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Article

Can the digital economy transform financial inclusion in rural communities? A gendered lens

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Abstract: Rural communities in Africa face various challenges related to infrastructure, limited economic activities and poverty. The COVID-19 pandemic, which aggravated some of the rural areas' socioeconomic conditions, has illuminated the vast divide in accessing digital platforms for social services and financial access. Rural communities' socioeconomic burdens can be alleviated through participation in the digital economy; however, this is yet to be a reality for these communities. While financial digital technologies have helped with financial access elsewhere, the same cannot be said for Africa's rural areas. This exclusion is because location plays a significant role in the availability of digital solutions; hence areas with limited infrastructure will not have access to products such as digital financing, which is supposed to reach those that are far from financial institutions. The study employed a systematic literature view to understand the extent of financial inclusion in Africa. Content and thematic analysis were used to analyse the data. The findings highlighted a myriad of challenges that affect the participation of the rural population in the digital economy, stemming from access to and stable supply of electricity, the poor or limited infrastructure required for accessing digital products and gender-related issues where women's gendered roles limit them from harnessing digital products. The study revealed that there is a shortage of digital products to reach all that needs access to finance. This is due to infrastructural challenges that are making access difficult for digital products such as mobile money to reach rural communities. Therefore, policymakers must focus on digital transformation for rural areas and support the usage of financial digital technologies to build the rural digital economy. In this way they will be promoting digital inclusion and reducing digital inequalities.

Keywords: digital financial inclusion; digital economy; rural areas; Africa; gender

1. Introduction

The COVID-19 pandemic profoundly impacted the global economy, particularly in rural areas where women's access to financial services and opportunities is already limited. In this context, digital inclusion can improve financial inclusion for women in rural areas after the COVID-19 impact. Providing access to financial services using digital platforms has the potential to empower women to improve their financial decision-making processes. Additionally, they are empowered to manage their finances effectively and access credit for their entrepreneurial activities (Rafiq and Adewale, 2019). Digital financing is known for promoting financial inclusion and overcoming challenges such as limited psychical infrastructure, distance and time. Financial inclusion is advantageous to women in rural areas because it enables access to formal financial services which include online payment facilities, digital savings, mobile cash transfers and mobile banking services (Bishop et al., 2023). According to

Ali and George (2019), financial products like microfinance are popular in assisting women to access credit and other financial services. As a result, they are then able to start or expand their businesses. Moreover, women are also able to invest in education and health care and improve their economic welfare.

According to Liu et al. (2021), digital inclusion has the potential to lower the risks which are associated with cash transactions, such as theft and loss of money and help promote financial transparency. Digital inclusion relies on the digital economy which opens new markets and opportunities for women living in rural areas. It can be used by women to market and sell their products online, reach out to more customers and increase profits. Huang and Zhang (2022) further stated that digital inclusion can improve women's access to information on financial literacy and market trends. This access to information can assist rural women in developing and implementing practical business strategies, improving their agricultural practices and making intelligent investment decisions (Liu et al., 2021). In general, after the COVID-19 impact, digital inclusion can aid in closing the gap in financial inclusion for women living in rural areas.

Digital inclusion can also increase rural women's access to financial services, which, in turn, will help to reduce obstacles such as distance and poor physical infrastructure in rural areas (Seadira and Heuva, 2021). Furthermore, physical obstacles such as lack of physical banks and ATMs can be overcome by improving digital connectivity and promoting digital financial services (FinMark Trust, 2022). Women will also have more access to financial services, resources and information if digital technologies, internet connectivity and network coverage are increased in rural areas (FinMark Trust, 2017; Liu et al., 2021).

Post COVID-19, digital inclusion can assist rural women to be more financially included by giving them more access to financial services and resources. This may enable them to obtain capital to fund their businesses, to use money wisely and to make sound decisions. Moreover, giving rural women the liberty to access financial resources, financial literacy and digital inclusion can help with women empowerment (Liu et al., 2021). However, despite these available opportunities, there are still obstacles that prevent rural communities in the Global South from benefiting from digital inclusion in the digital economy.

The COVID-19 pandemic led to socioeconomic and infrastructural disparities in rural areas to worsen, hence the emphasis on the significance of digital inclusion in ensuring equal opportunities for women in these places (Xie et al., 2023). Lack of power, inadequate infrastructure and restricted broadband connectivity prevent people from accessing digital financial services (Seadira and Heuva, 2021). This problem further creates a severe rural digital divide in African communities (Onyeneke et al., 2023) and has the potential to prolong gender digital inequalities. Given the inherent technical complexity of digital financial products, which include device and infrastructural needs required to access digital financial products, scholars such as Miine et al. (2023) do not welcome this development. According to their Ghanaian study, the wealthy will be the only ones who would access digital financial products. This led to the belief, among the study's participants, that digital finance is only for the wealthy, thereby validating the potential inequalities that must be addressed to achieve inclusive digital finance.

Although research on digital financial inclusion in Africa is new, Simatele's (2021), the study emphasises the value of digital finance and e-payments in enhancing the financial digital footprint on the African Continent. An integral component is a solid and extensive digital network, widespread mobile ownership and connectivity, a national payment structure and a well-disseminated personal identification (ID) system. Users who make digital payments can leave a trail that improves credit availability and transparency.

