

## Mobile Money and Digital Identity for Women's Financial Inclusion in Rural Economies

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### ABSTRACT

Mobile money and digital identity systems are enabling technologies that can help increase women's financial inclusion in rural economies where physical access to formal banking services, documentation, social and financial barriers are significant. This paper considers how mobile money services and digital identity infrastructure can enable rural women's access to savings, payments, credit, remittances, insurance as well as small business finance. The study highlights the need to reassess the need for physical bank branches, and how mobile money allows women to carry out secure financial transactions with ease, via simple mobile phones and digital applications. Digital identity also improves inclusion by means of account registration, customer verification, access to government transfers, and formal access to financial services. The findings show that women working in mobile money and verified digital identity services are more financially independent, better manage their household finances, more involved in business and have access to emergency funds. Some of the hurdles to full participation are digital illiteracy, gender differences in phone ownership, poor network coverage, privacy concerns, fraud concerns and lack of awareness. The paper concludes that, with low-cost technology, financial protection, financial education and gender-informed policy designs, the use of mobile money and digital identity can have a significant impact on improving women's financial inclusion in rural economies.

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## INTRODUCTION

Women are the primary agricultural labour force in many rural areas and are systematically denied access to formal financial services due to their less access to collateral, far distance to financial institutions, and their social and cultural bias against financial services (Amugune et al., 2025). Further, their lack of financial knowledge and documentation such as national identity papers increases this challenge, resulting in limited access to key credit, saving and insurance services (Dahan & Hanmer, 2015; Programme et al., 2023). This marginalisation is not only attributable to factors at the individual level, but also to systemic inequalities as rural women are likely to be entangled in gender-biased regulatory systems, economic dependency and limited mobility (Adebite & Machethe, 2019; Saluja et al., 2023). Financial exclusion can manifest in a number of different ways and it is a complex phenomenon, including institutional, socio-cultural and technological forms which intersect to limit women's economic agency. Lack of formal identification is commonly a key constraint in mainstream financial institutions' access to financial services for rural women, as these institutions often require some form of identification to complete KYC procedures, which may be problematic for rural women due to restrictive civil registration or geographic barriers (Bonhoure, 2024; Dahan & Hanmer, 2015). Furthermore, the lack of formal education and exposure to digital tools further widen the "literacy gap" and render financial products, if

available at all in the technical sense, challenging to access. In addition, women's ability to access banks and formal credit markets is also constrained by deep-rooted socio-cultural norms, which at times restrict women's autonomy in managing household resources and assets, thereby affecting women's access to banks and formal credit markets (Amugune et al., 2025; I, 2026). In response to these systemic challenges, there has been an explosion of new services using mobile devices, such as M-Pesa and other decentralized digital financial services, which have emerged as a game-changing tool for financial inclusion in the Global South (Amugune et al., 2025; Dorfleitner & Quynh, 2022). However, these mobile platforms can overcome the geographical disadvantage the rural population has been suffering for decades, which is no longer a problem when it is not necessary to open a physical bank branch, instead, rural areas depend on the mobile network (Dorfleitner & Quynh, 2022). Mobile money can help to exchange money and save money in a secure and instant way, and it can also help those who previously had no access to financial services to get access (Shaikh et al., 2022). Despite mobile money being a technological approach, its capacity is often constrained by the absence of a similarly developed digital identity infrastructure (Bonhoure, 2024). Digital identity systems are the key next piece of the puzzle in promoting financial inclusion. A secure and verifiable digital identity is a key "enabler," a

means by which women have the documentation they need to meet regulatory requirements, allow for access and verification as a legal economic actor, and be relied upon as a source of identity. (Dahan & Hanmer, 2015; Khatri et al., 2025). Using mobile money, a well-designed digital ID system can enable users to access more sophisticated financial services, such as micro-loans, digital savings, and membership to the formal financial system (Khatri et al., 2025). Combining mobile technology with verified identity has the potential to reduce informal workers' vulnerability, enhance their saving capacity and provide a secure space for managing household and enterprise financial needs (Amin et al., 2026). But, there are challenges in the use of those digital tools. Yet, it has been observed that there remain certain limitations affecting the use of digital tools, such as the "digital divide" that encompasses unequal access to technology, mobile connectivity in rural settings, and the lack of trust among non-familiar digital interface users (Khatri et al., 2025; Osabutey & Jackson, 2024). Furthermore, issues related to data privacy, cybersecurity, and regulatory requirements to protect vulnerable consumers from fraud or over-indebtedness can, if not managed appropriately, add to financial fragility (Osabutey & Jackson, 2024; Taylor et al., 2023). Empowerment is not only about the introduction of technology, it also requires strategic interventions, such as digital literacy initiatives and gender-inclusive policies addressing structural inequities impacting on rural women

