



OPEN The potential of digital loans to reduce gender disparities in financial inclusion among female health entrepreneurs in Kenya

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In Sub-Saharan Africa, female entrepreneurs are well represented in healthcare but struggle to access financial services. Digital financing technologies could help close this gap. This study assessed the readiness, perspectives and gender disparities in (digital) loan characteristics among Kenyan health Small and Medium Enterprises (SMEs). We interviewed 24 and surveyed 410 health SME owners and retrieved loan-history data for 850 health SMEs. Appropriate parametric and non-parametric tests were used to compare key variables across groups, focusing on gender disparities. In addition, multiple regression analyses were employed to explore how different factors, particularly gender, influence uptake and characteristics of traditional and digital loans taken. In-depth interviews (IDIs) identified low trust in digital lenders, while survey results indicated a strong demand for loans, regardless of gender. SME owners willing to take risks ($OR = 2.32$, $p = 0.052$), with monthly financial needs ($OR = 4.22$, $p = 0.001$), and positive perceptions of digital loans ($OR = 3.14$, $p = 0.004$) were more likely to take a digital loan, compared to the low risk takers, those who never or rarely experience acute financial needs, and those with negative perception of digital loans, respectively. Loan-history data showed a gender difference in the initial traditional loan amount, with women-owned businesses receiving an estimated 47.7% less than the male counterparts ($p = 0.022$) however, this gap disappeared for digital loans. Over 50% of women-led businesses using digital loans experienced significant growth, suggesting increased digital revenues linked to these loans. This study underscores the financing gap faced by Kenyan health SMEs and demonstrates the potential of digital loans to improve financial inclusion, particularly for female entrepreneurs. It addresses a gap in the literature by providing new evidence on how digital financial products can reduce gender-based barriers in the health sector. Low trust in digital lenders, especially among non-users, highlights the need for improved information and transparency to foster confidence in these tools.

Keywords Digital finance, Financial inclusion, Health SMEs, Female entrepreneurs

In Sub-Saharan Africa (SSA), approximately 50% of all health services are delivered by the private healthcare sector, which is predominantly composed of small- and medium-sized enterprises (SMEs)¹. Ensuring high-quality healthcare provision is essential for fostering human capital development and alleviating poverty². Addressing the prevalent challenges faced by health SMEs in SSA—such as inadequate infrastructure, shortages of skilled medical personnel, and poor service delivery—is impossible without access to financing³. Supply-side healthcare expenditures are linked to improved population health outcomes in SSA, including higher life expectancy at birth and lower infant mortality rates⁴. Loans represent a significant source of capital; however, the disbursement of loans to health SMEs owners remains challenging. Generally, health SMEs encounter obstacles in securing loans from the traditional lending institutions compared to larger firms because of a limited banking history, limited collateral, and perceived high risk of the sector^{5,6}.

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The importance of SMEs in SSA should not be underestimated as they are substantive contributors to the economic growth and development of countries⁷. The World Bank has documented that SMEs contribute to 50% of global employment and account for at least 40% of the gross domestic product (GDP) in emerging economies worldwide⁸. Similar findings have been documented in SSA, where SMEs contribute over 50% of the GDP⁹. Africa has a higher number of female business owners than male owners, accounting for 58% of the continent's self-employed population¹⁰. However, despite this apparent progress, female entrepreneurs across SSA continue to earn lower profits than their male counterparts, with an average shortfall of 34%¹¹. According to the Global Findex 2021, the region holds a 12% financial gender gap¹².

Barriers encountered by women in business

Women face significant barriers in starting and growing their businesses compared to their male counterparts^{13,14}. These barriers are multifaceted, encompassing sociocultural factors such as household and childcare responsibilities, educational deprivation and restricted autonomy^{15–17}. Additionally, women often encounter barriers in accessing finance, including limited collateral for loans due to lack of control over fixed assets, limited credit history, low financial literacy and inadequate business training^{18–22}. These constraints significantly hinder their access to credit and negatively impact the monthly turnover of female entrepreneurs^{23,24}. Financial inclusion has been identified as a key determinant of entrepreneurial success^{25,26}.

While some studies suggest that financial institutions may not explicitly discriminate against women in their lending practices²¹, the structural requirements of financial systems—such as collateral demands—disproportionately disadvantage women. This underscores that gender-specific barriers, rather than outright bias, are critical in shaping the financial inclusion of female entrepreneurs. These challenges are compounded by limited business networks and perpetuate a cycle of disadvantage, confining many women to smaller businesses in the informal sector. Such businesses typically require low capital investments, have limited growth potential, and yield lower returns on investments^{16,25}. A 2024 survey among women entrepreneurs from LMICs documented that, despite increasing engagement with digital technologies and improved business networks, financial access barriers persist. Moreover, limited access to smartphones and stable internet connections contributed to their digital and financial exclusion²⁷. Additionally, while there is a common agreement in the economics literature that females tend to be more risk averse than their male counterparts, a meta-analysis revealed that pronounced gender differences appeared in fewer than 10% of published studies²⁸. However, the evidence in countries with a higher inherited gender-bias is homogenous, showing that women less often apply for a loan which can be driven by the belief that their credit application will be denied or their internal risk attitude which may be fed by low financial literacy²⁹.

Opportunities created through digital financial solutions

The emergence of digital finance technologies has opened new avenues for financial services to SMEs⁵, thereby advancing digital financial inclusion (DFI). DFI seeks to ensure that individuals and businesses, especially those underserved or excluded from traditional financial systems, have access to a comprehensive range of financial services³⁰. For example, FarmDrive in Kenya provides financial services to unbanked and underserved farmers by using mobile phone technology, alternative credit scoring, and machine learning³¹. Specifically for women, DFI facilitates economic empowerment through financial autonomy, lack of collateral requirements, protection over their finances from appropriation by others, and greater flexibility by overcoming the barriers of time and place³⁰. Consequently, previously excluded, rurally located SMEs now have the potential to be financially included, leading to economic growth opportunities. Mobile money is the key driver of DFI and a ground-breaking innovation in Kenya that has grown exponentially since its launch in 2007. By 2019, its userbase had expanded to 33 million users, representing 69% of the Kenyan population¹⁵. In 2021, over 60% of Kenyan SMEs used mobile money platforms for business transactions³².

Despite the expansion of DFI in SSA, health SMEs continue to experience growth constraints, with limited access to finance cited as the primary barrier, resulting in suboptimal adoption of DFI³³. While existing literature explores the perceptions of SME owners across various sectors regarding the use and adoption of financial services^{34,35}, there remains a scarcity of evidence on the specific impact of digital finance on SME financial inclusion in Africa. A recent study has shown that digital finance significantly enhances SME financial inclusion on the continent³⁶. However, there is limited evidence on the impact of access to digital finance on health SMEs and particularly on female-owned health SMEs. To our knowledge, this is the first empirical study combining primary and real-world digital loan uptake data to explore gendered financial inclusion among health SMEs in Kenya.