This study focuses on women in rural areas of African countries and thus contributes to scientific novelty since rural areas and women face various socioeconomic and development challenges. African countries are predominantly rural, and more women reside there as men emigrate to urban areas for employment opportunities (von Fintel and Moses, 2017). In 2021, a population of 609 million was estimated to be living in Africa's urban areas (World Bank, 2024). While records for the rural population are inaccessible, about 698 million people in sub-Saharan Africa live in rural areas in 2022 (World Bank, 2024). Therefore, discussing financial inclusion through a gender lens is important and novel since it allows for a deeper understanding of how it can empower women to contribute to economic development within their communities to reduce urbanisation given that the trend is expected to result in 1.5 billion residing in urban areas in 2050 (Rocca and Fernández, 2020). This study aims to add to the body of science by focusing on how digital financial inclusion can support women in rural areas of Africa. Therefore, this research seeks to answer the following questions:

1) What is the status of digital financial inclusion in Africa?
2) How are women in rural areas of Africa being served financially?
3) What measures can be taken to achieve financial digital transformation in Africa?

2. Methodology

The study adopted the systematic literature review (SLR) method to understand how women in the rural areas of Africa can be supported by digital financial inclusion. The SLR followed a three-phased process to achieve the analysis. These were planning phase, conducting phase and reporting phase (Segooa et al., 2023). Primary articles were downloaded from three databases, namely Sage Publications, ScienceDirect and Scopus.

Using the pre-determined research questions presented in the introduction section of the paper, a search string was developed for implementing the search strategy. **Table 1** illustrates the search strings used on 30 November 2023 to search for the articles.

Table 1. Final search terms used for the literature search.

Boolean Operators	**Search Strings**
AND & OR	"Financial inclusion" OR "digital financial inclusion" AND "Rural women" AND "Africa" AND "COVID-19"

Source: Researchers' compilation.

Seventy-nine (79) articles were collated from the search process. The articles we reviewed and a final sample of twelve (12) papers was established, supported by

snowball sampling. Backward snowball sampling is cited to help identify related topics (Boell and Cecez-Kecmanovic, 2014). The 16-sample size was motivated by limited access to relevant literature and the fact that systematic reviews are cited as sufficient, with a minimum of two studies (Valentine et al., 2010). Grey literature was also used to supplement the identified because this type of literature helps address topics not well covered in the scientific body of knowledge (Mahood et al., 2014). **Figure 1** shows a summary of the PRISMA flow diagram, used for systematic literature review (Page et al., 2021), showing the inclusion criteria where "N" represents the number of records.

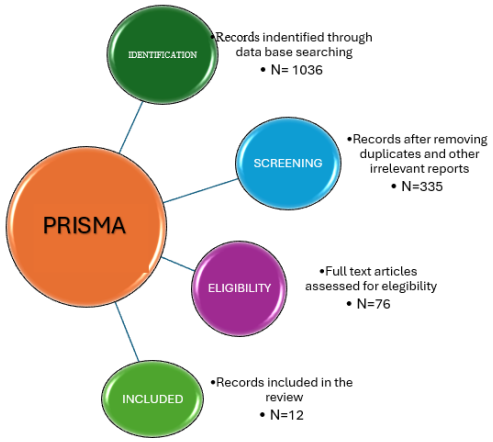

Figure 1. PRISMA flow diagram illustrating the search and inclusion process (Page et al., 2021).

The included papers were mainly those that focused on the African region and discussed financial inclusion, financial products and services, digital inclusion and digital financial products; and they were written in English. Excluded papers were outside the scope of Africa, and they did not address financial inclusion, financial products and services or digital inclusion, and needed to be in English. **Table 2** shows a summary of the inclusion and exclusion criteria. It should be noted that articles could not be limited to gender coverage due to the scarcity of literature on this topic, as will be discussed in the discussion section. It is proposed that the review of that systematic literature be conducted by at least two reviewers to improve the quality of the data (Charrois, 2015; Segooa et al., 2023), as two reviewers were involved in the review of generated articles and verified each other's content in the review and analysis process. The review was guided by a protocol that reviewed the data type that should be sought and extracted from the articles (Fink, 2019). Content and thematic analysis were applied in the analysis of data. The data analysis was primarily conducted by researchers who reviewed the data, and additional researchers were also involved in analysing the presented data to improve the analysis's quality and extract other meaningful nuances in the data that the review team might have missed.

Table 2. Inclusion an exclusion criterion on research for literature review.

Inclusion criteria	Exclusion criteria
Papers that focused and discussed financial inclusion	Duplicate papers such is those papers listed in more than one data base
Papers that focused on financial products and services	Studies which are not full papers
Papers that focused on digital inclusion and digital financial products	Papers that did not address financial inclusion, financial products, and financial services
Papers that focused on the African region	Papers outside the scope of Africa
Papers that are written in English	Papers which were not written in English
Papers published between 2019 and 2023 during the COVID-19 era	-

Source: Researchers' compilation.

3. Review of literature

Smith (2015) defines digital inclusion as the act of guaranteeing equitable access and proficient utilisation of information and communication technologies (ICTs) such as computers, smartphones and the internet to all individuals and communities, including those who are marginalised or disadvantaged. The disparity can be attributed to education level, age, gender and geographic location. Rural areas are also affected by digital exclusion due to the remote settings that place them far from government administrations' cities and consequently not being prioritised for some developments. Rural areas in Africa are faced with the challenge of limited resources (Mkansi and Nsakanda, 2023). Compared to men, women are more impacted by these issues due to the migration patterns that leave rural areas with a high female population concentration (Menashe-Oren and Stecklov, 2018). It is also argued that where financial access is possible, women are excluded from these resources due to biases inherent in financial institutions' lending practices (Sebaggala et al., 2019). To further understand contributing factors that influence digital financial inclusion, the proceeding subsectors elaborate on financial and digital inclusion, financial access in Africa, digital financial inclusion in rural areas and women's access to digital financial inclusion.

