After Access 2022-2023, Digital Africa Post the Pandemic:

Kenya Report

Margaret Nyambura Ndung'u, Abdiaziz Abdikadir Ahmed, Mariama Deen-Swarray, Mpho Moyo, Nawal Omar, Tapiwa Chinembiri & Andrew Partridge

RESEARCH ICT AFRICA

Workshop 17
17 Dock Road
V&A Waterfront
Cape Town, 8001
Cape Town, South Africa
Phone: +27 21 447 6332
Fax: +27 21 447 9529
www.researchictafrica.net

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Report authors: **Margaret Nyambura Ndung'u, Abdiaziz Abdikadir Ahmed, Mariama Deen-Swarray, Mpho Moyo, Nawal Omar, Tapiwa Chinembiri & Andrew Partridge**

Principal investigator and editor of the *2023 African After Access Survey: Digital Africa Post the Pandemic Policy Paper Series*: **Alison Gillwald**

Project lead: **Andrew Partridge**

Project manager: **Naila Govan-Vassen**

Technical advisor: **Alexandre Barabosa**, Centre of Excellence in Information and Communication Technologies (Cetic.br)

Research editor: **Alan Finlay**

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Executive Summary

Digitalisation is a crucial enabler of economic growth and development in Kenya. Recognising its transformative potential, the government has prioritised digital technology in its Vision 2030 strategy as a key driver of economic advancement. This strategy proposes the adoption of information communication technologies (ICTs) in the education sector to foster digital literacy and prepare students for a technology-driven future. Integrating ICTs into public service delivery, security-related issues and business services, among others, are all initiatives within the strategy to leverage technology to enhance services and opportunities for citizens.

This report draws on demand-side data from Research ICT Africa's (RIA) 2022 After Access survey in Kenya, comparing this to survey results from 2012 and 2018, as well as to data from other African countries included in the survey in order to provide a regional perspective. The report is divided into two sections. The first offers a policy, legislative and market overview and includes an analysis of trends in pricing and internet speeds. The second part reports in detail on the results of the demand-side survey data, and includes accounts of internet access and use, financial inclusion, and the use of digital technologies by microenterprises. The demand-side analysis is disaggregated by gender, location, age, income and educational attainment.

The findings to this report show that while there are positive trends in internet access and use in the country, major challenges limiting access and use exist. These are primarily driven by the intersectional factors of income, age, geographical location and education. Although the gender gap in internet access in Kenya has narrowed significantly, with access to the internet more than doubling for women compared to the previous After Access survey in 2018, the gap is still high when compared to a country such as South Africa.

Internet access has increased in both urban and rural areas, driven by access to smartphones. However, both the cost of devices and the cost of data prevent people from using the internet as much as they would like to. Nearly half of the respondents surveyed said that they lacked a device to get online – a significant increase from 2018 – and the cost of data prevented half of the microenterprises surveyed from using the internet. At the same time, while more people have become aware of the internet, they do not necessarily have the digital skills to use it. As a result, those accessing the internet in Kenya are likely to have both higher levels of education and income, highlighting the need for policy interventions targeting marginalised population segments.

Access to the internet in Kenya has doubled since 2018, increasing from 25% to 50% in 2022. This rapid growth underscores a transformative shift in digital connectivity across the country, particularly over the period of the COVID-19 pandemic. This aligns with results in South Africa and Ghana, two other countries included in the After Access survey, although the growth rate in Ghana more than doubled over the same period from 26% in 2018 to 57% in 2022. The growth in internet access over the past decade has been at a notably faster rate among females compared to males. The share of males with access to the internet in Kenya increased from 30% in 2018 to 56% in 2022, while access among women more than doubled, increasing from 21% in 2018 to 44% in 2022. This has led to a significant narrowing of the gender gap in the country, which stood at 60% in 2012, decreased to 36% in 2018 and further decreased to 23% in the 2022 survey. Despite this positive trend, the gender gap remains significant and higher than South Africa, where the gender gap was 2% in 2022. Internet access in rural areas increased significantly between the last two rounds of the survey, from 15% in 2018 to 40% in 2022. This is aligned with the government commitment through the Kenya National Digital Master Plan (2022-2032) to roll out 100 000 kms of fibre-optic cable to all 1 450 wards across the country. It further aligns with the Kenya National Broadband Strategy (2018-2023) that targeted 100% connectivity through the deployment of 3G, 4G and 5G networks. Access in urban areas also increased from 53% to 69% over the same period. This resulted in a reduction in the location gap from 146% to 58%.

Access levels were found to increase with higher levels of education and income. This confirms the findings from previous After Access surveys where income and education were the main drivers of digital access, implying that the continued inequalities across gender and location are a result of inherent structural inequalities in society. In terms of age, younger female adults had higher internet access and use levels than males in the same age cohorts, however large gender gaps still existed for older adults. The overall gender gap in internet access and use is still slightly in favour of men, a reflection of the high concentration of females around the lower education and income levels where access is notably lower.

While the location gaps continue to favour those in urban areas, the gap seems to be close to equal among the youth, an indication that youths in rural areas are as likely to access the internet as youths in urban areas. The urban-rural gap declines with higher educational attainment, such that individuals in rural areas with a tertiary, and even a secondary education, are almost as likely to use the internet as individuals with the same educational attainment in urban areas. This reflects the findings from the modelling that education is a positive and significant determinant of internet access and that once individuals have the same level of education and are provided with similar internet facilities the urban-rural gap narrows.

A lack of awareness about what the internet is was the main barrier to internet access in the 2018 round of the survey, preventing about 62% of adults from accessing the internet. However, the 2022 survey showed that this barrier had significantly decreased to 17%, reflecting increased awareness over time. Meanwhile, the inability to speak English was found to have an impact on internet access, with those who speak English more likely to be able to access and use the internet compared to those who cannot speak English. This highlights the importance of investing in and encouraging local digital content creation in indigenous languages.

The internet was found to be primarily used for social and entertainment purposes rather than for economic activities, with 94% of internet users and 72% of the adult population indicating that social purposes was the main reason they go online.

Mobile phones have and continue to be the device mostly used to access the internet, with 97% of internet users in Kenya using a smartphone to get online. The increase in smartphone ownership among the adult population in Kenya from 25% in 2018 to 46% in 2022 is a promising development in terms of getting more people in the country online. While this figure can be considered moderate, it is worth noting that there has been an increase in smartphone ownership for both males (29% to 53%) and females (21% to 40%) between 2018 and 2022. Smartphone ownership also increased among the rural adult population from 15% in 2018 to 36% in 2022, compared to an increase from 51% in 2018 to 66% in 2022 in urban areas. This has resulted in a decline in the smartphone ownership gap between 2018 and 2022.

However, in the 2022 round of the survey, the lack of access to a device was the main barrier to internet access, with 46% of the adult population citing this as a barrier. This was a sharp increase from 15% in 2018. The lack of an access device to go online was also reported as a barrier for both men and women, though more so for women (55%) than for men (41%). This was also the case for urban (63%) and rural (42%) dwellers, where the lack of an access device was the most cited barrier for accessing the internet.

Internet speed and quality are reported to have improved (from 12% in 2018 to 3% in 2022). However, while Kenya ranked favourably in comparison to other countries in terms of 1GB data costs, this is not reflected in the survey results as the cost of data remained a limiting factor preventing people from using the internet as much as they would like. Some 57% of internet users in 2022 indicated that the high cost of data limited their use of the internet, compared to 45% in 2018. While data cost as a limiting factor seemed to be the same for female and male internet users (57%), it was more of a limitation for rural dwellers (61%) than for urban dwellers (52%).

Mobile money continues to drive financial inclusion in Kenya. Financial inclusion has continued to increase over the years, reaching 92% in 2022. The share of the adult population with bank accounts showed no significant growth between 2012 and 2018, remaining at around 35% over this period. On the other hand, mobile money account ownership increased to 91% in 2022, from 71% in 2018 and 61% in 2012.

The gender gap in financial inclusion has decreased from 20% in 2012 to 14% in 2018 and to 3% in 2022, making financial access close to universal. The increase in financial inclusion between 2018 and 2022 was larger for females (72% to 91%) than for males (83% to 93%), which contributed to the significant drop in the gender gap in 2022. While financial inclusion is still higher in urban areas compared to rural areas, it grew more in rural areas between 2018 and 2022 (73% to 90%) compared to urban areas (87% to 97%). This led to a reduction in the financial inclusion location gap from 19% in 2018 to 8% in 2022.

Individuals with higher income and those who had attained higher levels of education were more likely to be financially included. As with internet access, levels of income and education were found to be major determinants of financial inclusion, exhibiting a positive relationship.

There was a relatively high level of smartphone ownership among microenterprises in Kenya, with 48% of respondents indicating that they had a smartphone used for business purposes. However, only 26% of microenterprises claimed to use the internet for business purposes, a slight increase from the 24% reported in the 2018 survey, but still concerningly low. Half of the microenterprises using the internet claimed that the high cost of mobile data prevented them from making use of the internet more for business purposes. Financial inclusion amongst microenterprises was nevertheless relatively high with 88% of microenterprises indicating that they had either a mobile money or bank account.

Policy recommendations

Based on these findings, the following recommendations are made:

- **Strengthen policy, legal and regulatory frameworks:** The current legal and regulatory framework needs to be strengthened to respond better to the emerging data-driven economy. In particular, the National Data Policy needs to be passed, and its corresponding Data Protection Act (2019) updated to respond to the current realities. Agile regulatory mechanisms such as regulatory sandboxes also need to be explored across regulatory interventions.
- **Address data and device costs:** The regulator should ensure mobile network operators offer more affordable and competitive tariffs and packages, collaborate to address common challenges in infrastructure, spectrum, and resources, and explore opportunities to deepen inclusion. Public-private cooperation to mobilise and deploy capital in the provision of affordable digital devices also need to be explored.
- **Review taxation policies:** There is a need to reassess the current taxation framework, especially the digital service tax and the excise duty on imported mobile phones and SIM cards, to alleviate the financial burden on consumers and businesses.
- **Invest in digital infrastructure with a focus on rural and underserved areas:** There is a need to invest in digital infrastructure, including last-mile infrastructure, to bridge the digital divide. In particular:
    - A clear roadmap and milestones need to be developed for National Digital Master Plan (2022) commitments to fibre-optic roll-out. There is huge broadband capacity from the submarine cables with landing points in Kenya whose use is mainly concentrated in urban areas, causing many in the rural areas to rely on mobile connectivity for internet access. Moreover, there are still many counties across the country that face connectivity challenges. Investing in the roll-out of fibre-optic networks to these less-connected counties is therefore necessary.
    - Sustainable models of investment in the deployment of broadband infrastructure to enable equitable access to high-speed internet should be explored, particularly in rural and underserved areas. This should include fostering public-private partnerships to facilitate nationwide deployment of 4G and 5G mobile networks.
    - There is a need to address challenges encountered during 5G pilot tests, such as device compatibility and coverage limitations.
    - The Communications Authority should consider using the universal access fund to extend last-mile connectivity to community centres, public schools, health centres and public administration offices across the country to facilitate access.
    - There is a need to assess the current mode of digital infrastructure development and address the emerging challenges including the meaningful involvement of the private sector and targeted communities to ensure sustainability.
- **Develop targeted programmes to address intersectional digital inequalities:** Targeted programmes at different levels are needed to address the digital divide, with a focus on gender, income and geographic disparities. This could entail supporting women in tech initiatives, subsiding internet access for low-income households, and deploying mobile internet access points in remote areas. The shift from basic and feature phones towards smartphones over the years is something that can be leveraged to promote internet access and use as well as financial inclusion.

- **Promote innovation and digital entrepreneurship:** There is a need to support the growth of digital entrepreneurship by introducing start-ups to existing mentorship programmes run by development partners like the International Telecommunication Union and facilitating access to capital and markets to encourage the development of local content and applications that are culturally relevant. The extent to which social media platforms can be leveraged as economically productive access channels should be explored.
- **Address barriers to digital literacy and awareness:** There is a need to invest in digital literacy and awareness programmes for citizens and to introduce these early in the education curriculum. Consumer rights and civil society groups should collaborate with the government, regulators, operators and development partners to implement these programmes widely. Digital literacy and awareness programmes should also be tailored for microenterprises, including offering examples of how the use of digital technologies can improve business practice.

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PART A: Introduction and supply-side analysis

1. Introduction

1.1. Digitalisation and sustainable development

When giving the 2020 Nelson Mandela Lecture, United Nations (UN) Secretary General António Guterres highlighted digital transformation as one of two "seismic shifts" which would shape the 21st Century, the other being climate change. Guterres also warned that on the current trajectory both stood to potentially widen global inequalities (Guterres, 2020). With digitalisation spreading to all corners of the globe it has become evident that digital inequalities largely reflect the systematic inequalities underpinning societies, and as the world becomes increasingly digital this can exacerbate existing inequalities in a vicious cycle which unless addressed will result in further marginalisation of the marginalised (Gillwald & Partridge, 2022).

The increasing rendering of activities into quantifiable data, or "datafication", has provided policymakers, researchers and the private sector with powerful tools to monitor and evaluate populations and to develop strategies to explicitly meet their needs (Cukier & Mayer-Schoenberger, 2013). This means, however, that policymaking and decision-making is based on the plight of the digitalised and essentially ignores those who are not, specifically the most marginalised who should in fact be at the centre of policymaking processes. This makes digital access inequalities important, not just to address the need for access to an increasingly digital global economy but also because it ensures visibility in policymaking processes.

The UN Sustainable Development Goals (SDGs) recognise the importance of digital technologies for sustainable development. The Global SDG Indicator Framework includes seven indicators which directly reference information communication technologies (ICTs). These fall under SDG 4 ("Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all"), SDG 5 ("Achieve gender equality and empower all women and girls"), SDG 9 ("Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation"), and SDG 17 ("Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development") (United Nations, 2023). However, equitable digitalisation will have significant impacts on progress towards all 17 SDGs (International Telecommunication Union, 2017).

Digitalisation is a crucial enabler of economic growth and development in Kenya. Recognising its transformative potential, the Kenyan Government has prioritised digital technologies in its Kenya Vision 2030 strategy as a key driver of economic advancement. According to the 2023 report on Kenya's digital economy by GSMA, the association for mobile network operators (MNOs), integrating digital technologies into sectors such as agriculture, manufacturing, transport, and trade could significantly boost Gross Domestic Product (GDP), generate substantial tax revenues, and create hundreds of thousands of jobs by 2028. The sectors it considers collectively account for 58% of the country's GDP. Reflecting this trend, Kenya's ICT output value increased by 5.8% to reach KES 6 040.2 billion in 2023. Additionally, mobile subscriptions grew slightly from 65.7 million in 2022 to 66.7 million in 2023, indicating a continued expansion of digital connectivity nationwide.

A key challenge in monitoring progress towards the SDGs is the large data gaps which exist in the developing world. The 2022 UN Sustainable Development Report (United Nations, 2022) highlights:

- for eight out of 17 SDGs, less than half the 193 countries or regions have internationally comparable data from 2015 or later;
- for SDG 13 ("Take urgent action to combat climate change and its impacts"), only 20% of countries have data available;
- only 21 of the 32 SDG indicators that require gender disaggregation have disaggregated data available (where availability requires more than 80% of countries to have at least one data point since 2015);
- for eight indicators, no gender disaggregated data is available at all;
- only seven out of 21 SDG indicators requiring disaggregation by both gender and age have data available;

- only two out of 10 SDG indicators requiring disaggregation by disability status have disaggregated data available; and
- major data gaps exist across several other layers of disaggregation.

These shortcomings in SDG monitoring highlight the importance of equitable digitalisation in the developing world, but even more critically highlight the importance of not relying on digital databases to monitor sustainable development progress. There is instead a need for nationally representative data sources that go deeper into critical development issues than is possible through censuses.

1.2. Objectives and primary research question

The purpose of this report is to assess the state of digitalisation in Kenya and the progress made in terms of the country's digitalisation objectives. It aims to identify the drivers behind digital technology adoption in the country and the major barriers holding back progress, in the process also highlighting digital inequalities that are resulting in uneven developments. It does this by drawing on Research ICT Africa's (RIA) After Access surveys for 2012, 2018 and 2022 in Kenya, as well as the results from six other African countries included in the survey.[1] It moves beyond access alone to look at how digital technologies are being used and where individuals are limited in their use. Importantly, it does not just look at the situation of the connected but also assesses the situation for those who have as yet been unable to access digital technologies.

2. Country context

2.1. Country profile

Kenya had a population exceeding 54 million in 2019, according to the Kenya population and housing survey (Kenya National Bureau of Statistics, 2019). It is a country that is renowned for its economic dynamism and has exhibited remarkable resilience and growth over the past decade. The country recorded a GDP of USD 113 billion in 2022, translating to a per capita GDP of USD 2 099 (World Bank, 2024). This places Kenya among the leading economies in Sub-Saharan Africa, with a contribution of 6% to the region's overall GDP. Kenya's economy is multifaceted and characterised by a blend of traditional sectors, such as agriculture and tourism, and emerging industries, such as technology and services. In 2021, the agricultural sector accounted for 21.5% of GDP with other notable sectors including transportation and storage (12.4%), tourism (10.4%), real estate (8.6%), wholesale and retail (7.9%), manufacturing (6.9%), the financial and insurance sector (7.6%), and construction (7.1%). Despite historical efforts by the government of Kenya, the ICT sector's contribution to GDP remains relatively low at 2.4%. Nevertheless, collectively this data underlines the diversified nature of Kenya's economy and the pivotal roles played by various sectors in its economic landscape (Kenya National Bureau of Statistics, 2022). Moreover, the country boasts a robust infrastructure network encompassing modern transportation systems and a well-established financial sector, fostering an environment conducive to both domestic and foreign investment (Baraza et al., 2022).

Kenya however also grapples with persistent challenges including high unemployment rates, income inequality, and low levels of financial inclusion for segments of the population. The country's Gini coefficient stood at 38.7 in 2025 suggesting a moderate level of income inequality. In addition, its unemployment rate was 5.6% in 2021. Even though strides have been made to enhance financial inclusion, a significant segment of the population, particularly in rural areas, remains excluded from formal financial services. According to the 2021 FinAccess Household Survey, a nationally representative survey conducted by the Kenya National Bureau of Statistics (KNBS), 11.6% of Kenyans still lack access to essential formal and informal financial services, with financial inclusion gaps evident across demographics such as age, education level, gender, income, and the rural-urban divide (Kenya National Bureau of Statistics et al., 2021). The digital divide in Kenya persists, with significant disparities in the use of digital technologies and the internet between urban and rural regions, which are compounded by the similar demographics of gender, age, income, and education, alongside affordability factors (Nyambura Ndung'u et al., 2019). Rectifying these structural socio-economic disparities requires concerted efforts from policymakers,

[1] South Africa, Nigeria, Uganda, Ethiopia, Tanzania, and Ghana

businesses, and civil society to foster inclusive growth and ensure that the benefits of economic progress are equally distributed across society (Gillwald & Mothobi, 2019).

2.2. COVID-19 impacts

The first official case of COVID-19 was recorded in Kenya on 12 March 2020 with more than 300 million cases being confirmed worldwide over the subsequent three years (World Health Organization, 2023). As of 2024, there were 5 689 deaths as a result of the pandemic in Kenya. The COVID-19 pandemic had wide-ranging effects on Kenya's economy, with lockdowns and movement restrictions being one of the several contributing factors. These measures led to disruptions in supply chains, reduced consumer demand, and resulted in widespread job losses across different industries, thus impacting the livelihoods of Kenyan households (Janssens et al., 2021; Pape et al., 2021). The tourism sector, a significant contributor to Kenya's GDP, experienced a severe downturn as international travel restrictions and fear of infection resulted in hotel closures and layoffs (Muragu et al., 2023; Wathuta et al., 2022). Additionally, the agricultural sector faced challenges due to disruptions in input supply chains, reduced access to markets, improved seeds and fertilisers, and challenges with access to extension services, thus impacting both production and livelihoods in rural areas (Mutegi et al., 2024).

Moreover, the pandemic exacerbated existing socio-economic inequalities, disproportionately affecting vulnerable groups such as informal sector workers (Gundertofte et al., 2022; E. O. Onyango et al., 2021), women (Decker et al., 2021; Yeboah & Yaya, 2023), children (Yeboah & Yaya, 2023), and the youth (Enane et al., 2021). The closure of schools and disruption of learning activities highlighted disparities in access to education and digital infrastructure, widening the education gap between urban and rural areas (Ochieng & Waithanji Ngware, 2023). Despite these challenges, the pandemic also catalysed innovation and resilience, with businesses and individuals adapting to remote work arrangements, embracing digital technologies, and exploring new avenues for economic growth (Onyango & Ondiek, 2022).

2.3. Performance on global digital indicators

Most digital indices rely on supply-side data collected by the International Telecommunication Union (ITU), which have been identified as patchy and incomplete. This is the case for the World Economic Forum (WEF) Network Readiness Index (NRI),[2] which draws on ITU data and a number and other qualitative sources to evaluate the readiness of 134 economies to leverage ICTs for enhanced competitiveness and well-being. The NRI assesses four key pillars – technology, people, governance, and impact – to gauge the overall ICT environment and broader economic and social implications of ICT adoption (impact pillar). The 2023 NRI ranks Kenya 70th out of 134 economies, surpassing some other upper-middle-income countries such as South Africa. It outperformed most countries in East Africa for each of the four pillars, and the country's score for the index's 12 sub-pillars was higher than the regional average for each of the sub-pillars. Kenya's strength is showcased in areas such as trust, regulations, and inclusion. The digital technology domain, where the country ranks 65th, and its solid digital governance framework, which was ranked 61st, are notable highlights. These are augmented by significant investments in computer software (ranked 28th) and a focus on adopting emerging technologies (ranked 33rd), both of which propel its ranking in the domain of future technologies (ranked 49th). A strong performance across the governance spectrum underpins a secure and trustworthy digital environment.

Meta, formerly known as Facebook, and Economist Impact, formerly the Economist Intelligence Unit (EIU), have collaboratively developed the Inclusive Internet Index (3i).[3] This index evaluates 100 countries using a holistic methodology to assess access, affordability, relevance, and readiness. This multifaceted approach considers demand and supply-side factors relevant to internet access and quality.

In the 2022 3i, Kenya ranked 58th globally, and second out of the 26 Sub-Saharan African countries included in the index. Despite experiencing a year-on-year decline in relevance, due to drops in the value of e-health and

[2] https://networkreadinessindex.org/
[3] https://impact.economist.com/projects/inclusive-internet-index/

e-commerce, the country ranked first in this pillar in the region. Kenya was placed third regionally in readiness owing to increasing government efforts to promote 5G and trust in online privacy. The country also ranked second in terms of both availability and affordability in Sub-Saharan Africa. Globally, the country ranked high in readiness, securing 21st position among the 100 countries, and reflecting robust user capabilities and supportive policy frameworks. However, challenges persist in the relevance of internet content which is a crucial factor for user engagement (Kenya ranks 59th globally). The rankings for availability (67th) and affordability (72nd) suggest that while foundational internet infrastructure exists, there remains a gap in ensuring widespread and cost-effective access. This mixed performance underscores the necessity of targeted strategies to enhance the internet's relevance and affordability, thereby maximising the benefits of its existing availability and readiness.

The GSMA's Mobile Connectivity Index (MCI)[4] evaluates 170 countries on four enablers of mobile internet adoption: infrastructure, affordability, consumer readiness, and availability of content and services. According to the 2022 MCI, Kenya had a mobile connectivity index score of 50.5%, indicating a relatively better mobile connectivity performance compared to other Sub-Saharan African countries, and above the average score for the region (40%). However, Kenya trailed behind much smaller economies such as Mauritius (66.93%), Botswana (57.21%), Cabo Verde (54%), and Gabon (53.81%), and outperformed only least-developed countries such as Sierra Leone (35.3%), Niger (22.6%), Malawi (33), Zambia (40.7%), Guinea-Bissau (31.61%), and one of Africa's more dynamic digital environments, Senegal (45.72%). A critical consideration in interpreting the MCI is its reliance on supply-side data which may be subject to overestimation owing to instances of individuals owning multiple digital devices. This factor poses a potential challenge in accurately gauging the true extent of mobile connectivity and may explain some of the more unintuitive results.

Despite some concerns with these indices, they provide insight into Kenya's digital outcomes. For example, the NRI highlights Kenya's strengths in areas such as digital governance and emerging technologies, indicating a robust ICT framework, while the 3i demonstrates strength in internet availability and affordability within the Sub-Saharan African region. Meanwhile, the MCI positions Kenya as moderately successful in terms of mobile connectivity, but trailing several other African nations. These rankings highlight Kenya's advancement in digital governance, internet availability and affordability, positioning the country as a regional leader in leveraging ICT for development.

During the COVID-19 pandemic, there was a substantial increase in digitalisation in Kenya. This was characterised by a notable rise in online activities such as online shopping, online learning, and e-payments which were driven by the need for social distancing and reduced physical contact. This rapid digital transformation enabled businesses to maintain their operations through digital platforms, demonstrating remarkable market resilience despite disruptions caused by the pandemic. In response to the crisis, Kenya swiftly formulated and implemented action plans, interventions, and adopted ICTs and digital technologies to mitigate the impacts of the pandemic. ICTs played a crucial role in allowing citizens to access essential services, while enabling online learning and facilitating remote work. Post-pandemic, these shifts have catalysed changes in Kenya's ICT sector, fostering growth in digital infrastructure and expanding the use of technology in various sectors.

3. Policy and governance framework

Kenya has made considerable progress in the policy, legal and regulatory environment since the last After Access report published before Covid-19 in 2019. Most recently, in 2023 the Cabinet Secretary instituted the ICT Sector Working Group[5] (SWG) to review existing policy and legislative frameworks, institutional structures, and administrative protocols regulating and underpinning the ICT and digital economy sector in Kenya and to make recommendations for reform.

The SWG's report[6] published in June 2024 had many recommendations, but notable and forward-looking ones touched on data governance, and emerging technologies and cybersecurity. Specifically, the report highlighted the

[4] The GSMA's Mobile Connectivity Index (MCI) is an index developed by the GSMA to assess the performance of countries in mobile internet connectivity based on four key enablers: infrastructure, affordability, consumer readiness, and content and services. For more information, see:GSMA Mobile Connectivity Index.
[5] https://archive.gazettes.africa/archive/ke/2023/ke-government-gazette-dated-2023-09-19-no-208.pdf
[6] https://ict.go.ke/sites/default/files/2024-09/MICDE Sector Working Group Report - June 2024.pdf

need to have a policy, legal and institutional foundation for data governance by developing a national data policy and a Data Protection Act and instituting a Data Governance Coordination Committee as a precursor to a future Data Governance Council. These would lay the necessary foundation for building a robust and relevant data-driven economy powered by Artificial Intelligence (AI) and other emerging technologies.

On the regulatory front, the SWG recommended pro-innovation regulatory approaches that included strengthening the recently instituted mechanism of regulatory sandboxing at the Communications Authority of Kenya and exploring avenues for having a similar mechanism at the Office of the Data Commissioner.

3.1. ICTs in national policies and strategies

The country is currently implementing the Fourth Medium Term Plan (2023-2027) on the theme of a "Bottom-Up Economic Transformation Agenda for Inclusive Growth" (The National Treasury and Economic Planning, 2024). This medium-term plan is the five year implementation plan for Vision 2030 (Government of Kenya, 2007) which was developed in 2008 and underpins the aspirations and priorities of the current governments' Bottom-Up Economic Transformation Agenda or BETA (2022-2027) (Parliamentary Budget Office, 2023; The National Treasury and Economic Planning, 2024). BETA is geared towards economic turnaround through a value chain approach. The agenda aims to create jobs and reduce poverty by focusing on the informal sector and small and medium enterprises in five priority areas: agriculture; micro, small and medium enterprises; affordable housing; the digital and creative economy; and health. BETA is also aligned with the Kenya Digital Economy Blueprint (2019), which contextualised the need for expanding internet connection capabilities to enhance the experiences of citizens and businesses in the digital space (Ministry of Information, Communications and Technology, 2019).

Vision 2030 aims to mainstream e-commerce in the economy, with considerable progress reported. (Government of Kenya, 2007). Areas of action include the creation of interoperable payment systems, scaling up the postal and logistics sector, improving the market entry ecosystem for start-ups and small and medium enterprises, setting up an online dispute resolution framework, the adoption of international standards to increase trust for services and commodities online, the expansion of data centres to host innovation including constituency innovation hubs, and developing digital skills and human capital (Ministry of Information, Communications, and Digital Economy, 2023a).

3.2. ICT sector-specific policies and strategies

The Ministry of Information, Communications and the Digital Economy launched its five year plan in 2024 (Ministry of Information, Communications, and Digital Economy, 2023b). The plan is aligned to other ICT-focused national strategies such as the National Digital Master Plan (2022-2032) launched in April 2022 (Ministry of ICT, Innovation and Youth Affairs, 2022b). The National Digital Master Plan reviewed and consolidated ICT initiatives into a 10-year plan, becoming a single point of reference for all government ICT plans. It is based on four pillars: digital infrastructure, digital services and data management, digital skills, and driving digital innovation for entrepreneurship (International Trade Administration, 2022). It builds on the pillars of the Kenya Digital Economy Blueprint (Ministry of Information, Communications and Technology, 2019), and the achievements of the Kenya National ICT Master Plan (2014 – 2017) (Ministry of Information, Communications and Technology, 2013). The government has also revised its broadband plan, which will run until 2030. From a policy perspective, the National ICT Policy 2019 was gazetted in 2020 (Gazette Notice No. 5472) in order to establish an enabling legal and regulatory framework.

3.3. Legislative and regulatory framework

The Constitution of Kenya, promulgated in 2010, guides the development of legislation in the country (Constitution of Kenya, 2010). The relevant articles in the digital ecosystem include:

- Article 31 on Privacy: the article provides that every person has the right to privacy, which includes the right not to have information relating to their family or private affairs unnecessarily required or revealed, and the privacy of their communications infringed upon;
- Article 33(1) on Freedom of Expression: indicates that every person has the right to freedom of expression, which includes the freedom to seek, receive, or impart information or ideas;

- Article 34 on Freedom of the Media: guarantees the independence of the media as a key component of a strong democracy; and
- Article 35 on Access to Information: this article requires that (1) every citizen has the right of access to information held by the state or information held by another person that is required for the exercise or protection of any right or fundamental freedom; (2) every person has the right to the correction or deletion of untrue or misleading information that affects the person; and (3) the state publish and publicise any important information affecting the nation.

Since the 2018 After Access report for Kenya, a number of laws and regulations related to the ecosystem have been passed, including the Access to Information Act No. 31 (2016), the Computer Misuse and Cyber Crime Act (2018) and the Data Protection Act No. 24 (2019), which aimed to protect personal data and equip data subjects with rights over their data. The law applies to both automated and non-automated processing of personal data.

The Data Protection Commissioner, established under the Data Protection Act, was appointed in 2020. To give effect to the provisions of the Data Protection Act and the mandate of the Data Protection Commissioner, data protection regulations were enacted in 2022. The regulations speak to the rights of data subjects and obligations of data controllers including a data localisation requirement, requirements for registration, and those for complaints and dispute resolution mechanisms in relation to the processing of personal information.

The regulations include the Data Protection (General) Regulations (Republic of Kenya, 2021a), the Data Protection (Compliance and Enforcement) Regulations (Republic of Kenya, 2021b), and the Data Protection (Registration of Data Controllers and Data Processors) Regulations (Republic of Kenya, 2021c). These have created the regulatory framework for privacy and data protection in Kenya. They have resulted in a revision of laws and organisations taking measures such as registering data controllers and data processors to comply. The Central Bank of Kenya Act (Central Bank of Kenya, 2021), for example, was revised to "require digital lending apps to be registered with the [Office of the Data Protection Commissioner], failing which, they would be denied the necessary licence for their business from the Central Bank" (MWC Legal, 2022). The Film Act (2022) was also enacted and aligned with the regulations (Films and Stage Plays Act (Cap. 222, 2022).

Due to the failure of digital identification (digital ID) to comply with the express provisions of the Data Protection Act, the High Court annulled the decision to roll out Huduma Cards in October 2021, finding the exercise illegal and in contravention of the Act (Macdonald, 2022). The Judiciary ordered the government to conduct a Data Protection Impact Assessment in line with the Act (Macdonald, 2022). The Huduma Cards were issued to Kenyan citizens for identification purposes and were set to replace the national identity cards that were in use. Contrary to the Act, the government kick-started the process of collecting personal data from Kenyans without putting measures in place to ensure that the data would be protected under the National Integrated Identity Management System (NIIMS). The court proceeded to issue an order of *mandamus* which sought to compel the government to first complete a data protection impact assessment before rolling out the Huduma Cards as it had intended. The digital ID process has since been re-started under the Maisha Card brand[7] and is currently being rolled out.

Kenya's comprehensive cybersecurity regulations were brought into effect in 2024. The Computer Misuse and Cybercrimes (Critical Information Infrastructure and Cybercrime Management) Regulations (2024) came into effect as per Gazette Notice Number 44 dated 9 February 2024 (Computer Misuse and Cybercrimes Act, 2018). The regulations aim to fortify cybersecurity measures in Kenya by establishing a framework to monitor, detect, and respond to threats in cyberspace, alongside ensuring the protection, preservation, and effective management of critical information infrastructure. They also seek to promote coordination and collaboration, and share responsibility among stakeholders within the cybersecurity sector, emphasising the importance of safeguarding critical infrastructure.