Theoretical framework for the study

The study examined the factors that influenced access to, and the decision-making around, the uptake of digital loans by health SME entrepreneurs in Kenya. The uptake of loans to invest in an SME is associated with risk due to the uncertainty regarding the returns on investment. Decision-making in contexts of uncertainty and risk has been studied by behavioral finance theorists who have documented that factors such as heuristics (representativeness, overconfidence), prospect behaviors (loss/regret aversion), and personality traits (emotions, moods) among others, form an integral part of the decision-making process³⁷.

Methods

This study comprised of two parts and utilized both primary and secondary data, consisting of in-depth interviews (IDIs), cross-sectional quantitative surveys and analysis of administrative loan data. The primary mixed-methods approach began with an exploratory qualitative phase whose findings informed the development of the tools for the subsequent quantitative phase. The secondary administrative data includes real-world loan history data of health SMEs between 2011 and 2024.

General study setting

This study was conducted in Kenya, a lower-middle-income country located in East Africa. The estimated population in 2022 was 55 million people³⁸. The 2021 GDP per capita was approximately USD 2061³⁹ and the total health expenditure was 4.55% of the GDP⁴⁰. The main revenue sources for health are the government, private health insurance, out-of-pocket expenditure, and development partners' funds⁴¹. The inflation rate, based on consumer price indices, as of May 2020 was 5.5% rising to 6.8% in September 2023, with fluctuations in between^{42,43}. According to a United Nations Development Program (UNDP) report, during the COVID-19 pandemic, SMEs in the country suffered negative impacts on their operations and revenues with 67.9% reporting severely reduced operations⁴⁴. Kenya has a dual system for health service delivery. This comprises government health facilities (46%) and the private for-profit and not-for-profit (faith-based) health facilities⁴⁵. Supplementary file 1 provides more background on the health SME landscape in Kenya.

In Kenya, the mobile money system, notably through platforms like M-Pesa, plays a significant role in financial inclusion. It allows individuals, particularly in rural or peri-urban areas, to access banking services without needing a traditional bank account. This system is widely used across different demographics, with higher adoption rates in urban areas, although rural and peri-urban areas have also seen significant uptake. Mobile money is especially popular among lower- to middle-income groups, including small business owners, youth, and women⁴⁶. The system enables transactions such as money transfers, bill payments, and access to digital loans. In this study, digital loans are integrated into the mobile money system, where users can access small, short-term loans directly through their mobile phones, often with minimal documentation via an Unstructured Supplementary Service Data (USSD) number or an app. The service has become a key feature of financial services in Kenya, particularly for individuals with limited access to conventional banking services.

Cross-sectional mixed methods approach

The following subparagraphs elaborate on the primary data collection consisting of IDIs and a cross-sectional quantitative survey. The purpose of using a mixed methods approach was to facilitate the exploration of the in-depth experiences and perceptions of the health entrepreneurs regarding loans and digital loans using qualitative methods, whereas the quantitative methods facilitated obtaining generalization and precision based on a larger randomly sampled study population.

Specific study setting

The study was conducted across five counties in Kenya (Nairobi, Kiambu, Kisumu, Mombasa and Makueni), highlighted in Fig. 1. These counties were purposively selected to ensure a high number of health SMEs, geographical representativeness, and a sufficient level of mobile money accounts utilization. Nairobi County was included due to its high number of health SMEs. The former Nyanza region (Kisumu County), Coast (Mombasa County), Central (Kiambu County) and the Eastern region and peri-urban (Makueni County) were selected for geographical representativeness and because they have the highest population-level utilization of mobile money accounts within their regions ranging between 85 and 94%⁴⁷. This county distribution was retained for both

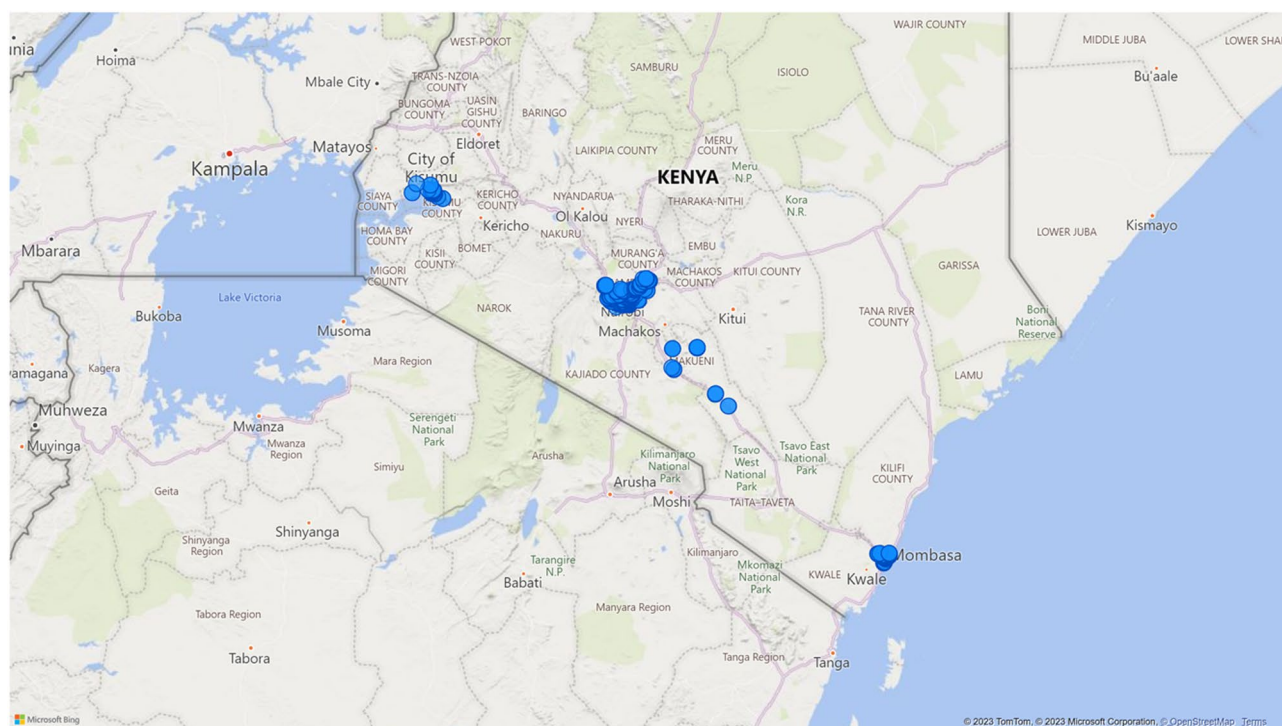


Fig. 1. The five study counties where data was collected.

the qualitative and quantitative phases of this study. Supplementary Table 1 provides more information on key county attributes.