3.1. Financial inclusion and digital inclusion

In today's rapidly evolving technological landscape, digital transformation fundamentally reshapes how organisations and individuals operate, communicate and collaborate (Hai et al., 2021). Digital inclusion fosters financial inclusion through financial literacy and microfinancing**.** Microfinance is particularly important as it was designed to reach the social groups traditionally excluded by commercial banks, one of the strategies for poverty alleviation and employment creation (Modisagae and Ackermann, 2018). Despite the proliferation of microfinance globally, financial exclusion issues still exist because the bottom of the pyramid groups need access to critical information on innovative financial products specific to their needs (Koti and Modiba, 2022). Other necessary efforts include mobile and agent banking initiatives (Abije, 2020). Such efforts promote economic empowerment and financial inclusion for rural women of Africa. Access to the services helps women to perform financial transactions, mobilise savings and receive payments using digital platforms. They do not need to travel to urban centres. Thus, In Chinese rural communities, Huang and

Zhang (2022) studied and established that these areas have benefited from the rise of digital inclusion. That has stimulated financial inclusion. Digital inclusion was accomplished in the Chinese rural areas by improving economic growth and development, thus raising the per capita disposable income in the rural areas.

Furthermore, financial inclusion encouraged local economic development in the communities, thus enhancing the consumption patterns of the rural residents. Park and Mercado (2015) found that the modifications to the financial system's regulations contributed to reduced inequality and financial stability in the communities. Financial inclusion significantly contributed to improved income levels, thus decreasing poverty among sub-Saharan Africa's low-income households (Jabir et al., 2017).

3.2. Digital financial inclusion in rural areas

Digital financial inclusion has a potentially significant impact on rural African populations in many ways. The inclusion increases access to formal financial services and reduces dependence on informal financial channels through digital financial solutions tailored to the requirements of rural communities (Nsiah et al., 2021). The disadvantaged populations benefit immensely from the process as they become part of more robust and inclusive economic growth efforts. Inclusive growth and development will necessitate financial stability for disadvantaged rural dwellers. As a result, collaborative engagement among various stakeholders, such as government agencies, policymakers, regulatory bodies and financial institutions, plays a vital role in crafting an all-encompassing and customised framework for financial inclusion that promotes economic prosperity among Africa's rural communities (Tay et al., 2022).

Conversely, Seadira and Heuva (2021) found that South Africa's rural areas are digitally excluded. Therefore, promoting digital financial inclusion in South Africa's rural areas is necessary. Digital poverty in rural areas leads to digital inequality in the country, with urban dwellers enjoying several benefits from digitalisation. Seadira and Heuva (2021) further state that digital financial exclusion creates information asymmetry that negatively affects rural dwellers. Because of poor access to information in rural areas, communities are excluded from the information society. Communities need to participate in the digital economy adequately, and to make this possible, information must be managed through digital financial products, which technological products can address.

Studies from other African countries report barriers incurred by rural areas. For example, Bongomin et al. (2017) stated that some rural areas in Uganda face significant financial access barriers such as exorbitant fees, high minimum balances, limited physical access, unsuitable financial products, lengthy loan processing times and stringent documentation and collateral requirements. Consequently, these factors have led to the exclusion of over 62% of the impoverished population residing in rural Uganda. In countries where digital products are accessible, specific disparities create exclusion.

3.3. Financial technology (fintech)

Financial Technology (FinTech) is a financial innovation that uses information technology to provide financial services (Takeda and Ito, 2021). Many needed to

understand this technology, and its existence was not recognised; however, to date, most financial institutions use it in the day-to-day running of their businesses (Jalal et al., 2024). FinTech has become popular and is widely used by small and medium enterprises in their transactions and asset management (Takeda and Ito, 2021). According to (Ali and Munir, 2022; Mahmood et al., 2023), having access to finance is essential because it promotes investment in human capital and microenterprises, which advances financial liquidity and puts the economy on the growth path. Raza et al. (2019) also argue that financial challenges should be identified so that businesses can quickly access finances, manage their day-to-day operations and assist their businesses in flourishing.

Rural areas are affected by a lack of financial services and innovation, such as FinTech and digital marketplace, which are identified as measures to facilitate financial inclusion and strengthen sustainability in rural areas (Aker, 2022). FinTech allows rural dwellers to access funds through crowdfunding and digital payment systems (Anshari et al., 2019). FinTech players in Africa include M-Pesa, Mukuru and retail stores, which enable those without bank accounts to send and receive money (FinMark Trust, 2017). Sanusi et al. (2022) also argue that Africa is leading the world in mobile money, and in some countries, the penetration of mobile phones is above 100%. The high mobile phone penetration yields an opportunity for digital financial products to reach those in need. However, Memela and Chidenga (2023) argue that adoption of FinTech products is still low in rural areas thus due to persisting digital divide. They further state that social media and platforms like WhatsApp have improved financial inclusion in some areas where digital infrastructure is not a problem.

3.4. Financial access in Africa's rural areas

As indicated above, financial inclusion is the process aimed at promoting both the accessibility and usability of formal financial services among individuals and businesses. This access ensures that formal financial services are readily available and utilised by a broad spectrum of the population (Demirguc-Kunt et al., 2018). The overarching goal of financial inclusion is to extend the reach of formal financial services to traditionally marginalised communities, particularly those in low-income groups, ensuring their access to various financial services such as credit, insurance and other equity-related instruments (Rajan, 2009). Furthermore, financial inclusion is operationally defined as the formal possession of an account with a recognised financial institution (Bruhn and Love, 2014). In essence, it encompasses the availability of financial services and the active engagement and participation of individuals and businesses in the formal financial sector.

Financial inclusion can be affected by literacy rate and unemployment; males seem to benefit more from it than females (Khan et al., 2022). Most African countries depend more on agriculture than other sectors; however, rural dwellers are financially excluded in these countries (Komodromos, 2021). Cicchiello et al. (2021) reported that a low financial inclusion rate determines the level of development in most African countries; thus, proving the importance of financial inclusion to any given economy.