Registration of SIM subscribers has continued as a legal requirement provided for under the Kenya Information and Communications (Registration of SIM cards) Regulations (2015) (Ministry of ICT, Innovation and Youth Affairs, 2022a).

7 https://immigration.go.ke/issuance-of-maisha-card-ids/

The law provides that telecom operators should register their existing and new subscribers (Ministry of ICT, Innovation and Youth Affairs, 2022b).

Over the last few years, regulations to boost competition have also been introduced, including the reduction of interconnection rates (International Trade Administration, 2022). Meanwhile the Commission on Administrative Justice published the Access to Information Regulations (2021) for public comments (Ministry of ICT, Innovation and Youth Affairs., 2021). This led to the Access to Information (General) Regulations (2023) Gazetted on 19 October 2023 under Kenya Gazette Supplement No. 197.

4. ICT landscape

4.1. ICT market overview

Kenya's digital ecosystem is vibrant with considerable development seen over the years. The country is positioned as the regional ICT hub in East Africa (International Trade Administration, 2022). This can be attributed to disruptive technologies and a young and tech-savvy population that have been participating in the global start-up community which was enabled by the government investing about USD 67 million in a digital literacy programme in the financial year 2021/2022 (Newsweek, 2020).

Mobile network expansion and coverage have been steadily rising in the country, resulting in significant progress towards stimulating internet adoption and redressing the network coverage divide (IBN Immigration Solutions, 2023). However, the mobile market is highly concentrated, with Safaricom serving more than half of the market (Global Monitor, 2020). Nearly all mobile subscriptions are concentrated around the two major MNOs, Safaricom (the leader, 66%) and Airtel (second largest, 28%).

Safaricom started in 1997 as the sole operator in the Kenyan mobile phone market. Thanks to its M-PESA service, it has dominated the mobile money market with more than 95% market share in 2021. Only two years after its launch, M-PESA reached five million users. This is more than the client base of all Kenya's banks combined (Tyce, 2020). In 2022, fifteen years after its launch, 30.5 million active customers transfer annually more than 85% of Kenya's GDP. Similarly, the population of M-PESA agents jumped from just over 4 000 in 2008 to about 16 000 in 2009 (Jack & Suri, 2011).

According to ITU 2022 estimates, 98% of the population in Kenya was covered by at least a 3G mobile network, while 97% was covered by at least a 4G mobile network (ITU, 2022). Safaricom however launched the first 5G network in the country in October 2022 (Ngugi, 2022), while other providers upgraded their 4G LTE networks, and aggressively expanded coverage to rural and remote areas (Fitch Solutions, 2022). The country's population coverage of 5G nevertheless remained low (2% of the population (GSMA, 2021)) due to the lack of success of pilot tests caused by lower penetration rates and a limited range of 5G bands. Moreover, overheating of 5G-enabled devices impeded the adoption of 5G (Global Monitor, 2020).

The deployment of fibre-optic cables has resulted in improved customer experience through better quality of service, enhanced internet speeds and lower costs. It has also resulted in an expansion in e-commerce, e-government services, and online learning (IBN Immigration Solutions, 2023). Furthermore, fibre-optic and bandwidth capacity grew by 19.4% and 34.6% in 2021 respectively (Osore, n.d.). While several submarine cables with landing points in Kenya have been built since 2009, most of these are concentrated in urban areas (Oxford Business Group, n.d.). As such, mobile connectivity remains the primary means of internet connectivity, particularly in rural areas (Research and Markets, 2022), due to the unbalanced coverage of fibre-optic cables resulting in uneven access to the internet across locations.

The northern region of Kenya has low network coverage, and in some areas there is no mobile broadband coverage (Engineering for Change, 2020). There is uneven network coverage, with Garissa, Wajir, and Mandera being the counties with the lowest 4G coverage. Over 60% of anchor institutions in these counties do not have any pre-existing fibre infrastructure and 95% of anchor institutions remain offline. The estimated cost of connecting these areas is USD 22 million (Namara, 2022).

The digital infrastructure deficiencies in some parts of the country hamper the growth and development of the ICT sector in Kenya (Engineering for Change, 2020). Universal Service Fund projects significantly improved connectivity and boosted the quality of service offered to end-users. However, the latest quality of service assessments among three MNOs shows that Airtel scored 79% and Telkom 65% and failed to meet minimum quality requirements of an overall performance score of 80%, while Safaricom performed well, surpassing minimum requirements with an overall score of 90%. As a result, the two underperforming operators received a penalty from the Communications Authority. In general, the quality of service was highest in urban areas. Compared to other operators, Safaricom had better coverage, whereas Telkom performed poorly on both coverage and data services (Communications Authority of Kenya, 2024).

Between July and September 2023, feature phone penetration (63.3%) was marginally lower than smartphone penetration (64.5%) (Communications Authority Kenya, 2023). Given that an individual may own more than one mobile phone, these estimates highlight that the actual penetration of internet-enabled devices was lower than 64.5%. Despite the considerable improvement in the supply of cheaper smartphones and reduction in data costs over time, internet-enabled devices remain inaccessible to a substantial share of the population (Research and Markets, 2022). A majority of those online (58%) indicated that their ability to optimally harness the internet was constrained by expensive mobile data.[8]

The government has focused on enhancing productivity and overall competitiveness through increased investment in digital infrastructure and scaling up broadband connectivity by prioritising the extension of the National Optic Fibre Backbone Infrastructure (NOFBI). This was intended to enhance reliable and affordable broadband connectivity and improve service delivery through digitalisation and the automation of processes (Government of Kenya, 2015). A report done by the auditor general in 2023 however revealed challenges in the implementation of the connectivity programme (Office of the Auditor-General, 2023). The government has also completed the implementation of the Last Mile Connectivity Program to improve access to electricity for poor and rural areas, as well as the overall business environment (Government of Kenya, 2015).

The President of Kenya has mentioned that investments made by Starlink in the economy have the potential to stimulate high-speed connectivity in various anchor institutions and hard-to-reach areas, which will play a pivotal role in unleashing the full potential of the country's digital economy. However, for various economic agents in the economy to be able to harness the internet for their needs and for the purported benefits to materialise, the President further indicated that there is an urgent need for Starlink to revise their prices downward, which remain high for an average consumer (Kassouwi, 2023).

4.2. Competition and pricing

Kenya's telecoms sector is undergoing several changes that have increased competition and improved internet connectivity. These include the revision of the broadband plan, the launching of the Digital Master Plan, and the reduction in interconnection rates mentioned earlier.

Despite these developments, challenges remain that impact both competition and pricing in the sector, such as taxation. In particular, a new digital services tax was introduced under Kenya's Finance Act in 2020 that taxes income from services provided through a digital marketplace at 1.5% of the transactional value (International Trade Administration, 2022). Furthermore, in 2022 under the Finance Act (2022), the government introduced a 10% excise duty on imported mobile phones and a further KES 50 (USD 0.42) tax imposed on imported, ready-to-use SIMs (Telegeography, 2022).

The telecommunication sector in Kenya is highly concentrated, with one firm serving more than half of the market (Global Monitor, 2020). Nearly all mobile subscriptions are concentrated around the two major players, Safaricom (the leader, 66%) and Airtel (second largest, 28%). The other three operators collectively account for 6% of total mobile subscriptions (Table 1). From 2014 onwards, some firms that were not performing well exited the market, resulting in significant market power among firms that continued operations. Safaricom was the sole provider of 4G

[8]Research ICT Africa Household and Individuals After Access Survey 2022

for a considerable time until Telkom Kenya and Airtel rolled out 4G in 2017 and 2018 respectively. This reinforced Safaricom's market power (Oxford Business Group, n.d.). According to the estimates reported, Safaricom's customer base accounts for 62% of mobile broadband subscriptions. Similarly, mobile money services are dominated by its M-PESA service. The rest of the subscriptions are split between Jamii Telecommunications Limited (JTL) and Finserve, a mobile virtual network operator. Airtel shares its infrastructure with FinServe (Communications Authority Kenya, 2023).

In early 2020, the Competition Authority of Kenya and the Communications Authority initially approved a merger between Airtel Kenya and Telkom Kenya. However, the merger stalled later in 2020 due to Ethics and Anti-Corruption Commission (EACC) investigations (Bowmans, 2021).

Table 1: Market share of MNOs and MVNOs 1st July to 30th September 2023

	Safaricom	Airtel	Telkom	Finserve (MVNO)	Jamii
Mobile subscriptions	66%	28%	3%	2%	1%
Mobile broadband subscriptions	62%	33%	3%	2%	1%

Source: Communications Authority of Kenya (2023a)

Between 1 July and 30 September 2023, mobile broadband subscriptions were dominated by 4G, which accounted for 69% of the total broadband subscriptions. This was followed by 3G, constituting 30% of the market. Hardly any of the mobile broadband subscriptions were on 5G (1%).

Table 2: Market share of networks 1st July to 30th September 2023

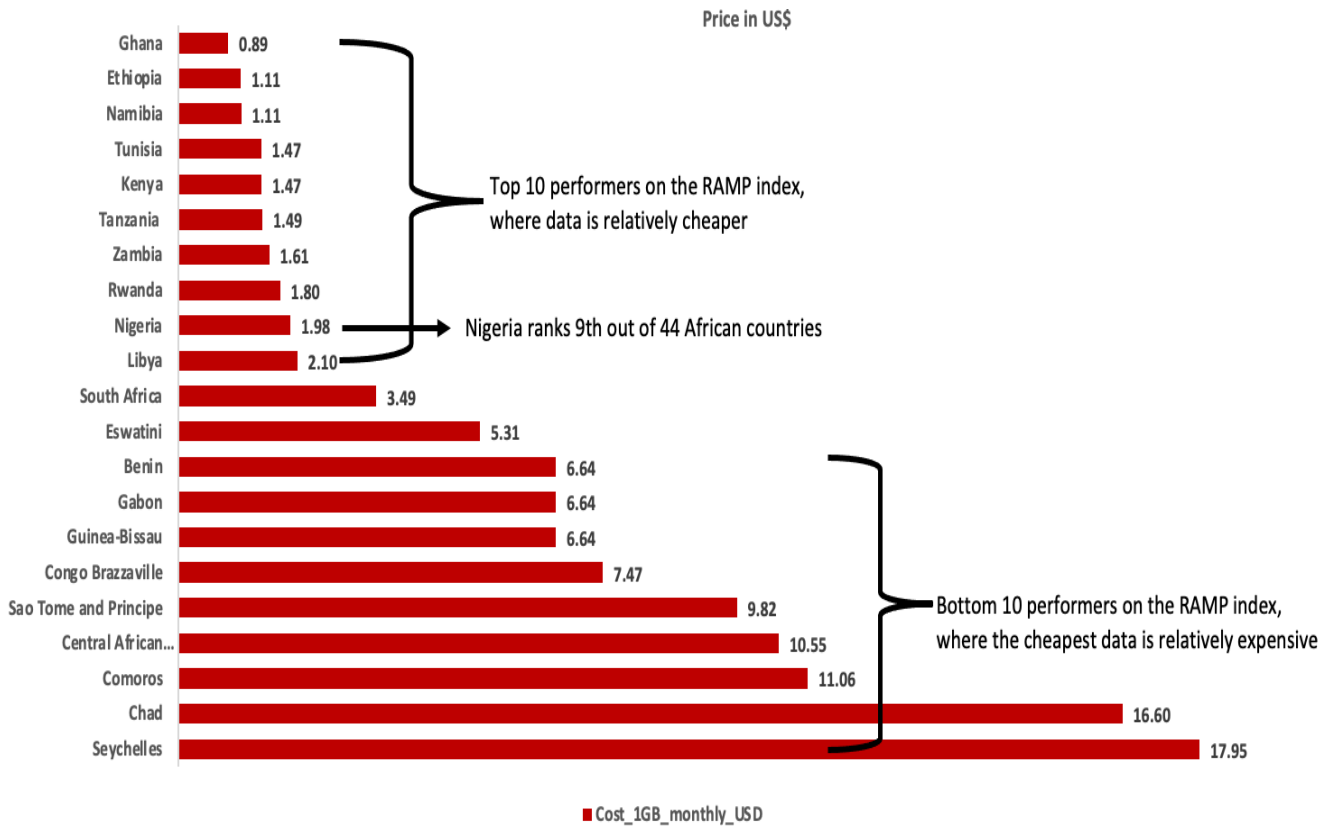
Indicator	3G	4G	5G	Total
Mobile broadband subscriptions	10 242 473	23 875 435	509 737	34 627 645
Market share	30%	69%	1%	100%

Source: Communications Authority of Kenya (2023a)

RIA's RAMP Index collects the lowest data and voice/SMS basket rates quarterly for each mobile operator in Africa. Figure 1 below depicts the costs for the cheapest data in 44 African countries in Q3 2023, allowing for comparisons between Kenya and other African nations. Out of 44 nations, Kenya is ranked 5th. The lowest price for 1GB of data offered by Airtel and Telkom Kenya is USD1.47, which is equivalent to KES 200. It is important to note that Safaricom remains the dominant operator even though it does not have the lowest data prices. This is due to it offering better quality of services. This indicates that there are other factors other than price that are driving demand. Furthermore, exchange rate fluctuations have also contributed to lower pricing in USD terms.

Ghana, where 1GB costs USD 0.89, has the most affordable mobile data prices in Africa, followed by Ethiopia, Namibia, and Tunisia. The two countries with the highest data prices are Seychelles and Chad, at USD 17.95 and USD 16.6 per 1GB respectively.

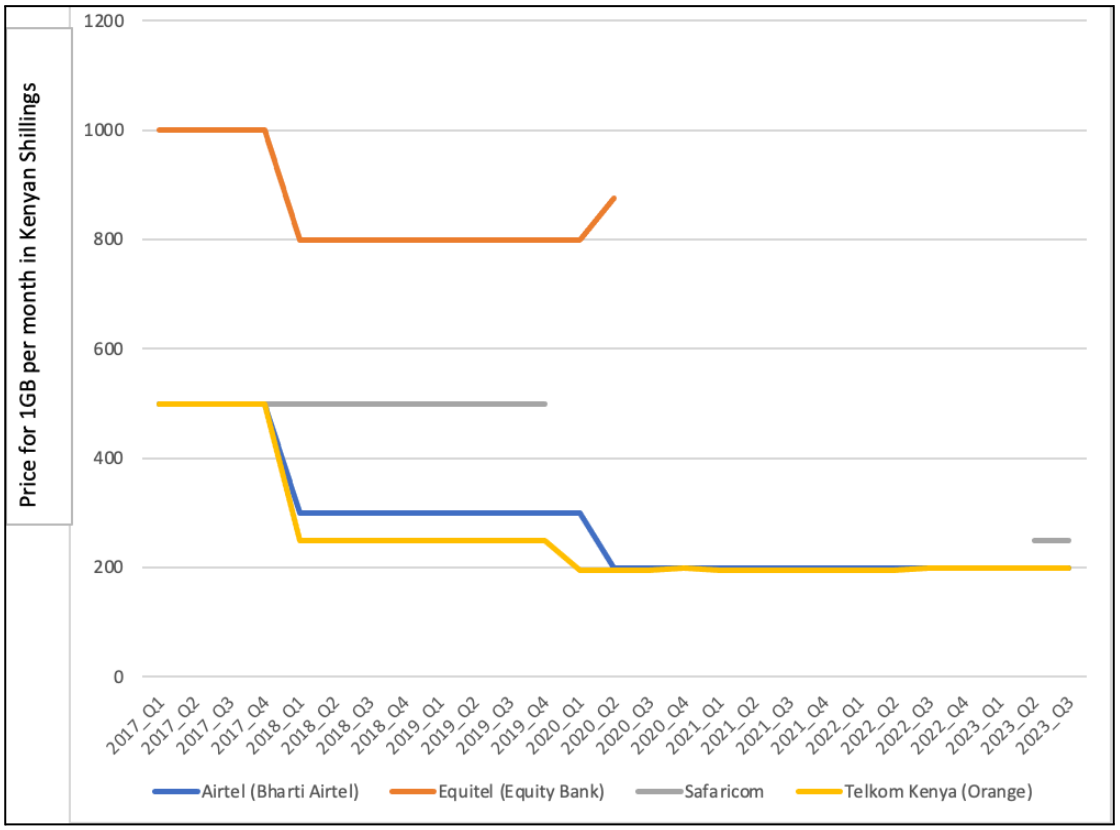
Figure 1: Top 10 and bottom 10 performing operators on the RAMP Index (price per 1GB monthly basket) in Q3 2023



Source: [(RIA, 2023b)]

Figure 2 depicts mobile data prices between 2017 and Q3 2023 for Kenya. Data prices have come down over time in the country. This can partly be attributed to increased international bandwidth and improved domestic networks (e.g. due to the NOFBI), coupled with operator price competition.

Figure 2:1 GB mobile data prices in Kenya between 2017 and Q3 2023

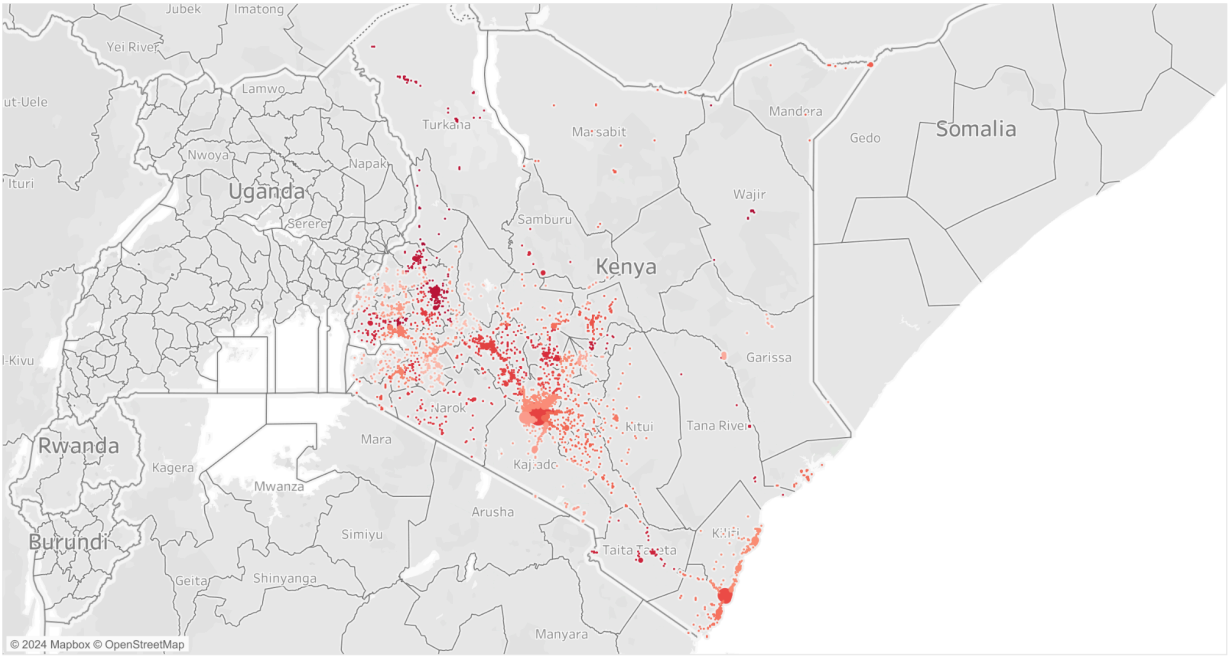


Source: RIA RAMP Index (2023)

4.3. Internet quality measurements

RIA conducted an analysis of internet speeds in 2023 for the different regions in Kenya to offer a comprehensive evaluation of network quality across the country. It used a geospatial country map of Kenyan counties (openAfrica, 2023) and data from the Ookla's (2024) Open Datasets. Significant variations in the number of mobile and fixed broadband speed tests conducted in each region were identified. A total of 40 555 mobile broadband speed tests were performed, with a notable concentration of 15 473 tests in Nairobi county. In contrast, only around 34 tests were conducted in the Tana river (Figure 3). Additionally, 283 133 tests were conducted for fixed broadband.

Figure 3: Concentration map of speed tests across counties, 2023



Source: openAfrica (2023); Ookla (2023)

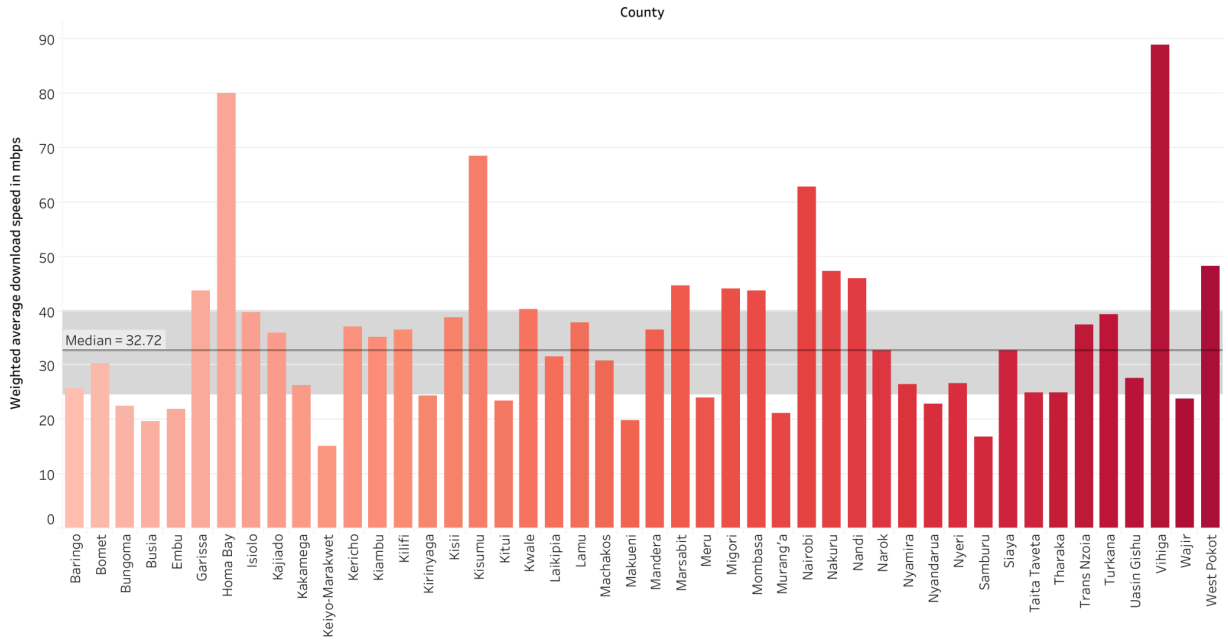
The methodology for measuring the median download speed, upload speed, and latency[9] in each region involved extracting data for Kenya from global shapefile speed tests for the four quarters of 2023. A spatial join was then created between the datasets, utilising the county boundaries from the Kenya shapefile map to extract the data for each region. Subsequently, the weighted national median and the aggregate regional average were calculated, with weights determined by the number of tests. Furthermore, regions with fewer than 40 speed tests were excluded from the analysis to ensure statistical reliability.

Nairobi county led with the highest number of fixed broadband speed tests, reaching 124 020, followed by Kiambu. On the other hand, West Pokot registered the lowest count at just five tests. This trend somewhat resembles the distribution seen in mobile broadband speed tests. However, it is worth noting that fixed broadband speeds across counties generally lag behind mobile broadband speeds. This suggests that mobile broadband is more widely adopted, possibly due to its superior quality, affordability, and coverage, while fixed broadband infrastructure still lags behind.

At the county level, mobile download speeds varied from the national median of 32.72mbps. Vihiga county boasted the highest average speed at 88.87mbps, while Keiyo-Marakwet had the lowest at 15.05mbps. Figure 4 illustrates significant county differences in mobile download speeds. These differences may reflect differences in infrastructure quality, levels of investment, network maintenance, and user density across counties.

[9] In computer networking, latency is an expression of how much time it takes for a data packet to travel from one designated point to another. Ideally, latency will be as close to zero as possible.

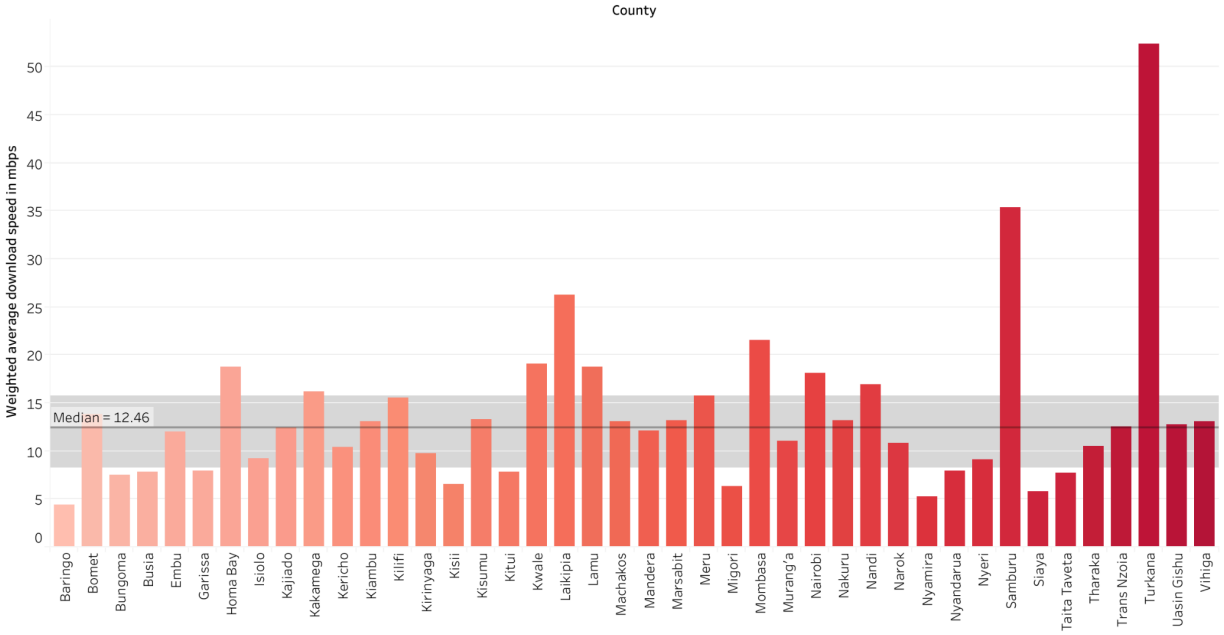
Figure 4: Weighted average mobile broadband download speed per county, 2023



Source: Ookla (2023)

Similar disparities were noted for fixed broadband, with the national median download speed of 12.46mbps considerably lower than that of mobile broadband. This indicates that the country's fixed broadband infrastructure still has a significant distance to cover, necessitating further investment. Turkana county recorded the highest average download speed at 52.33mbps, while Baringo had the lowest at 4.36mbps (Figure 5).

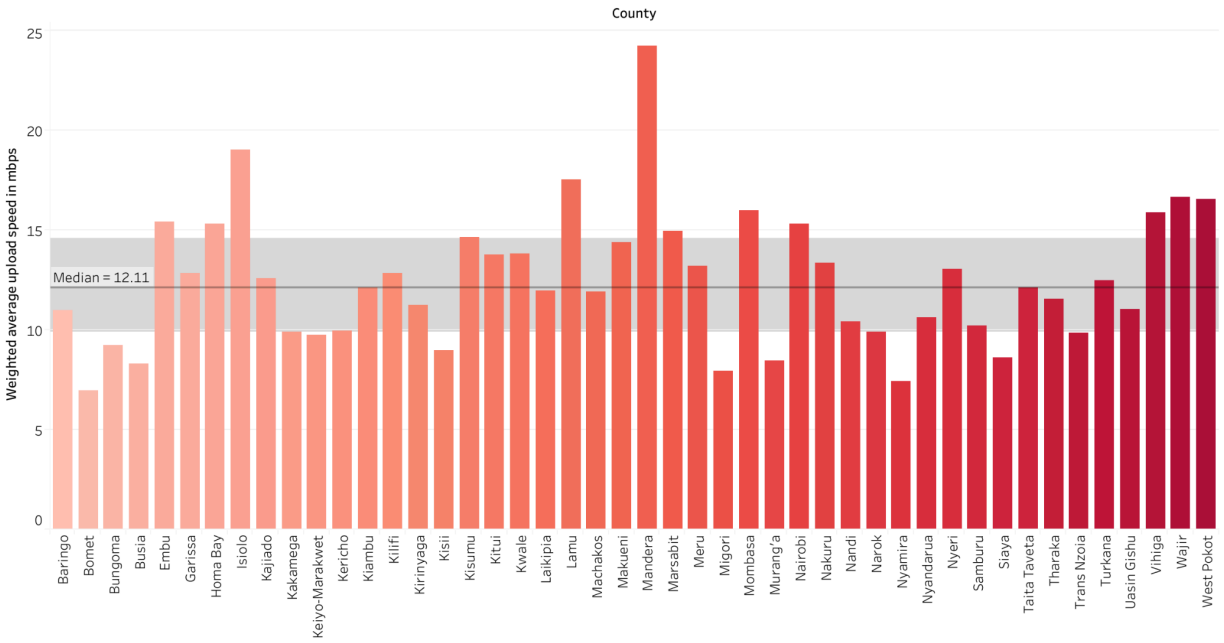
Figure 5: Weighted average fixed broadband download speed per county, 2023



Source: Ookla Network Performance Open Dataset (2023)

Counties with the highest weighted average mobile upload speeds included Mandera (24.21mbps), Isiolo (19.04 mbps), and Lamu (17.55mbps). Conversely, Bomet (6.95mbps) and Nyamira (7.41mbps) exhibited the lowest weighted average mobile upload speeds. The median national weighted mobile upload speed was recorded at 12.11mbps. This suggests that half of the counties boasted a weighted average upload speed surpassing 15.51mbps, while the remaining half maintained a lower average. Interestingly, as illustrated in Figure 6, the gap in mobile upload speeds between counties was almost the same when compared to download speeds.

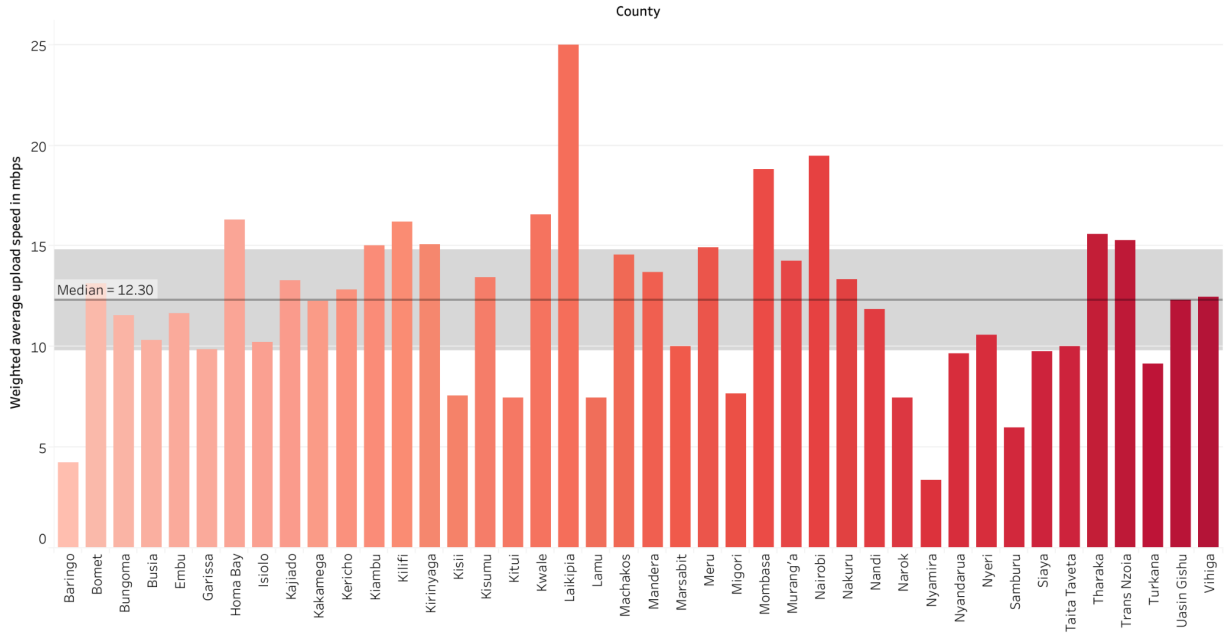
Figure 6: Weighted average mobile broadband upload speed per region, 2023



Source: Ookla Network Performance Open Dataset (2023)

Regarding fixed broadband upload speed, the national median was similar to that of mobile broadband at 12.30mbps, with Laikipia recording the highest upload speed at 24.97mbps, and Nyamira and Baringo recording the lowest at 3.37mbps and 4.24mbps respectively (Figure 7).