Study population and sampling approach

Health SMEs located within the selected five study counties were sampled based on two inclusion criteria: the health SME must be private or faith-based and must have been in operation for at least one year at the time of contact. The sampled health SMEs included healthcare facilities (medical clinics, dental clinics or specialist clinics), retail pharmacies, stand-alone diagnostic centers, or facilities providing any combination of these services. One health facility or pharmacy per study county for which ownership information was available was selected from open national databases of licensed health facilities and pharmacies maintained by the professional regulators^{45,48}. Subsequently, for the IDIs we applied purposive and snowball sampling to ensure the inclusion of sufficient female respondents. The anticipated sample size for the IDIs was 24 participants distributed across the five study counties, with provision to continue sampling until thematic data saturation was reached. The scope of this sample covered 14 healthcare facilities (including standalone diagnostic centers) and ten pharmacies. The number of respondents allocated to each county facilitated sampling of perspectives from these respective regions. For the survey respondents, we adopted a sampling approach that ensured health SMEs were distributed proportionately across the selected study counties. We applied a sampling probability proportional to size technique for sample allocation. Stratification was carried out based on counties and sub-counties. Researchers made phone calls to business representatives to explain the study's objectives and schedule interviews. If a participant agreed, the participant provided the business location for an in-person interview.

Sample size calculation

The sample size for the study was calculated using the SurveyMonkey sample size calculator, which considers a 95% confidence level and a 5% margin of error⁴⁹. Based on a total of 7671 private and faith-based health SMEs, and 5032 private pharmacies in Kenya, an initial sample size of 373 respondents was estimated. This was increased by a factor of 10% to 410 respondents to accommodate for non-response. To ensure representativeness, we pursued a proportional distribution of the 410 health SMEs between healthcare facilities and pharmacies.

Data collection

The IDIs were conducted using a semi-structured interview guide and the overarching objective was to gain insights into reasons for (not) taking a loan. The guide was inspired by an adaptation of the PESTEL analysis framework⁵⁰. This framework facilitated exploration of factors related to Policies, Economic climate, Social attributes, Technology, Environmental and Legal factors and has been used before to assess the external business environment for fintech providers⁵¹. It provided a suitable framework for categorizing key determinants that influence decisions regarding the usage of digital financial services. The interview guide was piloted ($n = 2$) in Nairobi and Kisumu, and since no significant changes were required, these pilot respondents were included in the study sample. The IDIs were conducted both face-to-face and via telephone. Physical interviews took place at the health SME premises. The interviews were carried out in English and commenced after obtaining informed consent; they lasted between 30 and 60 min. Upon consent, the interviews were audio-recorded, and participants received a numerical code to ensure anonymity during the analyses.

The survey questionnaire was subsequently developed, informed by the findings from the IDIs to quantify the insights generated. The background characteristics included were respondents' gender, age, education level, health SME type, location and business duration in years to capture maturity and operational experience. In addition, fed by the qualitative insights and informed by the PESTEL framework, we included variables such as level of awareness of digital loan products, financial behavior and risk-taking behaviors (adapted from FinaMetrica⁵²). Risk attitude was measured on a scale of 1 to 5 with the questions: "How willing are you to take financial risks?" and "When faced with a major financial decision, are you more concerned about the possible losses or the possible gains?" Respondents were categorized into high-, medium-, or low-risk takers. High-risk takers were defined as those who expressed a willingness to take significant financial risks, while low-risk takers were more cautious and concerned about potential losses. The questionnaire was digitized and administered using mobile phones through face-to-face interactions.

The data collectors underwent prior training to familiarize them with the tool and ensure adherence to research ethics during data collection. Participants did not receive any incentive to participate in this study. The data collected were transmitted in real-time to a secure encrypted cloud-based database.

Data analysis

The recorded IDIs were transcribed in Microsoft Word and anonymized using numerical codes. A coding matrix was created, corresponding to the PESTEL framework; the overarching thematic areas derived from this framework that guided the development of the interview guide were retained for the analysis. As such, deductive data analysis was used initially. This deductive approach was complemented by an inductive analysis approach, allowing subthemes to emerge during the data coding process. The themes and subthemes were iteratively compared and refined. To increase the rigor and credibility of the findings, the research team held peer debriefing sessions throughout the data analysis process.

Descriptive statistics of the survey data were generated for all variables of interest. Cross-tabulations were generated to gain insights into categorical variables associated with loan uptake. Chi-squared tests were conducted to determine the statistical significance of these relationships. The significance level was set at $p < 0.05$. To safeguard against inflated type 1 errors, Bonferroni-corrected pairwise comparisons were applied. A logistic regression model was applied to gain insights into the factors that were associated with a digital loan uptake. We examined the robustness of the findings by evaluating the model's goodness-of-fit, assessing multicollinearity

using diagnostic measures, and addressed potential confounding variables. All analyses were conducted in STATA 15.0.

Selection of variables

In the logistic regression, we included the following predictors: (i) cash-flow pressure, captured by the frequency of acute financing needs, reflecting the idea that short-term liquidity gaps are the primary trigger for taking digital credit^{53,54}, (ii) entrepreneurial risk tolerance was added because borrowers with lower risk aversion have been found to be willing to accept unsecured or novel loan products⁵⁵ and finally (iii) perceived trust in the provider markedly increases a user's likelihood of adopting mobile financial services⁵⁶. Standard demographic and business controls were also added to account for baseline heterogeneity.

Secondary data analysis on medical credit fund loan history data

The following sub-paragraphs elaborate on the secondary administrative data provided by the Medical Credit Fund (MCF).

Medical credit fund

MCF is a fund dedicated to providing loans to health SMEs in SSA. MCF was founded in 2009 with the objective of overcoming the access-to-finance challenges experienced by health SMEs and has been active in Ghana, Kenya, Nigeria, Tanzania and Uganda. MCF combines loans with technical assistance to support healthcare providers to improve their quality of services and invest in their businesses. Since its inception, MCF has provided over 10,000 loans worth EUR 165 million to more than 2100 health SMEs. The majority of MCF borrowers are healthcare providers like health centers, clinics, (small) hospitals and pharmacies.

MCF loan products

Initially, MCF offered only term loans: traditional loans with security and a fixed repayment schedule provided either directly or through partnerships with local banks. Loan sizes varied between a few hundred and EUR 2 million equivalent in Kenya Shillings, with tenors from 6 months up to 96 months. The loans were used by clients to finance working capital or invest in infrastructure and equipment.