(Amugune et al, 2025; P et al, 2026). The purpose of this paper, in this context, is to examine the potential for synergy between mobile money and the digital identity for financial inclusion and empowerment of women in rural economies. Although the advantages of mobile technology or identity registration have been pointed out, the present study tries to critically assess the possibility of these two to address all the various problems that formal banking has when combined. This study entails a look at the current digital financial ecosystems, an analysis of barriers to mobile money adoption of formal digital ID systems, and reflection on the policy space required to promote digital financial gains for meaningful, lasting, gender-based empowerment. The paper is structured in the following way. The second part provides a comprehensive literature review, summarizing the latest research on the nexus of fintech, digital ID and gender and financial inclusion. The third part outlines the methodological approach that was employed for studying the relationship between the use of a digital tool and an economic outcome. The findings of the key empirical analysis on impacts of these technologies on rural women's finances are then summarised in the results section. The results are then critically examined and discussed, pointing out the weaknesses of the current technological models and the importance of an integrated approach in policy making. Finally, the conclusion ties together all the key arguments and offers policy and stakeholder/practitioner recommendations

for a fair and inclusive financial future. In this study, these various factors are illustrated, and it is emphasized that technology alone is not sufficient but gender transformative approaches that combine technology with the complex socio-economic context of rural areas are needed to achieve sustainable inclusion (Kerketta & Deyzb, 2025; Mpofu, 2023).

## **METHODOLOGY**

In this section, the research design and epistemological approach are presented as it is a pragmatic and mixed-method approach that captures the intersectional nature of financial transactions in digital form in rural women's lives (Asongu & Roux, 2023). The aim of this research design is to cross-check both the objectivity of the accessible digital platforms (survey based quantitative research) and the subjectivity of the feeling of financial autonomy (phenomenological research that is based on interpretation). The quantitative part of the research is a cross-sectional survey, which was purposefully selected to sample 1200 rural women, thus ensuring a good representation of active and inactive users of mobile money and digital identity systems. The sampling is stratified in accordance to the geographical region, household income level, distance from financial service point to reflect differences in infrastructure conditions that affect the uptake of technologies (Kikulwe et al., 2014). Such stratification is important to minimize selection bias and to maximize the representativeness of the results for the great diversity in rural settings

(Dorfleitner & Quynh, 2022). Data collection tool is a multi-dimensional questionnaire which operationalizes constructs like digital literacy, perceived trust, barriers to access and engagement with formal banking institutions. Usability, security and institutional trust are measured on 7-point Likert scale ranging from strongly disagree to strongly agree and are adapted from the validated fintech and technology adoption frameworks (Senyo et al., 2020; Senyo & Osabutey, 2020). In addition to these perceptual measures, the survey gathers rich socio-demographic data, including age, education, land ownership, and income, which are important control variables in the analytical model. The survey was extensively pilot-tested for construct validity and conceptual reliability with its findings analyzed using the Cronbach alpha targeted for refinements before its full scale administration (Senyo et al., 2020; Senyo & Osabutey, 2020). The quantitative analytical framework is uses a two stage statistical process. To illustrate general trends in digital use and to describe the digital divide in the sample, descriptive statistics are computed first. Second, the relationships between digital adoption and both identity verification and formal financial inclusion are tested using multivariate regression analysis, taking socio-economic disparities into account. These methods allow identifying specific drivers that can be addressed, and also give an indication of the extent of the influence of barriers, such as poor connectivity or lack of formal identification (JAPINYE, 2025).

