

Digital Financial Inclusion and Financial Health in Kenya: Gendered Analysis

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Abstract

This paper adopted propensity score matching to estimate the propensity of digital financial inclusion among women in Kenya and the average treatment effect of digital financial inclusion on financial health of women in Kenya. Utilizing the Financial Access Survey 2021 dataset on 22024 households, the study found that the socio-demographic aspects that contributed to the digital financial uptake among women was the level of education, marital status, religion, age, and place of residence, with significant differences between users and non-users of digital finance. In addition, with mobile phone and television ownership, there was a higher likelihood of women using digital finance, with a significant difference between users and non-users. Additionally, it was found that women in Kenya using digital finance are more likely to be financially healthy. We, therefore, recommend that more targeted approach by government and financial institutions towards enhancing digital literacy, the government needs to implement gender-responsive policies that would foster the subsidization of mobile devices and offer incentives for mobile network operators to strengthen rural network connectivity, and the Kenya government and financial institutions could capitalize on accessible communication channels such as mobile phones, radio, and community outreach programs.

Key Words: Digital finance; financial health; gender; propensity score matching

JEL Classification Codes: D14 J16, O16

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1.0 Introduction

Financial inclusion refers to a system where all economic agents, including low-income households and underdeveloped areas, can access effective financial services (Liu *et al.*, 2021). It also entails having access to adequate, equitable, low-cost, and secure financial services and products (Ozili, 2021; Varghese & Viswanathan, 2018). Financial inclusion is critical for a country's all-inclusive economic, political, and social development (Tay *et al.*, 2022). When the financial system is all-inclusive, it helps to prevent the proliferation of exploitative informal credit sources, which have the potential to undermine financial system stability. On the other hand, financial health is a term used to describe the state of one's monetary status. A healthy financial status can be defined as being satisfied with the current and future financial situation (Swarbrick, 2006).

There has been a rising interest in the role of digital technologies in achieving financial inclusion in recent years (David-West *et al.*, 2020; Malady, 2016; Varghese & Viswanathan, 2018). Research demonstrates that the provisioning, acceptance, and usage of digital financial tools significantly boost formal financial inclusion for households and businesses, as seen by increased propensities to save, borrow, and send and receive remittances (Chamboko, 2022). Moreover, digital banking can ensure the smooth operation of financial inclusion and lay the groundwork for future growth (Goyal & Kumar, 2021). It can also help to advance the inclusion of previously excluded market segments (Kinyanzui *et al.*, 2018).

A study on the gender gap in financial health showed that only 20% of women are financially healthy as opposed to 29% of men. Additionally, women face a higher likelihood of vulnerability, with 24% struggling in almost all aspects of their financial lives, compared to 17% of men who face similar difficulties (Warren *et al.*, 2022). Women report worse outcomes on all measures of financial health: spending, saving, borrowing, and planning. Thus, financial health in women is critical since it will inform policy and offer solutions that will promote equity in accessing financial services, including digital financing.

Globally, approximately 1.7 billion adults have no access to a bank account (Liu *et al.*, 2021; Risman *et al.*, 2021). In Eastern Europe and Central Asia, there is a significant gender disparity in financial inclusion. Despite this, account ownership has increased in the region from 45% of the adult population in 2011 to 65% (Demirgüç-Kunt *et al.*, 2022). In Africa, only a quarter of adults have an account with a mainstream financial institution (Ouma *et al.*, 2017). According to Chamboko (2022), most of those excluded from the formal financial system are women.

Despite the rapid growth in digital financial services and efforts towards advancing equality for women through economic opportunities, gender differences persist in sub-Saharan Africa (Chamboko *et al.*, 2018). Men are more likely to use digital financial services than women. In South Africa, informal financial mechanisms were used mainly by women, while men used formal insurance, credit and savings products (Nanziri, 2016). In fact, Fanta & Mutsonziwa, (2016) observed that women had more access to informal finance accounts in non-bank formal financial institutions than men. There are also gender disparities in bank account ownership in countries such as Botswana, Mauritius and Swaziland (Fanta & Mutsonziwa, 2016). However, in instances whereby women accessed social grants, a positive gender gap in bank account ownership was observed (Fanta & Mutsonziwa, 2016).