With the rise in mobile money use in Kenya and further accelerated by the recent COVID-19 pandemic, MCF developed a digital loan product. To determine the health SMEs' eligibility and maximum loan amount, MCF uses a health SME's recent history of mobile money (M-PESA) revenues from patients (payments made by patients). The product is used to finance working capital or equipment and is typically smaller (between EUR 100 and 200,000) compared to a more traditional term loan and repaid over a shorter time span of 3 to 6 months by automatic real-time deductions from mobile money payments received by the facility. The loan does not require any collateral because a share of ongoing mobile money revenues, instead of assets, are used as the basis for providing the loan. The loan product was launched in 2017 in Kenya and has been growing exponentially since then. It is currently being introduced in Ghana and Tanzania.

Study setting

Most of Kenyan MCF clients are based in urban areas, with the large majority being in Nairobi and Kisumu. MCF aims to reach the small and medium segment of the health sector: 50% of MCF clients have less than 10 staff members and receive less than 750 patient visits per month, mostly patients from lower income groups.

Study sample

For this study, we included all term and digital loans provided in Kenya by MCF. We removed outliers by setting a threshold of EUR 800,000 for term loans, resulting in four exclusions, and EUR 200,000 for digital loans, leading to three exclusions. All financial values are expressed in EUR and the applied conversion rate was monthly (i.e. the rate at the end of the month for closed months and the end of the previous month for open months). We excluded observations where the facility owner's gender was unknown ($n = 3$).

Variables of interest

The key variable of interest is the ownership of the facilities, categorized into three options: female-owned (100%), male-owned (100%), or partnership (typically 50/50 male female owned). The loan type was a binary variable, either digital or traditional loans. Since digital loan amounts are determined by the mobile money revenues received from patients, we constructed a "growth in loan amount" variable to capture the change between the first and last digital loan. An upward trend in loan amounts over time indicates higher patient revenues and transaction volumes, thereby serving as a reasonable proxy for overall business performance. For facility characteristics, we considered the type of facility, categorized into levels commonly used in Kenya: level 1 (community health posts), level 2 (dental clinics, diagnostic centers, dispensaries, eye clinics, pharmacies), level 3 (health center, maternity home, outpatient center), level 4 (primary hospital). We also included the "other" category for equipment suppliers and support service companies. Additionally, the location of the facility—urban or rural—was captured.

Data analysis

We evaluated the gender differences in the two loan types by comparing the averages in the first loan amounts, as this is an important indicator for financial inclusion. To assess statistically significant gender differences, first a log-transformation was applied to obtain a normal distribution followed by an Analysis of Variance (ANOVA) test as the comparison was between three groups. When the variable was still not normally distributed, we applied the Kruskal-Wallis test. We also assessed gender differences in the *growth in loan amount*. Due to an extreme

leptokurtic distribution, this variable was transformed into a categorical variable so a χ^2 test could be applied to assess significant differences. A p-value < 0.05 was considered statistically significant. To ensure robustness of the gender analyses, we also conducted an ordinary least square (OLS) regression and a multinomial regression to control for facility characteristics.

Ethical considerations

All research was performed in accordance with the Declaration of Helsinki. For the cross-sectional mixed methods approach, ethical approval was obtained from the Strathmore University Institutional Ethics Review Committee, reference numbers SU-ISERC1616/23 and SU-ISERC1890/23. Additionally, a research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI), permit number NACOSTI/P/23/25096. Informed consent was obtained before the in-depth interviews or surveys began. Additional consent was sought to allow the in-depth interviews to be audio-recorded. All data was anonymized of any identifier information. For the secondary data analysis on the data provided by the MCF, ethical approval was obtained from the Research Internal Review Board of the Erasmus School of Health, Policy and Management in the Netherlands and the AMREF Ethics and Scientific Review Committee in Kenya. All data were anonymized.

Results

The IDIs were conducted between May and July 2023. Two out of the 24 interviewed respondents refused to be audio recorded. Due to extensive field notes taken during the IDIs, the content of their interviews could still be included in the subsequent analyses. The survey was conducted between September and November 2023 among 439 respondents, of whom 29 respondents refused to answer a central question (whether they had taken a loan). Consequently, the survey sample comprised 410 respondents. We first provide a summary of the main IDI findings, followed by the presentation of the quantitative insights. The analyzed results have been mapped onto the PESTEL framework themes that emerged strongly during analysis; not all thematic areas featured strongly within the responses (both IDI and survey). The PESTEL themes which emerged strongly were Economic and Social. Lastly, we analyzed real-world loan history data of 850 health SMEs including 6350 disbursed loans between 2011 and July 2024.

Cross-sectional study findings

Background characteristics of IDI respondents

Of the 24 IDI participants, 39% were female. The larger proportion of these participants were aged between 30 and 40 years; more than half (63%) of their businesses were microbusinesses (2–9 employees), with 58% located in urban areas. All participants had attained tertiary level education in health-related fields, see Table 1.

	Female (n = 9, 37.5%)		Male (n = 15, 62.5%)		Total (N = 24, 100%)	
	n	%	n	%	n	%
Age						
18–30	3	33.3	2	13.3	5	20.8
30–40	5	55.6	6	40.0	11	45.8
40–50	0	0	5	33.3	5	20.8
Above 50	1	11.1	2	13.3	3	12.5
Location						
Rural	0	0.00	0	0.0	0	0.00
Peri urban*	4	44.4	6	40.0	10	41.7
Urban	5	55.6	9	60.0	14	58.3
Education						
Secondary	0	0.00	0	0.00	0	0.00
Tertiary	9	100.0	15	100.0	24	100.0
Business type						
Consultation and treatment	4	44.4	9	60.0	13	54.2
Diagnostic centre	0	0.00	1	6.7	1	4.2
Pharmacy	5	55.6	5	33.3	10	41.7
Business size						
Solo Entrepreneur (1)	3	33.3	2	13.3	5	20.8
Micro Business (2–9)	5	55.6	10	66.7	15	62.5
Small Business (10–49)	1	11.1	3	20.0	4	16.7

Table 1. Background characteristics of IDI participants (N = 24). *Peri-urban: Transition zone between urban and rural areas⁵⁷.

Main qualitative insights

Out of the 24 IDI participants, 15 had never taken a loan from a bank. Six of these participants who had not taken a bank loan were female, and 12 of these businesses were in urban areas. The participants cited a variety of reasons for not taking bank loans, including reinvesting business revenues and preferring reliance on support from family and friends. Those who expressed an aversion to bank loans cited that they considered high interest rates as a deterrent.

Ten of the 24 IDI participants had ever taken a digital loan; and half of them were female. These respondents cited diverse experiences with their digital lenders. Some respondents described negative experiences with digital loans, which related to high interest rates, a lack of trust, privacy intrusion, harassment, and poor customer relations as key contributors to these negative experiences.