3.5. Women and financial inclusion

Microfinance has been used to address financial inclusion to boost the financial status of people experiencing poverty, especially women (Roy and Patro, 2022). According to Churchill and Marisetty (2020), women's financial participation can reduce poverty and inequality by participating in economic activities that ultimately contribute to the overall well-being of the household. Poverty and gender inequality are vital factors that negatively affect economic growth in many countries (Zhu et al., 2022). Ali and George (2019) further state that financially included women report feeling more self-assured and independent. Due to their financial independence and sense of accountability for their financial management, they also felt secure. The results of this study were comparable to those of a study by Kumar Jasheena (2016), which, likewise, revealed that most women's capabilities improved; this included their ability to reduce poverty, create jobs and enhance food security. Therefore, in areas where financial inclusion is lagging, access is needed for more women to be economically independent.

Chozarira et al. (2023) stated that although the COVID-19 outbreak made access to financial services difficult and expensive, financial inclusion positively affected entrepreneurial performance in women-led businesses in Bindura, Zimbabwe. In Nigeria, a study by Adegbite (2021) indicated that 78% of rural smallholders need to be financially included. In terms of gender, more males were financially included than females.

4. Theoretical framework

Many theories have been used to assess the issues of digital finance inclusion, namely, but not limited to, the resource-based theory (Mkansi and Nsakanda, 2023), technology determinism theory (Komodromos, 2021), knowledge gap theory (Seadira and Heuva, 2021) and empowerment theory (Smith, 2015). The empowerment theory seems more prominent based on its argument that the level of success of digital inclusion interventions depends on the investment made in digital empowerment. Digital empowerment can be attained by identifying and addressing the gaps of opportunity in the use of technology to ensure fair and equitable participation (Smith, 2015). Thus, the empowerment theory assumes that people feel excluded and disconnected when they cannot access resources, information, and opportunities.

However, this study's concerns on the digital economy's role in addressing financial inclusion in rural areas address one of the capital communities' needs for sustainable livelihood and development, which is the finance capital. This paper argues that digital financial inclusion has the potential to bridge the financial inclusion gender gap of women in rural areas of Africa and advance sustainable livelihood outcomes. These outcomes can improve productivity, income and food security (Adegbite and Machethe, 2020). This paper seeks to use the sustainable livelihood framework to address whether the digital economy can transform financial inclusion in rural communities (see **Figure 2**).

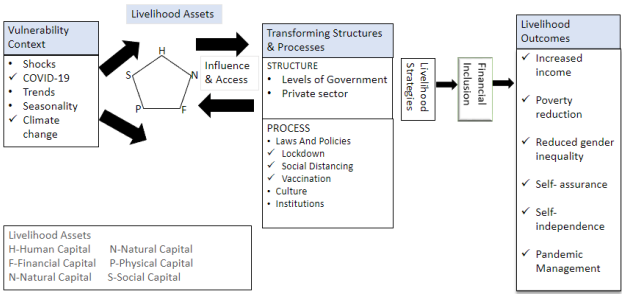

Figure 2. Rural digital financial assets mapping (DFID, 1999).

The sustainable livelihoods approach gives a better understanding of the lenses and ideas that reflect the realities of poor people in the digital economy. Generally, livelihood is understood as a strategic way an individual makes a living using assets, institutions and processes around them to achieve livelihood outcomes (Parkinson and Ramirez, 2006). The term sustainability in this context refers to a person's ability to endure shocks and uncertainties such as COVID-19 (Machasio, 2020) within the environment where livelihood is sought while, at the same time, preserving the same environment for the benefit of future generations (Parkinson and Ramirez, 2006; Rosen, 2020). The livelihood assets for assessing sustainability are human capital, financial capital, physical capital, natural capital and social capital (Machasio, 2020).

The sustainable livelihood framework in this study attempts to explain the vulnerability inflicted by COVID-19 on marginalised rural women (see Machasio, 2020). The livelihood assets of rural women were for attaining sustainability in the form of human, social, natural, physical and financial capital, which the lockdowns instituted by many governments displaced. In this study, it is hypothesised that financial inclusion is one livelihood strategy that can restore rural women's livelihood outcomes. The idea of analysing digital finance inclusion with the help of sustainable livelihood framework was adopted because of its comprehensiveness that allowed us to identify the issues and their interaction with various livelihood strategies that use a bottom-up approach (Chinoda and Kapingura, 2023). The approach is people-centred, which helped in the evaluation of the impact of digital finance inclusion on rural women in Africa (Gapp et al., 2022; Molla and Al-Jaghoub, 2007).

5. Findings

This section presents the findings from the review, with attention to emerging themes related to country coverage, challenges of accessing finance, women's access to digital financial products and transformation in financial inclusion. A summary of the results is captured in **Table A1** (see the Appendix section).

5.1. Countries

The accessed articles concentrated on the Africa region, focusing either on specific countries, the region (where selected countries are used as examples for specific topics), or sub-regions as illustrated in **Table 3**. The subregions were divided into Northern, Southern, Eastern, Western and Cental Africa using Google's classification. The reviewed literature covered 34 countries which included Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Chad, the Democratic Republic

of Congo (DRC), Egypt, Ethiopia (using the Northern position classification) (Ethiopean Embassy, 2022), Gabon, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe. Digital financial products and services were used differently, as discussed in the following subsections.

Table 3. Selected countries used as examples for specific topics.