In the Kenyan context, digital financial services have risen exponentially over the past decade (Pazarbasioglu *et al.*, 2020). According to Kenya's Vision 2030, the financial sector catalyzes the achievement of broad macroeconomic objectives and goals (Awinja & Fatoki, 2021). For this reason, the country has grown in financial inclusion levels during the last two decades (Kinyanzui *et al.*, 2018). Kenya is one of Africa's most developed Digital Banking markets, with accessibility and financial inclusion increasing by more than 300 percent in a decade (Waiganjo, 2018). Above all, digital credit is on the rise, with recent data indicating that two out of five consumers have used digital credit products. Airtime platforms, Sim toolkit utilities, Unstructured Supplementary Service Data (USSD), app-based payroll lending, applications, websites, and SIM toolkits are some ways Kenyans can access digital services (Ouma *et al.*, 2017).

Despite Kenya's significant progress in expanding financial inclusion, primarily through digital technologies, there is a critical gender gap. Notably, 66% of women are less likely to use mobile money compared to 84% of their male counterparts, and they are less likely to have a bank account, with only 67% of women having bank accounts compared to 82% of men (Johnen & Mußhoff, 2022). Various factors account for this gap, including financial innovation level, poverty levels, stability in the financial sector, the state of the economy, financial knowledge, and regulatory frameworks (Ozili, 2021). Moreover, women account for the majority of workers in the informal sector, where it is not easy to access financial services (Chamboko, 2022). Therefore, for Kenya to achieve equality in the uptake of digital financial services, a balance between financial system stability and greater financial inclusion should be attained (Ozili, 2021).

Given this context, decision-makers, suppliers of financial services, and development partners must continue to make progress in ensuring that women and young people have access to and meaningfully utilize digital financial services. This will be achieved once there is a clear understanding of the role gender plays in digital financial inclusion. Therefore, the current study is a gendered analysis that seeks to unravel propensity to digital financial inclusion among women in Kenya, and also attempts to investigate the effect of digital financial usage on financial health among Kenyan women. Identifying barriers to digital financial inclusion is critical in providing evidence-based recommendations that will inform policy and practice to improve financial health for women in Kenya.

To this end, we found that mobile phone ownership, age, education attainment, independent financial decision, television ownership, and marital status increases the likelihood of women having access to digital finance. Last, we document that digital finance significantly increases the probability of women financial health.

The remainder of this study is organized as follows: Section 2 reviews the literature; Section 3 highlights the methodology and data. The results are given in Section 4, and finally, Section 5 offers the conclusion and policy implications.

2.0 Literature Review

Digital financial inclusion (DFI) is known to promote financial well-being, especially for disadvantaged and underserved demographics such as women (Githaiga & Wildermuth, 2022; Kim, 2022; Kulkarni & Ghosh, 2021; Melubo & Musau, 2020). Achieving financial inclusion depends on the provisions of digital financial services and necessitates the participation and

commitment of various actors such as commercial banks, financial institutions, mobile network operators (MNO), fintech providers, telephony, banking and financial regulators, retailers, and customers (Durai & Stella, 2019). Through DFI, excluded and vulnerable groups have access to affordable financial products and services from the formal financial services that empower these groups to participate more fully in the economy (Prabhakar, 2021; Saxena & Goyal, 2022). This is especially relevant in developing countries, where expanding financial inclusion advances women's economic empowerment and contributes to progress toward attaining gender equality (Hendriks, 2019).

Moreover, the concept of financial well-being encompasses individuals' subjective appraisal of their financial security, along with their ability to fulfil financial obligations and make informed financial decisions (Lawrence, 2022). The attainment of financial well-being among women directly impacts the accomplishment of key Sustainable Development Goals (SDGs), such as gender equality (SDG 5), reduced inequalities (SDG 10), and promoting decent employment and economic growth (SDG 8). In essence, women who are financially healthy actively contribute to sustainable economic development and are key to bridging the gender and economic disparities (United Nations, 2022). A recent World Bank study in Sub-Saharan Africa demonstrated that enhancing financial inclusion by digitizing cash transactions can facilitate increased financial access and utilization, ultimately benefiting women's lives (Demirgüç-Kunt *et al.*, 2022).