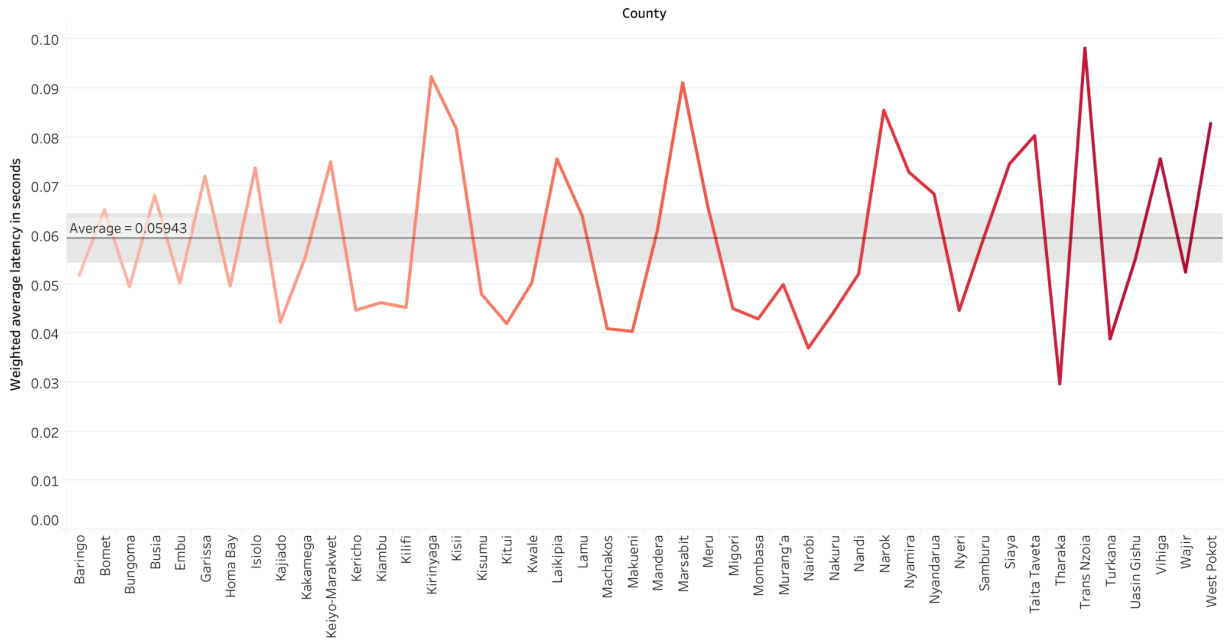
Figure 7: Weighted average fixed broadband upload speed per county, 2023



Source: Ookla Network Performance Open Dataset (2023)

Mobile broadband latency data revealed consistent variations across counties, with a national average of 0.059 seconds. Among the counties, Tharaka exhibited the shortest latency time at 0.028 seconds, followed by Nairobi at 0.037 seconds, while Trans Nzoia recorded the highest at 0.098 seconds (Figure 8).

Figure 8: Average mobile broadband latency in seconds per county, 2023

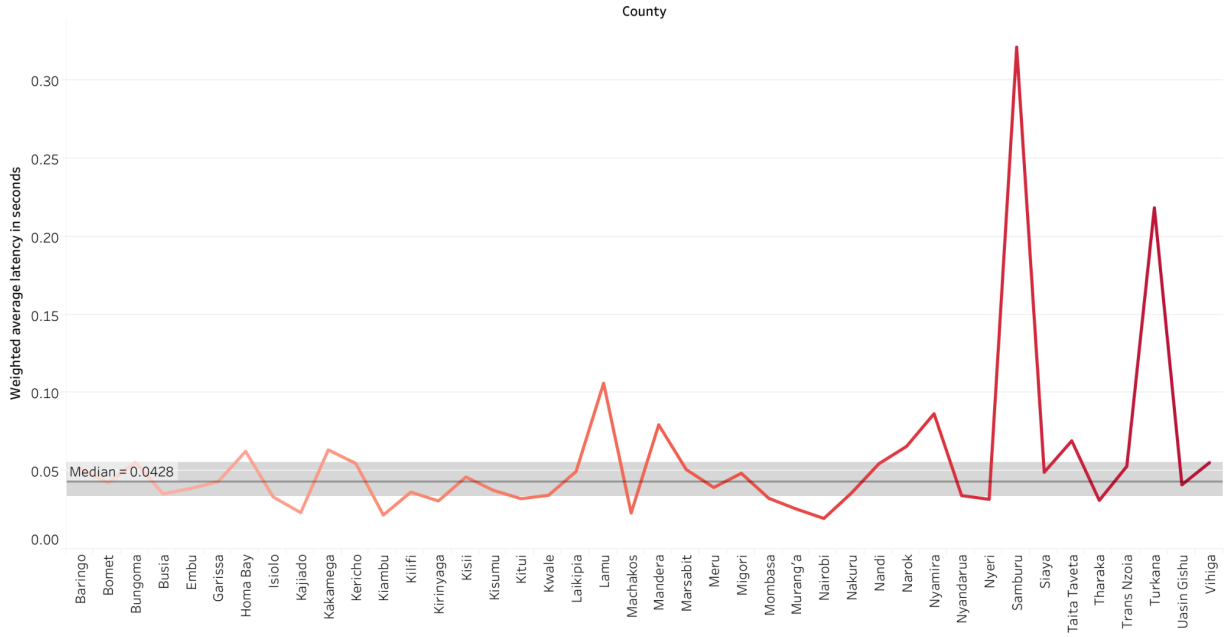


Source: Ookla Network Performance Open Dataset (2023)

For the latency of fixed broadband, the median was observed at 0.043 seconds, which was lower than that of mobile broadband. This indicates that fixed broadband exhibited a faster transmission of packets between sender and receiver. Furthermore, Nairobi recorded the lowest fixed broadband latency at 0.0196 seconds, followed by Kiambu

at 0.022 seconds. Conversely, Samburu experienced the highest latency at 0.32 seconds, followed by Turkana at 0.22 seconds (Figure 9).

Figure 9: Average fixed broadband latency in seconds per county, 2023



Source: Ookla Network Performance Open Dataset (2023)

In the latter half of 2023, Kenya's position in global internet rankings faced challenges compared to neighbouring countries Tanzania and Uganda. The nation ranked 113th out of 148 countries in mobile broadband, while its standing in fixed broadband plummeted to 167th out of 182 countries, as indicated by the Ookla Global Speed Index. Our county-level internet performance analysis confirms this concerning downward trend.

Kenya did witness a significant 20.4% increase in internet bandwidth in the three months leading up to June 2023. This boost can be attributed to a substantial upgrade in the capacity of one of its primary fibre-optic undersea cables, The East African Marine System (TEAMS). While this enhancement promises swifter internet speeds and improved connectivity, it is crucial to note that fixed broadband adoption remains sluggish compared to mobile broadband. The Communications Authority reports a stark contrast in subscriptions, with mobile data subscriptions reaching 47 760 337 compared to a mere 809 197 fixed data/internet subscriptions as of the last quarter of 2022 (Communications Authority of Kenya, 2023b).

Furthermore, the Authority's data reveals a notable surge in total international internet bandwidth accessible in Kenya, rising to 14 413gbps between January and March 2023, up from 11 970gbps in the previous quarter. This increase can be traced back to the upgrade of TEAMS, highlighting the critical role of infrastructure upgrades in enhancing internet accessibility and performance (Ambani, 2023).

The analysis of Kenya's internet infrastructure and performance underscores the urgent need for policy interventions to address existing disparities and drive the nation towards equitable access to ICTs. While strides have been made in enhancing internet bandwidth and connectivity, challenges persist, particularly in bridging the gap between mobile and fixed broadband adoption.

To ensure inclusive and sustainable development, policymakers must prioritise initiatives aimed at boosting fixed broadband infrastructure, promoting affordability, and closing the digital divide between urban and rural areas. Additionally, efforts should focus on leveraging partnerships with private sector stakeholders to accelerate the deployment of high-speed internet infrastructure for both fixed and mobile broadband to foster innovation in digital services.

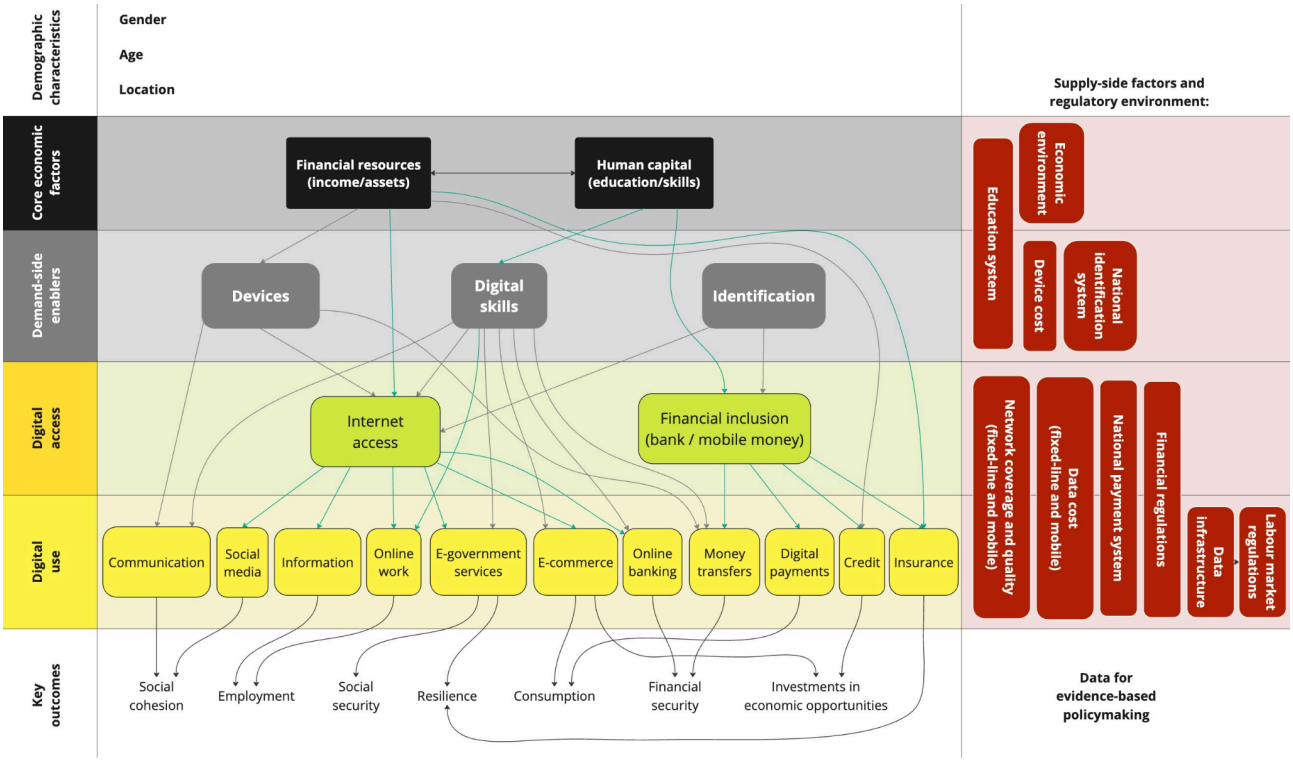
PART B: Demand-side analysis

5. Demand-side data and methodology

5.1. Analytical framework

Digitalisation is a complex phenomenon which has the potential to impact all aspects of socio-economic life. Figure 10 is an attempt at synthesising some of the key areas of digitalisation and the links between different layers of analysis. Overall, the approach for the demand-side analysis centres around three key layers: demand-side enablers, digital access, and digital technology use. Demand-side enablers are those foundational requirements necessary to allow digitalisation. The next step is then gaining access. As the internet is the main channel through which the majority of digital products and services can be accessed, this is considered as one of two access channels. The second channel is financial inclusion, a requirement to be able to access digital financial services that do not always require internet access. Once access has been achieved, the next step is use or being able to apply digital technologies to human activities. The different use cases portrayed in Figure 10 are not homogenous, nor are they exhaustive. However, in the face of budget, time and practical survey limitations there was a need to ring fence some key use case areas and these were deemed the ones most worthy of further analysis.

Figure 10: Analytical framework for demand-side analysis



Source: RIA, developed by Andrew Partridge (2024)

In order to assess the extent of digital equality, outcomes are segmented based on the gender, age and the geographic location (urban/rural) of respondents. Past research highlighted that the core determinants of digital access and use are income and education, emphasising the fact that digital inequality was a reflection of structural economic inequalities in terms of these two factors and that unless these were addressed digitalisation threatens to exacerbate inequalities going forward (Aguilar et al., 2020a; Chair et al., 2016; Gillwald & Partridge, 2022). Therefore income and education are considered as the overarching core economic factors influencing digital use both directly and indirectly through their influence on access and on demand-side enablers.

Digital access and use needs to be considered in light of the supply of ICTs and the regulatory environment discussed in Part A of this report. While these factors are considered external to the demand-side assessment, they

influence not just the state of the demand-side elements but also the links between them. Importantly they also show where the most effective policy levers will be to address the demand-side constraints identified in our study.

The demand-sided analysis therefore proceeds by applying the lens of each of the three key areas, first the demand-side enablers, then digital access, and digital technology use. An additional chapter is then included to highlight the specific case of digital technology adoption and use amongst Kenyan microenterprises.

5.2. Data: The After Access survey

RIA conducted the first After Access survey between 2005 and 2008. They were then called the "ICT Access Surveys" and covered a total of 17 countries across the African continent. Since then, new waves of the surveys have been conducted, between 2010 and 2012 and between 2017 and 2018. In the 2017-2018 round of the survey the name was changed to "After Access" to highlight the realisation of the importance of not just looking at access alone but also how individuals interact with ICTs once access has been achieved. The latest round of the survey took place between 2022 and 2023 encompassing seven African countries.[10] The survey provides detailed accounts of how individuals interact with ICTs and the barriers holding them back from tapping into the benefits of digitalisation. For each round of the survey since 2010-2012, the nationally representative household and individual survey was accompanied by a microenterprise survey which contained questions on the ways in which microenterprises use ICTs within their businesses.

In the latest round of the survey, 1 703 Kenyan households were interviewed as well as a randomly selected individual in each household. The sample was selected from the 2019 census sampling frame provided by the Kenya National Bureau of Statistics (KNBS) with households selected using satellite imagery and remote sensing of rooftops. A total of 547 microenterprise surveys were completed in the enumeration areas (EAs) in which the household and individual surveys were conducted, identified through the individual survey respondents in conjunction with a random walk technique. All households surveyed are included in the analysis at the household level, while aspects assessed at the individual level are restricted only to individuals over the age of 16 years old. Microenterprises are defined as businesses of up to ten employees (businesses which are part of a franchise were excluded). For a detailed description of the sampling methodology see Appendix A1 of this report.

Data weights were calculated for households and individuals based on the total number of EAs in each population strata, the total number of households in each sampled EA, and the total number of individuals in each sampled household. To ensure representativity, the weighted breakdown of the sample in terms of gender, age, and education level were compared with official national breakdowns calculated from the 2015/16 Kenya integrated household budget survey (KIHBS) and the 2019 Kenya population and housing survey (KPHC). The comparison with these datasets is provided in Appendix A2 to this report and shows a satisfactory alignment allowing for representativity to be assumed. Due to the sampling procedure employed for the microenterprise survey, and the lack of official microenterprise listings, it was not feasible to calculate accurate weightings and hence unweighted data is used for the microenterprise data.

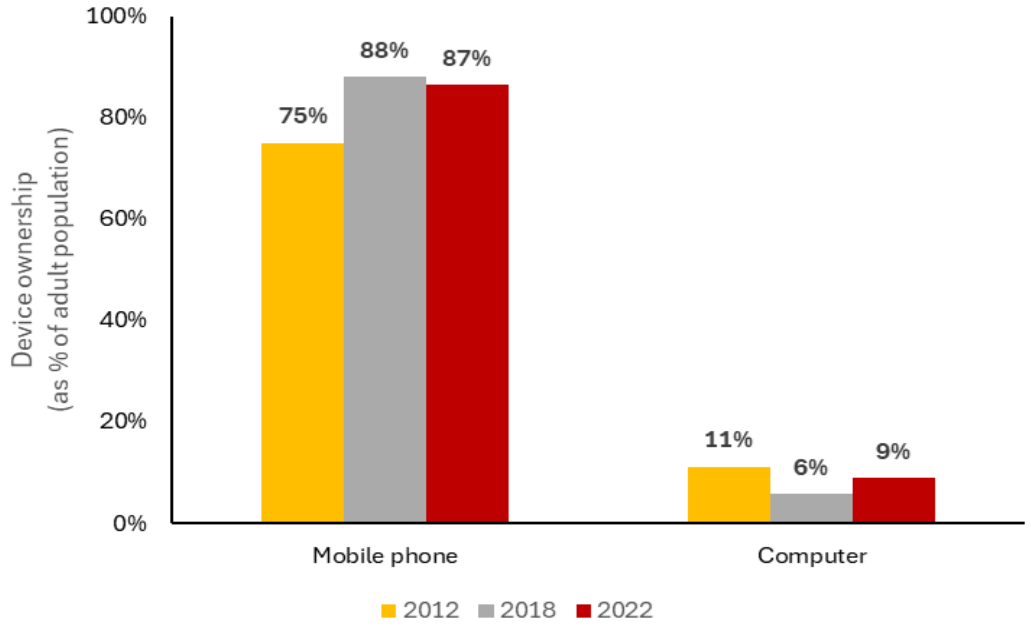
6. Demand-side enablers

6.1. Device ownership

Kenya has achieved almost universal mobile phone ownership with 87% of the adult population estimated to have a mobile phone. As Figure 11 shows, there was a notable increase in ownership from 2012 to 2018, but a slight drop after that to 87%. In contrast, computer ownership remains low in Kenya at 9% of the adult population. While this is higher than observed in 2018, it is still lower than in 2012 highlighting the unaffordability of computers for the majority of the population.

Figure 11: Device ownership amongst the adult population, 2012, 2018 and 2022

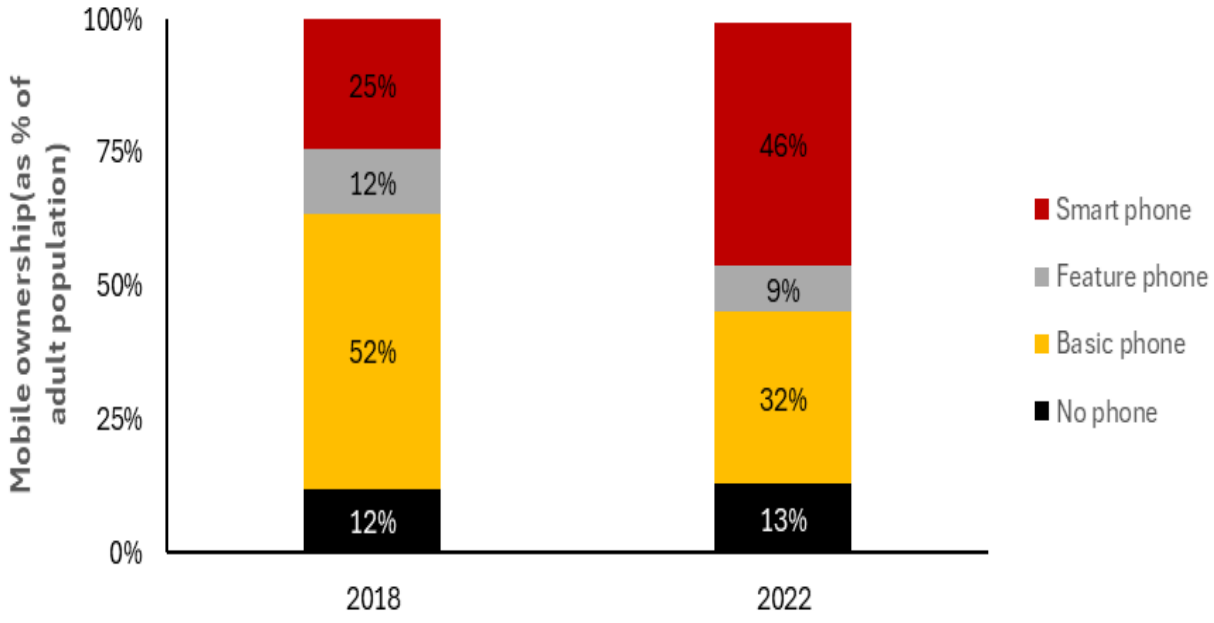
[10] South Africa, Nigeria, Uganda, Ethiopia, Kenya, Tanzania, and Ghana.



Source: RIA (2012, 2018a, 2022a)

What is encouraging for digitalisation in Kenya is the growth in smartphone ownership. The breakdown of the adult population by the most advanced type of mobile phone owned in Figure 12 shows that the growth in mobile phone ownership is not only driven by an increase in smartphone ownership, but that individuals are moving away from basic phones and feature phones towards smartphone use. The share of the adult population with basic phones declined from 52% in 2018 to 32% in 2022 with smartphone ownership increasing from 25% to 46%. However, the percentage of people without any mobile phone did not decrease – rather it increased slightly from 12% in 2018 to 13% in 2022. This data indicates a persistent segment of the population, approximately 1 in 8 adults, who remain without access to ICTs, highlighting a continued digital divide.

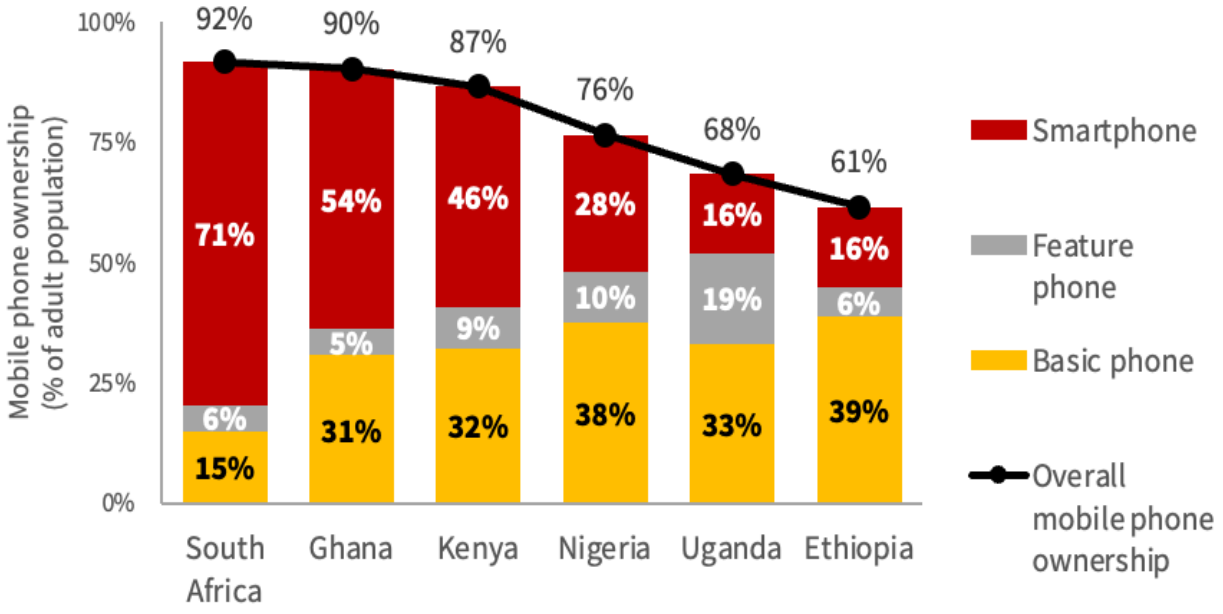
Figure 12: Mobile phone ownership by most advanced type of phone, 2018 and 2022



Source: RIA (2018a, 2022a)

When compared to other countries, Kenya trailed South Africa and Ghana with regards to mobile phone and smartphone ownership, but outperformed in basic and feature phone ownership. This could be attributed to several factors, such as affordability, network coverage, and user preferences.

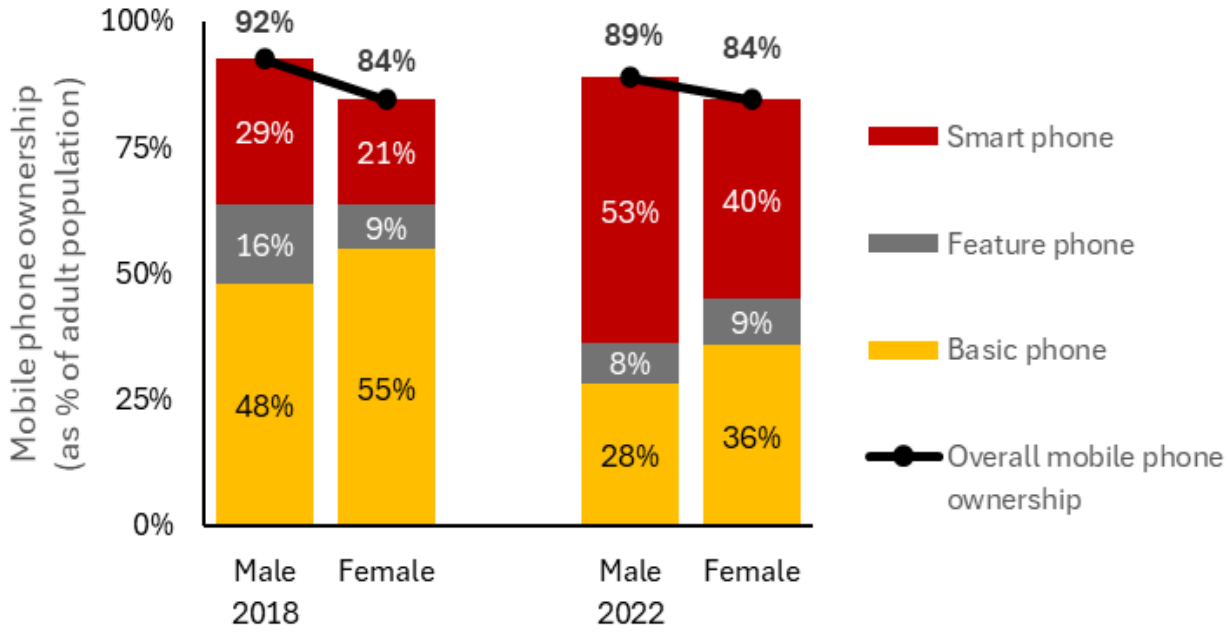
Figure 13: Mobile phone ownership by most advanced type of phone for countries surveyed, 2022



Source: RIA (2022a)

In the 2018 survey, male mobile phone ownership in Kenya was higher than that of females. Mobile phone ownership amongst females was also more restricted to basic mobile phones, with smartphone ownership higher amongst males than females (29% vs 21%). As Figure 14 shows, between 2018 and 2022 mobile phone ownership decreased slightly for males and remained the same for the females. Smartphone ownership increased more for females than males.

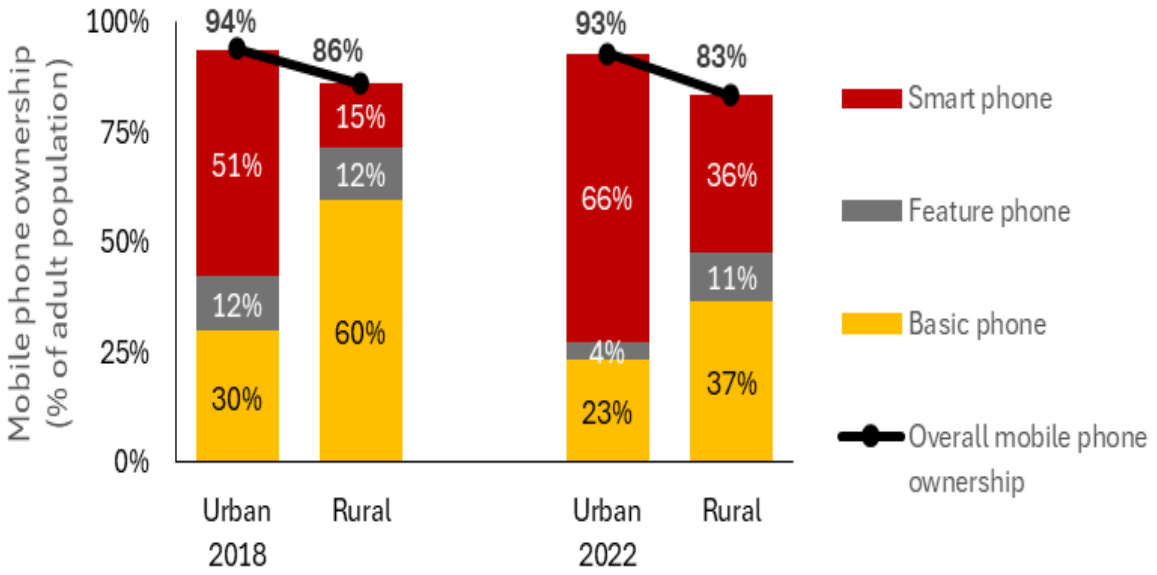
Figure 14: Gender comparison of mobile phone ownership by most advanced type of phone, 2018 and 2022



Source: RIA (2018a, 2022a)

Between 2018 and 2022 there was a sharp increase in smartphone adoption in rural areas, from 15% in 2018 to 36% in 2022 (Figure 15). Reliance on basic phones was still higher in rural areas than it is in urban areas; however, it was notably less so than was the case for rural individuals in 2018.

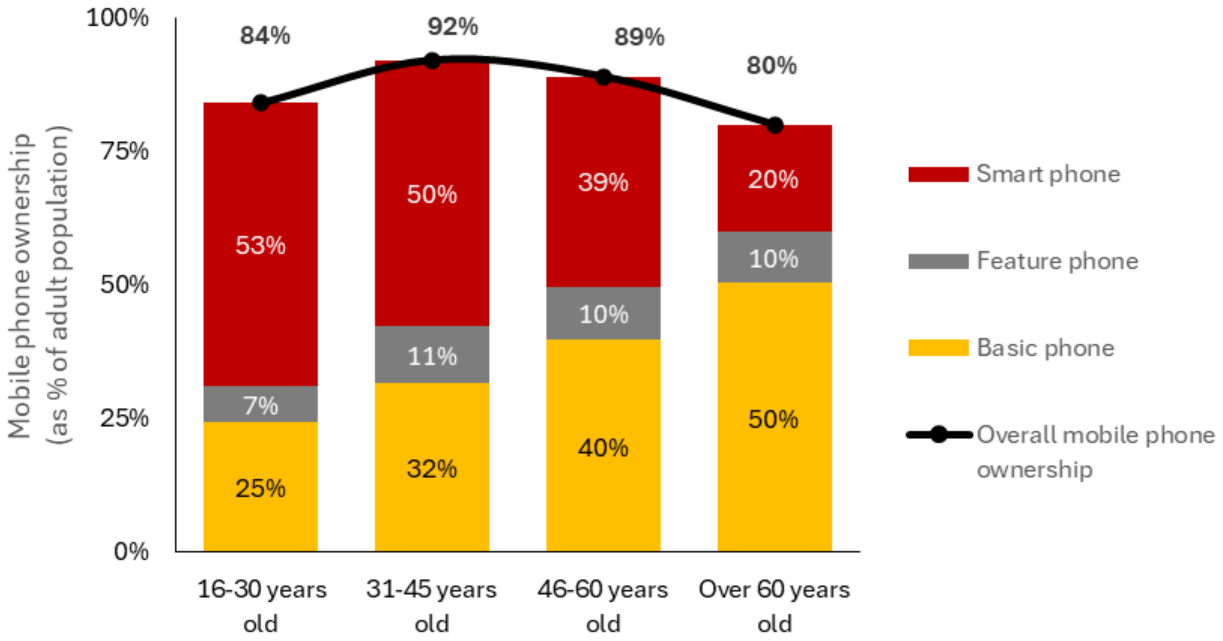
Figure 15: Urban-rural comparison of mobile phone ownership by most advanced type of phone, 2018 and 2022



Source: RIA (2018a, 2022a)

There is a clear relationship between mobile phone ownership and age displayed in Figure 16. Overall mobile phone ownership was highest for those 31-45 years old. The biggest differential was with smartphone ownership, which was highest for the youth (16-30 years old). Smartphone ownership was slightly lower for young adults (31-45 years old), and then notably lower for both of the two older age cohorts. Despite the fact that Kenyans have reduced their reliance on basic mobile phones it is worth noting that the majority of mobile phone owners over the age of 60 years still relied on a basic phone. This is particularly relevant when thinking about using digital channels such as mobile money for the disbursement of government pensions and disability grants, amongst other state benefits.

Figure 16: Age cohort comparison of mobile phone ownership by most advanced type of phone, 2022



Source: RIA (2022a)

Figure 17 shows that mobile phone ownership also increased with income. Smartphone ownership was nearly universal among high-income earners, with 88% owning one. Surprisingly, among individuals with no income, smartphone ownership (37%) exceeded basic phone ownership (23%). This contradicts the assumption that the poorest primarily use basic phones. Furthermore, the no-income group had a higher smartphone ownership rate (37%) than the lower-middle income group (34%), revealing a non-linear relationship between income and smartphone access. Despite income constraints, overall mobile phone ownership was still substantial among the poorest: 73% of adults with no income and 74% of those in the lowest income quartile (0–25%) owned some form of mobile phone. Nevertheless, the highest income groups enjoyed greater connectivity and access to advanced features facilitated by smartphones.