Sub regions	Country	Frequency
Northern	Ethiopia	2
	Sudan	2
	Egypt	1
Southern	Zambia	3
	Zimbabwe	3
	South Africa	3
	Lesotho	3
	Botswana	3
	Mozambique	1
	Namibia	1
Central	DRC	3
	Gabon	2
	Angola	1
	Chad	1
Eastern	Tanzania	5
	Kenya	4
	Uganda	5
	Rwanda	2
	Malawi	3
	Burundi	1
	Madagascar	1
	Mauritius	1
	Somalia	1
Western	Ghana	6
	Mauritania	2
	Senegal	2
	Mali	4
	Nigeria	3
	Guinea	2
	Cameroon	2
	Benin`	1
	Niger	1
	Burkina Faso	1
	Sierra Leone	2
Total	34	-

Source: Researchers' compilation.

5.2. Challenges in accessing finance

This study's findings revealed several challenges and disparities that need to be addressed to ensure equitable access to financial services for all segments of the population, particularly women and marginalised groups (Adera and Abdisa, 2023). These challenges include, but are not limited to, internet connectivity, digital literacy, cultural barriers and the need for interoperability between different digital financial platforms, lack of digital infrastructure and services, which hinders the expansion of network connections and access to digital devices, as well as impacts the full realisation of digital financial inclusion in Africa (Adera and Abdisa, 2023; Anakpo et al., 2023; Coffie and Hongjiang, 2023).

African women are often economically and financially disadvantaged and marginalised (Anakpo et al., 2023). Furthermore, the rural women in African countries are less likely to own a mobile phone than men. They are also less likely to have access to the internet due to the costs involved. The resultant digital gap between men and women contributes to digital financial exclusion, leading to reduced economic empowerment. In rural Uganda, as an example, people lack access to formal financial services (Bongomin et al., 2023). They are also confronted with low financial literacy (due to poor financial literacy support systems) and limited access to smart mobile phones. All these factors have an influence on financial inclusion. Resultantly, this leaves the rural population with less privileges to participate in the digital economy.

Additionally, Anakpo et al. (2023) stated that the issue of inactive users of financial services poses a significant challenge, as some individuals become passive consumers of financial goods and services despite efforts to integrate them into the formal financial system. Another impediment is financial firms' unwillingness to work with policymakers to promote financial inclusion. Similar issues have been highlighted in Tanzania, a country which still must catch up in terms of financial inclusion, according to Were et al. (2021). The gender gap in financial inclusion persists; despite significant increases in financial service accessibility in Tanzania; women continue to lag in obtaining and utilising formal financial services. They also state that women face exclusions such as poor income, financial illiteracy and a lack of access to digital products and devices. They also argued that their findings showed that married women are less likely than men to borrow and save, thus limiting their financial growth.

According to the findings, the regulatory framework either facilitates or hinders the development and acceptance of digital financial products and services. Ajide (2020) study reported that the regulatory environment in many African countries has been conducive to the growth of digital financial services, allowing for innovation and expansion of mobile money and other digital payment platforms. Furthermore, technological improvements, particularly the widespread usage of mobile phones, have aided the expansion of digital financial inclusion in Africa. Additionally, efforts to expand network coverage and improve infrastructure have contributed to the accessibility of digital financial services in both urban and rural areas.

Despite Africa making significant strides in digital financial inclusion, ongoing efforts are required to address remaining challenges and ensure that digital financial services are accessible to all population segments, including women and underserved

communities (Ajide, 2020).

5.3. Financial products used

Of the sources that were examined, the two studies that concentrated on Uganda required a greater use of digital financial instruments. The identification of mobile money was made by Bongomin et al. (2023). Mobile money was used in Cameroon. The expense of implementing mobile money, the intricacy of the technology and the perceived hazards of using mobile money were further obstacles (Mvogo et al., 2023).

The use of financial digital products is widespread per sector. For example, Mapanje et al. (2023) research identified various mobile-based platforms that have emerged in some African countries to support smallholder farmers. These platforms provide various services, such as funding for solar energy goods through crop insurance and mobile money transfers. The most notable platforms include M-PESA, ACRE, MyAgro, AgroTech, RiMFin, M-KOPA, MSHWARI and M-CASH. By leveraging the power of mobile technology, these platforms are helping smallholder farmers improve their livelihoods and agricultural productivity. As such, they are essential in promoting sustainable agriculture and economic development in Africa.

Ibrahim (2022) study reports on the use digital financial products in African countries like Ghana, Kenya, South Africa and Tanzania. According to their research, M-Pesa and other mobile money transfer services have become popular because these services allow customers to transact on their mobile phones without owning a bank account; making it easy to send and receive money. Furthermore, point of sale (POS) devices are used for services such as loans and money transfers by some microfinance providers.

Governments' support of digital financial products and series was also deemed important in strengthening the digital economy. For instance, The Ghanaian government was cited to have taken an exemplary leadership by bolstering infrastructure development, which facilitated the establishment of the FinTech market. According to Coffie and Hongjiang (2023), the Ghana Interbank Payment and Settlement Systems Limited (GhIPSS), developed e-zwich which was the first biometric payment system. This e-zwich transformed the digital financial services in Ghana. However, like other nascent technologies it had limitations like scalability, insufficient POS devices in the country and lack of interoperability, which made transacting between different digital services non-viable.

Ibrahim (2022) also states that POS devices are instrumental in digitising financial processing and boost efficiency. Moreover, mobile banking services allow users with bank accounts to transact on their mobile phones. These digital transactions are beneficial for people with limited access to traditional financial services, especially those in remote rural areas. Additionally, some microfinance companies in Africa provide digital savings products that allow people to save money using their mobile phones. Therefore, these products are convenient for individuals with no access to traditional savings accounts.