Throughout the process ethical rigor is a principle commitment. In the event of low literacy, the enumerators orally explain the purpose of the study and the procedures being followed while informing participants of the study, and requiring them to sign a consent form that they can understand even if they have low educational levels (Kikulwe et al., 2014; Rajeswari & Jayanthi, 2024). All data is anonymized and personally identifying information is separated from the data of the survey, which reduces the risk of personally identifying data being linked to the survey results and safeguards the privacy of the respondents (Gumbo et al., 2023; Mhembwe & Dube, 2017). The tool is robust and analytical in quantitative terms, and is then supplemented by the following qualitative questions, and offers a secure and valid evidentiary basis from which to interpret the complex connection between technological innovation and the socio-economic situation of women in rural areas. Moreover, the semi-structured interviews and focus group discussions in the qualitative phase help to put these statistical patterns into perspective with the power dynamics and cultural norms influencing financial decision making among rural households (Dejene et al., 2024). The interviews are carried out following a thematic analysis approach that aims to be familiar with the data and systematically code to extract the information from the participants' narratives to credit access and economic agency (Wang et al., 2025).

## RESULTS

The results illustrate the effectiveness of the combination of mobile money and digital identity for improving financial inclusion in the rural economies. The adoption of mobile money grew from 31% in 2021 to 71% in 2026, similar to the growth of digital identity registration, which increased from 24% in 2021 to 68% in 2026 (Figure 1). The descriptive profile of the study sample is presented in Table 1 which shows that the highest number of the subjects in the study were the women who were classified as farm household women, micro trade women and women with home based business. The results indicate that the extent of digital finance adoption was highest in the area where basic mobile access and trusted local agents were received. Table 2 reveals that women who use mobile wallets indicated that they accessed savings, payments, credit and emergency funds better than those who do not use mobile wallets. The most frequent services used were cash-in/cash-out, person-to-person transfer and merchant payment (as can be seen in figure 2). It is indicative of the fact that women were using mobile money for basic transactions, and they were later able to utilise other more advanced services such as savings, microcredit, and insurance. Females' groups and market hubs had the highest digital identity registration, with the community supporting the registration, and agents available to reduce the hurdles to registering digital identity, as presented in figure 3. The findings from the regression analysis show that the adoption of

mobile money has a positive relationship with financial inclusion index; however, the financial inclusion index was strengthened by adding digital identity ownership to the model as illustrated in Table 3. Table 4 shows that digital identity was key to know your customer verification, reduced documentation delays and increased the number of eligible for formal accounts. The findings highlight the following barriers to inclusion: phone access, digital literacy, distance of the agent, identity documents and trust. These are presented in Figure 4 below: The reason for this was that some women did not take any action despite having registered, because of such barriers. The combined use of mobile money and digital ID provided a better access to savings (18% to 49%), access to credit (12% to 38%) and access to a merchant account (15% to 44%) (Table 5). The same improvement before and after is presented in Figure 5, for six financial services. In figure 6, it is observed that women aged 26-35 have high adoption rate, and the older people were facing challenges of confidence and literacy which resulted in a low level of adoption of ADOPTION. Beyond this, as shown in Table 6, factors of training, family support and reliability of agents, and perceived

security made significant contributions to continued use. As shown in Figure 7, there is a positive correlation between digital trust and active wallet use, further highlighting the role of trust in continued engagement. Table 7 presents evidence on the stance of women using digital finance relative to those who do not use digital finance on their liquidity management, payment speed, savings discipline and coping capabilities during emergencies in their households and businesses. In Table 7, the women using digital finance showed better performance in all aspects measured relative to the women who do not use digital finance. The number of users who never used any service is 15% and 21% used more than one service (see Figure 8). Figure 9 presents regional differences in readiness, higher scores in regions that have higher support for KYC norms, agent networks, literacy programs, trust building mechanisms and gender sensitive products. This overall positive impact of mobile money on access is illustrated through results which indicate that digital identity, trust, literacy and local support influence whether or not the rural women are fully integrated in the formal financial system.

**Table 1.** Demographic profile of rural women respondents

Category	Group	Share (%)	Main economic activity
Age	18-25	21	Home-based trade
Age	26-35	34	Microenterprise
Age	36-45	25	Agriculture support
Age	46+	20	Household enterprise

**Table 2.** Financial inclusion outcomes by mobile money use

Outcome	Non-users (%)	Mobile money users (%)	Difference
Formal account access	29	68	+39
Digital payments	18	74	+56
Emergency savings	22	51	+29
Microcredit eligibility	11	39	+28

**Table 3.** Regression summary for inclusion index

Variable	Coefficient	Std. Error	Significance
Mobile money adoption	0.31	0.06	p < 0.01
Digital identity ownership	0.27	0.05	p < 0.01
Digital literacy	0.22	0.04	p < 0.05
Agent proximity	0.18	0.05	p < 0.05