“It’s called xxx (brand-name of digital lender) ...and we said never again! They keep calling you, they keep harassing you days before the agreed date. You just have to pay. They also go to your house to take pictures... no, those ones they harass you psychologically.” (female IDI respondent).

Additionally, some of these female health entrepreneurs preferred to rely on internal business revenues. Conversely, other respondents showed a business growth mindset and demonstrated a high appetite for financial information. Most of them had a positive prior loan experience, supported by the quotes below:

“...you don’t have to fear of taking loans.... For you to grow you have to take a loan.” (Interviewer: Would you consider taking a loan from a digital lender?) “Respondent: yes, if they have favorable requirements...” (female IDI respondent).

(Interviewer: Have you taken a loan from a digital lender?) “Yes; it was swift... (the experience) was okay.... If need be, I would take another one (digital loan).” (female IDI respondent).

The prominent determinants of loan uptake from these qualitative results were (i) Social factors including financial behaviors such as reliance informal financial sources, (mis)trust of digital lenders, financial knowledgeable, and positive perception of digital loans; and (ii) Economic factors chiefly cost of the loans (both traditional and digital) and financial needs (liquidity). These key qualitative findings were integrated into the survey, which included factors that influencing entrepreneurs’ decisions to take up loans—mainly risk-attitude and financial needs.

Background characteristics of survey respondents

Table 2 outlines the background characteristics of the survey respondents. Of the 410 survey respondents, 28% were female. Most respondents were aged between 30 and 40 years. Slightly less than two-thirds (64%) of the businesses were urban-based, with microbusinesses being the most dominant. The majority (83%) reported that they systematically tracked their business revenues. Slightly more than half (51%) of the female respondents were running a pharmacy, whereas most of the male respondents (59%) provided consultation and treatment services.

Loan history and health SMEs readiness for digital loan adoption

Figure 2 shows a flowchart on the loan uptake and readiness among the entire study sample. The left arm shows that out of the 410 respondents, 39% indicated that their businesses had ever taken a loan. Bank loans were the most frequently cited source of credit among the respondents (58%) followed by digital loans (42%). Other sources of loans included savings and credit cooperative societies (14%) and informal loans from family and friends (8%) (*not in figure*). Within the category of respondents who reported having taken a business loan, 48% of female respondents had taken a bank loan, compared to 61% of male respondents ($p=0.12$) (*not in figure*). Among the 158 respondents who had taken loans, 42% had taken digital loans. The larger proportion (67%) of these respondents with a history of taking digital loans reported satisfaction with this loan product. Additionally, slightly more than half (52%) of the respondents with a history of taking a digital loan, had taken this loan more than once. The right arm shows that among the 61% of the respondents without a loan history, almost half (44%) of the businesses experienced an acute financial need at least monthly during the year preceding the survey. Almost all respondents (86%) who had an acute business financial need at least once a month received their revenues through digital financial platforms, suggesting that they are eligible to receive digital loans. Supplementary Table 2 describes the background characteristics of this particular group, which do not differ significantly from the overall study sample. Supplementary Table 3 shows the gender distribution for each block of the flowchart. While we found no gender gap in overall loan uptake, women with a loan history were more likely to take taken digital loans compared to men.

Factors associated with the uptake of digital loans

Table 3 shows the logistic regression model with the uptake of digital loans as the dependent variable. We found that those with monthly financial needs were significantly more likely to take digital loans (OR = 4.22, 95% CI 1.74–10.24, $p=0.001$) translating into approximately a 17-percentage point greater probability of loan uptake compared to those who ‘never/rarely’ had financial needs. Regarding behavioral characteristics, we found that risk attitude and perception towards digital loans were associated with digital loan uptake. Respondents who perceived themselves to be high-risk takers were about twice as likely to take a digital loan (OR = 2.32, 95% CI 0.99–5.41, $p=0.052$), reflecting roughly a 9-percentage point increase in uptake probability compared to those with a self-perceived low risk profile. Similarly, having a positive perception towards digital loans tripled the likelihood of taking a digital loan (OR = 3.14, 95% CI 1.46–6.79, $p=0.004$), corresponding to a 14-percentage-point increase in probability compared to those with a negative perception. Demographic and facility controls

	Female (<i>n</i> = 115, 28.1%)		Male (<i>n</i> = 295, 71.9%)		Total (<i>N</i> = 410, 100%)	
	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%
<i>Age category</i>						
18–30	16	13.9	52	17.6	68	16.6
30–40	67	58.3	142	48.1	209	51.0
40–50	24	20.9	74	25.1	98	23.9
Above 50	8	7.0	27	9.2	35	8.5
<i>Location</i>						
Urban	67	58.3	197	66.8	264	64.4
Peri-urban	47	40.9	94	31.9	141	34.4
Rural	1	0.9	4	1.4	5	1.2
<i>Education level</i>						
Secondary	1	0.87	1	0.34	2	0.49
Tertiary	114	99.13	294	99.66	408	99.51
<i>Business type*</i>						
Consultation and treatment	52	45.2	174	59.0	226	55.1
Diagnostic center	4	3.5	10	3.4	14	3.4
Pharmacy	59	51.3	111	37.6	170	41.5
<i>Business size</i>						
Solo entrepreneur (1)	22	19.1	38	12.9	60	14.6
Micro business (2–9)	75	65.2	201	68.1	276	67.3
Small business (10–49)	18	15.7	56	19.0	74	18.1
<i>Use an information system to keep track of business income and expenditures</i>						
No	24	20.9	47	15.9	71	17.3
Yes	91	79.1	248	84.1	339	82.7
<i>Financial need</i>						
Never/rarely	39	33.9	94	31.9	133	32.4
Daily/weekly	28	24.4	76	25.8	104	25.4
Monthly	21	18.3	69	23.4	90	22.0
No specific pattern	27	23.5	56	19.0	83	20.2
<i>Digital loan uptake</i>						
No	94	81.7	249	84.4	343	83.7
Yes	21	18.3	46	15.6	67	16.3
<i>Perception of digital loan uptake</i>						
Negative	51	44.4	127	43.1	178	43.4
Neutral	32	27.8	94	31.9	126	30.7
Positive	32	27.8	74	25.1	106	25.9
<i>Risk level assessment</i>						
Low risk taker	41	35.7	90	30.5	131	32.0
Average risk taker	44	38.3	123	41.7	167	40.7
High-risk taker	30	26.1	82	27.8	112	27.3

Table 2. Background characteristics of survey respondents (*N* = 410). *Statistically significant difference with *p* = 0.035.

were not independently associated (*p* > 0.05) Further detailed marginal effects are provided in Supplementary Table 7.

Social factors—risk attitude and positive perception—and the economic factor—acute business financial need (liquidity)—emerged from the survey respondents as the key determinants for digital loan uptake.