A number of theoretical perspectives have emerged to explain the relationship between digital financial inclusion and financial well-being of women. The capability approach conceived by Amartya Sen and Martha Nussbaum postulates that an individual's well-being is contingent upon their capabilities – the range of valuable functions they are at liberty to accomplish (Drèze & Sen, 2001; Nussbaum, 2000; Robeyns, 2017). Drawing on the capability approach, DFI has the potential to expand women's capabilities through offering them with new means for accumulating savings, handling financial risks, and investing in education or entrepreneurial ventures (Lagna & Ravishankar, 2022). On the other hand, the social cognitive theory (SCT) underscores the significance of self-efficacy in influencing behavior and outcomes (Bandura, 1986). Studies in behavioral economics suggest that enhancing individuals' financial knowledge and skills can boost financial self-efficacy, which in turn leads to better financial decision-making and improved financial well-being (Asmin *et al.*, 2021; Dare *et al.*, 2022; Palić *et al.*, 2020). In this regard, DFI could potentially improve women's financial well-being by increasing their sense of financial self-efficacy and promoting well-informed financial decisions.

A growing body of literature underscores the importance of financial inclusion in enhancing the financial well-being of women. Lyons *et al.*, (2022) observed that fintech has significantly contributed to the financial inclusion of vulnerable groups, particularly women, in emerging economies. For instance, in the United States, fostering financial inclusion for individuals with low incomes is associated with increased wealth accumulation and improved financial stability at the household level (Célerier & Matray, 2019). Similarly, in Mexico, the adoption of debit cards for cash transfer beneficiaries has resulted in a decline in the distance traveled to access bank accounts, improved financial inclusion, and less likelihood of women foregoing responsibilities such as work and childcare (Bachas *et al.*, 2018).

In India, Jain (2022) contends that women accessing digital financial services are poised to have expanded opportunities in the formal economy. To fully capitalize on these prospects, recent studies have argued that a gender-sensitive approach to financial inclusion, along with access to the appropriate infrastructure, reduced costs in accessing digital financial services, and financial literacy are critical to enhancing women's economic well-being in India (Jain *et al.*, 2022; Kulkarni & Ghosh, 2021; Riha Parvin & Panakaje, 2022; Trivedi, 2022). Besides these factors, the accessibility and utilization of digital financial services among women in India are significantly impacted by socio-demographic aspects such as age, educational attainment, income levels, and employment status (Nandru *et al.*, 2021). Similar observations were elicited in Pakistan where working women had a high level of financial well-being (Rashid *et al.*, 2022). Thus, understanding and addressing these issues is crucial in devising effective interventions to enhance DFI among women and foster financial well-being.

In the African context, particularly in Nigeria, women's financial inclusion was associated with their involvement in gainful employment (Sakanko, 2020). Specifically, female entrepreneurs who utilized digital financial tools elicited higher earnings than those without access (Vivian Chinelo & Peter Ayodeji, 2022). This indicates a competitive edge for women using digital finance in their businesses. However, illiteracy, poverty, and societal ills contributed to the digital financial exclusion of women in Northern Nigeria and hindered their economic empowerment (Onukogu, 2021). In this regard, Ojo (2022) recommended gender equity in the digital environment for women to harness the benefits of digital financing.

Drawing on insights from Uganda and Kenya, Mugume and Bulime (2022) found that DFI is more prevalent among middle-aged men with multiple SIM cards. In Kenya, the rapid growth of mobile money services, particularly M-Pesa, has revolutionized the financial landscape, offering new avenues for enhancing financial inclusion among women (Omanga & Dreyer, 2020). The widespread utilization of M-pesa seems to have increased mobile phone ownership for both genders, though internet adoption remains relatively low among women (GSMA, 2022). Encouragingly, the gender disparity in accessing digital services has significantly declined from 8.5% in 2016 to 4.2% in 2021, allowing women to participate more substantially in formal economic activities (Central Bank of Kenya, 2021).

For women entrepreneurs in Narok County, they have attained financial inclusion by adopting digital banking services (Melubo & Musau, 2020). In Nairobi County, the widespread adoption of mobile money has significantly decreased the proportion of financially excluded women and enabled them to benefit from instant money transfers and a means of saving money safely (Kim, 2022). In light of these developments, the present study explores the relationship between digital financial inclusion and women's financial health in Kenya. In contrast to prior studies, the emphasis is on comparing a treated group with access to and usage of digital financial services to a control group without access to these services. This approach intends to establish if there is a positive link between digital financial inclusion and the financial well-being of women in Kenya.