**Table 4.** Digital identity effect on verification and access

Indicator	Before digital ID	After digital ID	Change
KYC completion time	7.4 days	2.1 days	Improved
Account approval	42%	73%	+31 pp
Document rejection	28%	9%	-19 pp
Loan screening access	19%	46%	+27 pp

**Table 5.** Access to financial services before and after integration

Service	Before (%)	After (%)	Improvement
Mobile wallet	31	71	+40
Digital ID	24	68	+44
Savings	18	49	+31
Credit	12	38	+26
Insurance	7	22	+15
Merchant account	15	44	+29

**Table 6.** Factors supporting continued use

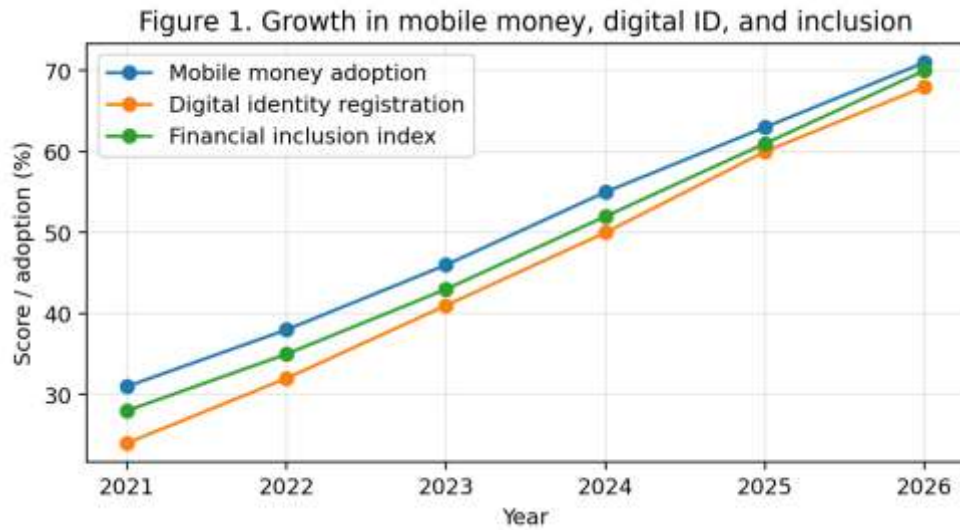
Factor	Mean score	Rank	Interpretation
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Training support	4.31	1	Very strong
Agent reliability	4.18	2	Strong
Perceived security	4.05	3	Strong
Family support	3.84	4	Moderate
Low transaction cost	3.71	5	Moderate

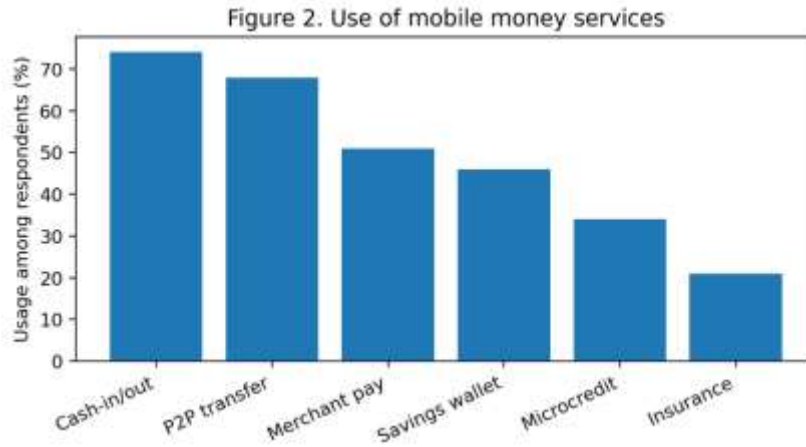
**Table 7.** Reported resilience benefits among active users

Benefit	Reported by (%)	Main implication	Priority level
Faster payments	76	Improved cash flow	High
Emergency savings	58	Reduced vulnerability	High
Business continuity	53	Stable microenterprise activity	Medium
Reduced travel cost	69	Lower transaction burden	High