Real world loan history data—MCF

Study sample description

In total, we analyzed loans disbursed to 850 facilities, of which the majority were male-owned (74%) (Table 4). More than half of the sample were level 2 facilities (dental clinics, diagnostic centers, dispensaries, eye clinics, pharmacies), and more than 80% were situated in urban areas. Overall, 70% of the facilities had taken a digital loan and 30% a term loan.

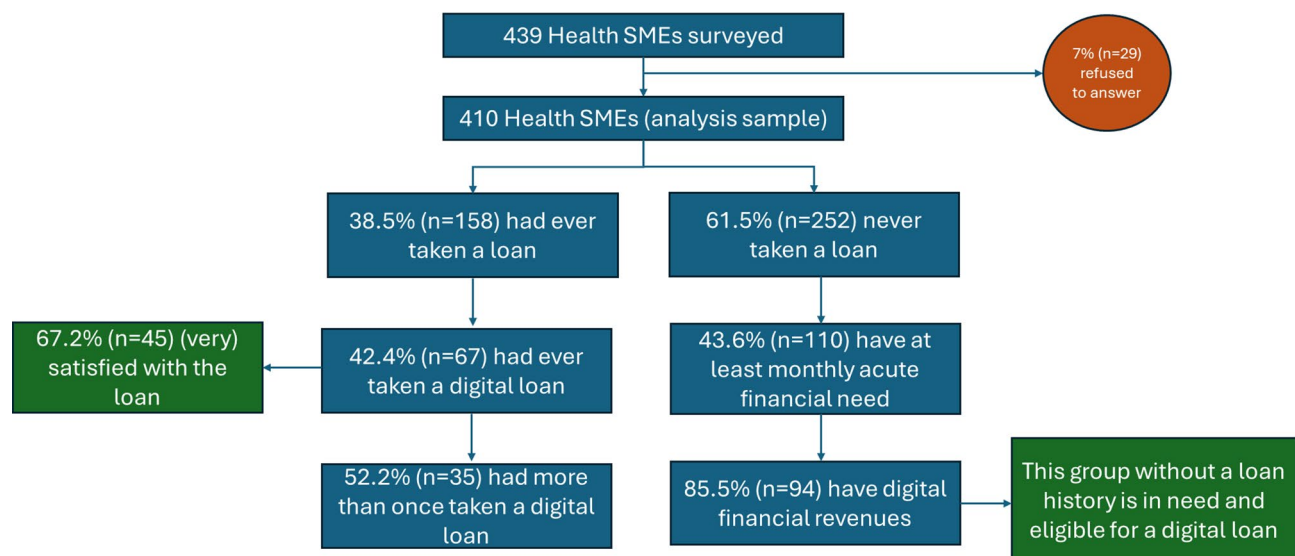


Fig. 2. Flowchart of loan uptake and readiness among Health SMEs.

Table 5 describes the characteristics of loan disbursements stratified by loan type. A total of 6350 loans were disbursed, with most of them being digital loans ($n = 5,939$). This distribution is uneven because, by design, digital loans have a shorter tenor—typically used to finance working capital—which leads to repeat borrowing (with an average of 8 loans per customer in this dataset). The disbursement of term loans decreased over time, as between 2011 and 2015, 275 term loans were disbursed, whereas only ten were disbursed between 2021 and 2024. This can be explained by the fact that smaller term loans were replaced by digital loans since 2017, which also explains the increase in average loan amount for term loans. The large standard deviations in loan size for both loan types demonstrate there are huge variances between loans. Supplementary Figs. 1 & 2 provide an overview of the number and average first loan amount per year.

Gender differences in loan characteristics

We examined gender differences in the first loan amount for both term and digital loans (Table 6). For term loans we found a clear gender gap with partnerships receiving significantly higher first loan amounts (EUR 42,187) compared to female-owned (EUR 10,400) and male-owned (EUR 18,321). Since facility characteristics are likely to influence loan size, we conducted an OLS regression on the log of the first term loan amount, controlling for facility level and location (see Supplementary Table 4). After adjusting for these factors, the significant gender association remained, with a coefficient of 0.39 ($p = 0.022$), implying an estimated 47.7% difference in first loan amounts in favor of men. In addition, facility level 4 emerged as the most likely to secure the largest first term loans. No gender differences were found in the number of repeated term loans. For digital loans, there was also a significant gender difference in the size of the first loan, with partnerships receiving the largest amount (EUR 10,400) followed by male-owned (EUR 4671) and female-owned receiving the lowest amount (EUR 2793). After controlling for facility characteristics in an OLS regression (see Supplementary Table 5), the significant difference between partnerships and female-owned facilities remained but the gender difference disappeared. Facility level 4 again emerged as the most likely to secure the largest first digital loan. We used the growth in loan amount indicator as a proxy for digital revenue growth. More than 50% of the female-owned facilities experienced high growth, which was borderline significant ($p = 0.08$) different from the other two groups. A multinomial regression (see Supplementary Table 6) confirmed a stronger significant association after controlling for facility characteristics indicating that women were more likely to experience high growth (coefficient for male ownership = -0.59 ; $p = 0.006$).

Discussion

This study applied a mixed methods approach to evaluate the readiness, perspectives and gender disparities in (digital) loan characteristics among health SMEs in Kenya. We interviewed 24 and surveyed 410 health SME owners. We identified a moderate demand for loans among Kenyan health SMEs. Additionally, we used real-world loan history data from 850 health SMEs in Kenya to evaluate gender differences in digital and term loans. We identified a gender gap in the first disbursed term loan amount, with female-owned businesses receiving the lowest amounts and partnerships the highest. In contrast, this gender gap disappeared for digital loans. Both survey findings and real-world loan history data demonstrate that female entrepreneurs are digitally financially included. This study adds to the evidence on health financing options for health SMEs to promote financial inclusion for female health entrepreneurs.

The gender distribution in the survey and administrative loan data was comparable, suggesting that men and women have similar access to finance. However, the sample indicates that most health SMEs are male-owned. This unequal gender distribution in ownership, while the health workforce is dominated by women, is likely