3. 0 Methodology and Data

3.1 Methods

The objective of this study seeks to investigate the causal association between digital financial inclusion and financial health among women in Kenya. Digital financial inclusion is measured by

whether women have access to digital finance or not, as observed during the time of the survey. However, the estimation of causal effect of digital financial access on financial health is associated with potential econometric problems that emanates from the inability to observe the outcomes for the same individual in treatment and control group (Heckman, 1995; Heckman & Robb Jr, 1985). For example, empirical research shows that employment status is a key determinant of access and usage of digital financial product (Soumare *et al.*, 2016). Employed individuals are more likely to be financially included than the unemployed group. At the same time, the employed individuals are more likely to be financially healthy. Thus, we probably cannot identify the causal effect of digital financial inclusion if we do not account for the influence of confounders. The proposed technique to remedy this problem is to utilize randomized control (RCT) experiment where individuals with similar observable characteristics are assigned treatment group (digitally included) and control group (digitally excluded). In the absence of RCT, the standard practice is to utilize propensity score matching (PSM) that consistently estimates an average treatment effect (ATE) of the intervention or treatment.

We categorize individuals into treated groups if they have access and usage of digital finance, and control groups if they do not use digital finance. PSM then allows for two-step procedure in which the first step, using probit model, allows for the estimation of a propensity score $p(x)$ that estimates the probability of individuals using digital finance while controlling for a vector of observable explanatory variables (X). The covariates (X) included in the model are employment status, education attainment, place of residence, marital status, financial decisions, age, age-squared, mobile phone-ownership, religion, and television ownership. We denote our outcome variable as $Fhealth_{0i}$ for individuals in treated and control groups and define $dfin \in \{0,1\}$ as a binary indicator for digital finance usage. The propensity score $p(x)$ is therefore specified as follows (Rosenbaum and Rubin, 1983).

$$p(x) = prob(dfin = 1|X) = E(dfin|X) \quad (1)$$

Equation (1) defines the probability of an individual using digital finance given a set of explanatory variables (X). In the second stage, we match female individuals who have access and usage of digital finance to non-users of digital finance and obtain the average treatment effect (ATE) and the average treatment effect of the treated (ATT). Thus, using propensity scores calculated in Equation (1), ATT is specified as follows:

$$\begin{aligned} \widehat{ATT} &= [E\{Fhealth_{1i} - |dfin_i = 1\} = E\{E\{dfin_{1i} - dfin_{0i}|Fhealth_i = 1, p(x)\}} \\ &= E\{E\{Y_{1i}|dfin_i = 1, (x)\} - E\{Fhealth_i|dfin_i = 0, p(x)\}|Fhealth_i = 1\} \quad (2) \end{aligned}$$

Equation (2) is estimated if the assumption of the conditional independence (CIA) and overlap assumption holds. The ATE is estimated using stratification, kernel, and nearest neighbor matching methods while robustness check is ascertained if a common support is defined and the balancing property is satisfied.

3.2 Data Source

The study utilized Financial Access Household Survey 2021 dataset. The survey was jointly conducted by Kenya National Bureau of Statistics (KNBS), Financial Sector Deepening Trust

(FSD) Kenya and the Central Bank of Kenya (CBK). For this study, we use a sub-sample of female respondents to answer our study objective.

4.0 Results

4.1 Summary statistics

Table 1 provides summary statistics for the overall sample and stratified by digital finance users. In the overall sample, 14.76% of female individuals are financially healthy. However, we observe that 17.5% of female who use digital finance are financially healthy as compared to 5.1% of their counterparts. Mobile phone usage is higher (95.4%) among female individuals utilizing digital finance than non-digital financial users (22.4%). In terms of place of residence, 38.4% of women residing in urban setup use digital finance while only 19.9% in urban areas do not use digital finance.

The average of women who use digital finance and non-users of digital finance is 38.95 and 39.81 respectively. For education attainment, 17.1% of women with no formal education report using digital finance. In comparison, 38.9% do not use digital finance, 41.1% primary education holder, 28.5% secondary education holder, and 13% of tertiary education holders use digital finance. Of women who use digital finance, 45.1% report making self-financial decision compared to 32.4% non-digital financial users.