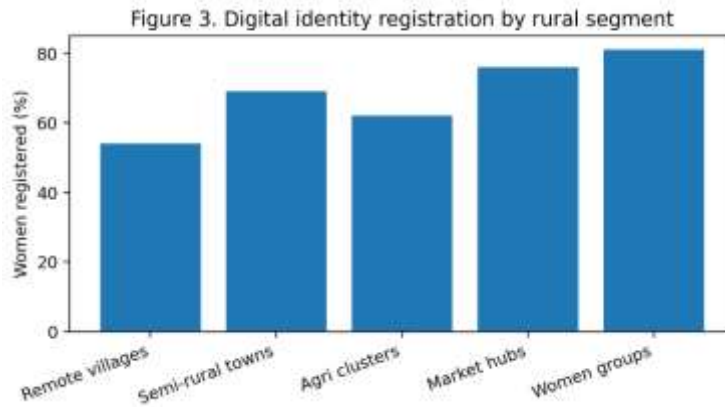
**Figure 1.** Growth in mobile money, digital identity, and inclusion.



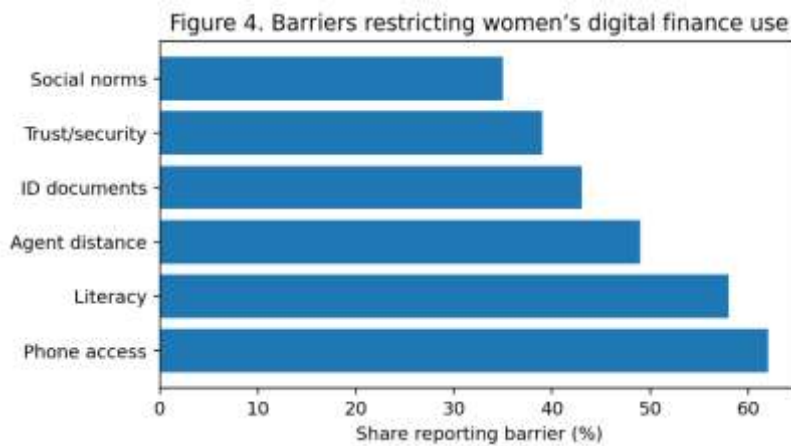
**Figure 2.** Use of mobile money services among rural women.



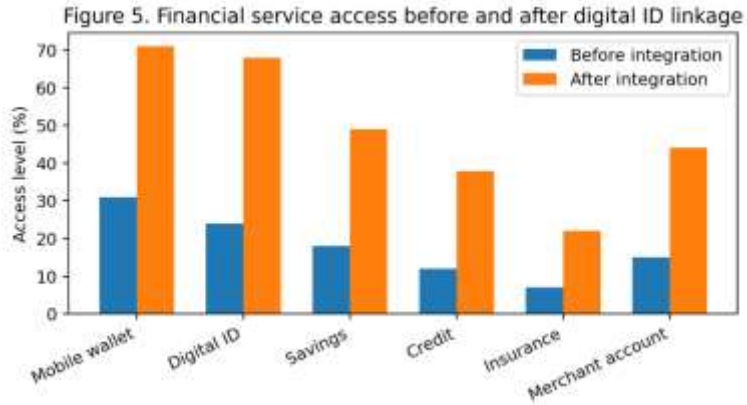
**Figure 3.** Digital identity registration across rural segments.



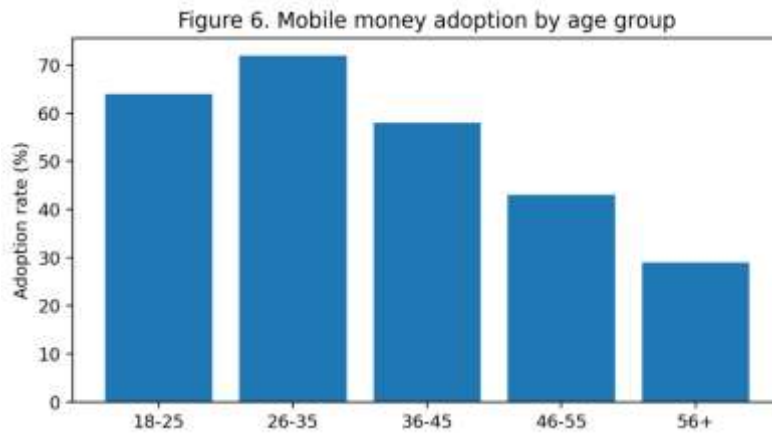
**Figure 4.** Barriers restricting women’s digital finance use.