	Odds ratio (95% CI)	P-value
<i>Background characteristics</i>		
<i>Gender (Men)</i>	<i>Ref</i>	<i>Ref</i>
Women	0.77 (0.41–1.44)	0.416
<i>Age category (18–30)</i>	<i>Ref</i>	<i>Ref</i>
30–40 years	0.70 (0.32–1.54)	0.377
40–50 years	0.99 (0.38–2.56)	0.983
Above 50 years	2.72 (0.87–8.49)	0.085
<i>Years in business</i>	1.02 (0.97–1.07)	0.476
<i>Location business (Urban)</i>	<i>Ref</i>	<i>Ref</i>
Peri-urban	1.40 (0.77–2.56)	0.269
Rural	1.86(0.16–21.28)	0.619
<i>Business size (Solo Entrepreneur (1))</i>	<i>Ref</i>	<i>Ref</i>
Micro Business (2–9 employers)	1.28 (0.57–2.84)	0.547
Small Business (10–49 employers)	0.64 (0.17–2.38)	0.507
<i>Business type (consultation & treatment)</i>	<i>Ref</i>	<i>Ref</i>
Pharmacy	1.90 (0.95–3.76)	0.068
Diagnostic centre	1.04 (0.12–9.32)	0.970
<i>Financial need (never/rarely)</i>	<i>Ref</i>	<i>Ref</i>
Daily/weekly	2.28 (0.94–5.52)	0.067
Monthly	4.22 (1.74–10.24)	0.001**
No specific pattern	1.31 (0.49–3.53)	0.591
<i>Behavior characteristics</i>		
<i>Risk attitude (low risk taker)</i>	<i>Ref</i>	<i>Ref</i>
Average risk taker	1.54 (0.69–3.44)	0.295
High-risk taker	2.32 (0.99–5.41)	0.052*
<i>Perception towards digital loans (Negative)</i>	<i>Ref</i>	<i>Ref</i>
Neutral	1.52 (0.70–3.34)	0.293
Positive	3.14 (1.46–6.79)	0.004**
<i>Cons</i>	0.03 (0.01–0.12)	0.000
<i>Number of observations</i>	410	
<i>Pseudo R²</i>	0.14	

Table 3. Logistic regression on the uptake of digital loans ($N = 410$). * $p < 0.05$ (statistically significant); ** $p < 0.01$ (highly statistically significant); *** $p < 0.001$ (very highly statistically significant).

associated with another gender gap linked to differences in career opportunities. This gender distribution of SME ownership is also documented in a 2021 survey conducted by the Kenya Bankers Association (70% male-ownership)⁵⁸, suggesting that, in terms of gender, our sample is well representative for the country. Additionally, our IDI and survey sample may appear biased due to the inclusion of only higher-educated respondents. However, the target population—health sector entrepreneurs—typically requires tertiary education to establish and manage such enterprises effectively. Thus, this reflects the population's characteristics rather than sampling bias.

The survey results identified that four in every ten health SME owners had ever taken a loan; with most opting for bank loans, while fewer than half had used digital loans. The majority of the surveyed health SME owners had not taken a loan for their businesses, while more than half of them reported an acute business financial need, at least monthly. In contrast to these findings, other studies documented that the businesses' operational costs, accessibility of digital platforms, credit information sharing and the cost of credit^{53,59,60} increased the likelihood of loan uptake, whereas high cost of credit and bureaucracies with bank loans were deterrents⁵⁹. The qualitative findings highlight poor reputation and low trust in digital lenders among health SME owners, yet the survey findings showed high satisfaction among those who had used digital loans, suggesting mistrust is stronger among those without direct experience. A study by the Consultative Group to Assist the Poor (CGAP) also found that lack of trust hindered digital loan uptake among SMEs⁶¹. Trust also emerged as a strong determinant of digital loan uptake from studies conducted in Cameroon and Nigeria^{62,63}. Additionally, the survey findings also showed that irrespective of gender, high risk-takers, those with monthly acute business financial needs, and those with a positive perception of digital loans were more likely to use them. Similarly, perceived financial needs, ease-of-use, easy accessibility, and perceived usefulness of mobile platforms promoted digital loans uptake^{60,64}. These findings demonstrate the importance of effective information dissemination by lenders to build trust and promote digital loan uptake.

In the real-world loan history data, a small proportion (6%) of the included health SMEs were classified as partnerships (with the majority 50/50 male-female ownership). Our findings show that they secured the highest

	Female-owned (19.8%, <i>n</i> = 168)	Male-owned (74.1%, <i>n</i> = 630)	Partnership ³ (6.1%, <i>n</i> = 52)	Total (100%, <i>N</i> = 850)
Facility type ¹	% (<i>n</i>)	% (<i>n</i>)	% (<i>n</i>)	% (<i>n</i>)
Level 1	0.6 (1)	1.3 (8)	0 (0)	1.1 (9)
Level 2	57.7 (97)	53.8 (339)	34.6 (18)	53.4 (454)
Level 3	36.3 (61)	36.8 (232)	46.2 (24)	37.3 (317)
Level 4	4.2 (7)	7.3 (46)	19.2 (10)	7.4 (63)
Other	1.2 (2)	0.8 (5)	0 (0)	0.8 (7)
Location	% (<i>n</i>)	% (<i>n</i>)		% (<i>n</i>)
Urban	84.5 (142)	80.6 (508)	90.4 (47)	82.0 (697)
Rural	15.5 (26)	19.4 (122)	9.6 (5)	18.0 (153)
Loan type ^{*2}				
Digital	61.3 (103)	71.3 (449)	86.5 (45)	70.2 (597)
Term	38.7 (65)	28.7 (181)	13.5 (7)	29.8 (253)

Table 4. Facility characteristics (*N* = 850). ¹ level 1 (community health posts), level 2 (dental clinics, diagnostic centers, dispensaries, eye clinics, pharmacies), level 3 (health center, maternity home, outpatient center), level 4 (primary hospital), “other” (equipment suppliers and support service companies). * *p*-value ≤ 0.05 ² Some facilities have both loan types³ The majority of the partnerships are a duo-ownership of a male and female. One facility has ten owners, two facilities have five owners, three facilities have four owners, and four facilities have three owners.

	Digital (<i>N</i> = 5,939, 93.6%)	Term (<i>N</i> = 404, 6.4%)	Total (<i>N</i> = 6,343, 100%)
Number of loans	% (<i>n</i>)	% (<i>n</i>)	% (<i>N</i>)
2011–2015	n/a	100 (275)	100 (275)
2016–2020	94.7 (2145)	5.3 (119)	100 (2264)
2021–2024	99.7 (3794)	0.3 (10)	100 (3804)
Average loan amount in EUR	μ (sd)	μ (sd)	μ (sd)
2011–2015	n/a	14,814 (28,530)	14,814 (28,530)
2016–2020	5210 (13,307)	42,564 (63,862)	7174 (21,184)
2021–2024	7534 (19,210)	98,607 (103,848)	7773 (20,379)
Interest rate in %	μ (sd)	μ (sd)	μ (sd)
2011–2015	n/a	17.5 (2.7)	17.5 (2.7)
2016–2020	23.2 (6.2)	15.4 (3.3)	22.8 (6.4)
2021–2024	34.8 (14.9)	22.6 (3.4)	34.8 (14.9)
Repayment period in days	μ (sd)	μ (sd)	μ (sd)
2011–2015	n/a	508.6 (445.4)	508.6 (445.4)
2016–2020	114.5 (175.3)	867.6 (521.6)	154.1 (267.5)
2021–2024	102.0 (132.5)	222.6 (120.0)	102.4 (132.6)