Figure 17: Income bracket comparison of mobile phone ownership by most advanced type of phone, 2022

Source: RIA (2022a)

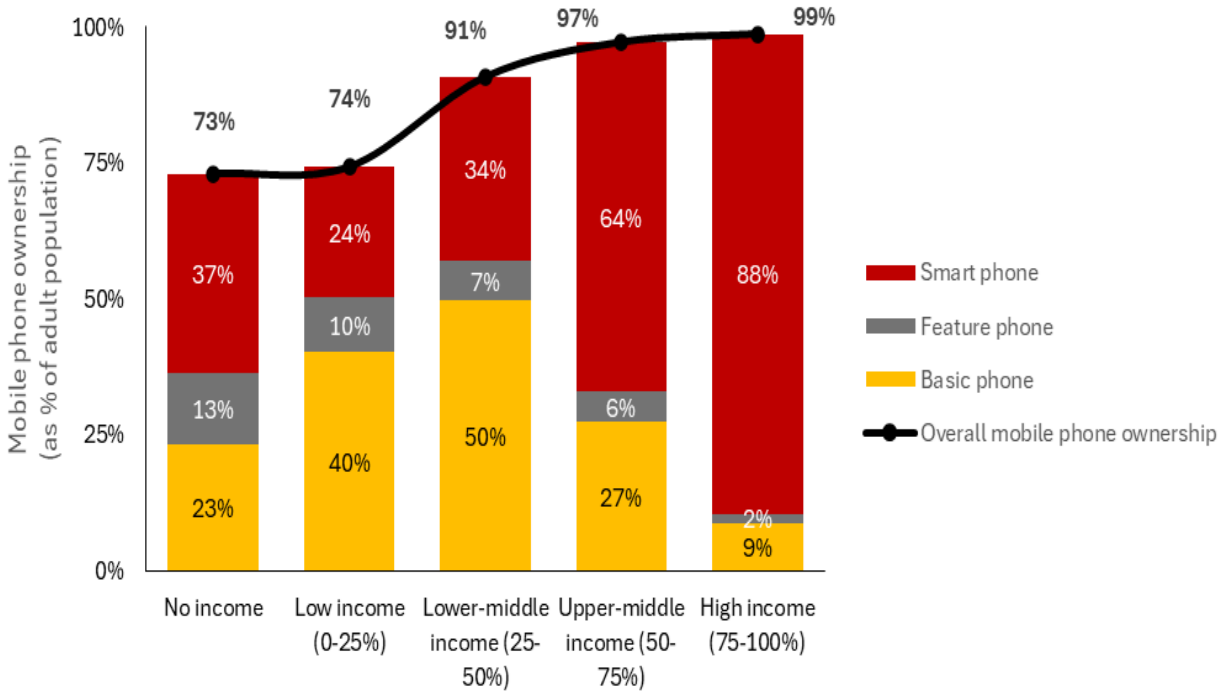
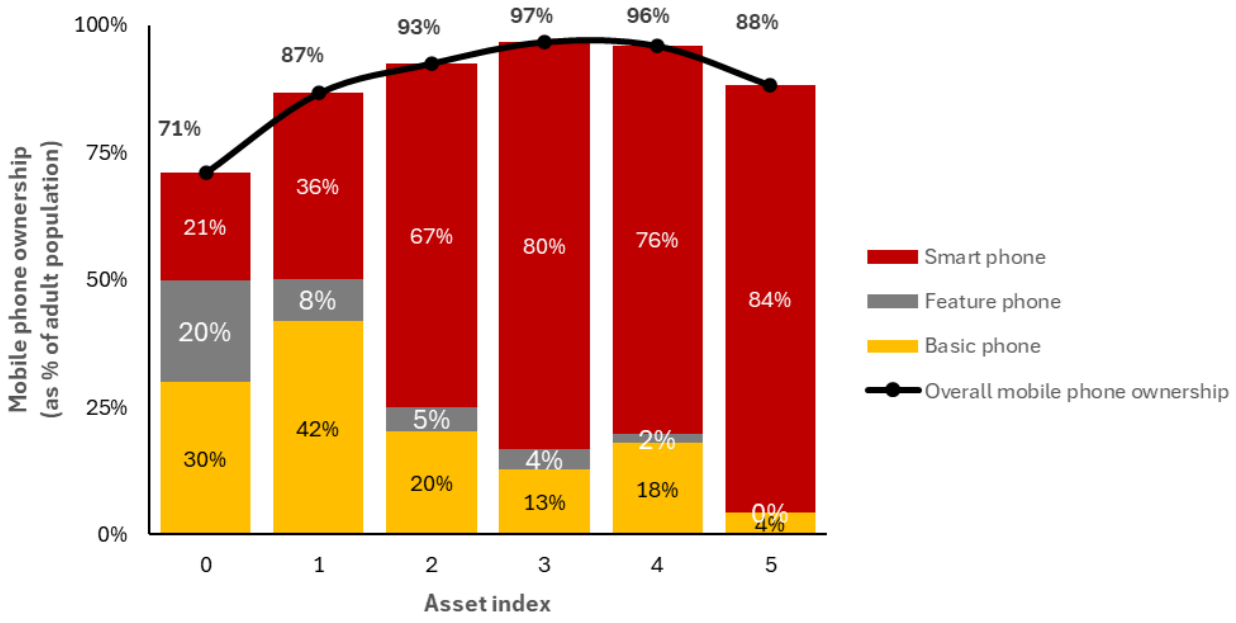


Figure 18 shows the results of mobile phone ownership based on the asset index used in the study. The asset index indicates the amount of assets owned by an individual's household (for details of how it is calculated see Appendix A3 of this report). There are individuals in households possessing all assets included in the asset index who still do not own a mobile phone, and there are individuals who own only a basic mobile phone. A demographic analysis within these households reveals a higher prevalence of basic phone ownership among older adults and young students. This indicates that such individuals are often supported by the household's shared resources.

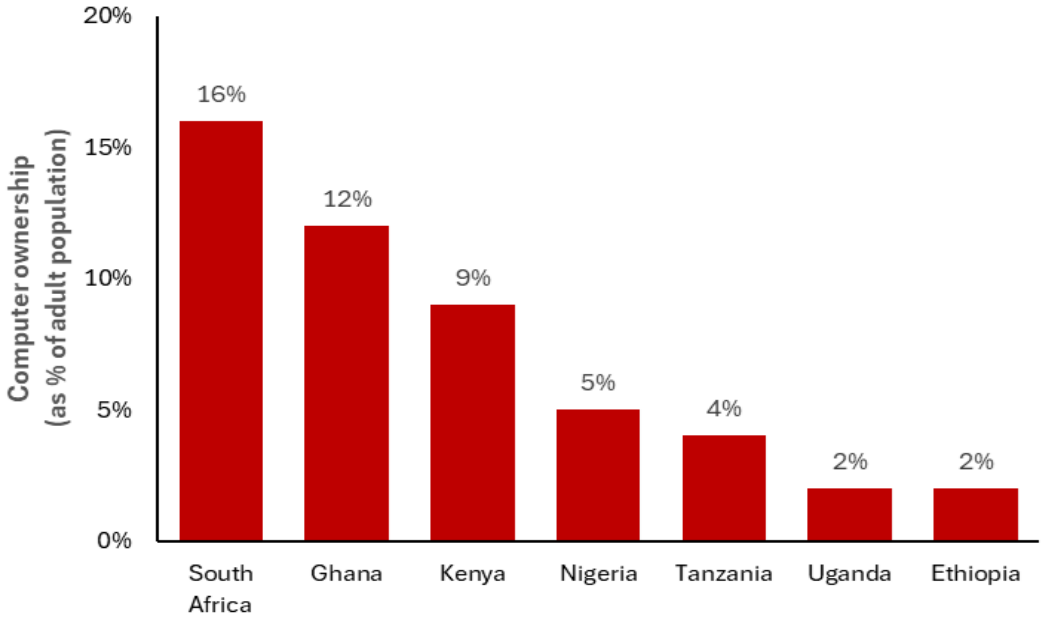
Figure 18: Household asset index comparison of mobile phone ownership by most advanced type of phone, 2022



Source: RIA (2022a)

Although computer ownership was low in Kenya, it was high relative to Nigeria, Tanzania, Ethiopia and Uganda. As Figure 19 shows, South Africa has the highest share of the adult population with a computer. The ranking of countries by extent of computer ownership follows the rankings in terms of mobile phone and smartphone ownership very closely.

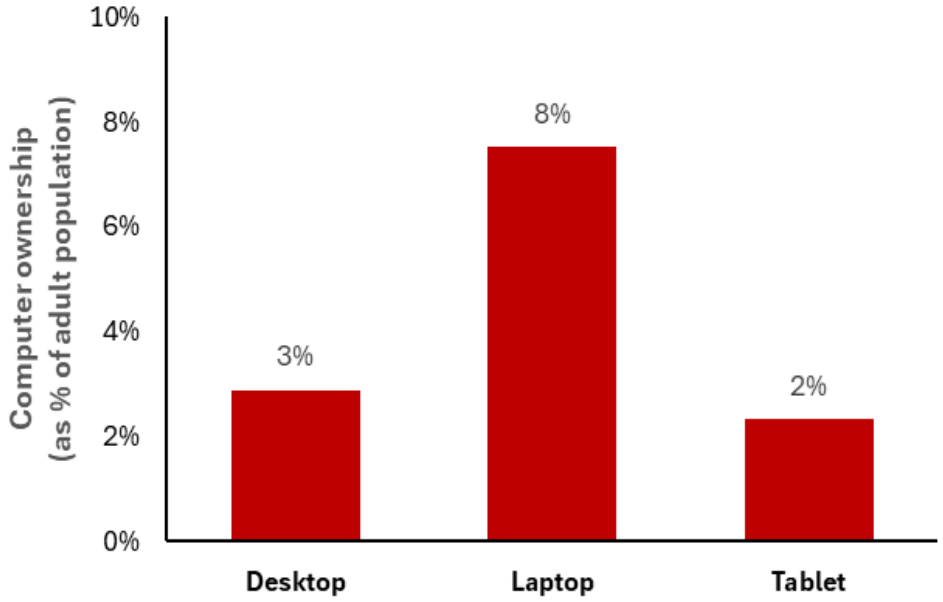
Figure 19: Computer ownership for countries surveyed, 2022



Source: RIA (2022a)

Laptops were the most popular type of computers owned by Kenyans with 8% of adults owning a laptop. Desktop computers and tablets were relatively less common, owned by only 3% and 2% of the adult population respectively. The fact that the sum of the ownerships of different computers exceeds the overall level of computer ownership is a result of some individuals owning multiple computers. Unlike with mobile phone ownership where it was possible to only count the most advanced mobile phone, some individuals were counted under multiple types of computer ownership.

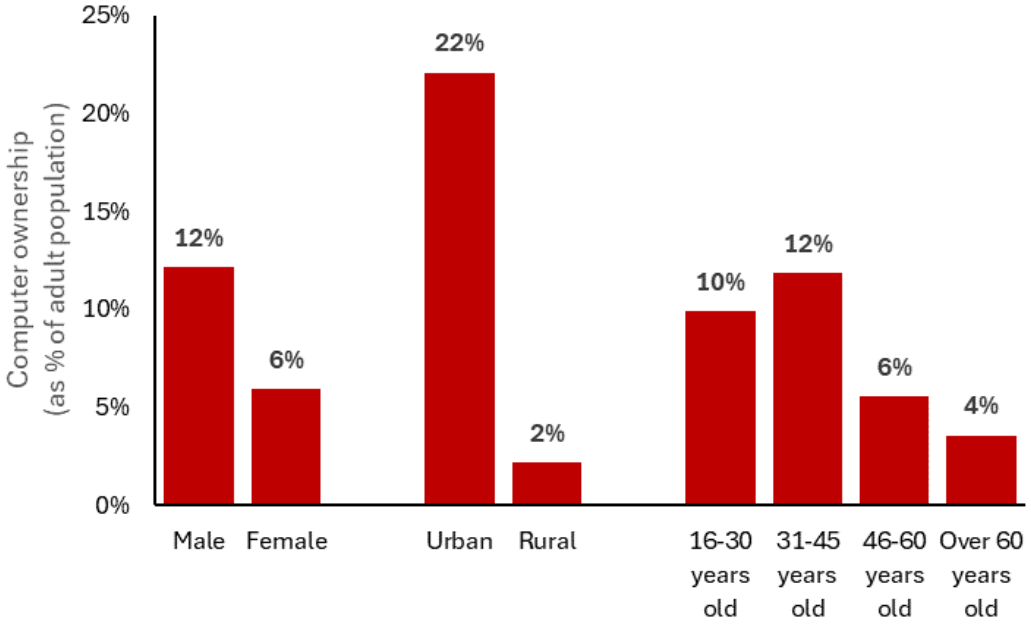
Figure 20: Specific types of computer ownership, 2022



Source: RIA (2022a)

Computer ownership differs across the demographic segments displayed in Figure 21. While 12% of adult males owned a computer in 2022, only half (6%) of female adults did. The gap was even wider between urban areas (22%) and rural areas (2%). The differences across age gaps followed mobile phone ownership to a degree. Those 31-45 years old had the highest level of computer ownership, and the oldest age cohort, those over the age of 60 years the lowest.

Figure 21: Gender, location and age comparison of computer ownership, 2022

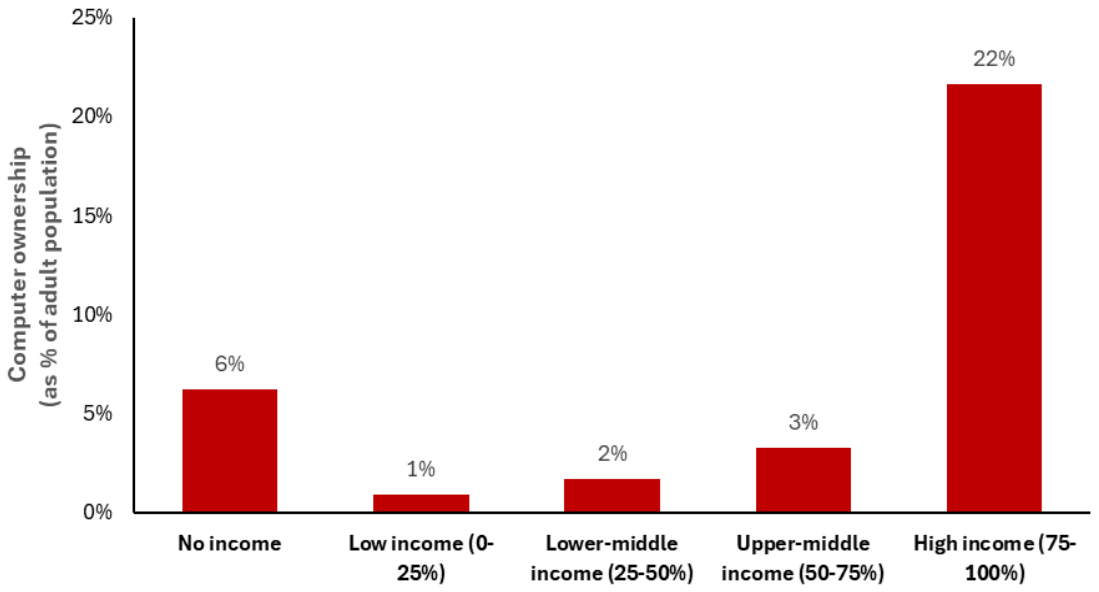


Source: RIA (2022a)

The low level of computer ownership was not evident in the high-income quartile where 37% of adults owned a computer, further highlighting the lack of affordable computers for low-income, and even middle-income earners. The share of individuals with computers among the no-income category was higher than the low- income category.

This is a result of income being measured at the individual level. Hence there will be some unemployed or not economically active individuals who are in high-income households.

Figure 22: Income comparison of computer ownership, 2022



Source: RIA (2022a)

The link between income levels and computer ownership was further evident from the breakdown of computer ownership by asset index in Figure 23. Most households fell into the top three asset indexes, meaning there was still a large proportion of households in the top asset indexes without a computer. However, there was a sharp jump between asset indexes of 4 (38%) and 5 (70%).

Figure 23: Asset index comparison of computer ownership, 2022

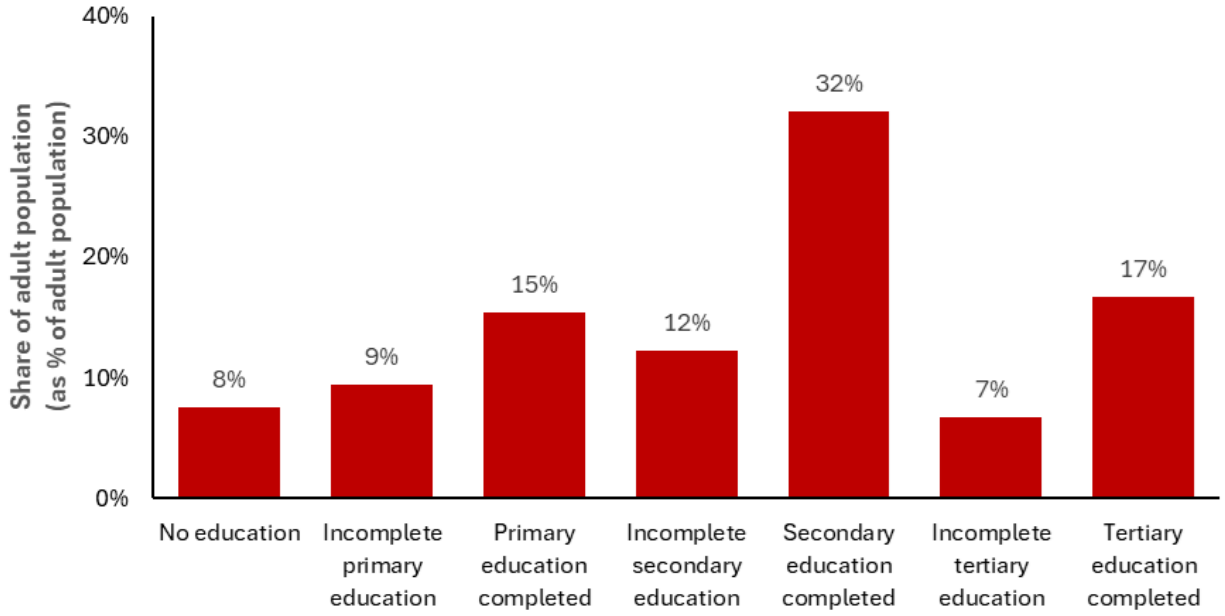
Source: RIA (2022a)

The recent increase in smartphone adoption is a promising development for Kenya, indicating progress toward widespread access to digital technology. However, simply having the devices is not enough; individuals also need the necessary skills to effectively utilise these technologies.

6.2. Digital skills

Figure 24 indicates that most Kenyan adults[11] (56%) at the time of the survey had gone beyond a primary school education but only 32% had completed secondary school. Moreover, the majority of those that completed secondary school did not go further than that with only 17% gaining a degree or diploma at a higher education institution. Only 8% of adults claimed to have had no formal education at all and only 9% had not managed to complete primary school.

Figure 24: Education status of Kenyan adult population, 2022

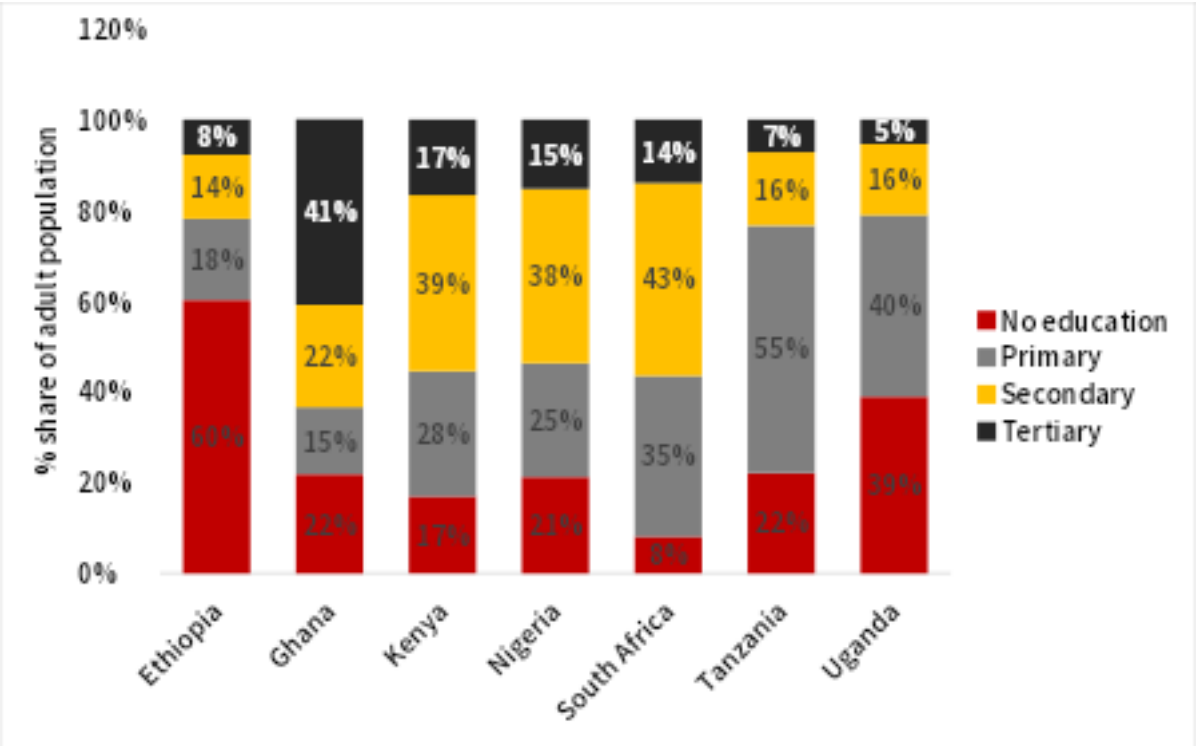


Source: RIA (2022a)

Relative to the other countries in the 2022 After Access survey depicted in Figure 25, Kenya (17%) ranked second to South Africa (8%) with respect to the least proportion of the adult population lacking education. Apart from Ghana (41%), Kenya also had a higher proportion of the adult population that had completed a tertiary education (also 17%) compared to other countries surveyed. Tanzania had the most respondents who only had primary level credentials (55%).

Figure 25: Country comparison of educational attainment amongst adult population, 2022

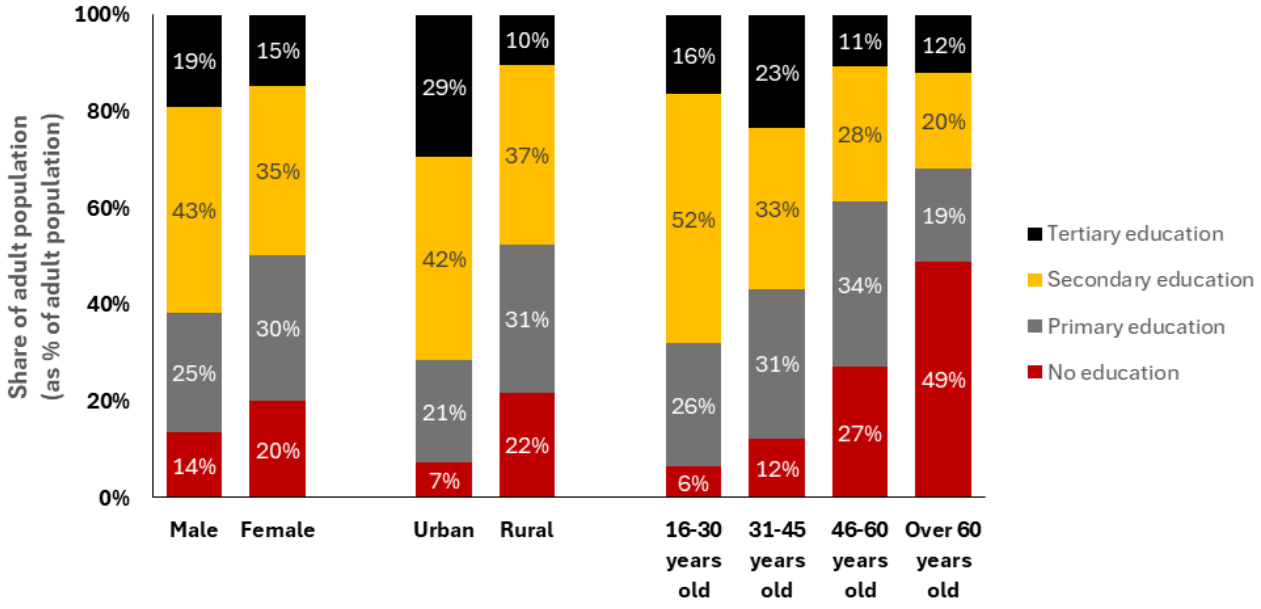
[11] We define adults as individuals aged 16 years and older. Our approach considers respondents within this age group as capable of providing informed consent and accurate data.



Source: RIA (2022a)

Educational attainment differs across the demographic population segments in Figure 26. A higher share of female adults had no education. More females had also only completed primary education compared to males, but then a slightly higher share of males had attained a tertiary education. Individuals in rural areas had notably lower educational attainment than in urban areas, as evidenced by a higher share with no education and with just a primary education, and consequently lower shares having obtained secondary and tertiary educations. There was evidence of improvements in education in the intergenerational decrease in individuals with no education and decreasing share in individuals having attained a tertiary education. The trend appears to break for the youngest age cohort, which is expected given the fact that this cohort has a high probability of still being busy with their education.

Figure 26: Demographic comparison of educational attainment amongst adult population, 2022



Source: RIA (2022a)

Individuals that have at some point utilised digital technologies were asked in the survey a range of questions to try and ascertain their level of digital literacy. These questions are broadly grouped into three key areas which were scored as individual sub-indicators and then averaged to provide an overall digital literacy score developed by RIA:

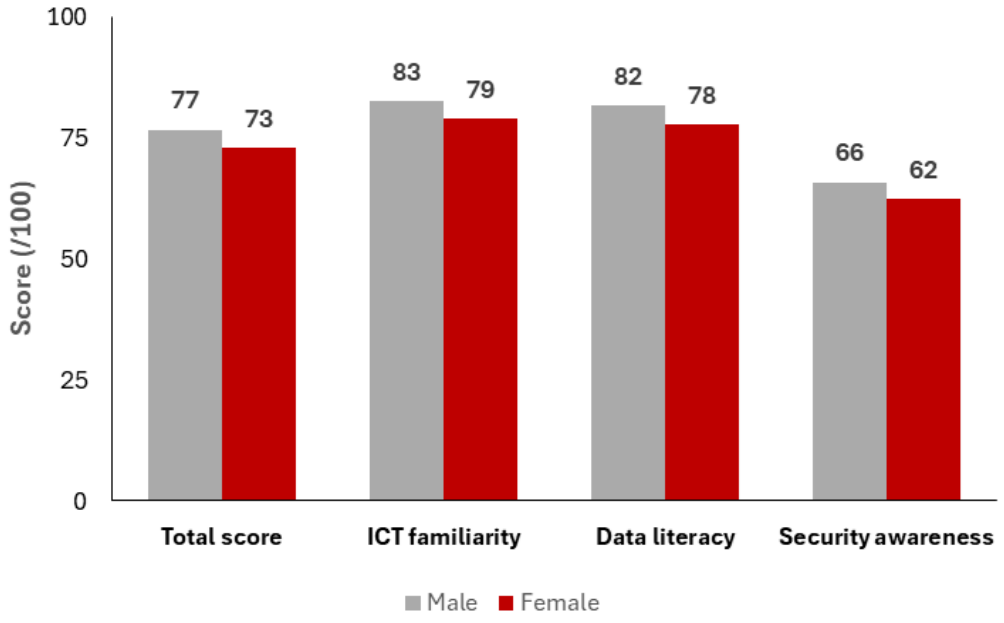
- ICT familiarity: The ability to connect to networks, upload and download an application, configure application settings, and operate browsers;
- Data literacy: The ability to search for data and information, store it on digital mediums, upload and download files, and fill in online forms; and
- Security awareness: The knowledge of a secure password, awareness of cyber risks, the use of two-factor authentication, ability to control online privacy settings, and knowing how to report online abuse.

Each of the sub-indicator scores are based on aggregated scoring across a range of different questions where the respondent was required to state their level of agreement with a statement on a scale from 1 (strongly disagree) to 5 (strongly agree). The detailed breakdown of the digital literacy scoring is provided in Appendix A4 to this report.

The average overall score across the three sub-indicators for the whole of Kenya was 75%. The highest sub-indicator scoring was on ICT familiarity where the average score was 81%, followed by data literacy with 80%. Security awareness was lowest at 64%. The low score on security awareness is a concern as it highlights a lack of awareness about security which prevents individuals from being able to protect themselves in the digital world and could lead to harms and a deterioration of trust in digital technologies.

As the gender breakdown in Figure 27 shows, males in Kenya performed better on average than females in terms of overall digital literacy and across all sub-indicators. However, the differences were relatively minor, with the overall digital literacy score for females at 73% only slightly below the score of 77% for males.

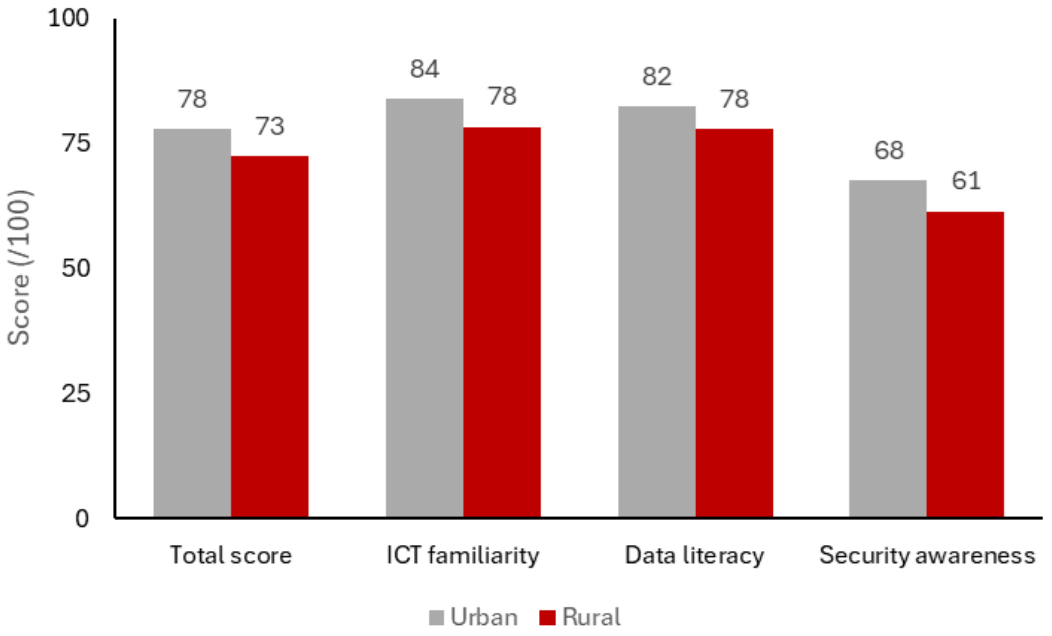
Figure 27: Digital literacy scores by gender, 2022



Source: RIA (2022a)

Similarly, individuals in urban areas had overall higher levels of digital literacy than individuals in rural areas. The gaps in the geographic breakdown in Figure 28 were again relatively small although they were more notable than was observed in the gender breakdown. The overall digital literacy gap was estimated at 5%, and, in complete contrast with the gender gaps, the largest gap between urban and rural areas was observed to be in security awareness (7%) and the smallest gap in data literacy.

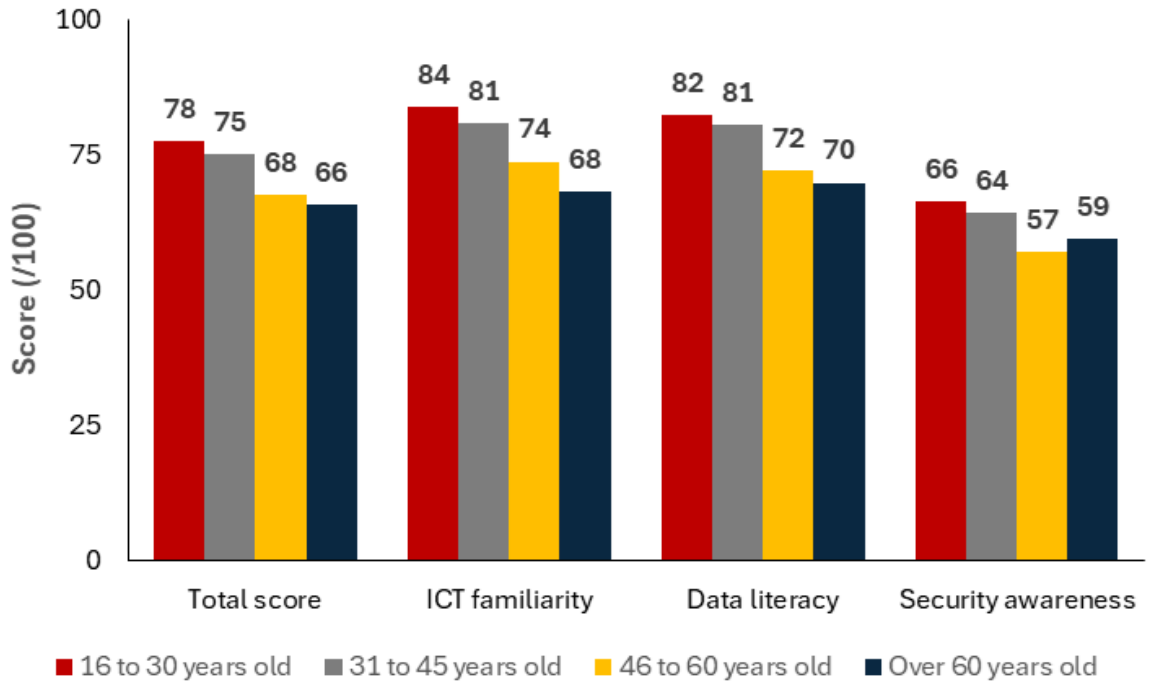
Figure 28: Digital literacy scores by location, 2022



Source: RIA (2022a)

More notable differences were observed when breaking down digital literacy by age cohorts in Figure 29. There was a clear decline in digital literacy with age, with the youngest age cohort achieving notably higher digital literacy scores across all sub-indicators.

