or very poor. Among non-users, perceptions of their own arrangements were mixed and, given the limited number of respondents, are interpreted with caution. Although some expressed satisfaction with informal arrangements, responses regarding their adequacy for saving, managing money, and handling emergencies were divided, suggesting that reliance upon informal mechanisms may not fully meet the financial needs of this group.

Overall, fintech-enabled digital financial services are perceived to have a positive impact on financial inclusion, particularly with respect to convenience, transaction efficiency, resilience, and enterprise activity. The findings therefore support the broader argument that fintech can contribute meaningfully to inclusion in emerging economies by reducing barriers to financial access and participation. However, the uneven pattern evident in the responses indicates that this impact is not uniformly experienced and is closely tied to the reliability and affordability of the services, providing a direct link to the adoption barriers examined below.

C. RQ3. What Challenges affect the Adoption of Digital Financial Services?

Adoption is shaped by a combination of infrastructural, financial, security-related, and capability-related challenges. When the proportion of respondents rating each factor as very or extremely significant is considered, high transaction fees or service costs (52%) and concerns about fraud, scams, or financial security (52%) emerged as the most significant barriers, closely followed by poor mobile network or internet connectivity (50%) and frequent electricity or power supply interruptions (50%). Geographic distance or remoteness (47%) and the limited availability of agents, automated teller machines, or bank branches (42%) were also widely regarded as significant, while limited awareness of available services (40%) and difficulty understanding or using digital platforms (39%) were rated as significant by a substantial minority. Low or irregular income (36%) and difficulty obtaining identification documents (34%) were comparatively less prominent.

Figure 3: Barriers Rated very or extremely Significant (Percentage of Respondents, n = 100)



Source: Field Data, May 2026

As presented in Figure 3, the barriers rated most significant were dominated by cost, security, and infrastructure. High transaction fees and fraud or security concerns were each rated very or extremely significant by 52% of respondents, closely followed by poor connectivity and electricity interruptions (each 50%). Capability-related and awareness-related factors, together with income and documentation, were rated significant by smaller, though still substantial, proportions. The figure underscores that structural and operational constraints, rather than purely financial limitations, represent the principal barriers to adoption.

These results highlight the centrality of infrastructural constraints, since poor connectivity, unreliable electricity, geographic remoteness, and limited-service points together represent the most frequently cited category of barriers. This is consistent with evidence that the digital divide, encompassing disparities in connectivity, devices, and supporting infrastructure, constitutes a fundamental constraint upon adoption and sustained usage in emerging economies [1]. A notable feature of the findings is the prominence of affordability, as the identification of transaction fees as the single most significant barrier, alongside the strong emphasis upon charges, tariffs, and taxation within the qualitative responses, indicates that cost is a material constraint within this setting and underscores the importance of pricing and taxation policy. The equally prominent role of fraud and security concerns indicates that trust remains a critical determinant of adoption, consistent with evidence that perceptions of security and reliability strongly influence the willingness to use such services [16, 17].

The qualitative responses provided detail on the improvements considered necessary. The most frequently raised concern related to network and infrastructure, with repeated calls for stronger and more reliable connectivity, improved rural coverage, and more stable electricity supply. Affordability featured almost as prominently, with widespread calls for reduced charges and tariffs and, in several instances, for the removal or reduction of taxation on financial transactions. Financial literacy and public awareness constituted a third major area, with emphasis upon education, sensitisation, and practical training, particularly in rural communities and in local languages. Calls for an expanded and better-resourced agent network, including ensuring that agents hold sufficient cash so that withdrawals can be reliably made, formed a further recurring concern, as did the need for stronger fraud protection and timely communication during periods of system downtime, while a smaller number of respondents highlighted the value of interoperability between banks and mobile money platforms and of simpler registration procedures. These concerns were echoed in respondents' accounts of their experiences, which centred upon unreliable networks and delayed transactions, high charges, fraud and scams, the unavailability of cash at agents and automated teller machines, periodic system breakdowns, and the imposition of additional informal charges by some agents, particularly in remote areas. Such accounts indicate that, while digital financial services deliver clear benefits, the reliability and integrity of the services are uneven, constraining both adoption and sustained usage.