Findings from van Hove and Dubus (2019) report that Africa is leading globally with mobile money adoption, with services like M-Pesa in Kenya and similar platforms in other countries. These services have enabled individuals, including

women, in remote and underserved areas to access savings and make payments using their mobile phones (Ajide, 2020; van Hove and Dubus, 2019). Moreover, gender-inclusive digital financial services have been promoted in some areas, recognising the relevance of women's access to and usage of these services for economic development (Ajide, 2020).

Various programs, however, have been launched to address financial inclusion among African rural women. One approach is using mobile money services, which have gained significant traction recently. Mobile money services allow users to access financial services through their mobile phones, thus, enabling women to make transactions, save money and access credit. For instance, the study by Adera and Abdisa (2023) accentuate the positive impact mobile phone ownership on financial inclusion among women in Ethiopia. Similarly, Bongomin et al. (2023) reported that the unbanked population is now financially serviced by mobile money in Uganda's rural areas. Therefore, digital products and services are valuable for women residing in rural areas of Africa.

5.4. Women's access to financial products

In Sub-Saharan Africa, there is a gender gap in accessing finance when women are less likely to access formal financial services than men (Aterido et al., 2013). Nevertheless, initiatives aiming to increase financial inclusion among women in rural areas have been reported. For instance, the Affirmative Finance Action for Women in Africa (AFAWA) program spearheaded by the African Development Bank aims to close such gaps by providing women entrepreneurs access to finance, training and other resources to boost their businesses (Asuming et al., 2019). Likewise, the United Nations Capital Development Fund (UNCDF) established the Mobile Money for the Poor (MM4P) program, with the aim to expand access to digital financial services in rural areas, that would also cater for women (Asuming et al., 2019).

Results from Ajide (2020) demonstrate that community-based savings and lending groups have also become powerful tools for financial inclusion in rural Africa and are often led by women. These organisations offer a platform for women to save money, get credit and develop financial resilience. In addition, programs centred on agricultural finance and value chain financing have been developed to support women farmers and agri-entrepreneurs by giving them credit, inputs and market connections. This is because women make up a sizable portion of the agricultural workforce in rural areas.

According to Ajide (2020), empowering women by educating and enhancing their financial literacy is critical in helping them make informed financial decisions, manage their resources and engage effectively with financial services. These educational programs strive to close the gap in financial inclusion in rural areas while reflecting a multifaceted approach to supporting women in rural areas and acknowledging their varied financial demands and situations.

5.5. Regulatory environment

The findings suggest a need to address the digital financial gender gap, financial literacy should be encouraged, and customised financial products and services that

cater the unique requirements of women in rural communities should be the main priorities of policymakers and practitioners. Furthermore, programs that empower women socially and economically—among them, digital financial inclusion—are essential for advancing gender parity and sustainable development in Africa (Anakpo et al., 2023; Coffie and Hongjiang, 2023; Mhlanga, 2020).

5.6. Digital transformation

According to Bongomin et al. (2023); Coffie and Hongjiang (2023); Were et al. (2021), improvements are required for Africa to achieve digital financial inclusion. These improvements include building reliable digital infrastructure, promoting digital literacy, developing innovative digital products, strengthening financial and digital regulations and addressing gender disparities. Were et al. (2021) do cite some progress; however, the goal should also be to provide inclusive access to rural communities. However, these developments will require significant investments from both the private and public sectors. Furthermore, microfinance providers should partner with regulators and other stakeholders to guarantee that users' records when transacting digitally are safe and secure (Ibrahim, 2022).

6. Discussion

The purpose of this study was to understand how digital financial inclusion might improve access to finance for women in Africa's rural communities. The findings are discussed in line with the research questions set in the introductory section.

6.1. The status of digital financial inclusion in Africa

The status of the digital financial inclusion in Africa has been a cause of concern as most countries are reliant on traditional financial products. Accessing finance is still a challenge thus, making financial inclusion an issue for some population groups in Africa. For example, scholars such as Sebaggala et al. (2019) indicated that farmers in Uganda experience financial exclusion in both the formal and informal sectors. Sebaggala et al. (2019) highlight that a noteworthy portion of farmers, precisely 70%, is grappling with financial exclusion. Notably, a staggering 90% of farmers are excluded from formal financial institutions within this percentage. It was also found that distance played a role in farmers' access to credit; those far from commercial banks were likely not to receive funding. These disparities highlight the need for more inclusive forms of financing that would not be affected by geographical positioning. These findings echo what FinMark Trust (2017) had reported indicating that the Africa region has low ownership of bank accounts, which synonymous with financial exclusion.

Non-financial factors such as high cost of servicing loans, account minimum balances, lengthy waiting periods, tedious documentation, collateral, education, and poor digital infrastructure also affect financial inclusion (Ajide, 2020; Adera and Abdisa, 2023; Mhlanga, 2020). This finding aligns with that of (Bongomin et al., 2017). It has also been noted that regulatory concerns limit the growth and use of digital financial products in rural regions (Coffie and Hongjian, 2023). The lack of commitment to infrastructural development affects progress in closing the financial

inclusion gap.

6.2. Financial services for women in rural areas of Africa

The findings revealed that women encounter inequalities in accessing financial services and products. These inequalities are caused by women's lack of collateral and other exclusionary requirements that make them unfit for formal financial lenders. The exclusion is worse for women residing in rural areas as they are far from commercial banks (Badr El Din, 2022). Information asymmetries are cited by Mhlanga (2020) to deter access to financial products for women, even for products intended to support them—a finding in line with Koti and Modiba's (2022) results.