Figure 29: Digital literacy scores by age cohort, 2022

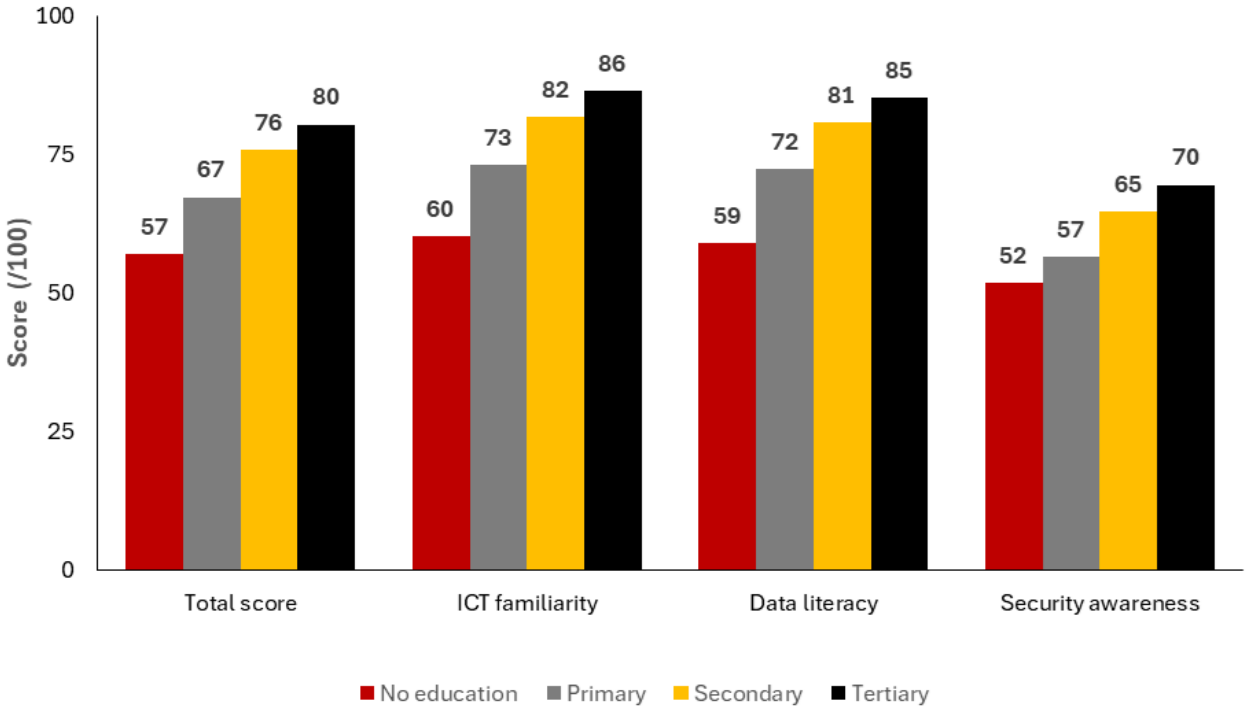


Source: RIA (2022a)

The link between education and digital literacy is also very clear from Figure 30, with very low digital literacy scores for individuals with no education, and scores getting progressively higher with higher levels of educational attainment. Just having a completed primary education makes a big difference with a sharp jump in digital literacy, but the importance of tertiary education is also evident from the high scores observed for individuals who have obtained a degree or diploma from a higher education institution. Interestingly, even individuals with no formal

education achieved scores over 50% across digital literacy indices, suggesting that they possess some level of literacy, potentially developed through the practical use of ICTs like mobile phones. This highlights an opportunity for further research on how people with minimal formal education and limited income acquire and utilise digital skills through channels such as mobile technologies.

Figure 30: Digital literacy scores by educational attainment, 2022



Source: RIA (2022a)

Although Kenya performs relatively well in education outcomes compared to other African countries, there is still significant room for improvement in building digital literacy. Gender and geographic disparities highlight inequalities that must be addressed to achieve greater digital inclusion. Encouragingly, Kenya's youth show stronger digital literacy skills than older generations, reflecting improvements in educational attainment. The positive correlation between digital literacy and formal education is promising, particularly as Kenya excels in tertiary education compared to other African nations. However, the country's low scores in digital security awareness are concerning as ensuring safe and secure access to the digital economy is essential for all.

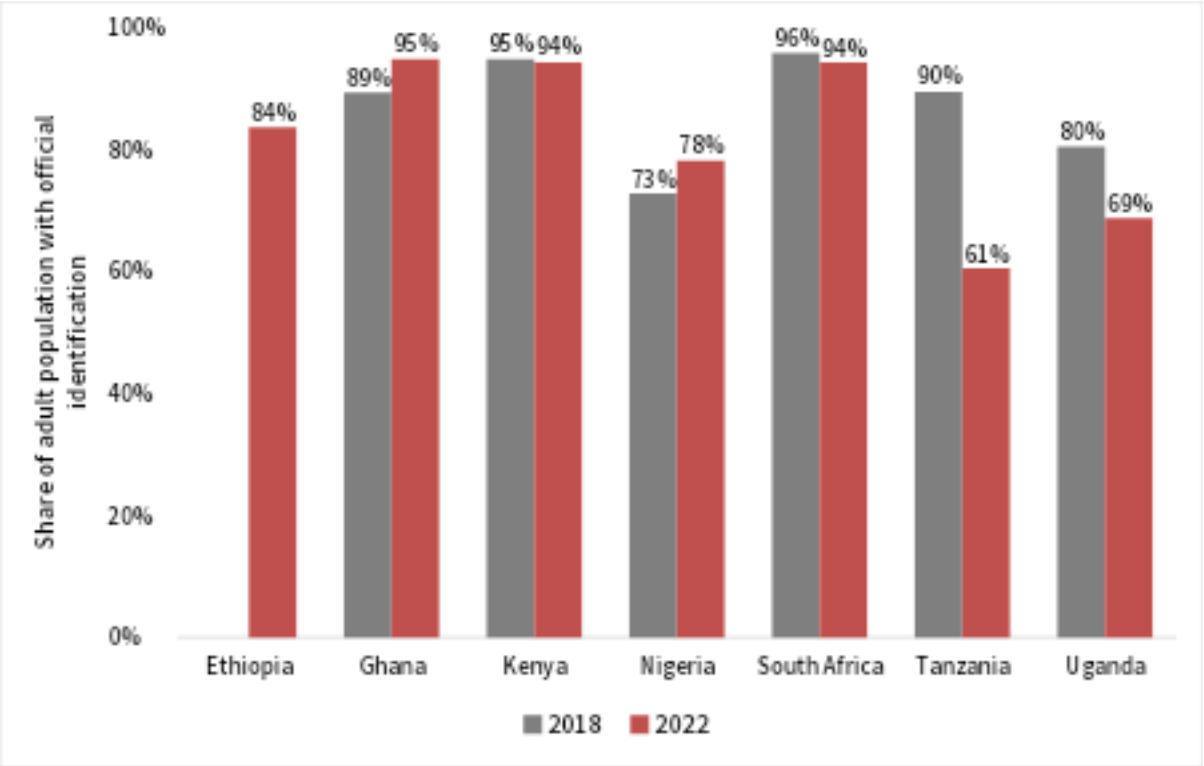
6.3. Identification

The recognition of individuals as persons before the law is a human right enshrined in Article 6 of the Universal Declaration of Human Rights (United Nations, 1948) and Article 16 of the International Covenant on Civil and Political Rights (United Nations, 1966). The SDGs also recognise the importance of identification for sustainable development, setting the goal of providing legal identity for all by 2030 (United Nations, 2015). In Kenya, the Constitution guarantees that every child has the right to a name and nationality (Article 53). However, as is the case in many African countries, many individuals in Kenya remain without any official form of identification (UNHCR & Lawyers for Human Rights, 2021).

Figure 31 shows the share of the population that possessed some form of official identification, be it a national identification document or a passport. Most Kenyans had some form of identification, on par with Ghana and South Africa, and a greater reach than observed in Ethiopia, Nigeria and Uganda. However, there was still 6% of the adult population with no form of identification, a share which has grown since the 2018 survey (5%). This is possibly a result of delays and backlogs at the Ministry of Interior and Coordination of National Government due to the social distancing restrictions in place during COVID-19. Among other use cases, official identification allows individuals

access to formal financial services. Tanzania had the least proportion of respondents with official identification of 61%

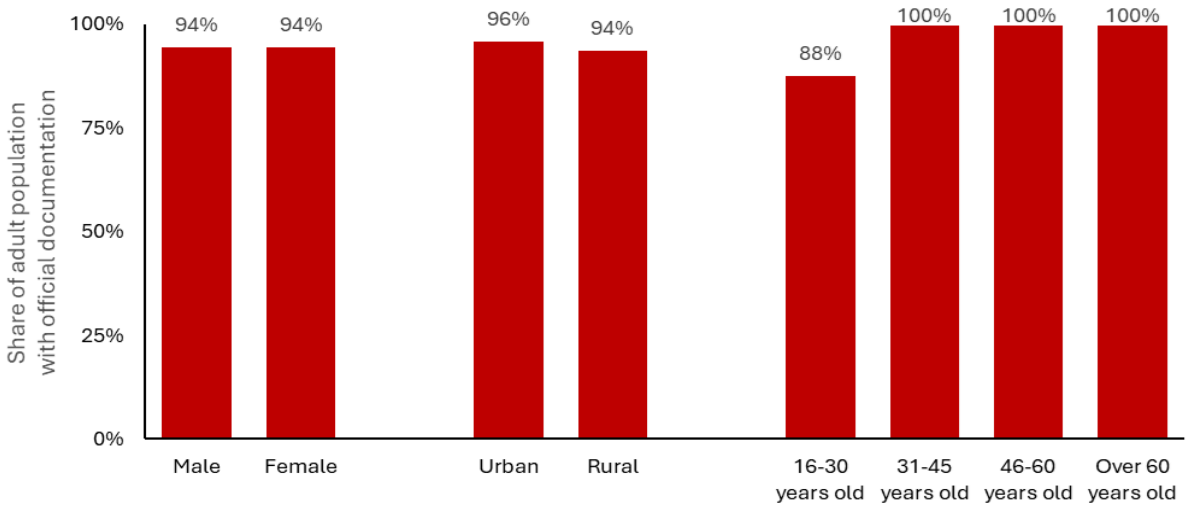
Figure 31: Country comparison of official identification amongst adult population, 2022



Source: RIA (2022a)

As Figure 32 shows, the majority of the adult population possessed official documentation, with small variations across demographics. Specifically, 94% of both males and females had official documentation. Urban residents had slightly higher documentation coverage (96%) compared to rural residents (94%). Documentation coverage increased with age, with 88% of individuals aged 16-30 years having official documentation, compared to 100% coverage among those aged 31-45, 46-60, and over 60 years. These figures suggest relatively high access to official documentation, though younger adults may face more barriers.

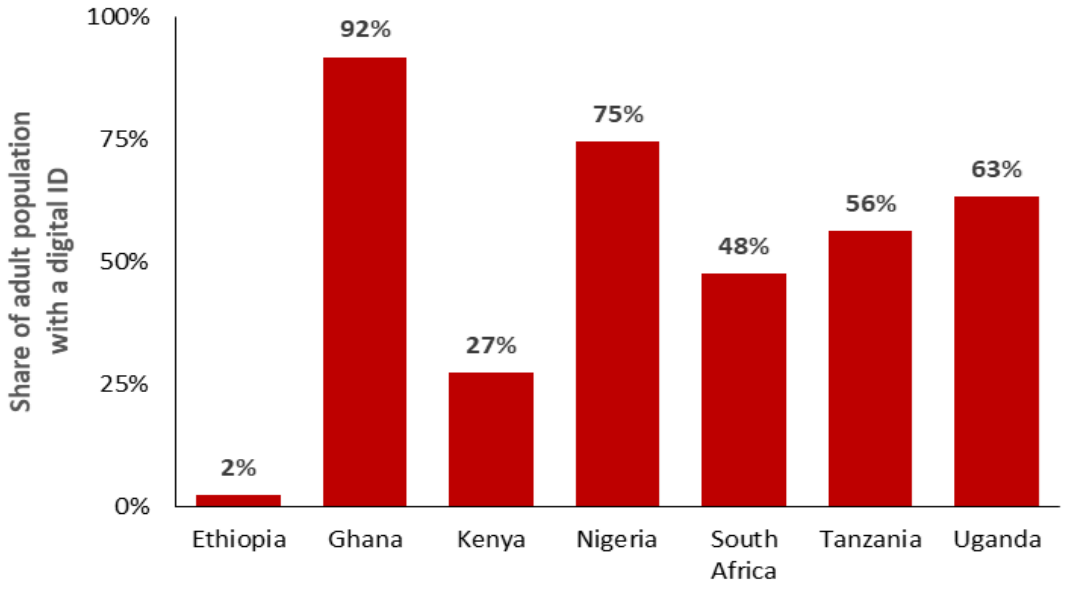
Figure 32: Demographic comparison of official identification amongst adult population, 2022



Source: RIA (2022a)

Identification is a key requirement for many forms of digital access and therefore a lack of ubiquitous official identification is a major barrier to digitalisation and achieving digital equality. However, digitalisation can in itself provide a solution to the lack of identification through digital ID systems. The African Union's Digital Transformation Strategy acknowledges this opportunity and identifies digital ID as a key priority, while also addressing the risks inherent in digital ID roll-out (African Union, 2020). Compared to the other countries in the survey, Kenya's adoption rate was significantly higher than Ethiopia's but lagged considerably behind Ghana, Nigeria, Uganda, Tanzania and South Africa, suggesting potential areas for improvement in Kenya's digital ID initiatives.

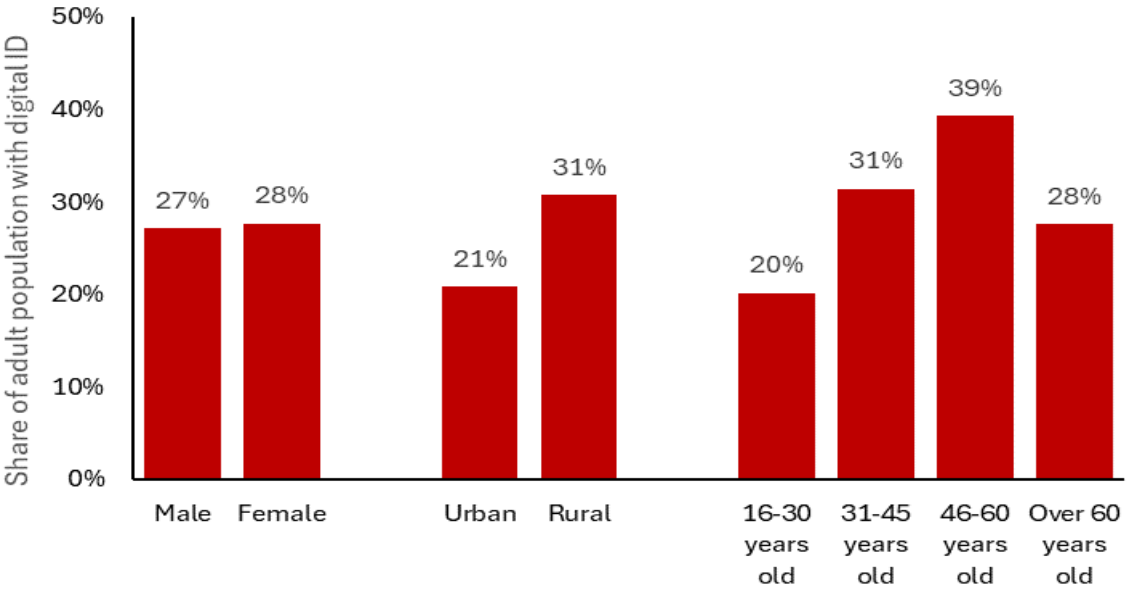
Figure 33: Country comparison of digital ID adoption amongst adult population, 2022



Source: RIA (2022a)

Digital ID adoption was relatively similar for males and females but was higher in rural areas compared to urban areas. In terms of age, it was highest among adults aged 31-45 years and 46-60 years, where digital ID adoption reached 31% and 39% respectively. The higher adoption rate amongst the 31-45 age group may reflect the fact that individuals getting their first ID after turning 31 will get a digital ID rather than an analogue one.

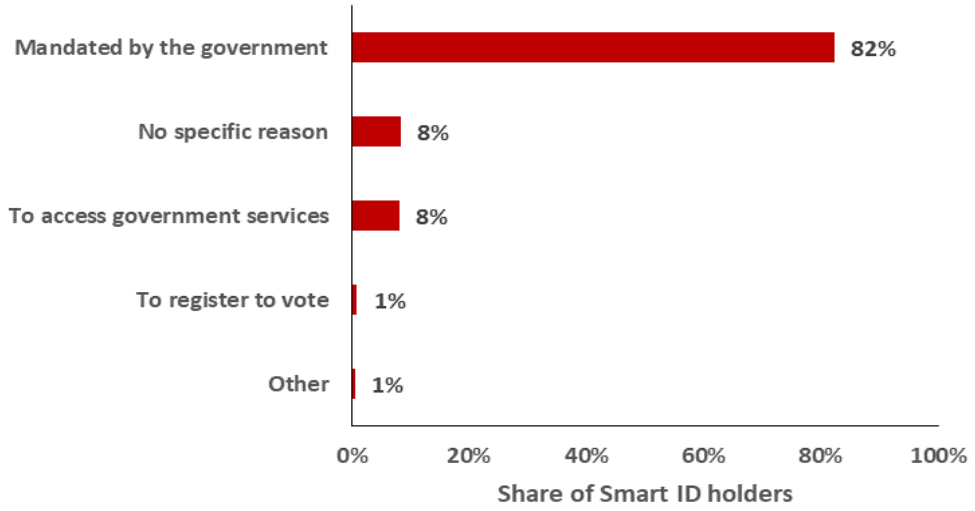
Figure 34: Demographic comparison of digital ID adoption amongst adult population, 2022



Source: RIA (2022a)

The majority of Kenyans (82%) obtained a digital ID primarily due to government mandates for accessing both public and private services. While possessing a digital ID is not compulsory, it becomes necessary to access specific social benefits provided by the government as well as for essential services like acquiring a passport. A digital ID is also necessary to access some private services such as those offered by commercial banks. As depicted in Figure 35, among the remaining digital ID holders, a small percentage (8%) obtained a digital ID for accessing government services, while others did so for no specific reason. A minor percentage (1%) obtained a digital ID for voter registration purposes.

Figure 35: Main motivation for getting a digital ID in Kenya, 2022



Source: RIA (2022a)

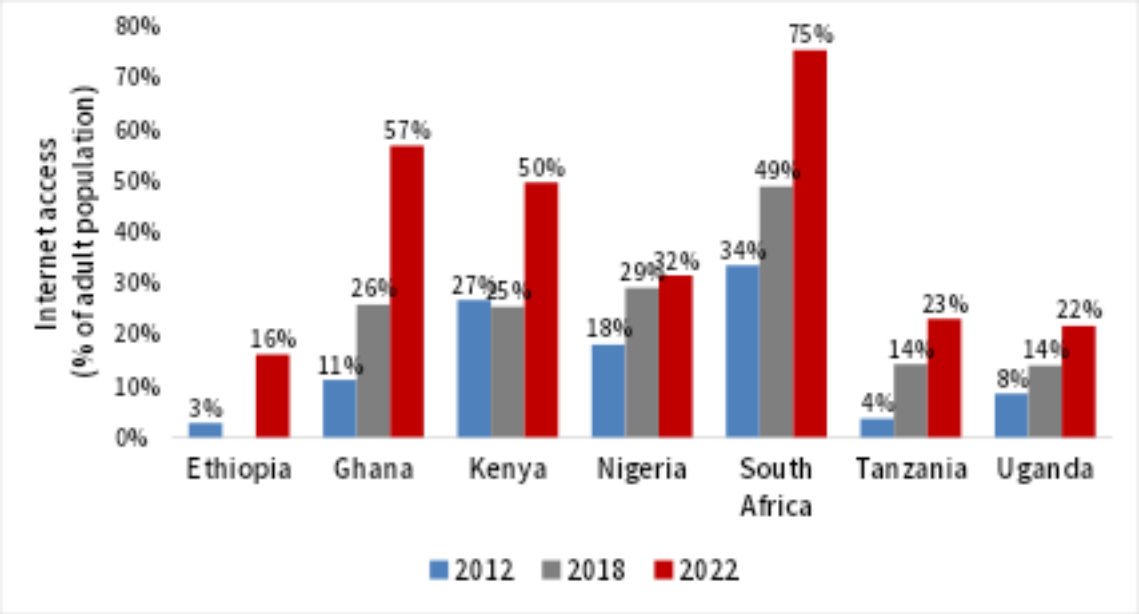
7. Digital access

7.1. Internet access

Internet use[12] among Kenyans doubled between 2018 and 2022, rising from 25% to 50%. This rapid growth underscores a transformative shift in digital connectivity across the country. The comparison of access rates for the different countries included in the After Access survey in Figure 36 shows that Kenya trails South Africa and Ghana, but outperforms Nigeria, Ethiopia and Uganda.

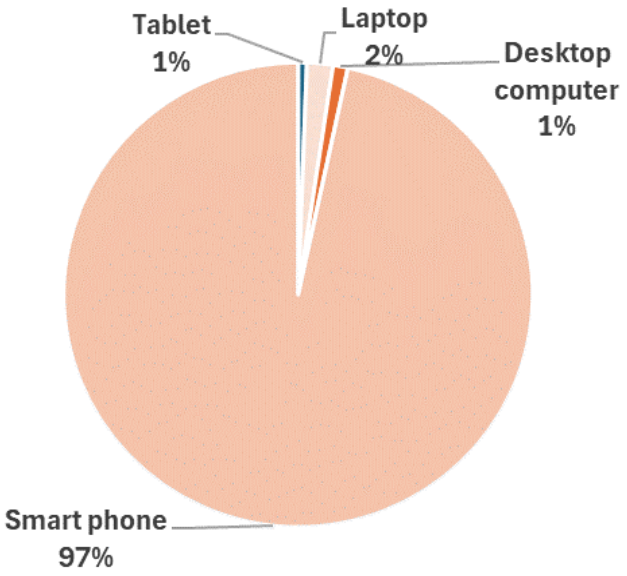
Figure 36: Country comparison of internet access, 2012, 2018 and 2022

[12] There was a slight change in the After Access questionnaire design between these two periods, specifically a change in the definition of internet use from individuals indicating that they use the internet currently in 2018, to indicating that they have used it in the last three months in 2022. The requirement relating to using the internet in the last three months aligns with the definition adopted by the ITU (International Telecommunication Union, 2020).



Unsurprisingly in light of the analysis on device ownership, 97% of internet users in Kenya mainly used a smartphone to get online. As Figure 37 shows, computers were used far less to get online, with only 2% saying they mainly used a laptop computer, 1% a tablet, and 1% a desktop computer.

Figure 37: Main device used to access the internet, 2022

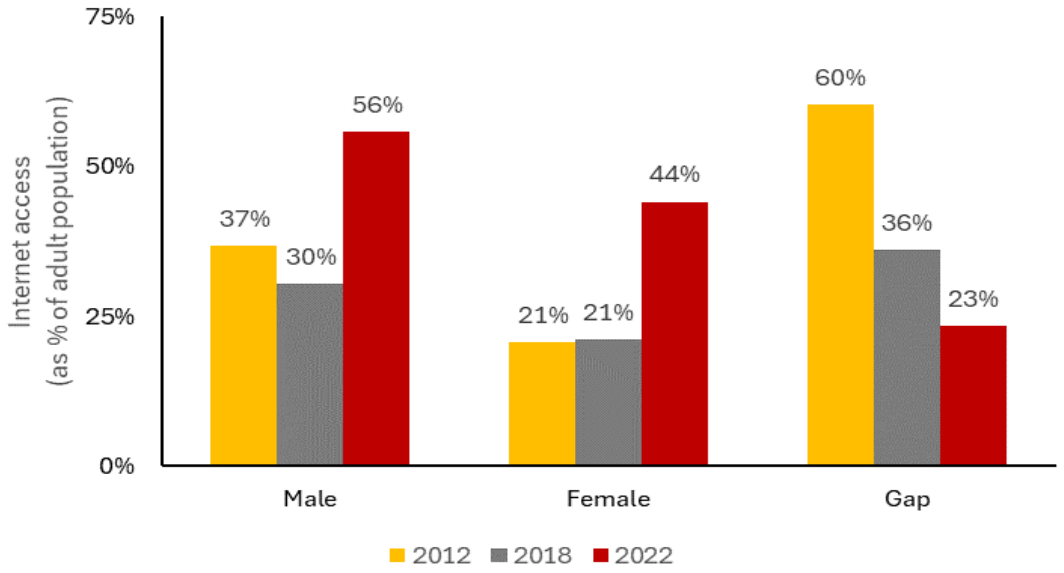


Source: RIA (2022a)

Gaps[13] provides an indication of the relative difference in access between two population groups. With respect to the gender gap in Kenya, which gives an indication of the relative difference between males and females, the growth in internet access among females exceeded that of males over the past decade. This has led to a significant narrowing of the gender gap which was quite pronounced in earlier survey periods. The gender gap stood at 60% in 2012, decreased to 36% in 2018, and further diminished to 23% in the latest 2022 survey. Despite this positive trend the gender gap remains significant.

[13] In order to ensure that the gender gaps are relative to the overall level, and to allow gaps to be comparable no matter the direction of the gap, the gap between two population groups a and b, within a population p, on a particular indicator i, is measured as: $gap^{i}_{a,b} = (i_b - i_a) / i_p$. For a detailed overview of the gap calculations see Appendix A5.

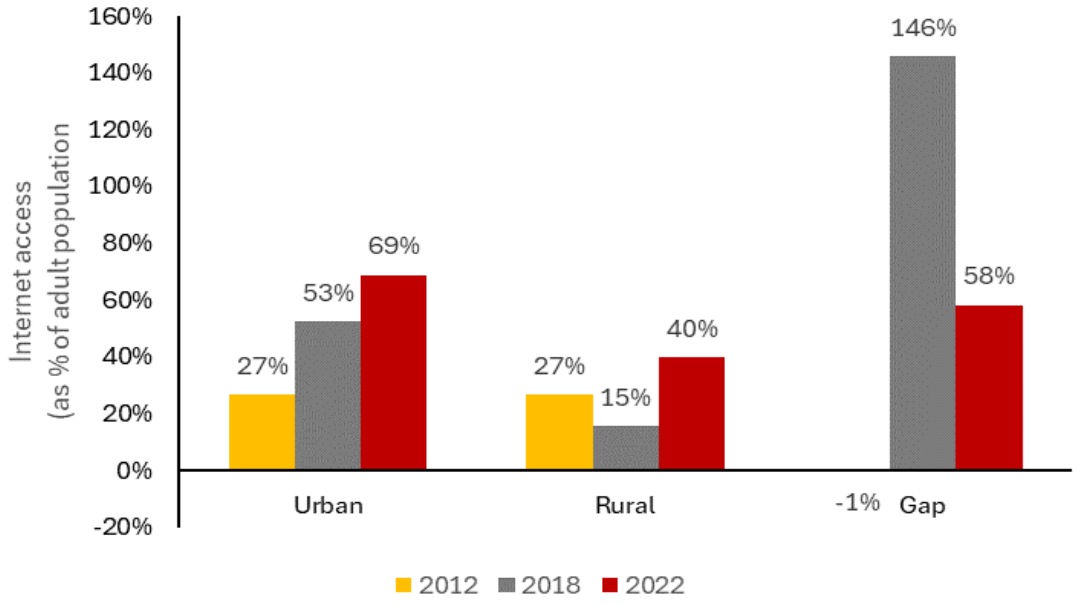
Figure 38: Internet access by gender and resulting gender gap, 2012, 2018 and 2022



Source: RIA (2012, 2018a, 2022a)

The gap between urban and rural areas has also been declining, albeit from a higher base which means that a significant 58% gap still remains. Of particular note is the increase in internet access in rural areas between the last two rounds of the survey, from 15% in 2018 to 40% in 2022. This resulted in the location gap approximately halving over this period, from 146% to 58%.

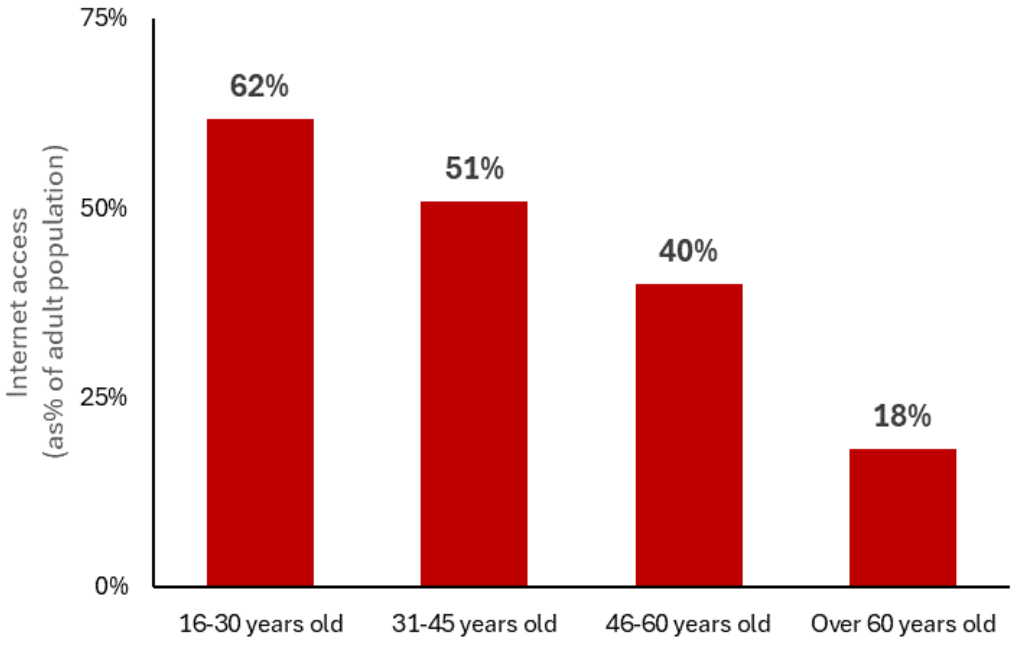
Figure 39: Internet access by geographic location and resulting location gap, 2012, 2018 and 2022



Source: RIA (2012, 2018a, 2022a)

The age comparison of internet access in Figure 40 shows that access was significantly lower for older individuals. It stood at only 18% for individuals over the age of 60 years, compared to 62% for the youth (16-30 years old). Younger adults, aged 31-45 years old, had average access levels of 51%, only slightly lower than the youth age cohort, but this drops significantly to 40% for those 46-60 years old.