Despite these challenges, willingness to adopt was not the primary limitation. Overall satisfaction with current arrangements was moderate, with 55% of respondents reporting satisfaction, and interest in future adoption among non-users was high, indicating that the principal constraints are structural and operational rather than attitudinal. These findings align with established frameworks of technology adoption while also extending them. Consistent with the Technology, Organisation, and Environment framework [19], adoption is shown to be shaped by technological characteristics, organisational capacity, and environmental conditions. However, within this low-income setting, environmental and infrastructural factors function as primary constraints rather than secondary considerations. Similarly, while broadly consistent with the Unified Theory of Acceptance and Use of Technology [17], the findings suggest that facilitating conditions, including connectivity, affordability, and security, are more decisive than behavioural intention, given the high levels of interest and usage observed. This reinforces the view that the effectiveness of fintech and digital finance in emerging economies depends not only upon user acceptance but also upon the adequacy of the enabling environment [15]. Consequently, expanding financial inclusion requires not only wider adoption of fintech services but also improvements in infrastructure, affordability, security, and institutional support.

Taken together, the findings reveal that fintech-enabled digital financial services have expanded access to financial services and contributed positively to financial inclusion in Sierra Leone. However, the findings also demonstrate that these gains are driven predominantly by mobile money services, while the adoption of other fintech solutions such as digital banking and digital credit remains comparatively limited. In addition, infrastructural deficiencies, affordability concerns, and security-related challenges continue to constrain both adoption and sustained usage. The findings therefore suggest that while fintech possesses considerable potential to advance financial inclusion within emerging economies, its effectiveness depends upon the extent to which supportive technological, institutional, and socio-economic conditions are established. These findings contribute to the growing literature on fintech, digital finance, and financial inclusion in emerging economies by demonstrating that while fintech-enabled services can significantly expand financial access, their long-term inclusionary impact remains dependent upon supportive infrastructure, affordability, security, and institutional support.

IV. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

This study assessed the role of fintech and digital finance in enhancing financial inclusion in Sierra Leone, providing empirical evidence from an emerging economy in which formal financial infrastructure remains limited. Drawing on evidence from both users and non-users of digital financial services, it examined the patterns of access, use, and non-use, the perceived impact of digital finance on financial inclusion, and the challenges affecting adoption.

The findings demonstrated that fintech-enabled digital financial services have become a primary means of accessing financial services within the population examined. The level of usage exceeded formal bank account

ownership, which indicates that such services have extended financial access beyond the formally banked population and have drawn in many individuals who previously relied upon informal or cash-based arrangements. This expansion was found to be driven overwhelmingly by mobile money, which functioned as the principal gateway to digital finance, while digital banking services, electronic transfer systems, digital remittance services, digital credit, and other components of the wider fintech ecosystem remained comparatively limited. Usage was also concentrated in routine person-to-person transfers rather than more advanced functions. The study concludes that financial inclusion in Sierra Leone is at present broad in reach but narrow in depth, resting upon a single dominant service rather than a diverse and maturing fintech ecosystem.

The perceived impact of digital finance on financial inclusion was found to be largely positive. Digital financial services were credited with improving convenience, reducing the time and cost of transactions, strengthening resilience during emergencies, and supporting enterprise activity, and a majority of respondents regarded their wider contribution to national financial inclusion as good or excellent. These benefits were not uniformly experienced, however, as a consistent minority reported little or no improvement. The study concludes that the inclusionary impact of fintech is real but uneven, and that it remains closely tied to the reliability and affordability of the underlying services.

The challenges affecting adoption were found to be predominantly structural and operational rather than attitudinal. The most significant barriers related to the cost of transactions, concerns over fraud and security, unreliable network connectivity, and frequent interruptions to the electricity supply, alongside the limited reach of agents and service points, gaps in awareness, and difficulties in understanding or using digital platforms. Awareness, willingness to adopt, and overall satisfaction were nonetheless relatively high, and limited awareness rather than outright rejection was the principal constraint among non-users. The central conclusion of the study is therefore that the main obstacle to deeper financial inclusion is not a lack of awareness or willingness, but the limited capacity of the surrounding environment to convert access into meaningful and sustained use.