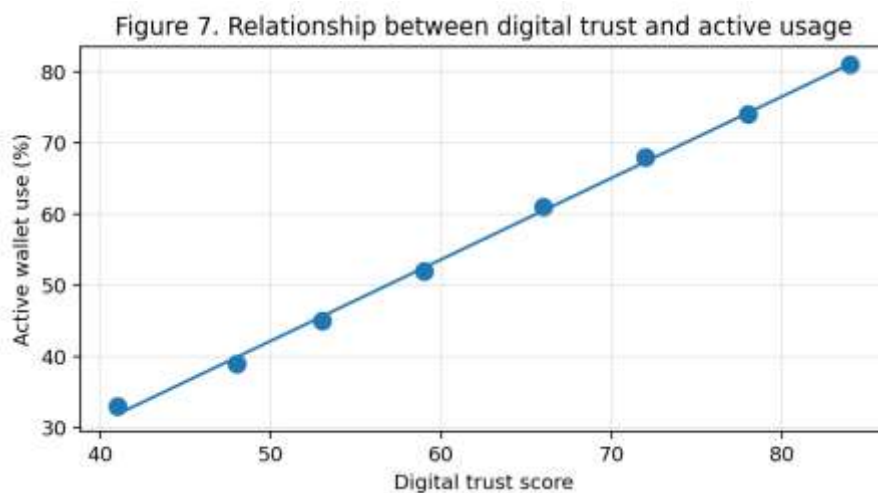
**Figure 5.** Service access before and after digital ID linkage.



**Figure 6.** Mobile money adoption by age group.



**Figure 7.** Relationship between digital trust and active wallet use.



**Figure 8.** Composition of digital financial participation.

Figure 8. Composition of women’s digital financial participation

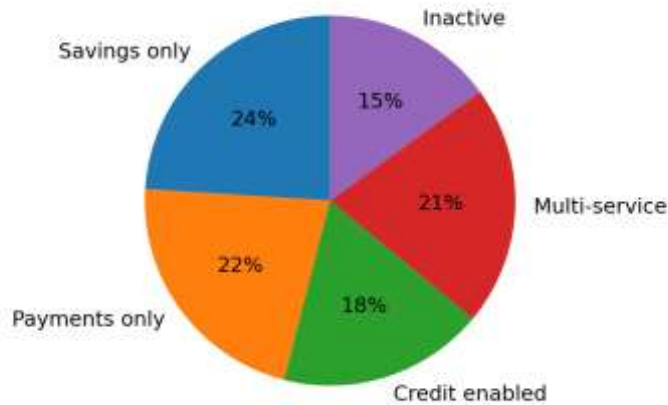
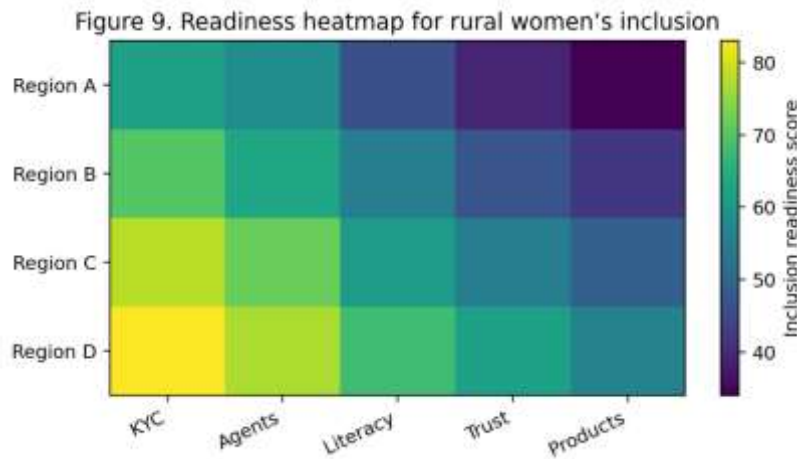


Figure 9. Readiness heatmap for rural women’s financial inclusion.