This point also supports the findings of Efobi et al. (2014) that women in Nigeria are less likely to use bank financial services. The causes were attributed to the poor socioeconomic characteristics (such as poverty, illiteracy, lack of bank account(s), lack of formal identification and poor access to mobile phone and sim card ownership) of women. Furthermore, CBN (2015) indicated in their baseline report on financial literacy that rural women in Nigeria (primarily involved in smallholder agriculture) had the poorest socioeconomic condition and constituted the most susceptibility to financial exclusion. As a result, Nigerian women's low socioeconomic status limits their ability to take advantage of economic possibilities by influencing their desire for financial services and inclusion.

6.3. Measured required to achieve financial digital transformation in Africa

The findings further suggest that some digital financial products are available in Ghana, Kenya, Uganda, and Zimbabwe (Bongomin et al., 2023; Ibrahim, 2022; Mvogo et al, 2020). Digital savings products are also available through microfinance providers, making it easier for users to save money via mobile phones (Ibrahim, 2022). The literature also indicated digital transacting in countries like South Africa and Zimbabwe, supporting some of the countries covered in our list. In Uganda, mobile money is used, the study by Bongomin et al. (2023) demonstrated a notable and positive correlation between mobile money usage and financial inclusion. The findings suggest a positive impact of mobile money usage on enhancing the financial inclusion of the impoverished population in Uganda's rural areas. In other words, any changes in mobile money usage will affect the level on financial inclusion for those in need.

The findings on the use of digital finance were mixed for Uganda. Telukdarie and Mungar (2023) highlight financial literacy as one of the factors that may affect the adoption of digital financial products. On the other hand, Sebaggala et al. (2019) pointed out that this was different for farmers researched in Uganda. However, it is acknowledged that financial literacy can contribute to the knowledge of needed financial products and assist in credit application (Sebaggala et al., 2019). Therefore, digital and financial literacy should be prioritised when developing financial digital resources for rural areas. Telukdarie and Mungar (2023) posit that digital financial products can help users become financially literate.

Bongomin et al. (2017) proposed building social capital among different generations to address problems with financial access. Other scholars suggest the need

for policies that will target specific needs of women and address digital financial infrastructure for rural areas (Anakpo et al., 2023; Asuming et al., 2019). According to Mhlanga (2023), financial inclusion of individuals in low-income and non-income groups, women, youth, and small companies can be ensured with digital financial services and products. They further assert that the introduction of artificial intelligence (AI) will improve inclusivity. However, inherent exclusions in the development and coding of some AI systems have been discovered as exerting inequalities, particularly based on race and gender (Hooda et al., 2022).

While ownership of bank accounts was cited as an issue in the region, transformation should not only be about linking people in African with banks, but also availing multiple offerings that enable the unbanked to transact wherever they are comfortable.

A multifaceted approach involving multiple stakeholders is required to achieve financial digital transformation in Africa (Ajide, 2020). Developing regulatory frameworks that are supportive, executing focused financial inclusion initiatives, investing in digital infrastructure, and encouraging public-private partnerships are some steps that may be taken to accomplish financial digital transformation in Africa (Anakpo et al., 2023). In addition, promoting digital literacy, supporting innovation and entrepreneurship, implementing gender-sensitive strategies, leveraging data analytics and engaging in international partnerships are also important (Assuming et al., 2019; Anakpo et al., 2023). By implementing these measures, African countries can work towards achieving financial digital transformation, expanding access to financial service, and ultimately contributing to sustainable development and economic empowerment across the continent (Ajide, 2020).

Despite these challenges, the study suggests that digital financial inclusion can address the socioeconomic ill of financial exclusion with the right policies and practices and contribute to sustainable development in Africa. Researchers agree that using Point of Purchase (POS) devices and mobile banking services is transforming banking in Africa because they improve efficiency and make banking accessible in remote areas (Coffie and Hongjiang, 2023; Ibrahim, 2022). However, more must be done to guarantee that digital financial inclusion reaches all segments of the African population, especially the marginalised and those excluded from traditional financial services, despite some progress being made in this regard (Anakpo et al., 2023).

7. Conclusion

Digital financial technologies offer an option for African communities to access financial products. The results of this study highlighted that digital financial products which are mainly located far from formal financial institutions are more lucrative in rural areas. To this end, the Africa region still experience low uptake in bank accounts, thus making the cash transfer mostly preferred by rural populations. However, the availability of digital financial products and services could protect these communities from informal lenders who charge exorbitant interest. The results also indicated limited research on digital financial products and services, especially for women. Therefore, the reporting on financial inclusion and digital finance in Africa needs to be aggregated by gender to ensure that the scientific community does not perpetuate

exclusion in other vulnerable gender groups. A proposal to adopt AI into digital financial services was cited in the study as instrumental in narrowing the current financial divide. However, while AI-powered digital financial solutions can resolve inequalities, this digital financial leap means that Africans will need to play an active role in developing such financial products to ensure that they are sensitive to the racial, gender and socioeconomic status of the continent. These results further point to the need for policymakers and African leaders to prioritise rural development and infrastructure provisions and the importance of furthering the emancipation of women by making resources available that will empower them to participate in the digital economy. The review of 34 African countries has provided a glimpse of challenges and opportunities that could spur innovations and incite critical discussions on how digital transformation must be addressed in Africa and the global South.

The limitation of this study is its methodology because it would have shed even richer findings if sufficient data had been collected from women in rural communities. Future studies could consider comparative studies on digital financial products and services using mixed methods and to conduct more studies in sub-regions that reported low rates of digital financial inclusion such as Benin, Egypt and Mozambique.

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Appendix

Table A1. Data table.