Proportion of women who own television set and use digital finance is 3.8% compared to their counterparts who are 1.5%. Compared to other religious beliefs, women who are Christians tend to use digital finance more at 86.8% of that population. In terms of marital status, 56.4% of married women use digital finance while 36.4% of this category do not use digital finance, only 19.3% of single women use digital finance compared to 8.5% of divorced women. Equally, the summary statistics further shows that 34.5% of single women do use digital finance while 4.6% of divorced women are not using digital finance.

We also performed t-test to test whether the means for the two categories are statistically significant. The t-test for the differences between users and non-users of digital finance reveal significant differences in terms of financial health, mobile phone use, place of residence, age of respondents, education attainment, television ownership, religion, and marital status.

Table 1: Descriptive statistics

Variable	Digital Financial Users			Non-Digital Financial Users			t-test p-value	Overall sample		
	N	Mean	SE	N	Mean	SE.		N	Mean	SE.
Financial Health	9,837	0.175	0.380	2,836	0.051	0.220	0.000	12,673	0.1476	0.3547
Mobile Phone Users	9,837	0.954	0.209	2,836	0.224	0.417	0.000	12,673	0.7910	0.4066
Place of residence	9,837	0.384	0.486	2,836	0.199	0.399	0.000	12,673	0.3428	0.4747
Age of respondents	9,837	38.949	15.388	2,836	39.810	23.354	0.020	12,673	39.1417	17.4916
Age squared	9,837	77.898	30.777	2,836	79.621	46.708	0.020	12,673	78.2834	34.9831
No education (ref)	9,826	0.171	0.376	2,836	0.389	0.488	0.000	12,662	0.2196	0.4140
Primary education	9,826	0.414	0.493	2,836	0.344	0.475	0.000	12,662	0.3984	0.4896
Secondary education	9,826	0.285	0.451	2,836	0.256	0.437	0.003	12,662	0.2785	0.4483
Tertiary education	9,826	0.130	0.337	2,836	0.011	0.104	0.000	12,662	0.1035	0.3047
Self-financial decision	9,837	0.451	0.498	2,836	0.324	0.468	0.000	12,673	0.4224	0.4940
Television ownership	9,808	0.038	0.191	2,832	0.015	0.121	0.000	12,640	0.0326	0.1776
Other religion (ref)	9,807	0.009	0.093	2,825	0.031	0.173	0.000	12,632	0.0137	0.1162
Christianity	9,807	0.868	0.339	2,825	0.831	0.375	0.000	12,632	0.8597	0.3473
Islam	9,807	0.123	0.329	2,825	0.138	0.345	0.038	12,632	0.1266	0.3325
Single	9,825	0.193	0.395	2,834	0.345	0.476	0.000	12,659	0.2275	0.4192
Divorced	9,825	0.085	0.279	2,834	0.046	0.210	0.000	12,659	0.0762	0.2653
Widowed	9,825	0.157	0.364	2,834	0.244	0.430	0.000	12,659	0.1767	0.3814
Married	9,825	0.564	0.496	2,834	0.364	0.481	0.000	12,659	0.5196	0.4996

Source: Authors own computation from Fin Access (2021).

4.2 Factors explaining digital financial uptake among women in Kenya

We report, in Table 2, the probit regression estimates together with marginal probability effects for the model. We observe that mobile phone ownership among women increases the probability of digital finance use among women by 32% and this is statistically significant at 1% significance level. The propensity of digital financial uptake among women in urban areas is 2.11% more than women in rural areas at 1% significance level. Also, additional year increases the probability of digital finance usage among women by 0.051% at 1% significance level. Women with primary level education are 6.36% more likely to use digital finance than their counterparts without formal education. The likelihood of digital financial inclusion is 7.39% higher among women with secondary school qualification than those without formal education. Equally, tertiary school qualification among women enhances the probability of digital finance use with a likelihood of 16.9% more than female without education. Women who make independent financial decision are 5.09% more likely to use digital finance than women who jointly make independent financial decision. Television ownership among women increases the probability of women using digital finance by 2.97% at 10% significance level. Female Muslims are more likely to uptake digital finance by 3.54% compared to non-religious female. Equally, we observe that, the likelihood of

financial inclusion increases by 10.1% among female who are married and by 3.79% among female who are divorced at 1% significance level.