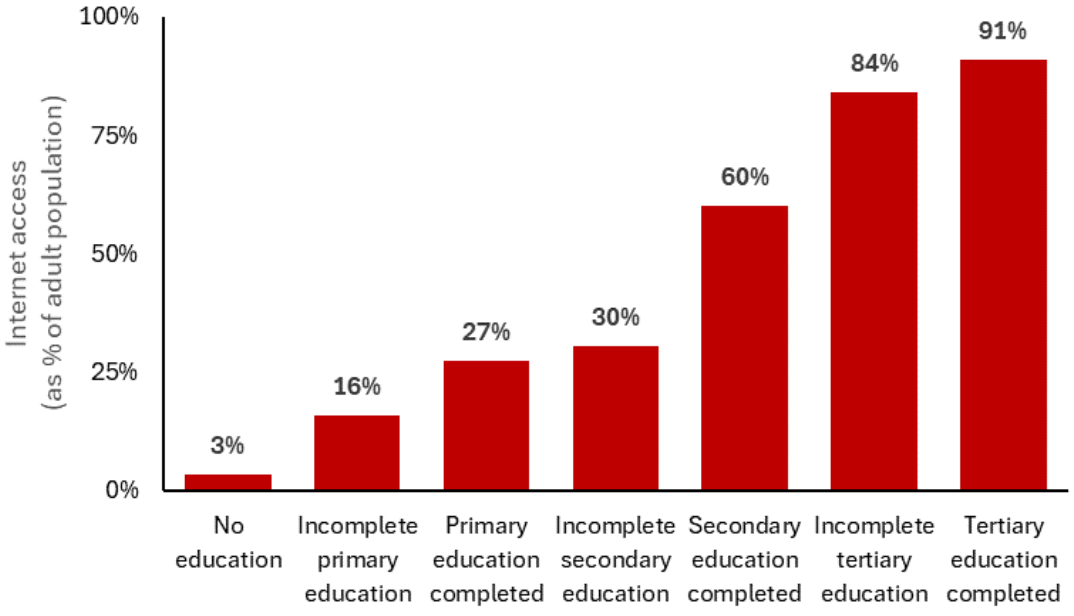
Figure 40: Internet access by age cohort, 2022



Source: RIA (2022a)

Access levels increased with higher levels of education (Figure 41). Moving from no education to primary education, the average level of access more than doubled from 10% to 29%. Similarly, moving from primary to secondary education the average level of access more than doubled from 27% to 60%. Despite access levels reaching as high as 60% for individuals with a secondary education, it increased further with a tertiary education to 91%.

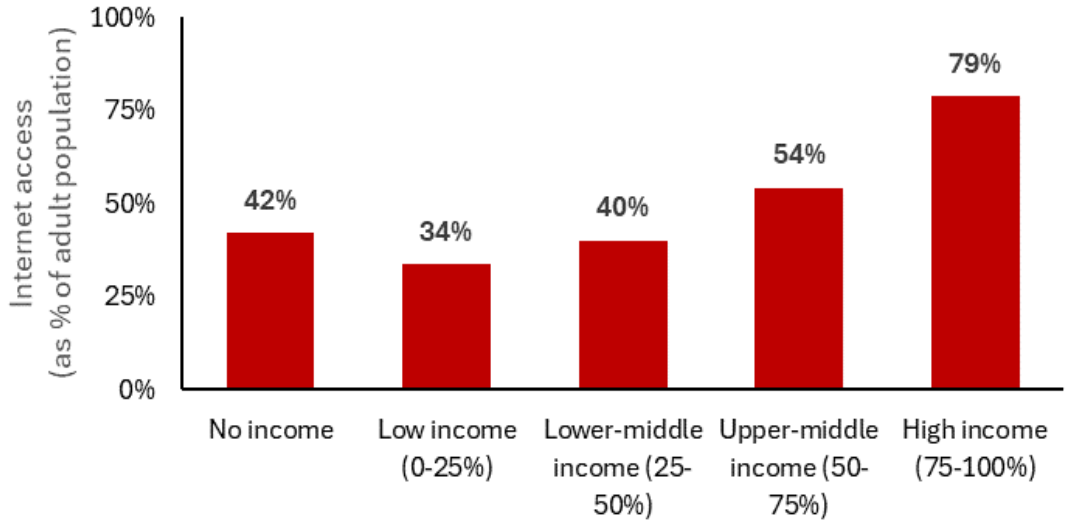
Figure 41: Internet access by education level, 2022



Source: RIA (2022a)

The difference in access levels across income quartiles in Figure 42 was less stark than was observed for education and age, however, there was a noticeable increase in access levels with higher incomes to the extent of there being near universal internet access for the top half of income earners.

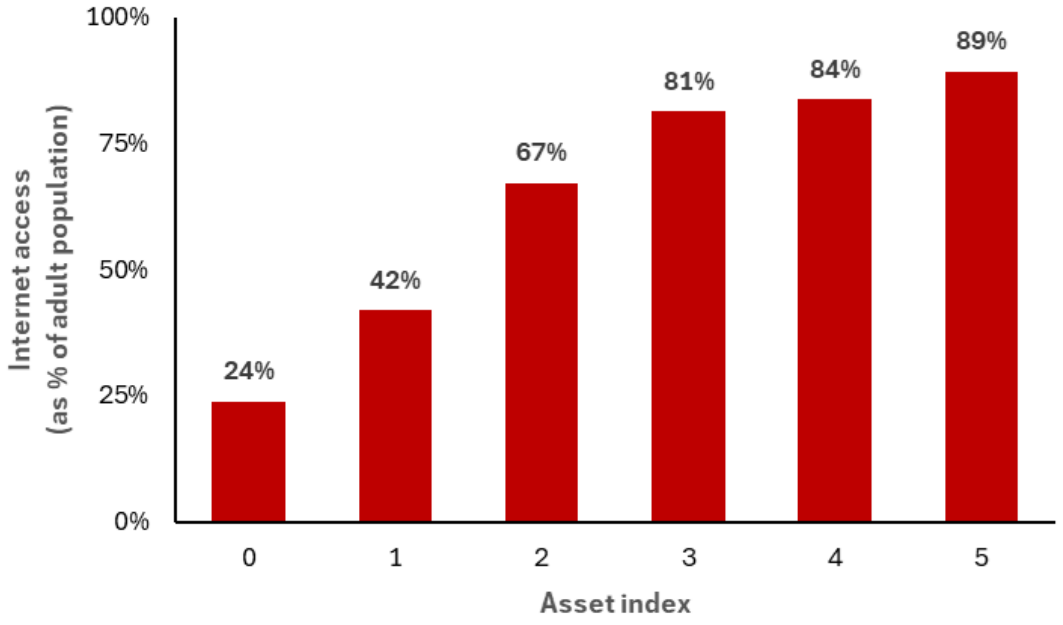
Figure 42: Internet access by income bracket, 2022



Source: RIA (2022a)

Similarly, access increased when moving to higher scores on the asset index (Figure 43). Among individuals with an asset index of 0 – a small group comprising only 24% of the population – access was significantly lower than in other groups. Beyond this, internet access rose steadily across the lower three asset index scores, eventually plateauing at over 80% for those with higher asset index scores.

Figure 43: Internet access by household asset index, 2022



Source: RIA (2022a)

Digitalisation literature has highlighted that inequalities are not stand-alone phenomena but rather intersectional issues. Similarly, previous After Access surveys have shown how access in Africa is determined by income and education, implying that inequalities manifesting across gender and geographic location are ultimately a result of structural inequalities relating to income and education (Aguilar et al., 2020a; Chair et al., 2016).

Table 3 presents some base findings on intersectional access inequalities in relation to gender in Kenya. In terms of age, in the 2022 survey younger female adults actually had higher access levels than males in the same age cohorts. However large gender gaps still existed for older adults.

Table 3: Gender access intersectionality, 2022

		Male Access	Female access	Gender gap
Age	16-30 years old	92%	93%	-1%
	31-45 years old	77%	90%	-16%
	46-60 years old	64%	58%	10%
	Over 60 years old	41%	25%	52%
Education	No education	15%	20%	-26%
	Primary	65%	63%	2%
	Secondary	87%	90%	-4%
	Tertiary	99%	99%	1%
Income	No income	71%	70%	1%
	Low income (0-25%)	79%	73%	8%
	Lower-middle income (25-50%)	50%	58%	-16%
	Upper-middle income (50-75%)	77%	80%	-4%
	High income (75-100%)	91%	99%	-8%

Source: RIA (2022a)

In terms of education and income, the gaps between genders within each education and income level appeared to overall favour females. In terms of education, amongst individuals with no education, access was significantly higher for females as evidenced by a 26% gender gap in favour of females. Amongst individuals with a secondary education there was a gender gap in favour of females of 4%, with the primary and tertiary education levels having slight gaps in favour of males. The fact that the overall gender gap is still slightly in favour of males is because females are more highly concentrated around lower education levels where access is notably lower.

The access levels with respect to income categories was only higher for males in the lower income groups, and the gender gap was only 1% for those earning no income. The gap was largest for lower-middle income earners where it was 16%, but higher for females compared to males. For the highest two income groups the gap also showed higher access levels for females, at 4% and 8%. The fact that the overall access gap is still in favour of males despite these findings highlights how females were more concentrated in lower income groups where access has been shown to be lower.

Location gaps are in favour of urban areas for all age, education, and income brackets. Interestingly, however, the size of the gap differs. The location gap was very high for older adults, but close to equality for the youth. This means that the youth in rural areas were just as likely to be online as the youth in urban areas. While individuals with no education in rural areas were far less likely to use the internet than those with no education in urban areas, the gap declines with educational attainment, such that individuals in rural areas with a tertiary and even a secondary education were almost as likely to use the internet as individuals with the same educational attainment in urban areas.

Table 4: Location access intersectionality, 2022

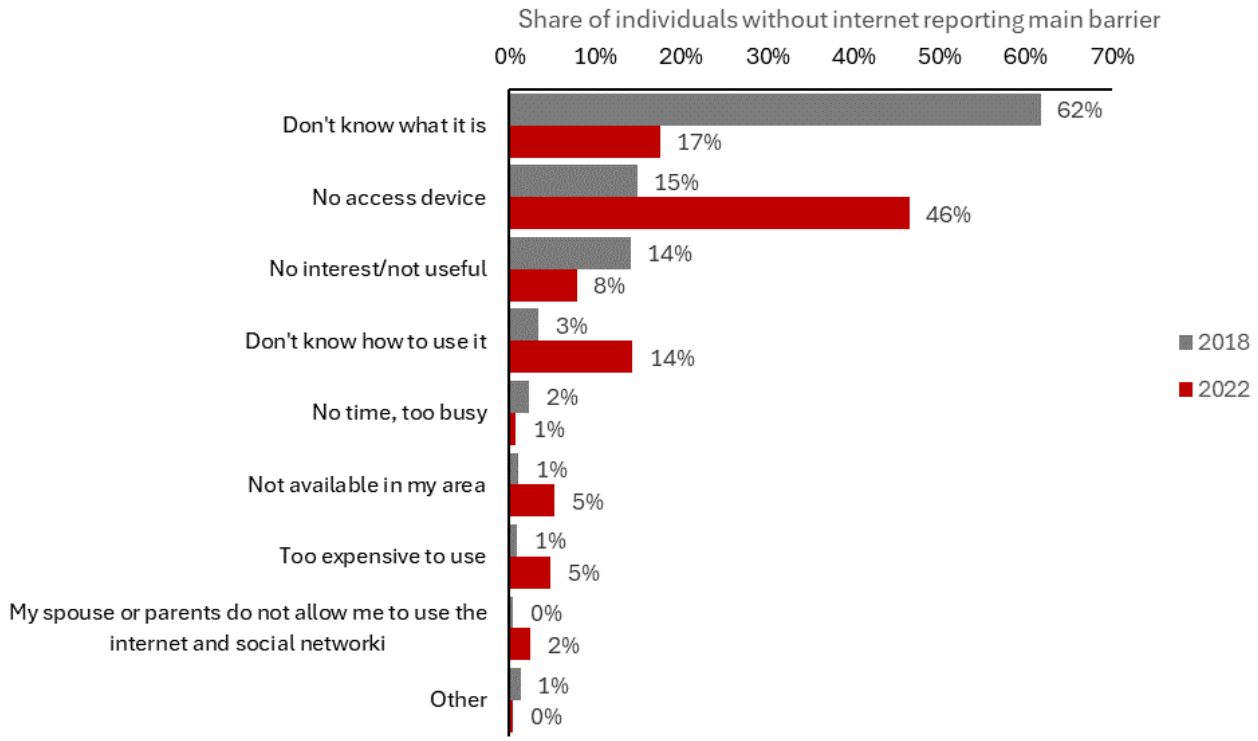
		Urban access	Rural access	Location gap
Age	16-30 years old	93%	91%	2%
	31-45 years old	89%	75%	16%
	46-60 years old	70%	38%	54%
	Over 60 years old	43%	13%	97%
Education	No education	29%	12%	92%
	Primary	67%	59%	14%
	Secondary	90%	84%	6%
	Tertiary	99%	97%	3%

Income	No income	76%	60%	23%
	Low income (0-25%)	83%	72%	15%
	Lower-middle income (25-50%)	58%	53%	8%
	Upper-middle income (50-75%)	87%	66%	26%
	High income (75-100%)	96%	88%	8%

Source: RIA (2022a)

In the 2018 round of the survey the biggest barrier preventing internet access was a lack of awareness about what the internet was, preventing 62% of adults from using the internet. However, by 2022 this barrier significantly decreased to 17%, reflecting increased awareness over time. In contrast, having no access to a device became the most reported barrier in 2022, with 46% identifying it as a primary obstacle, up from 15% in 2018. The lack of digital skills also became one of the major barriers in 2022, with 14% reporting that it prevented them from accessing the internet, compared to only 3% in 2018. Other notable barriers, such as finding the internet "too expensive to use" or "not available in my area", also saw slight increases in 2022. This shift suggests that while awareness about the internet improved, device access, digital skills and affordability have become more pressing challenges for connectivity.

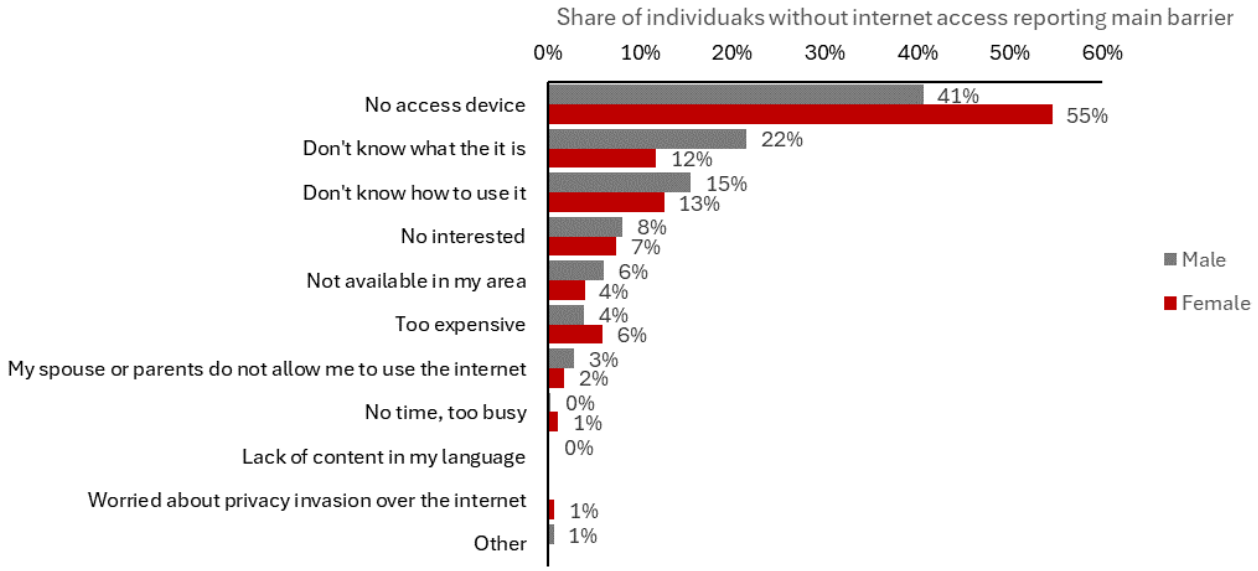
Figure 44: Main barriers preventing internet access, 2018 and 2022



Source: RIA (2018a, 2022a)

The breakdown of access barriers in Figure 45 shows that the lack of an access device to go online remained the main barrier for both men and women, though more so for females (55%) than males (41%). The prevalence of the digital skills barrier was slightly higher for men at 15% compared to females at 13%. A lack of awareness of what the internet is was more of a pressing barrier for men (22%) than for females (12%). Other barriers included a lack of interest, the unavailability of the internet in certain areas, and cost. Social restrictions, time constraints, the language of content, and privacy concerns had minimal impact on internet access.

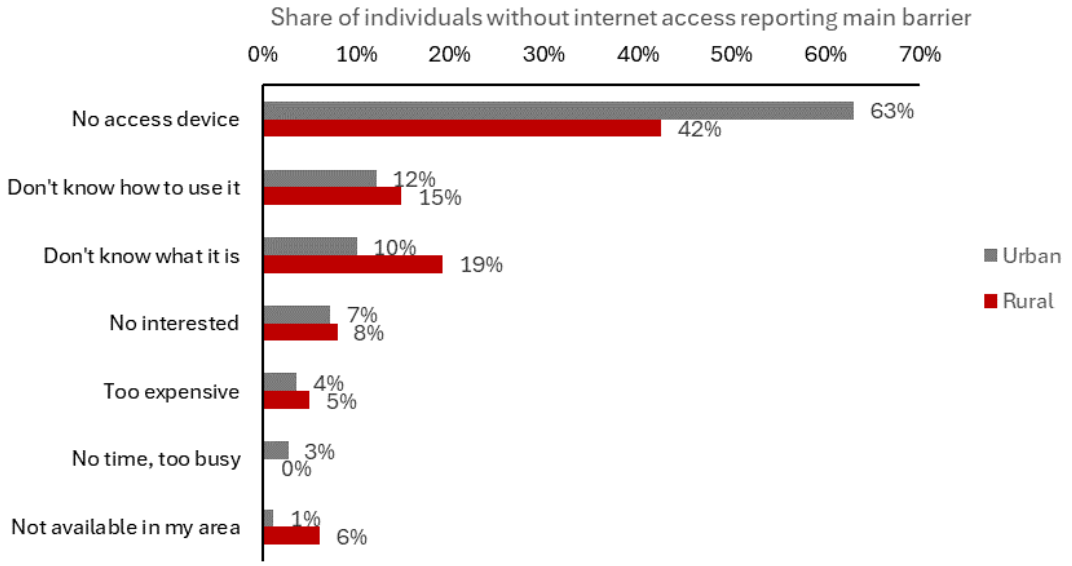
Figure 45: Main barriers preventing internet access by gender, 2022



Source: RIA (2022a)

Digital skills and awareness were more pressing barriers in rural areas compared to urban areas (Figure 46). In urban areas, where there were higher levels of digital skills and digital awareness, the lack of access devices came out as a relatively stronger access barrier. The higher prevalence of urban dwellers citing a lack of devices could be due to several factors. In rural areas, wealthier households might already possess the necessary devices, thereby shifting the primary barrier to skills and awareness. Alternatively, rural residents might not report a lack of devices as frequently because their primary barriers are more foundational, such as digital literacy and awareness. This suggests that while urban areas face hardware constraints, rural areas need more foundational support in building digital skills and awareness to fully leverage digital access.

Figure 46: Main barriers preventing internet access by geographic location, 2022



Source: RIA (2022a)

In addition to showcasing the trends in internet access in Kenya over the past decade, this section has also highlighted how aggregate access levels can mask key differences across population segments and the intersections between these segments. This underscores the importance of digging deeper into demand-side data to really understand the nuances associated with internet access trends.

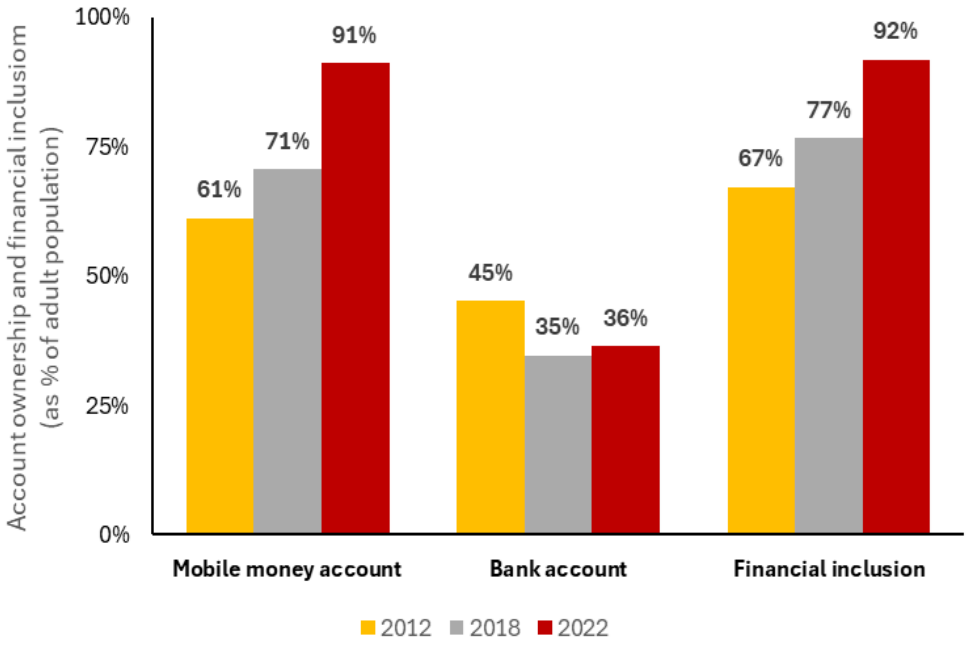
7.2. Financial inclusion

The African Development Bank has adopted the definition of financial inclusion developed by the Alliance for Financial Inclusion (AFI) which stipulates that formal regulated financial products and services are made available (access), are used by individuals and enterprises (usage), and are appropriately tailored to the needs of users (quality) (Triki & Faye, 2013). As the World Bank argues, the foundation for financial inclusion is a deposit or transaction account with a financial institution or mobile money provider which is capable of storing value as well as making and receiving payments (Demirguc-Kunt et al., 2017). There exists a vast literature which shows the benefits of financial inclusion for sustainable development and the need to have a bank or mobile money account to be able to access a wide range of financial services which can serve to improve livelihoods.

Safaricom's M-PESA, launched in 2007, has revolutionised financial inclusion in Africa by pioneering mobile money services. It is an SMS-based money transfer system that allows individuals to deposit, send, and withdraw funds using their mobile phone. Its user-friendly interface and widespread accessibility, even in remote areas, have led to its rapid adoption. In March 2022, as Kenya's leading mobile money platform, it reported over 30 million active monthly users in the country. In contrast, data from the Central Bank of Kenya indicated that, as of 2021, approximately 55% of Kenyan adults held conventional bank accounts. Given Kenya's adult population of about 27 million, this translates to roughly 14.85 million individuals with traditional bank accounts. Currently, M-PESA serves millions of users across several countries, significantly reducing the reliance on traditional banking systems and empowering individuals and businesses through improved financial access and economic participation. Its success has inspired similar initiatives worldwide, solidifying its status as a transformative force in the global financial landscape.

Kenya's financial system is predominantly driven by mobile money, with limited adoption of traditional banking services. This is illustrated in Figure 47, which depicts trends in bank and mobile money account ownership alongside overall financial inclusion. The data indicates that financial inclusion has been primarily driven by mobile money accounts and mobile banking. Notably, the proportion of the adult population with bank accounts showed a decline between 2012 and 2018 from 45% to 35%. However, from 2018 to 2022, a period marked by the COVID-19 pandemic and increased reliance on digital payment methods, there was a slight increase in bank account ownership to 36%. In contrast, mobile money account ownership saw substantial growth, reaching 91% in 2022. Overall financial inclusion also rose, reaching 92% in 2022, suggesting a significant shift towards digital financial services. Our findings are consistent with the 2021 Global Findex Database that highlights Kenya's financial system as being predominantly driven by mobile money, with bank account adoption lagging.

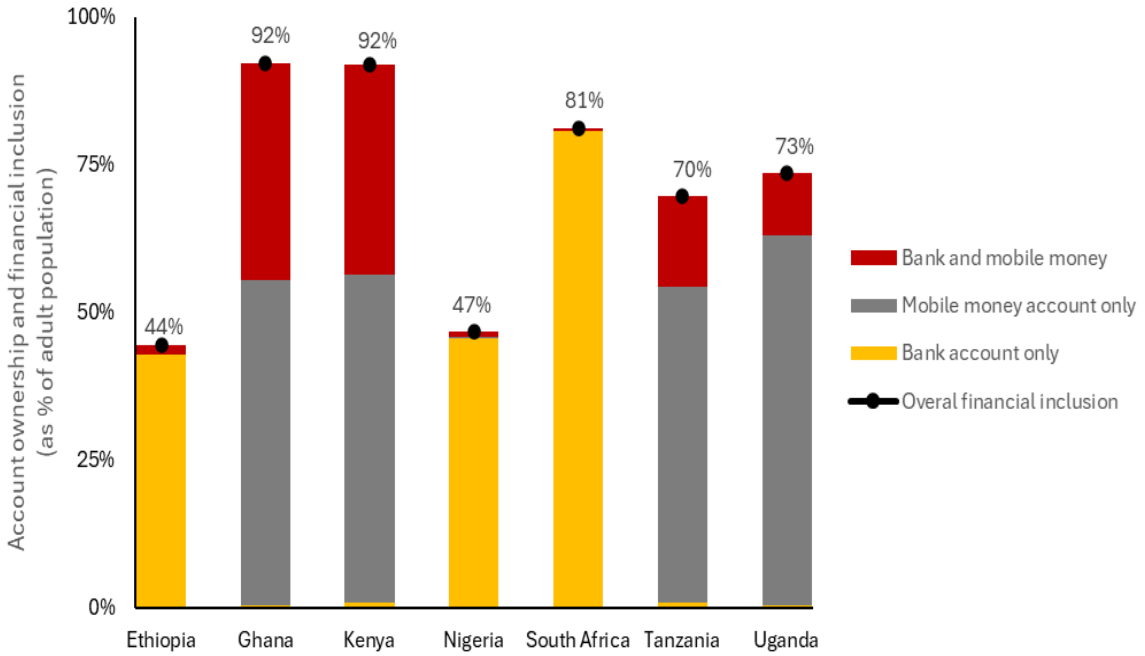
Figure 47: Financial inclusion, 2012, 2018 and 2022



Source: RIA (2012, 2018a, 2022a)

Figure 48 shows that in 2022 financial inclusion was higher amongst the surveyed countries in Kenya (92%) and Ghana (92%) where financial inclusion was also driven by mobile money. Particularly noteworthy is the rapid growth observed in financial inclusion driven by mobile money systems. While Kenya's M-PESA has long been established and widely adopted, Ghana and Uganda started from relatively lower inclusion rates in 2018 (40% and 41% respectively) but experienced remarkable growth by 2022, surpassing South Africa's growth trajectory. This trend underscores the effectiveness and potential of mobile money-driven initiatives in fostering financial inclusion, especially in comparison to more traditional banking systems.

Figure 48: Country comparison of financial inclusion, 2022

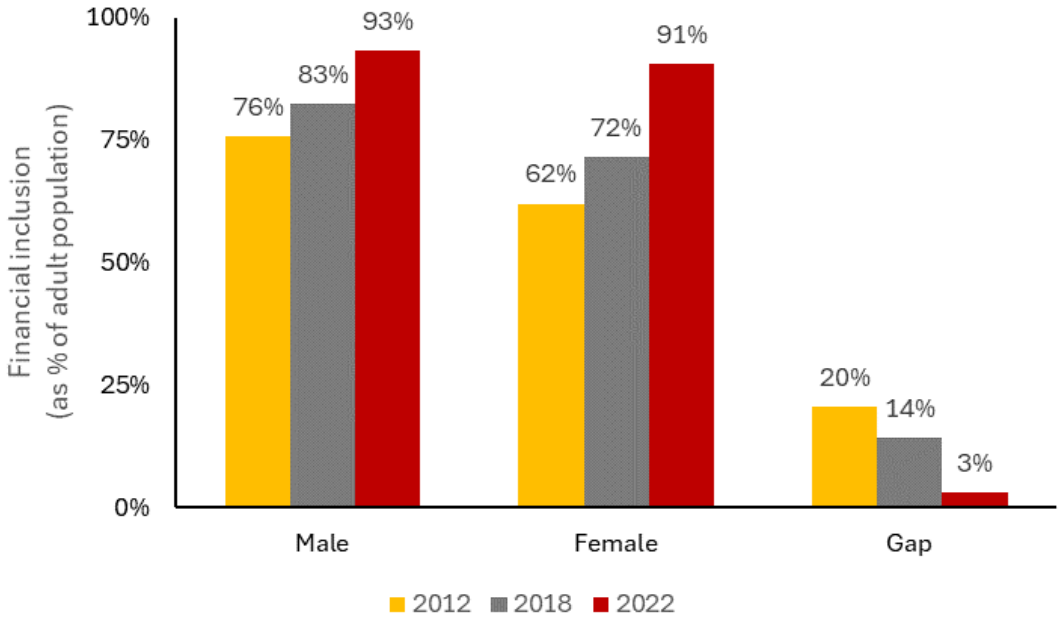


Source: RIA (2022a)

The importance of the banking sector is highlighted by the fact that even in countries where financial inclusion is driven by mobile money, there is generally still significant bank account ownership. The converse is not true of bank account holders also holding mobile money accounts in bank-dominated financial systems. While this may in some cases be influenced by the design and accessibility of the financial system for different service providers, it may also reflect the fact that mobile money accounts do not enable the use of certain financial services, making it necessary to have a bank account.

The gender gap in financial inclusion in Kenya has shown significant changes over the years. In 2012, the gap was 20%, which decreased to 14% in 2018. As Figure 49 illustrates, the increase in financial inclusion between 2018 and 2022 was larger for females (from 72% to 91%) than for males (from 83% to 93%). As a result, the gender gap has been greatly reduced and is now at just 3%, indicating a nearly equal level of financial inclusion for both genders.

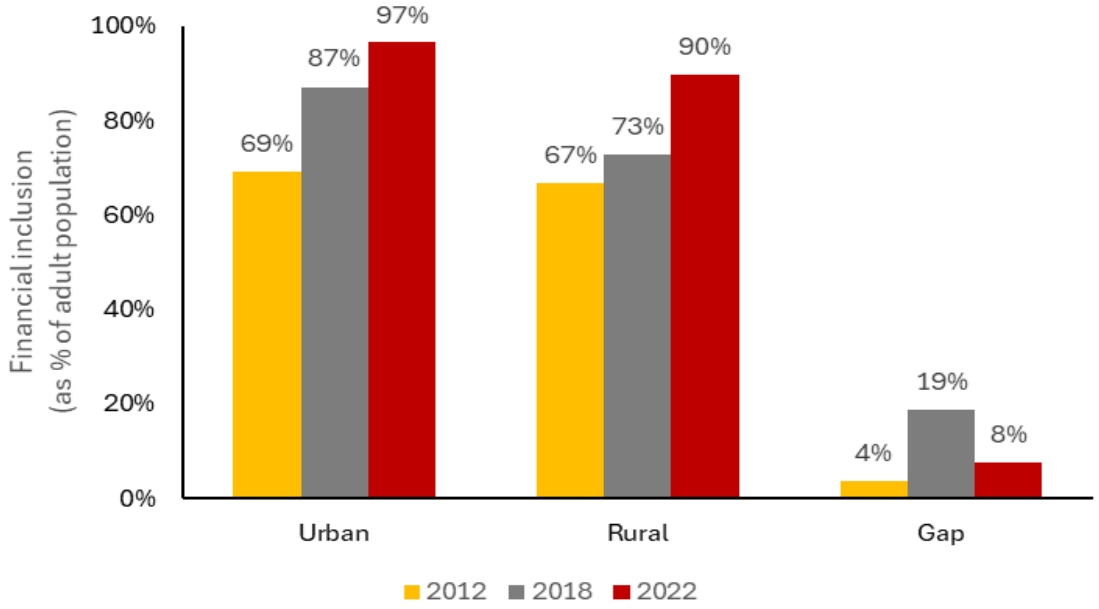
Figure 49: Financial inclusion by gender and resulting gender gap, 2012, 2018 and 2022



Source: RIA (2012, 2018a, 2022a)

Financial inclusion grew strongly in rural areas between 2018 and 2022 (from 73% to 90%), outpacing growth in urban areas (87% to 97%) and consequently reducing the location gap to 8%, less than half of what was observed in 2018 (19%).

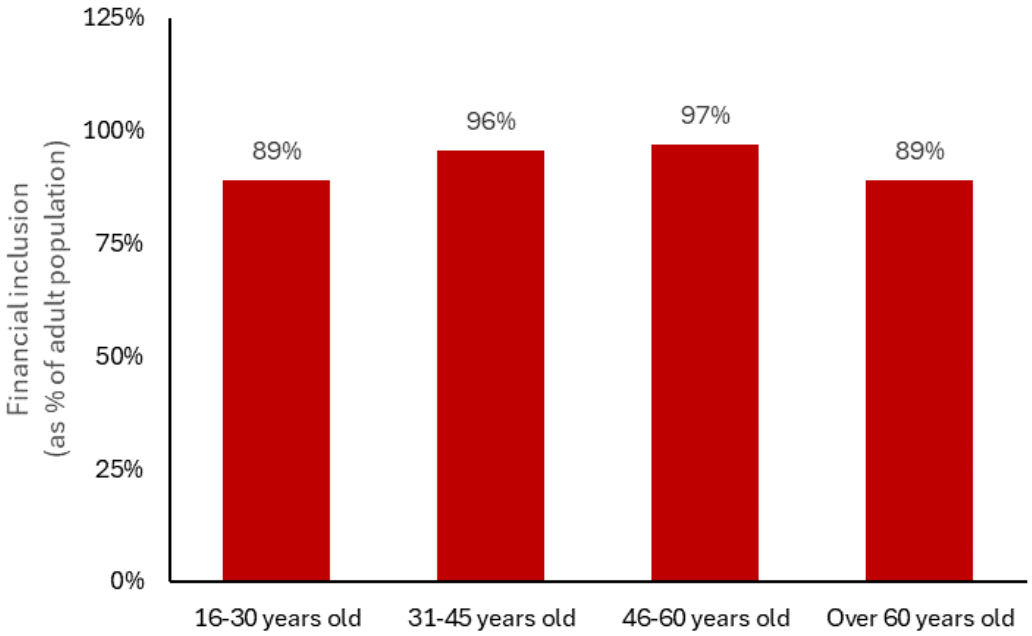
Figure 50: Financial inclusion by geographic location and resulting location gap, 2012, 2018 and 2022



Source: RIA (2012, 2018a, 2022a)

Unlike what was observed for internet access, financial inclusion was lowest amongst the youth (89%). Young adults aged 31-45 were observed to have the highest level of financial inclusion, although it was relatively similar for those 46-60 years old. Overall, the variation across age groups was much less than was observed when analysing internet access indicating less influence of age on outcomes.