Region [Country]	Financial resources available	Use of digital financial tools (DFT) and products	Challenges related to financial access and DFT	Digital financial transformation required	Women's use of DFT	Theory	Sources	Journal
Ethiopia	None	Not used	Education is determinant for financial inclusion. Women have low education levels. Difficulties in accessing loans and credit, especially rural dwellers. Poor digital infrastructure.	Close the education gap to improve use of digital products. Ensure access to digital financial products, through mobile devices. Improve infrastructure	Not used	None	(Adera and Abdisa, 2023)	Cogent Economics and Finance
Selected African countries–Algeria, Botswana Cote d' Ivoire, DRC, Ethiopia, Gabon, Ghana, Tanzania, Malawi, Mali, Mauritania, Nigeria, Sierra Leone Tunisia, Uganda, Zambia	Community based savings	ATMs for accessing financial services	Access to credit by women entrepreneurs. Low education affects financial access.	Digital financial inclusion is required to support women entrepreneurs. The need to empower women in financial literacy.	None	None	(Ajide, 2020)	Journal of Financial Economic Policy
Selected African countries–Kenya, Lesotho, Ghana, Namibia, South Africa, Sudan, Zimbabwe	Mobile and online banking; ATMs	Mobile money for example EcoCash (Zimbabwe) and M-Pesa (Kenya)	Low use of mobile money. Poor financial infrastructure.	Reducing the financial gap for women through policy formulation and implementation. Improvement of digital financial infrastructure.	Mobile money	None	(Anakpo et al., 2023)	MDPI-FinTech
Africa–Angola, Botswana, Benin, Burkina Faso Burundi, Chad, Cameroon, DRC, Gabon, Ghana, Guinea, Kenya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Togo, Uganda, Zimbabwe, Zambia	None	Mobile money	Women and youth financially excluded.	Financial inclusion policies to target women and youth.	Mobile money	None	(Asuming et al., 2019)	Journal of African Business

Table A1. (*Continued*).

Region [Country]	Financial resources available	Use of digital financial tools (DFT) and products	Challenges related to financial access and DFT	Digital financial transformation required	Women's use of DFT	Theory	Sources	Journal
Uganda	Mobile money platforms. Mobile money agents' services. Cash deposit and withdrawals via Point of sale (POS)	Mobile money platforms POS	Liquidity affects agents' capacity to transact.	Liquidity management practices. Availability of cash and electronic float.	Data not aggregated by gender	None	(Bongomin et al., 2023)	Cogent Business and Management
Ghana	Point of sale (POS) e-zwich	POS e-zwich	Inadequate financial infrastructure. Scaling the e-zwich.	Ensuring that people without mobile money accounts are financially included. Adequate infrastructure to support use of DFPs.	Not specified – women benefit from mobile money platforms	None	(Coffie and Hongjiang, 2023)	Technological Forecasting
Africa – Kenya, Tanzania, Mozambique, Lesotho, DRC, Ghana, South Africa, Rwanda, Senegal, Uganda, Zambia, Malawi, Mali, Nigeria, Guinea, Zimbabwe, Botswana	M-Pesa, Eco cash, insurance services, savings, credits, mobile money	M-Pesa, eco cash, mobile money, My-Gro	Poor infrastructure in rural areas. Low adoption rates. Awareness of digital products. Cash preference. Users' unique needs not catered for.	Developing digital infrastructure. Promoting digital financial literacy. The need for DFP that are cognisant of women's challenges.	Use M-Pesa to save and invest. Access credit to buy inputs for farming.	Sustainable livelihoods framework	(Mapanje et al., 2023)	MDPI-Sustainability
Selected countries – DRC, Egypt, Ghana, Lesotho, Mozambique, Tanzania.	Credit scoring enabled by AI. Mobile money services	Mobile money services	Risk challenges such as cyber security.	Use of AI to support customers by using chatbots for fraud detection and cybersecurity.	Women use mobile wallets and payment platforms to transact online.	Credit rationing theory	(Mhlanga, 2020)	MDPI—International Journal of Financial Studies
Cameroon	Mobile money	Mobile money used to make and receive payments Managing cash flow. Accessing credit. Conduct secure transactions. Less use of cash which reduces theft and other security threats. Improves financial records.	Lack of awareness and understanding of mobile money. Limited access to mobile phones and network coverage. Concerns about the security and reliability of mobile money services.	Transformation in infrastructure, managing costs of setting digital fiancial services. Introducing more service providers for a competitive environment.	Not mentioned, sample composition is not aggregated by gender.	Multi-perspective theory	(Mvogo et al., 2023)	African Journal of Science, Technology, Innovation and Development

Table A1. (*Continued*).

Region [Country]	Financial resources available	Use of digital financial tools (DFT) and products	Challenges related to financial access and DFT	Digital financial transformation required	Women's use of DFT	Theory	Sources	Journal
Uganda	Credit; informal finance and microfinance	No digital tools used.	Women's businesses considered small to be funded. Residing far from commercial banks impacts access to financial access. Lack of collateral.	The need for equitable distribution of credit.	No digital tools used	None	(Sebaggala et al., 2019)	Business and Economic Management Review
Kenya	Mobile money	M-Mpesa.	Uneducated people are less adaptors of mobile phone technology. Urban-rural divide affects access to ICT.	Ensuring a stable network so that people can be able to transact easily. Success of the M-PESA money transfer has allowed people to save.	Women have limited access to M-PESA access to because they are less likely to own a phone.	Behavioural economics	(Van Hove and Dubus, 2019)	MDPI-Sustainability
Tanzania	Mobile phone money; ATM cards; Bank accounts	Mobile banking; Internet banking; Point of sale machines.	Individuals opt not to bank. Lack of income. Lack of financial literacy. Lack of access to mobile phones and other facilities.	Enhance access to digital financial literacy. Improve women's education and financial literacy.	Married women are less likely to access mobile money services and banking financial services than men.	None	(Were et al., 2021)	Working Paper-The United Nations University World institute for development economics research