These findings contribute to the growing body of research on fintech, digital finance, and financial inclusion in emerging economies. By drawing on the perspectives of both users and non-users, the study shows that, in low-income settings, infrastructural, affordability, and capability-related conditions are more decisive than attitudinal factors in shaping the depth of financial inclusion. In doing so, it supports and extends established frameworks of technology adoption, including the Technology, Organisation, and Environment framework [19] and the Unified Theory of Acceptance and Use of Technology [17], by demonstrating that facilitating conditions, rather than behavioural intention, represent the decisive constraint within this setting. While the evidence is specific to Sierra Leone and should be interpreted with regard to its national setting, the patterns identified provide insights that may be relevant to other emerging economies facing similar infrastructural, affordability, and financial inclusion challenges.

4.2 Recommendations

Drawing on these findings, several practical and policy-oriented recommendations are proposed to strengthen the adoption and effective use of fintech-enabled digital financial services and to deepen financial inclusion in Sierra Leone and comparable emerging economies.

First, the strengthening of digital infrastructure should be treated as a priority. Given the heavy dependence of digital finance upon stable connectivity and a reliable electricity supply, the expansion of network coverage, improvements in service reliability, and the reduction of geographical disparities, particularly beyond the major urban centres, are essential if access is to be translated into sustained use.

Second, the affordability of digital financial services should be improved. As the cost of transactions emerged as the single most significant barrier and featured prominently in respondents' accounts, the reduction of transaction fees and a review of the taxation applied to digital financial transactions are recommended. Closer coordination between service providers and regulators on pricing would help to ensure that cost does not undermine inclusion, particularly among low-income users.

Third, measures to strengthen security and user trust should be adopted. Concerns over fraud and financial security were found to be as significant as cost, which indicates that trust remains a critical determinant of adoption. Enhanced fraud protection, stronger consumer safeguards, and timely communication during periods of system downtime would help to build confidence in digital financial systems.

Fourth, the agent network should be expanded and adequately resourced. As access depends heavily upon agents, ensuring that agents hold sufficient cash so that withdrawals can be reliably made, extending agent coverage to remote areas, and addressing the imposition of informal charges would improve both the reach and the reliability of digital financial services.

Fifth, financial and digital literacy should be enhanced through targeted and practical initiatives. Since limited awareness and difficulty in using digital platforms were found to constrain adoption, particularly among non-users,

training and sensitisation efforts should emphasise the applied and everyday use of digital financial tools and should be delivered in a manner accessible to rural communities, including through the use of local languages. Financial institutions, service providers, educational institutions, and other relevant stakeholders should collaborate in delivering practical financial and digital literacy initiatives.

In addition, the wider fintech ecosystem should be broadened beyond mobile money. As inclusion was found to rest largely upon a single dominant service, the promotion of interoperability between banks and mobile money platforms, together with the responsible development of digital banking and digital credit services, would help to deepen financial inclusion and reduce reliance upon basic transfer functions.

The promotion of inclusive participation is also important. Given the comparatively lower representation of women among users, targeted interventions should address disparities in access to skills and financial services in order to ensure that the benefits of digital finance are shared equitably across different groups.

Finally, the policy and regulatory environment should be strengthened to support inclusive fintech development. Balanced regulatory frameworks that protect consumers without unduly restricting innovation are required, and the further integration of fintech and financial inclusion objectives into national development strategies would help to create a more enabling environment. As effective digital financial ecosystems tend to emerge from coordinated interaction between public and private actors [20], closer collaboration between government, financial institutions, technology providers, and local developers should be encouraged.

Further research is recommended to build upon the findings of this study. Larger and more diverse samples, including a stronger representation of rural and digitally excluded populations, would enhance the comprehensiveness of future investigations. Longitudinal research would provide insight into how adoption and its impact evolve over time, while comparative studies across emerging economies would deepen understanding of how differing institutional and infrastructural conditions shape fintech-driven financial inclusion.

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