Table 5. Disbursed loans between 2011–2024 by MCF (*N* = 6,350).

first loan amounts and experienced substantial growth in their digital loan journeys. A possible explanation for this finding could be that partnerships are owned by multiple stakeholders and may therefore in general dare to take more risks than single borrowers. In addition, 20% of partnership-owned health SMEs in our sample were classified as a level 4 facilities, compared to just 5% among female- and male-owned health SMEs, which is an explanatory factor for a higher loan uptake. Similar to our findings, other studies have shown that female-owned firms are less likely to access formal bank credit, but that this disparity disappears after accounting for firm characteristics like size⁶⁵. This suggests that differences in access to finance may be driven more by firm attributes than the owner’s gender; a concept referred to as the *unconditional gender gap*. Women are more likely to operate smaller clinics or less capital-intensive businesses, which reduces their likelihood of qualifying for or seeking larger loans^{66–68}. These patterns reflect not necessarily financial exclusion, but gendered business preferences and constraints.

A potential explanation for the lower initial loan amounts disbursed to women is their tendency to be less risk seeking compared to men. Women may be less inclined to accept the highest loan offers, opting instead for a safer, smaller (initial) loan size, while men are more inclined to take on larger, riskier loans. This gender difference in risk attitude is extensively reported in the literature^{69–71} and, in this context, may be linked to the

	Female (<i>n</i> = 109, 27.0%)	Male (<i>n</i> = 272, 67.3%)	Partnership (<i>n</i> = 23, 5.7%)
Term loans (<i>N</i> = 404) ¹	<i>μ</i> (sd)	<i>μ</i> (sd)	<i>μ</i> (sd)
First loan amount**	10,400 (26,395)	18,321 (40,267)	42,187 (53,799)
Repeated loans	1.7 (0.9)	1.5 (0.8)	2.6 (1.9)
Digital loans (<i>N</i> = 5939) ²	Female (<i>n</i> = 1126, 19.0%)	Male (<i>n</i> = 4397, 74.0%)	Partnership (<i>n</i> = 416, 7.0%)
	<i>μ</i> (sd)	<i>μ</i> (sd)	<i>μ</i> (sd)
First loan amount***	2793 (7187)	4671 (14,261)	10,400 (18,691)
Growth in loan amount	1138 (5382)	1316 (12,255)	3809 (24,119)
Growth in loan categories*			
No growth (<0), % (<i>n</i>)	23.8 (40)	22.4 (141)	30.8 (16)
Moderate growth (0–7499), % (<i>n</i>)	23.2 (39)	33.2 (209)	28.9 (15)
High growth (7500–100,527), % (<i>n</i>)	53.0 (89)	44.4 (280)	40.4 (21)
Repeated loans	9.0 (11.6)	8.8 (11.2)	8.5 (7.9)

Table 6. Gender differences in loan characteristics. Variables highlighted in *italic* are statistically significant.

¹ANOVA test is performed on log-transformed value and Kruskal-Wallis test on the repeated loans indicator.

²ANOVA test is performed on log-transformed value and Chi² test on categorical variable. *P-value = 0.08.

P-value < 0.05. *P-value < 0.000 but significant difference disappears after controlling for facility level and location.

fact that women often manage multiple responsibilities, such as family care, making them less likely to take risks in their professional life. This has also been documented by studies conducted by König et al. and Morsy^{72,73}. However, our findings suggest that female-owned health SMEs benefit significantly from digital loans, with over 50% experiencing substantial growth in digital revenues after taking an MCF digital loan. This suggests that digital loans may play a key role in their business success. Nevertheless, this conclusion should be interpreted cautiously, as it is based solely on digital revenue growth, without insights into the broader distribution of their cash and digital earnings.

Our findings suggest that digital loans may offer a viable pathway to reducing gender disparities in access to finance among health SMEs in Kenya. While traditional term loans, showed a significant gender gap, with women receiving about 48% less than men on their first loan, no such disparity was observed for digital loans. This is likely due, at least in part, to the automated, data-driven nature of digital lending, which relies on recent mobile money revenue data rather than asset-based collateral or subjective assessments. By removing these common barriers, digital loan products offer a more inclusive model, especially for women who are often underserved by traditional financial systems. However, the typical size of digital loans (EUR 100 to 200,000) is considerably smaller than traditional loans. Given that women are generally more risk averse, they may be naturally drawn to these smaller, lower-risk products. Therefore, while digital loans show potential to improve gender equity, it remains unclear whether they can close the gap when larger, long-term financing is required.

Strengths and Limitations

We used IDIs to design the survey, which is a strength of the study as we have optimized context specific information. Another key strength of this study is that we analyzed unique real-world data spanning a broad time window (2011–2024); the loan-history data is not self-reported but drawn from administrative records, making it highly reliable. We acknowledge the following limitations. Firstly, the survey findings were self-reported which may have led to selection and information bias. Secondly, while most IDIs were conducted in person, a subset was conducted via telephone. This mode of communication may have limited the depth of responses compared to in-person interviews, potentially influencing the richness of the findings. Thirdly, while the growth in digital revenues was not the primary focus, it would have been beneficial to compare digital revenue growth with health SMEs that did not receive loans to better quantify the loan product's impact. Lastly, we only had data on approved loans, while including data on rejection rates and requested loan size would have provided additional insights. To address this gap, we conducted surveys with health SMEs without a loan history with MCF to better understand their landscape and readiness for digital loans.

Conclusions and policy implications

This study highlights a significant financing gap among health SMEs in Kenya, with notable difference in loan uptake and amounts highly favoring partnership-owned health SMEs. Despite comparable access to finance between men and women, most health SMEs remain male-owned, reflecting broader gender disparities in business ownership. Expanding social support networks for female entrepreneurs could foster trust and encourage greater participation of women in the financial credit market. Given the low trust in digital lenders, especially among those without prior experience, digital loan literacy and trust-building campaigns among female entrepreneurs must be prioritized: improving information dissemination and reputation through media and marketing campaigns is crucial to build confidence in digital financial products. Further, financial and digital literacy programs and trainings – especially for women – on using mobile loans safely could be done.

Overall, our findings underscore the need for customized loan products and support services that address firm characteristics, risk attitudes, and gender-specific barriers to finance.

Data availability

The data is available upon reasonable request by contacting CD (c.dieteren@pharmaccess.org).

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Author contributions

CD conceptualized the study. J.A.A., M.A. and J.S. designed the mixed methods study, collected and analyzed the data; CD analyzed the MCF data and survey data; all authors were involved in the interpretation of the data, J.A.A and C.D. wrote the initial draft manuscript with input from M.A., all authors reviewed and approved the final manuscript for submission.

Declarations

Competing interests

The authors declare no competing interests.

Additional information

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