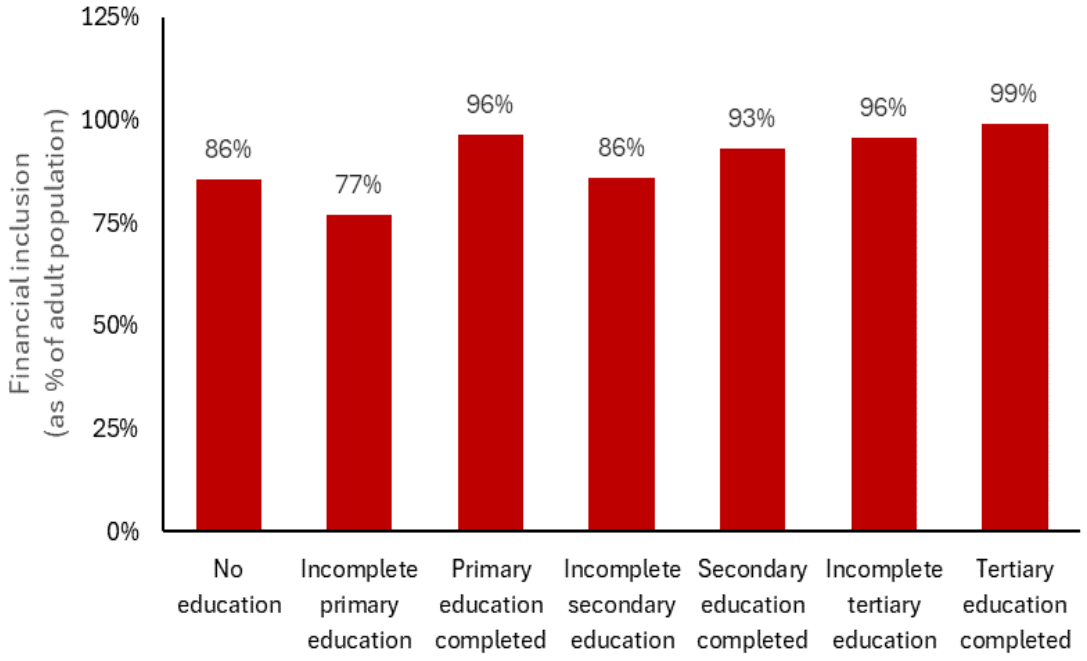
Figure 51: Financial inclusion by age cohort, 2022



Source: RIA (2022a)

The relationship between education and financial inclusion as seen in Figure 52 was also less stark than what was observed when looking at internet access, although higher education is clearly still associated with higher levels of financial inclusion. Interestingly, financial inclusion was higher amongst individuals with no education compared to individuals who had started a primary education but had not gone beyond primary school if completed. This can be explained by several factors. Firstly, older individuals with no formal education may have adapted to using formal financial services over time. Secondly, those without formal education might be engaged in informal employment that provides access to financial services through community groups or employer-facilitated accounts. Thirdly, state support programmes often target uneducated individuals, providing them with financial access. Lastly, social safety nets can enhance the financial inclusion of those without education, who may rely more on this support than those who left school early.

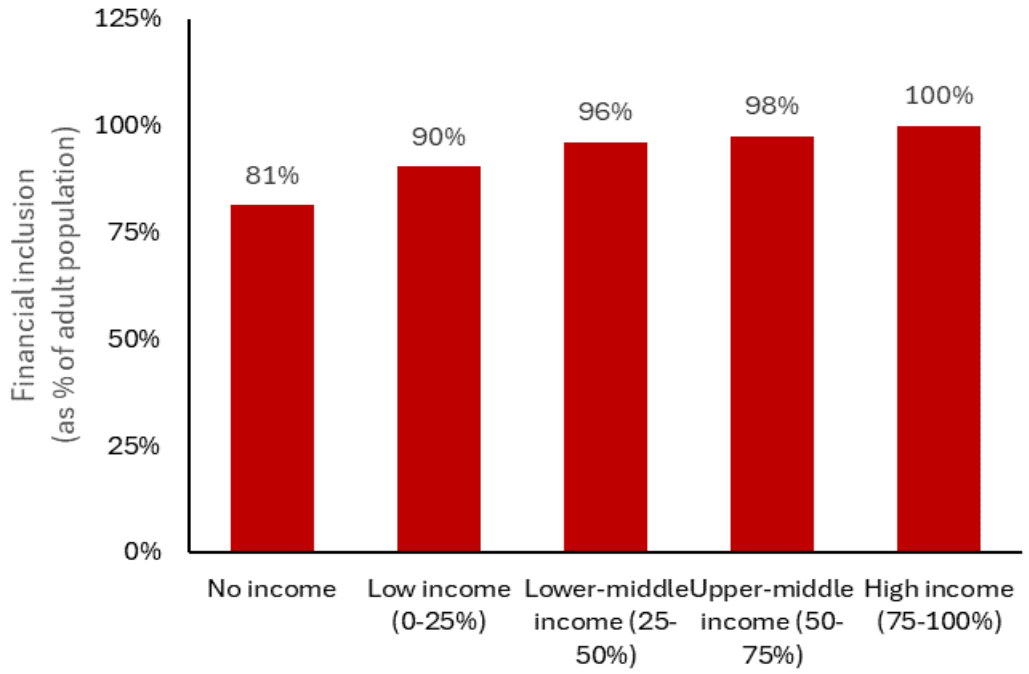
Figure 52: Financial inclusion by education level, 2022



Source: RIA (2022a)

The link between financial inclusion and income was similar to what was observed in terms of internet access, with the top half of income earners having near universal financial inclusion and lower levels of financial inclusion observed for lower income levels. Financial inclusion was lowest for individuals not earning any income, despite the fact that some of these individuals may reside in high-income households.

Figure 53: Financial inclusion by income level, 2022



Source: RIA (2022a)

The highest increase in financial inclusion was observed between asset scores 0 and 1 on the asset index. Financial inclusion was above 90% from asset scores of 2 to 5.

Figure 54: Financial inclusion by household asset index, 2022

Source: RIA (2022a)

Despite the relative gender equality in financial inclusion at the aggregate level, differences were seen when considering age, education and income (Table 5). Notably, women over 60 years old were the least financially included, followed by those with no education.

Table 5: Financial inclusion gender intersectionality, 2022

		Male Access	Female access	Gender Gap
Age	16-30 years old	89%	88%	1%
	31-45 years old	97%	95%	2%
	46-60 years old	98%	96%	2%
	Over 60 years old	96%	82%	16%
Education	No education	91%	83%	9%
	Primary	84%	87%	-4%
	Secondary	97%	94%	3%
	Tertiary	99%	99%	-1%
Income	No income	72%	77%	-6%
	Low income (0-25%)	93%	89%	5%
	Lower-middle income (25-50%)	97%	95%	3%
	Upper-middle income (50-75%)	80%	82%	-3%
	High income (75-100%)	100%	100%	0%

Source: RIA (2022a)

Individuals in urban areas had higher levels of financial inclusion than individuals in rural areas when looking across age, education, and income groups, with parity observed at higher income levels. The location gap was largest amongst the youth and those over 60 years old, and relatively small for those 46 to 60 years old. The location gap also becomes quite small for higher levels of education. For high income earners there is no location gap between rural dwellers and urban dwellers, suggesting that rural dwellers who earn incomes on par with urban dwellers are able to achieve similar levels of financial inclusion.

Table 6: Financial inclusion location intersectionality, 2022

		Urban access	Rural access	Location Gap
Age	16-30 years old	95%	85%	11%
	31-45 years old	99%	93%	6%
	46-60 years old	98%	96%	1%
	Over 60 years old	94%	88%	6%
Education	No education	90%	85%	6%
	Primary	93%	83%	12%
	Secondary	98%	95%	3%
	Tertiary	99%	99%	-1%
Income	No income	91%	77%	17%
	Low income (0-25%)	92%	90%	3%
	Lower-middle income (25-50%)	100%	95%	5%
	Upper-middle income (50-75%)	99%	97%	3%
	High income (75-100%)	100%	100%	0%

Source: RIA (2022a)

Although internet access is not required for financial inclusion, there is a correlation between internet access and financial inclusion as evidenced by the fact that financial inclusion amongst those with internet access is 85%, compared to 68% for those without internet access. This is likely due to both internet access and financial inclusion having similar determinants.

7.3. Core drivers of digital access

Descriptive statistics such as those presented in this section thus far are limited in their ability to capture the intersectional nature of determining factors. To be able to get to the heart of the determinants of access requires multivariate techniques. In an attempt to address this, a logistic[14] model was developed, incorporating all the factors analysed in this section, as well as others which are believed to influence digital access based on the current digital inclusion literature.

Two models were developed to assess the two types of access which are the focus of this analysis – internet access and financial inclusion – as well one model to look at the issue of mobile phone ownership. As smartphone ownership follows internet access very closely, it was not deemed necessary to look at smartphone ownership specifically as the results would be the same as for internet access.

There are eleven explanatory variables included in the model based on the descriptive analysis as well as other digital inclusion literature:

x1. **Income**: The log of individual income. Where income was 0, it was set to the 1 to allow for the logarithmic conversion and is acceptable as there was no recorded income of less than 1;
x2. **Household wealth**: A score from 0 to 5 based on the asset index calculation explained in Appendix A3 to this report;
x3. **Education:** Measurement of the highest level of education of the respondent on a scale from 0 to 6: (0) no education; (1) primary incomplete; (2) complete primary; (3) incomplete secondary; (4) secondary complete; (5) incomplete tertiary; and (6) tertiary complete;
x4. **Age:** The age of the respondent in years. Although it is common practice to use an age quadratic, the descriptive findings suggest a more linear relationship with age and hence it is included as a linear determinant;
x5. **Female:** Indicator[15] variable which takes on a value of 1 if the individual is female;
x6. **Rural:** Indicator variable which takes on a value of 1 if the individual resides in a rural area;
x7. **Remittances:** Indicator variable which takes on a value of 1 if the respondent's household receives remittances;
x8. **Grants**: Indicator variable which takes on a value of 1 if the respondent's household receives any form of government grant;
x9. **Electricity:** Indicator variable which takes on a value of 1 if the respondent's household has electricity access;
x10. **Language barrier:** Indicator variable which takes on a value of 1 if the respondent does not speak English; and
x11. **Marital status:** Indicator variable which takes on a value of one if the respondent is married.

Table 7 below shows which variables were significant determinants in the model as well as the direction of the relationship. Only significant variables are discussed in more detail, with the full regression outputs provided in Appendix A6 to this report.

Table 7: Main determinants of mobile phone ownership and digital access

	Mobile phone		Internet		Financial inclusion	
	Sig	+ / -	Sig	+ / -	Sig	+ / -
Income	***	+	***	+	***	+
Household wealth			*	+		
Education	***	+	***	+	***	+

[14] A logit/probit model was preferred to a linear probability model due to the ability to interpret the marginal effects as probabilities and avoid the fact that the interpretation of the coefficients in the linear probability model can result in probability impacts outside the 0 to 1 range. A logit model was preferred to the probit based on better fit as determined by a Hosmer-Lemeshow test. All three model specifications are included in Appendix A6 to this report.
[15] An indicator is a binary variable which takes on a value of 1 if true and 0 if not true.

Age	* +	*** −	** +
Female			
Rural	** −	** −	* −
Remittances		** +	
Grants			
Electricity			
Language barrier		*** −	
Marital status	*** +		*** +
Model statistics:			
• *Observations*	*1 431*	*1 433*	*1 433*
Hosmer-Lemeshow (10 groups):			
• *chi² statistic*	*5.14*	*11.32*	*3.98*
• *p-value*	*0.7424*	*0.1841*	*0.8589*

Robust standard errors
**** p<0.01 (strong significance), ** p<0.05 (moderate significance), * p<0.1 (weak significance)*
Source: Own estimations using RIA (2022a)

The Hosmer-Lemeshow test reveals that this model performs well in terms of goodness-of-fit ensuring confidence in the outputs derived. Variance inflation factors (VIF) are also calculated to ensure the model is not affected by high intercorrelations between the dependent variables (or "multicollinearity"). The highest VIF observed was 1.80 which is low, confirming the absence of a problem in this regard.

Individual income was highly significant across the different measures of access. Based on the associated marginal effects, holding all else equal, a 1% increase in income was associated with an approximate 3.6 percentage point increase in the probability of owning a mobile phone, a 2.8 percentage point increase in the probability of internet access, and a 2.6 percentage point increase in the probability of financial inclusion. In contrast, household wealth was only significant for internet access and even there it was only weakly significant and the effect relatively small in magnitude, with each step on the six-point asset index scale associated with a three percentage point increase in the access probability.

Education was also highly significant and positive across all the access measures. Each step along the seven-point education scale was associated with a 5.3 percentage point increase in the probability of mobile phone ownership, a 9.6 percentage point increase in the probability of internet access, and a 2.7 percentage point increase in the probability of financial inclusion.

Age was significant across the measures but differed in both the level of significance and the direction of the relationship across the different access measures. Each additional ten years of age increased the probability of both mobile phone ownership and financial inclusion by 1.4 percentage points, however this is only with weak and moderate significance respectively. For internet access age was highly significant but negative with each additional ten years of age associated with a 4.8 percentage point decline in the probability of internet access.

Once all other determinants are controlled for, gender becomes insignificant as a determinant of access, highlighting how gender digital inequalities in Kenya are largely driven by intersectional gender inequalities in areas such as income and education. There does, however, remain evidence of location inequalities with rural dwellers 5.5 percentage points less likely to own a mobile phone, 6.2 percentage points less likely to have internet access, and 4.2 percentage points less likely to be financially included. Although moderately significant, except for the relationship with financial inclusion which is only weakly significant, these are relatively small impacts for a binary measure and in particular seem smaller than what would be expected given the digital location inequalities observed. This highlights that although intersectional inequalities do not fully account for location differences, they do appear to be significantly widening them.

Receiving remittances and the inability to speak English only appear to be relevant for internet access. Individuals from households that received remittances appeared 10.3 percentage points more likely to have internet access with moderate significance. In contrast individuals who cannot speak English were 11.1 percentage points less likely to be able to access the internet. Marital status was not significant in terms of internet access but was observed to be significant for both mobile phone ownership and financial inclusion. Married individuals were estimated to be 9.9 percentage points more likely than unmarried individuals to have a mobile phone, and 9.2 percentage points more likely to be financially included.

Income is clearly a key determinant in digital access. This is a concern for Kenya given the levels of income inequality, which may affect the country's ability to make further progress in digitalisation. Ensuring all individuals are able to complete a secondary education so that more people become digitally active is also an important priority for the country. Kenya's rural areas are underserved by digital technologies, even after controlling for differences in other key determinants such as income and education. Given the country's history and the legacy of spatial segregation, it is important to find solutions to bridge this gap and allow rural individuals equitable access in the digital economy.

8. Digital technology use

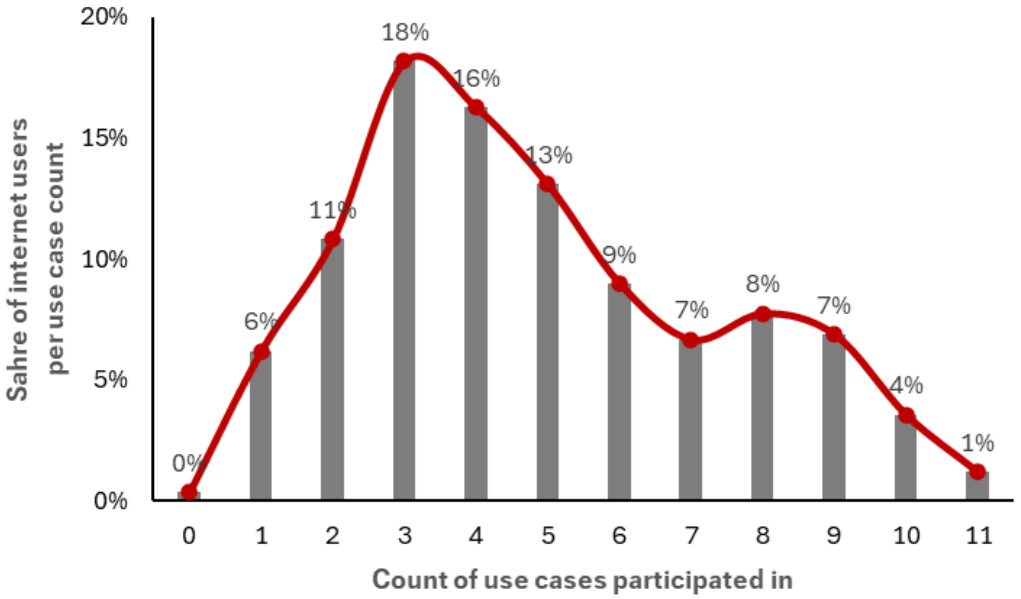
8.1. Main uses of the internet

To get a better understanding of the ways in which Kenyans with internet access are using the internet, they were asked whether or not they use it for eleven key use cases:

- formal education (attending online schooling and learning for school or university);
- social networking (Facebook, WhatsApp, Twitter, LinkedIn etc.);
- online work;
- online learning (online courses, reading articles, etc. but not school or university);
- shopping;
- government services (e-services);
- professional (searching for jobs and professional life, including a personal website or LinkedIn profile);
- online banking;
- content creation (creating digital content);
- entertainment (digital content consumption such as movies and video streaming, music and podcasts, and online gaming); and
- news (accessing online news and current affairs).

The average number of use cases participated in across all individuals was just below four (3.92). However, as Figure 55 shows, there was a wide distribution in the number of use cases, with the most common outcome being for an individual to partake in only three use cases. Less than 1% of internet users did not engage in any of the listed online activities.

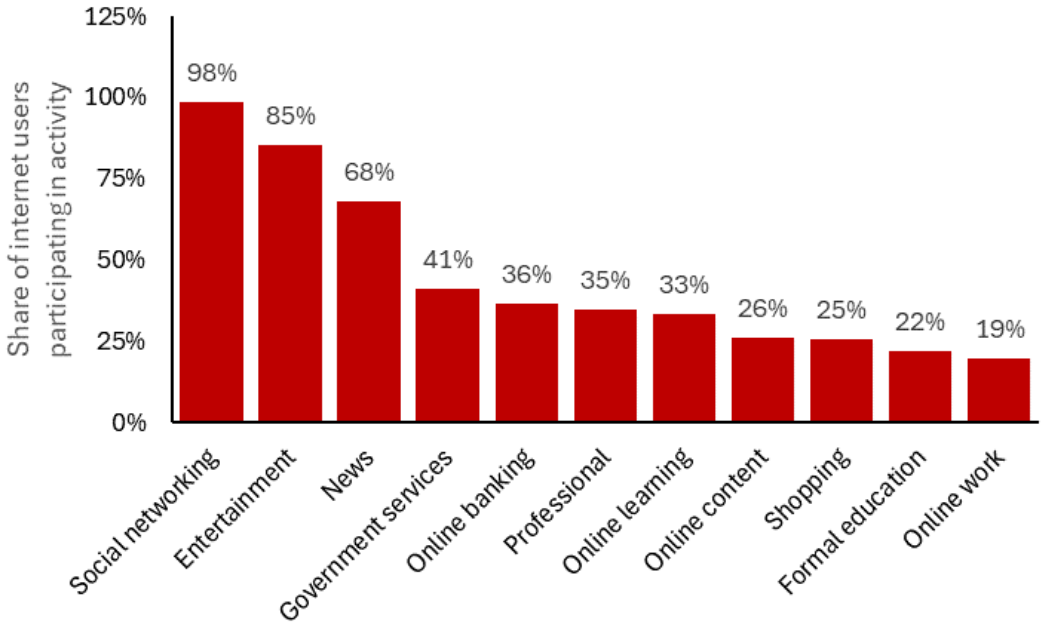
Figure 55: Distribution of internet users by number of adopted use cases, 2022



Source: RIA (2022a)

The main use case was social networking with almost all internet users engaging in this online activity. The next most popular use cases were entertainment and news, with the internet being used by 85% and 68% of internet users for these purposes respectively. All other use cases were engaged in by less than half of internet users with particularly low use noted for shopping (22%), online learning (22%), and online work (19%). Although Kenya has achieved a high level of access, this analysis of use cases reveals that the internet is still primarily used for social networking and entertainment. Aside from a high use for online banking, and to a slightly lesser extent professional services, the use cases associated with economic benefits are still relatively minimal.

Figure 56: Main uses of the internet, 2022

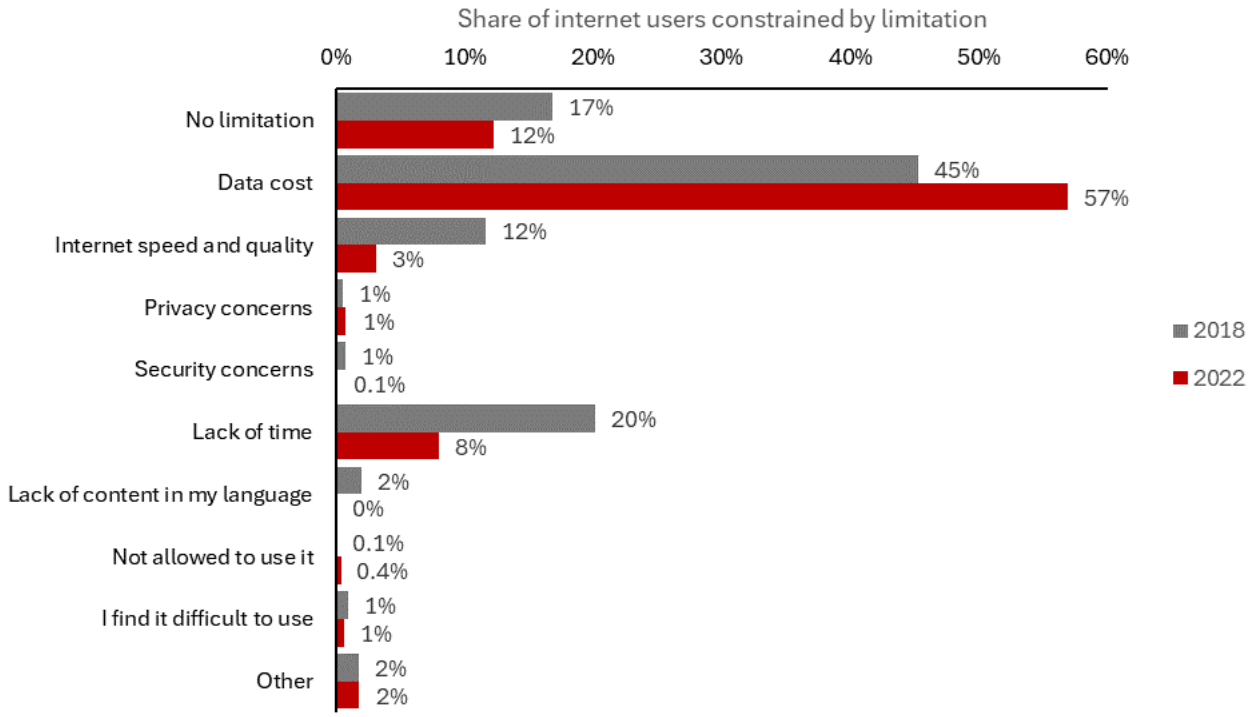


Source: RIA (2022a)

In the 2018 survey 83% of users felt they were restricted in some way from using the internet as much as they wanted to. In the 2022 survey this increased to 88% of internet users. The limitation caused by the cost of data has remained the strongest issue of those listed in Figure 57, and actually increased in the degree to which it constrained

users, with 57% of internet users claiming they would use the internet more if it were not for the high cost of data (this was 45% in 2018). The most notable improvement was in internet speed and quality which was a limiting factor for 12% of internet users in 2018, but only 3% in 2022.

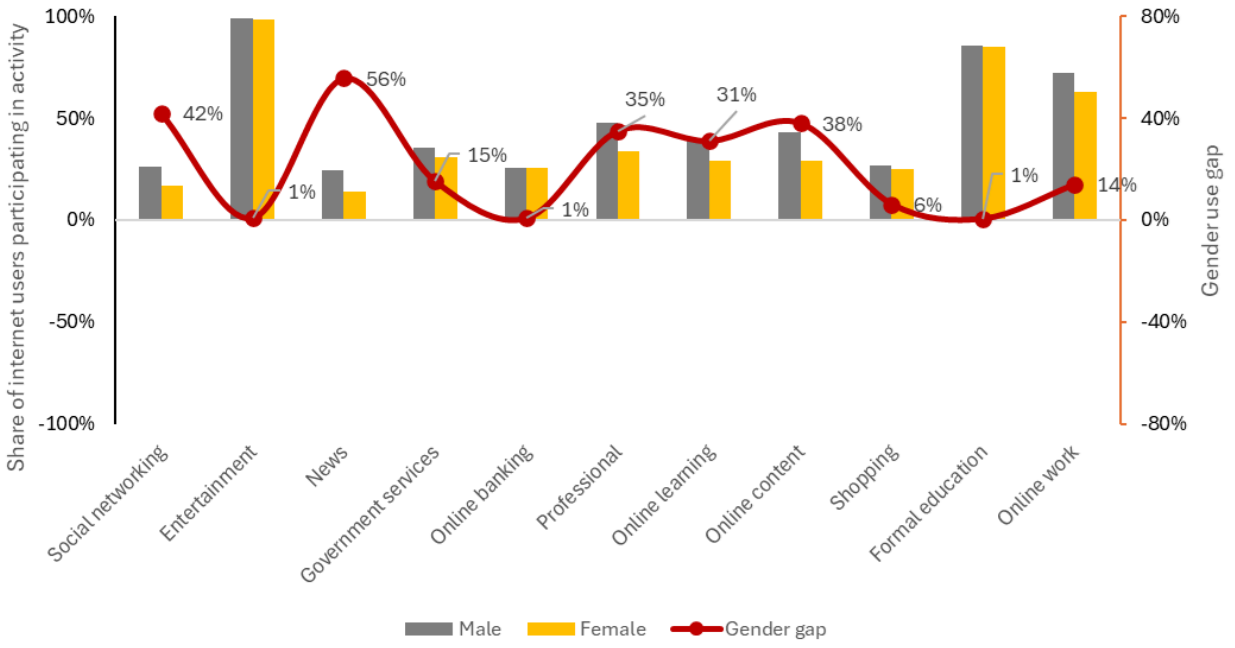
Figure 57: Limitations constraining internet use, 2022



Source: RIA (2018a, 2022a)

With the exception of online banking, entertainment and formal education which were only marginally in favour of males, the gender gap in most use cases significantly favoured males. This included use cases associated with direct economic benefits such as online content (38%), professional services (35%), government services (15%), and online work (14%).

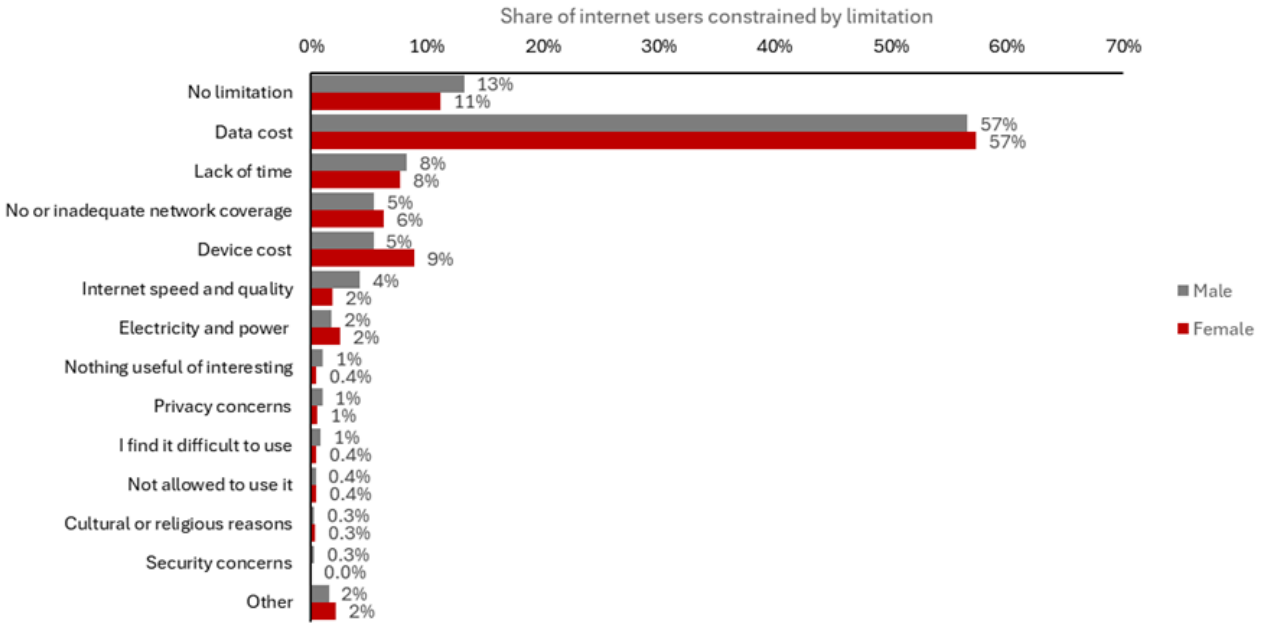
Figure 58: Gender gaps in uses of the internet, 2022



Source: RIA (2022a)

Despite the clear inequalities, Figure 59 shows that male internet users only felt slightly less limited than female users, with 13% feeling they were not limited in their use compared with 11% of females. Both males and females encountered similar constraints (57%) with regards to the cost of data. Network coverage was also slightly more pressing a limitation for females (5% vs 6%), suggesting a higher likelihood of females being in more remote areas where network coverage is poor. Similarly, female internet users felt slightly more limited by not being able to afford a device which would enable a deeper internet engagement (9% vs 5%).

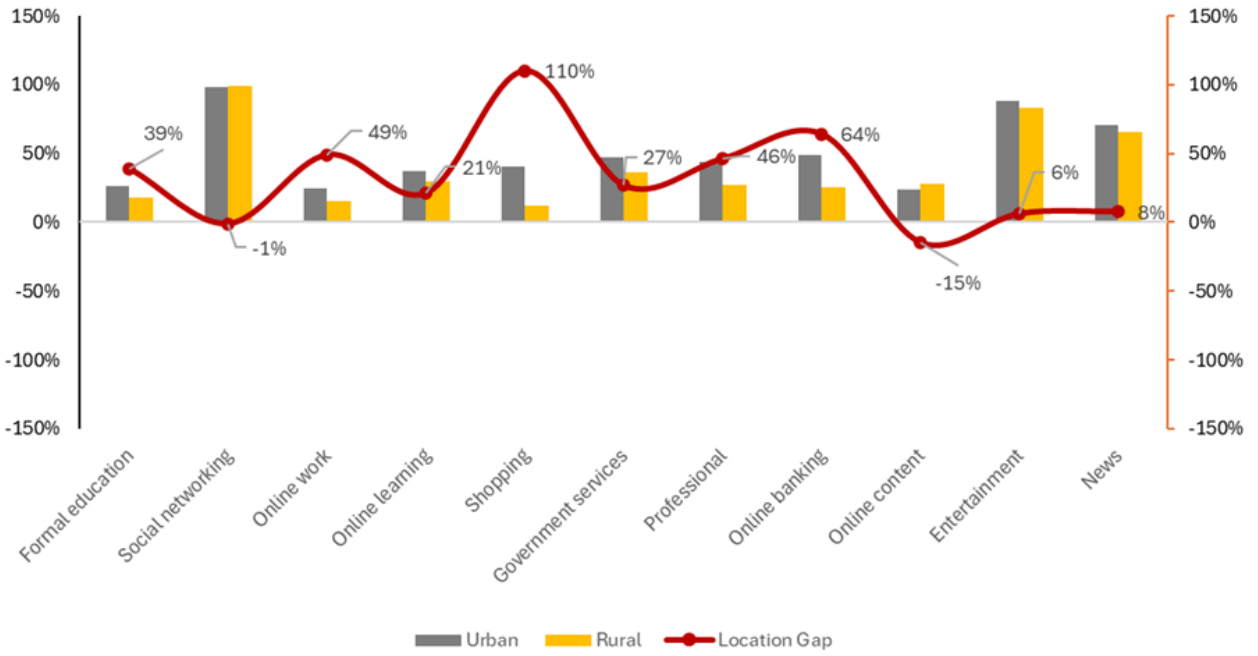
Figure 59: Limitations constraining internet use by gender, 2022



Source: RIA (2022a)

Interestingly, rural internet users demonstrated a higher tendency to utilise online content compared to their urban counterparts. Notably, the largest gap was evident in shopping, highlighting the lack of accessibility of these services for rural residents. The e-commerce location gap can be attributed to several factors: rural areas are often less served with deliveries due to logistical challenges and location issues with maps. Additionally, trust and the risk of receiving incorrect items are higher among rural users, further deterring online shopping. Lack of awareness about available e-commerce services also contributes to this disparity. Furthermore, substantial disparities based on location were observed in accessing online banking, online work and professional services, emphasising the broader digital divide.