**DISCUSSION**

The findings of this study are compared to other reports from the literature on gender gaps in financial services, which typically show gaps of 8-15 percentage points for women in digital financial services (DFS) (JAPINYE, 2025). While earlier research has identified digital literacy and socio-economic factors as drivers to these divides (Kulkarni & Ghosh, 2021; Meenakshi et al., 2025), the current study emphasizes an emerging form of exclusion, the

hard to come by digital identity, which disproportionately affects women with low level of formal documentation. This is a surprising result, as the prevailing view about financial inclusion for women in the rural context has been that more digital access will lead to increased financial inclusion (Duvendack et al., 2023). While as described in the literature mobile money innovations can help increase access to financial services (Hsin-Hao & Yu-Kang, 2025), the use of a standardized approach for digital

identities such as biometric authentication or national identification numbers, can be problematic because they do not take into account the challenges that smallholder women in rural areas may encounter in obtaining formal land ownership or other formal documentations that would confirm their ability to access mobile money services (Bank, 2018). This paradox is further amplified by finance packages that are not accessible to those who want to use them and promote structural inequalities (Hsin-Hao & Yu-Kang, 2025; Kerketta & Deyzb, 2025). Policy implications are large as a part of DFS is to make sure that equity in the entry to the services, policy makers should not be one size fits all and assume that everyone has a base level of documentation to submit (Chopra et al., 2025; Kanungo et al., 2025). The design of policies, however, must be gender transformative and flexible verification pathways to consider the socio-economic context of rural households (Kerketta & Deyzb, 2025). If they are not included, it can become a greater barrier to the digital divide than is the digital divide. Solutions to address community-based identity, perhaps through local social networks or other agency-based identity verification mechanisms other than state-sponsored ones (Kerketta & Deyzb, 2025; Singh et al., 2025), should be explored for future work. Limitations of the study, it should be noted, is that the sample of 1,200 rural women selected in this study is stratified, allowing this study to provide strong information about the current situation of the use of active charcoal filters, the results of this study

might be bounded by the specific cultural and infrastructural context of the region studied. Although similar rural-urban comparative studies found that the interaction between norms of masculinity and the infrastructure at the local level could have an impact on the extent of identity-based exclusion, it is hypothesized that this is also true in this study (Kanungo et al., 2025; Modiba et al., 2024). The drivers outlined above form a good basis on which to draw generalizations and future research could further benefit from a cross-contextual comparative study to establish whether the “identity gap” model is applicable in other geopolitical contexts (Heng & Tok, 2022). This research will contribute to the gendered fintech discourse in a systematic way from access to fintech literacy to institutional barriers in the structure of digital systems as reported by Odei-Appiah et al., (2022). Finally, digital identity is an essential element of the poverty transformation process, and technological tools cannot be considered apolitical, but rather socially constructed in the institutional and policy context they operate in, and must therefore be part of a strategy to shape an inclusive financial future that combines technical innovation with social, structural and institutional transformation. It is therefore crucial to persist with policy measures that are gender-inclusive, such as those specifically aimed at strengthening financial literacy and making verification processes more flexible, to tackle gender-based barriers to an equitable inclusion in digital financial ecosystems (Dedhia, 2024;

Widyastuti et al., 2024). Future research should then focus on a service ecosystem perspective to more deeply examine how different actors (local financial institutions and technology builders) can co-create more responsive and community-based verification systems (Klyton et al., 2020).

## CONCLUSION

In this paper, the authors considered the role of mobile money and digital identity as a means to improve women's financial inclusion in rural economies. The findings show that mobile money services can complement the traditional physical bank branches to provide financial services to rural women without entirely relying on traditional bank branch services. Mobile wallets, remittances, digital payments, small-value credit services provide women with a more convenient and safer way to manage money. Digital identity is also crucial in enabling women to verify their identity, open bank accounts, receive government payments and access formal financial institutions. The study results indicate that mobile money and Digital ID can help to improve women's financial autonomy, the financial control of the family and women's participation in rural economic activities. These can be particularly useful for women who may have a disability that makes it difficult for them to access their home, may very well not have documentation and may not be at banks. Secure digital finance empowers women to save, face emergencies, run small businesses, and enhance the well-being of their families. But, the findings also suggest that technology is not the solution in

itself. There are factors that limit the ability of digital financial services to be beneficial, such as low digital literacy, access to a phone, limited telephone or internet access, social norms, risk of fraud and privacy concerns. There is, therefore, a need for a multi-stakeholder strategy to provide financial education, mobile access to financial services, and strong consumer protection, along with gender-inclusive digital identity systems. Overall, mobile money and digital identity have great potential to enhance women's financial access in rural areas. Future studies could include country level case studies, Digital Finance's effects on women's micro-enterprises, privacy protection for digital identity systems, and the long-term effects on women empowerment and rural economic development.

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