Table 2: Determinant of digital financial inclusion

Variable	(1) Digital Finance
Mobile phone ownership	0.320*** (0.00421)
Place of residence (urban=1, 0=rural)	0.0211*** (0.00564)
Age of respondents (women)	0.000513*** (0.000181)
Primary education level	0.0636*** (0.00645)
Secondary education level	0.0739*** (0.00797)
Tertiary education level	0.169*** (0.0147)
Financial decision making (self=1, otherwise 0)	0.0509*** (0.00600)
Television ownership	0.0297* (0.0160)
Christian women	0.0296* (0.0162)
Muslim women	0.0354** (0.0173)
Divorced women	0.0781*** (0.0109)
Widowed women	0.0379*** (0.00925)
Married women	0.101*** (0.00669)
Observations	12,607

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3 Digital financial inclusion and financial health

The econometric result for the second objective of the study is presented in Table 3. In particular, we present the ATT for the effect of digital finance usage on financial health of women in Kenya. The ATT captures the differences in average proportion of financial health female individuals who use digital finance to those who do not use. Three matching methods were employed, namely; nearest neighbor, kernel, and stratification matching, each utilizing 5 bootstrap replications. Causality was inferred from matching results using nearest neighbor matching. Nearest neighbor matching is preferred since it outperform consistently well across a wide range of settings (Austin & Stuart, 2017). Common support condition was satisfied with a probability between 4.9% and 99.6%. As we control for confounders, the results show that female who use digital finance are 8.3% more likely to be financially health at 1% significance level compared to female who do not use digital finance with similar propensity scores. Similar trend, with an almost negligible difference for stratification matching, is reported in both the kernel and stratification matching output.

Table 3: Digital financial inclusion and Financial health (propensity score matching)

<i>Matching</i>	<i>ATT</i>	<i>SE</i>	<i>t-value</i>	<i>Sample size treatment</i>	<i>Sample size control</i>
<i>Nearest-Neighbor</i>	0.083	0.005	15.496	9837	2836
<i>Kernel</i>	0.082	0.006	13.851	9837	2836
<i>Stratification</i>	0.083	0.012	7.049	9837	2836

Note: Authors' own calculations based on the FinAccess household survey 2021 using nearest neighbour matching. ATT = Average treatment effect of treated with female with access to digital financial being the treatment. Dependent variable = financial health. Number of Blocks = 7; balancing property is satisfied; region of common support is [0.049; 0.996]; standard errors are simulated with 1000 bootstrap replications.

5.0 Conclusion and Policy Implication

The study sought to establish factors explaining digital financial uptake among women in Kenya and subsequently examine if a relationship exists between digital financial inclusion and the financial well-being of these women. Key among the socio-demographic aspects that contributed to the digital financial uptake among women was the level of education, marital status, religion, age, and place of residence, with significant differences between users and non-users of digital finance. In addition, with mobile phone and television ownership, there was a higher likelihood of women using digital finance, with a significant difference between users and non-users. Consequently, it was found that women in Kenya using digital finance are more likely to be financially healthy.

In light of these findings, the study recommends a more targeted approach by government and financial institutions towards enhancing digital literacy, especially of women in rural areas, through tailored training programs and awareness campaigns of the benefits of digital financial services. Similarly, in these digital finance awareness programs, the government and financial institutions could leverage existing social structures so that all women attain digital financial inclusion and well-being regardless of marital status and religious affiliation. Also, to ensure that there are no disparities in the uptake of digital financial services because of the place of residence, there is a need for public-private-sector partnerships to expand affordable digital financial services to the rural set-up.

Additionally, the government needs to implement gender-responsive policies that would foster the subsidization of mobile devices and offer incentives for mobile network operators to strengthen rural network connectivity. Also, financial institutions should endeavor to improve the usability and accessibility of digital financial services through mobile phones. Besides, the government should put in place supportive policies that foster the development of digital financial products that align with the interests of female entrepreneurs and those in employment. Finally, to ensure that there is no disparity in access to digital finance information because of television ownership, the Kenya government and financial institutions could capitalize on accessible communication channels such as mobile phones, radio, and community outreach programs. This approach will

eliminate barriers and reduce disparities, ensuring equal access to digital financial services for all women.

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