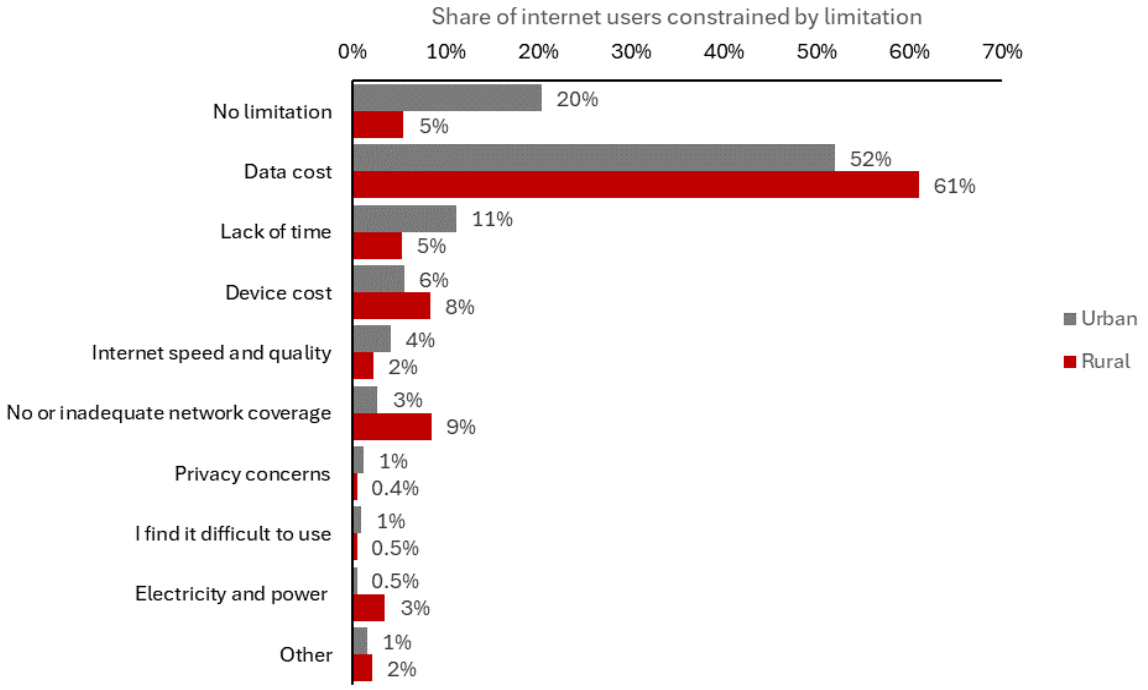
Figure 60: Location gaps in uses of the internet, 2022



Source: RIA (2022a)

An overwhelming 95% of rural internet users still felt limited in their use of the internet, compared to 80% in urban areas, with data cost being the most cited limitation by both urban and rural dwellers. However, it is more pressing in rural areas. As Figure 61 shows, device cost, and no or inadequate network coverage are other limitations to internet use cited by more rural than urban dwellers. While about a fifth of urban dwellers indicated that they had no limitation to using the internet, more urban than rural respondents stated that lack of time, internet speed and quality, and privacy concerns prevent them from using the internet more.

Figure 61: Limitations constraining internet use by geographic location, 2022



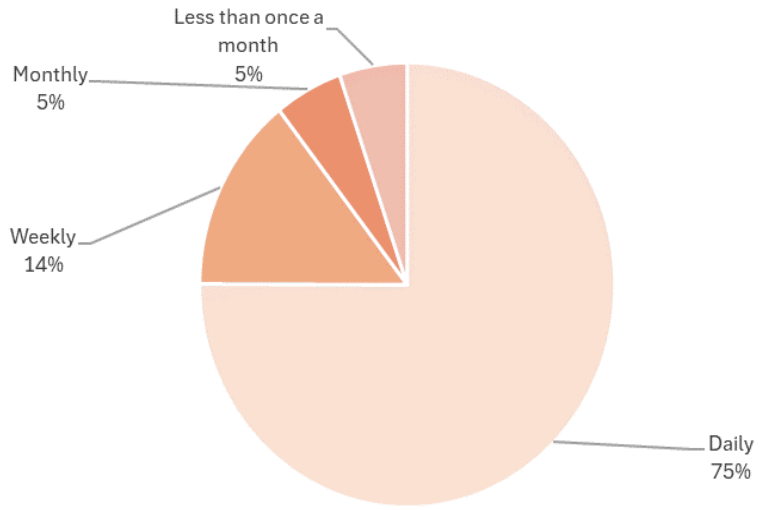
Source: RIA (2022a)

The analysis of internet use cases reveals some interesting details which are easily overlooked when looking at access trends. In particular they show clear inequalities in the way in which the internet is used even where access parity has been achieved, highlighting that not all internet users have the same opportunities online. The findings also highlight that although there are some interesting caveats across time and across population segments, the cost of data is a critical issue which is preventing more digital activity.

8.2. Social media

Social media is the most popular use of the internet in Kenya. Moreover, most internet users who use social media do so on a daily basis. As Figure 62 shows, in 2022 75% of individuals who used social media claimed to do so on a daily basis and only 5% used it less frequently than on a weekly basis. This finding holds relatively consistently across demographic groups, with 72% of female social media users using it daily compared to 78% of males, and 83% of urban users using social media on a daily basis compared to 68% of rural users.

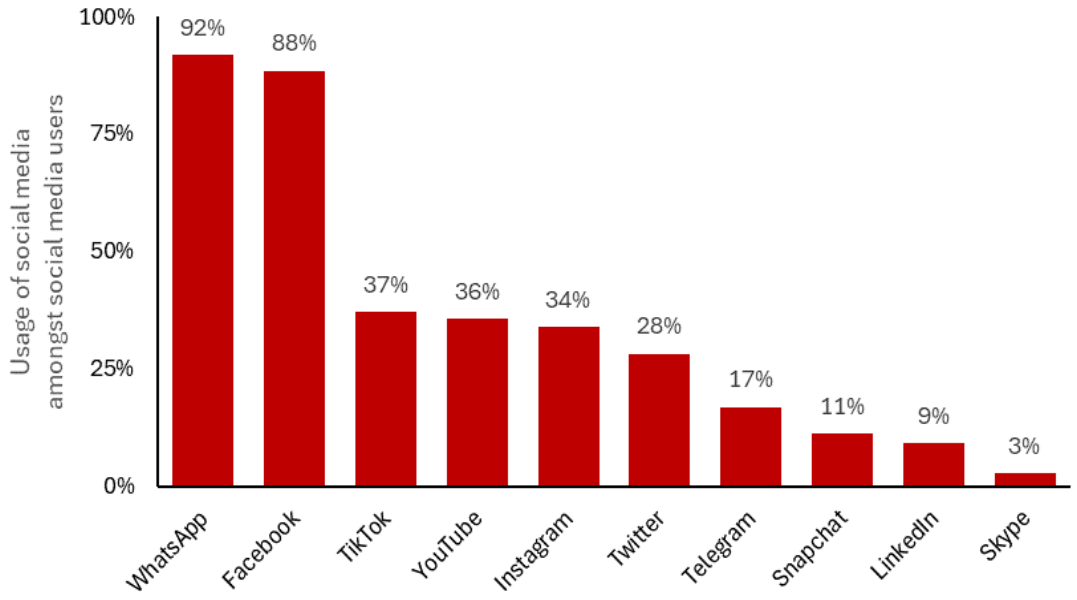
Figure 62: Frequency of use of social media, 2022



Source: RIA (2022a)

WhatsApp emerged as the most popular social media platform, with 94% of social media users indicating their presence on the platform, followed closely by Facebook at 79%. YouTube and TikTok were the next preferred platforms, with usage rates of 34% and 33% among social media users respectively. While the gender distribution of users across platforms remained relatively consistent, female users tended to be less active on Twitter (11% vs 23%) and LinkedIn (7% vs 14%), and somewhat less so on Facebook (78% vs 81%), Instagram (22% vs 27%), and YouTube (32% vs 39%). Conversely, female social media users showed a higher likelihood of being on TikTok (36% vs 28%) and Snapchat (24% vs 10%). Urban users displayed a higher overall usage across platforms compared to their rural counterparts, indicating a broader adoption of various social media platforms in urban areas.

Figure 63: Main platforms accessed by social media users, 2022

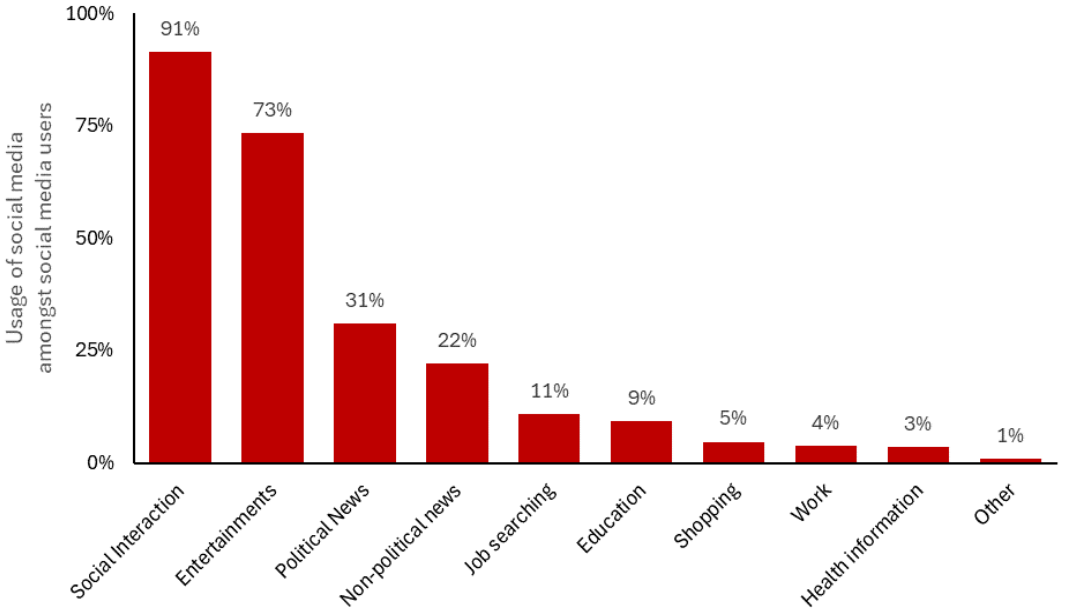


Source: RIA (2022a)

The primary use of social media was for social interaction, with 73% of total respondents using it for this purpose. Other uses such as for entertainment (31%) and searching for jobs (9%) were significantly smaller. Less than 20% of respondents used social media for all other listed purposes in Figure 64. The breakdown of social media use by gender showed a high level of consistency, with females slightly more inclined to use it for searching for jobs (12% vs

10%), education (9% vs 9%), and accessing health information (3% vs 0%), and males slightly more inclined to use it for entertainment (76% vs 71%) and work-related purposes (4% vs 3%), as well as accessing both non-political (23% vs 21%) and political news (39% vs 22%). Differences across geographic areas were more noticeable, with social media users in rural areas more likely to use it for searching for jobs (12% vs 10%) and accessing non-political news (24% vs 21%) compared to urban users, who were more likely to use social media for entertainment (72% vs 76%) and shopping (7% vs 4%).

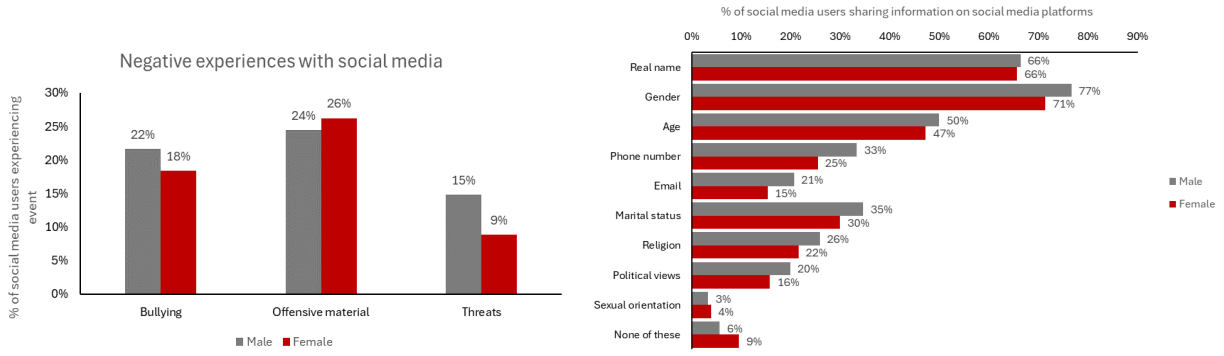
Figure 64: Main uses of social media, 2022



Source: RIA (2022a)

Female social media users appeared less affected than males by negative behaviour such as online bullying (offensive or unwanted comments, messages or e-mails), and threats (of violence or to cause harm to the respondent or someone they know) as a result of their social media interactions. They were however slightly more likely than males to receive offensive or inappropriate material (e.g. sexual content). As is evident from Figure 65, the incidence of these events was, however, generally low in Kenya despite the high degree of social media usage. The low incidence amongst females may seem surprising given their disproportionate vulnerabilities to such events. However it is worth considering that in addition to the differences being small, females were also more careful with sharing information online as evident from the lower share of female social media users sharing most of the information categories listed on the right-hand side of the graph. The only identified occurrence where females were more likely to share their information was with regards to sexual orientation. In many of these cases there was nevertheless also a low incidence of information-sharing and the differences between male and female social media users was small.

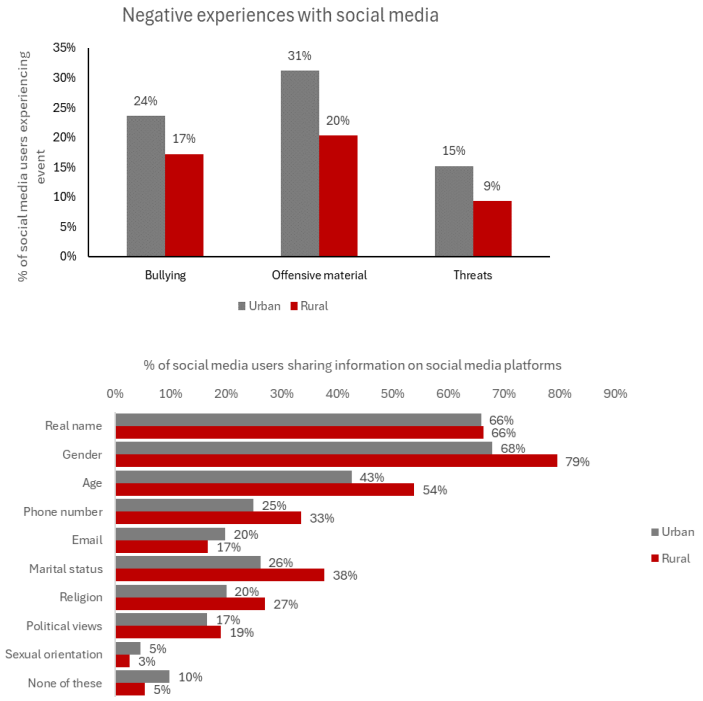
Figure 65: Negative events experienced on social media and information shared by gender, 2022



Source: RIA (2022a)

There was a greater difference evident in the experiences of negative behaviour on social media between urban and rural social media users. Urban users were more likely to be bullied, receive offensive material and threatened. On the whole users in rural areas appeared to share more information on social media platforms with urban users only having a greater degree of sharing of their email address and sexual orientation.

Figure 66: Negative events experienced on social media and information shared by geographic location, 2022



Source: RIA (2022a)

There are two key things to note with regards to the findings on social media. Firstly, the predominance of social media usage with regards to internet activity highlights the fact that although Kenya has achieved a high level of internet access, the internet is mostly used for activities that are at the fringes of the potential for digital technology to provide socio-economic benefits. Secondly, the high use of social media should not be ignored but should be seen as an opportunity to reach individuals and serve as an access channel to a wider range of digital products and services.

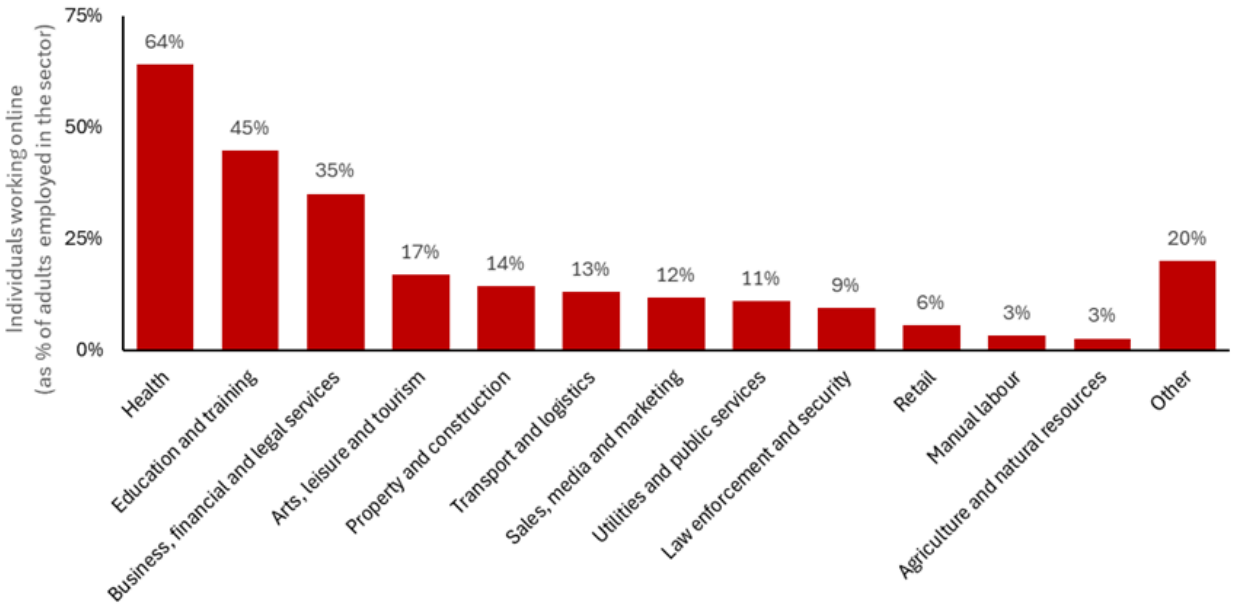
8.3. Online work

Despite the need for individuals to work online during the COVID-19 pandemic, and the alterations to business models to accommodate online work more, the use of the internet for remote online work in Kenya remains low when considering the population as a whole. Only 18% of internet users claimed to use the internet for online work, which works out to less than 14% of Kenya's adult population.

An obvious issue with measuring online work at the population level is that individuals can only work online if they have work to do online. Given Kenya's extremely high unemployment rate, it stands to reason that many are not working online because they are not working at all. However, restricting the calculation to only those who are employed still shows that only 26% of all adults in wage employment were working online in any way, with this increasing to 42% for self-employed workers.

The extent of online work varied considerably across the work sectors listed in Figure 67. The highest rate of online work was in the health sector where 64% of employees claimed to work online. This was followed closely by the education and training sector (45%) and business, financial, and legal services where 35% of employees worked online. At the other end of the scale, online work was very rare amongst employees working in retail (3%), as well as those working in manual labour and agriculture (both 3%).

Figure 67: Share of sectoral employees that work online, 2022

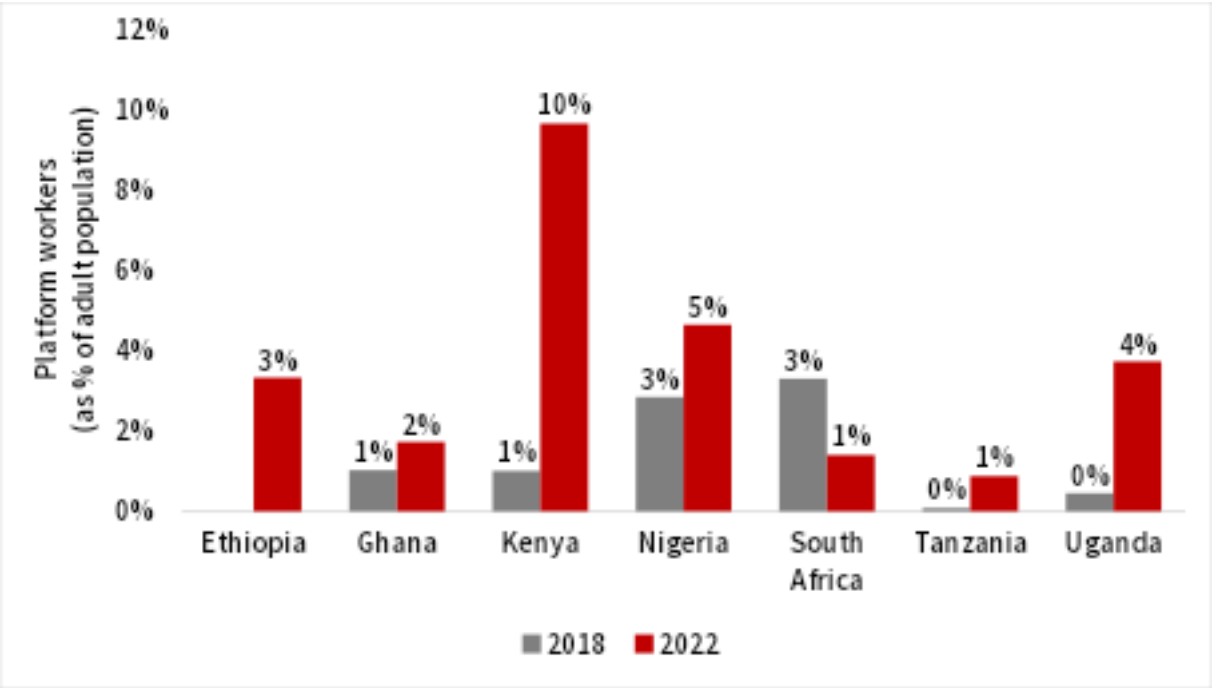


Source: RIA (2022a)

Platform work is a form of work in which organisations or individuals use an online platform to access other organisations or individuals to provide specific services or solve specific problems in exchange for payment. These sites require workers to create a user profile in order to find and accept assignments and also to coordinate payment once the work is complete (popular examples include Uber, Bolt and Amazon Mechanical Turk). There has been a sharp rise in platform work in recent years, offering a means of income generation for marginalised groups in developing economies grappling with high unemployment rates, informality in employment, and limited job opportunities. In this way platform work circumvents the failure of traditional labour markets to cater for the employment needs of the populations in many African countries (Aguilar et al., 2020b; De Stefano et al., 2021; Graham et al., 2017; Irani, 2015). Working through a digital platform also presents the opportunity to learn skills such as digital literacy, data entry, online research, and online customer service.

In the 2022 After Access survey it was estimated that 10% of the adult population in Kenya had engaged in platform work in the 12 months preceding the survey. This equates to more than three million individuals. Figure 68 shows that this was the highest population share observed across all the countries surveyed. Moreover, Kenya was the only country that exhibited a relative increase in platform work between 2018 and 2022, with all other countries exhibiting moderate increases and, in South Africa's case, a decrease.

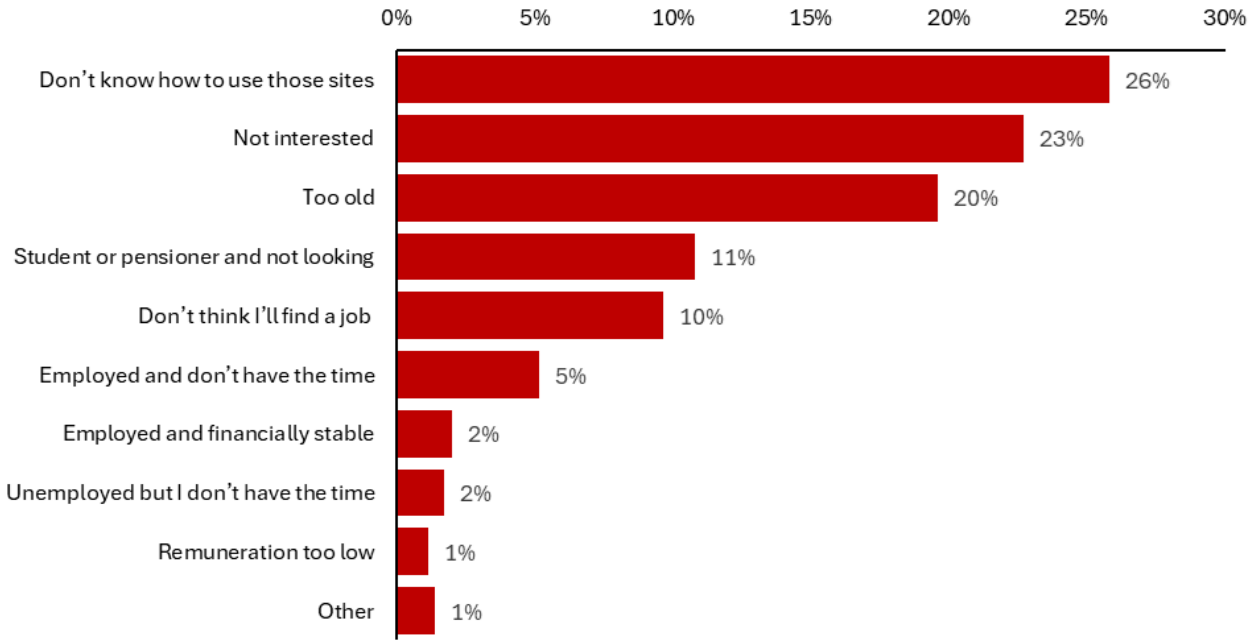
Figure 68: Country comparison of the extent of platform work amongst adult population, 2018 and 2022



Source: RIA (2018a, 2022a)

The most common reason for individuals not being involved in platform work was that they did not know how to operate platform sites (i.e. lacked the digital skills). However, this only accounted for 26% of those not engaged in platform work (Figure 69). A significant 23% claimed the main reason was a lack of interest in doing so, with a further 20% claiming that they were too old to engage in platform work. Being a student or pensioner also came out as a significant barrier preventing many from being able to access platform work opportunities.

Figure 69: Main reason for not engaging in platform work, 2022

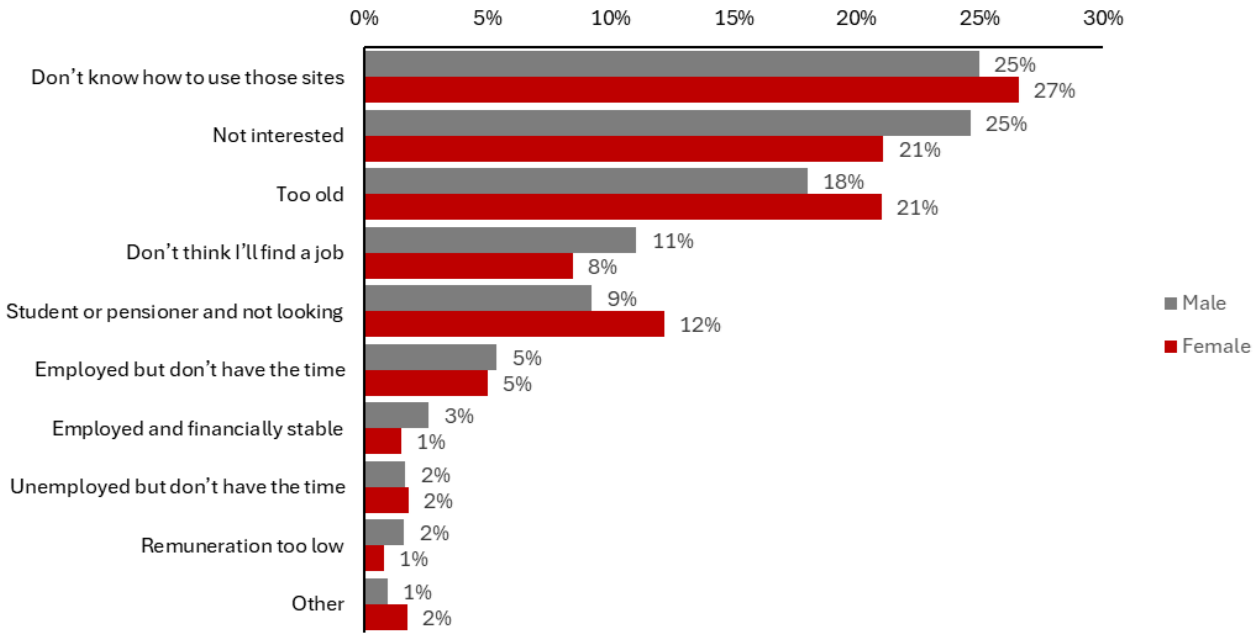


Source: RIA (2022a)

There were notable gender differences in the reasons cited for not engaging in platform work, as seen in Figure 70. Females were more likely to say that they did not have the digital skills to use platforms (27% vs 25%), were too old to do so (21% vs 18%) or were students or pensioners and not looking for platform work (12% vs 9%). On the other

hand, male respondents were more likely to say they were not interested in platform work (25% vs 21%), and did not think they would find a job (11% vs 8%).

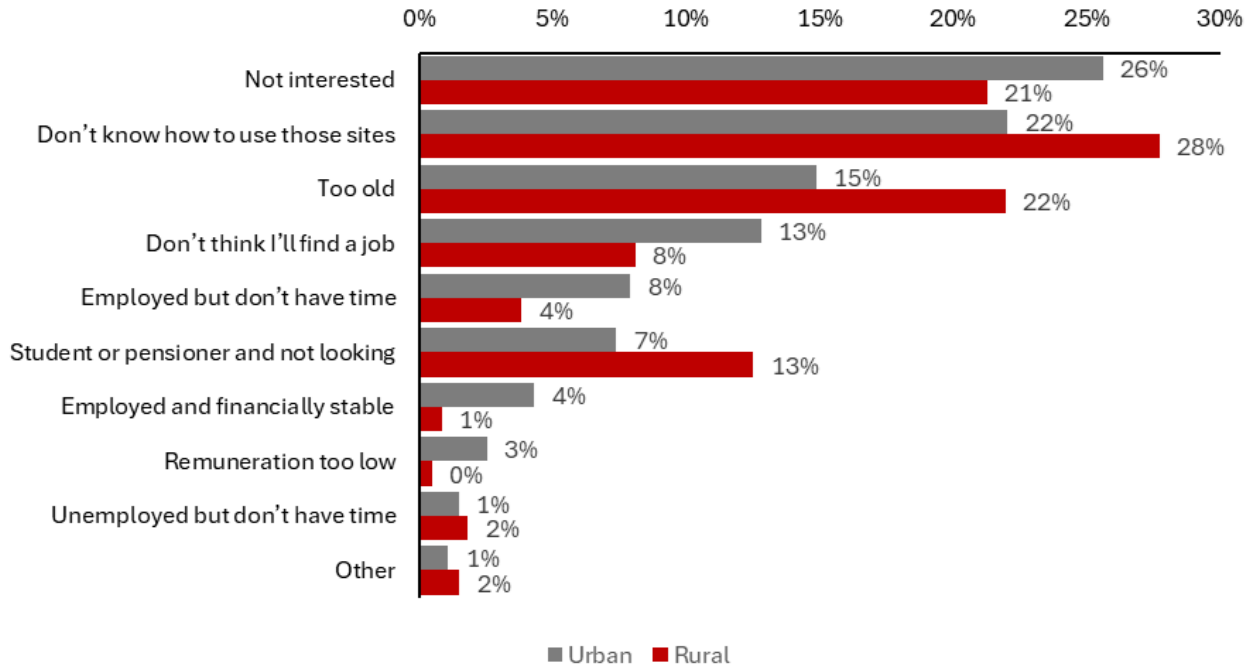
Figure 70: Gender comparison of the main reason for not engaging in platform work, 2022



Source: RIA (2022a)

There were also notable geographic differences in the reasons for not engaging in platform work, as seen in Figure 71. Rural dwellers appeared disproportionately held back by a lack of digital skills to use platforms (28% vs 22%), being too old to do so (22% vs 15%), and being students or pensioners (13% vs 7%). In contrast, in urban areas a lack of interest (26% vs 21%), respondents not thinking they would find a job (13% vs 8%), and a lack of need as a result of being financially stable (3% vs 1%) were more pressing barriers.

Figure 71: Geographic location comparison of the main reason for not engaging in platform work, 2022



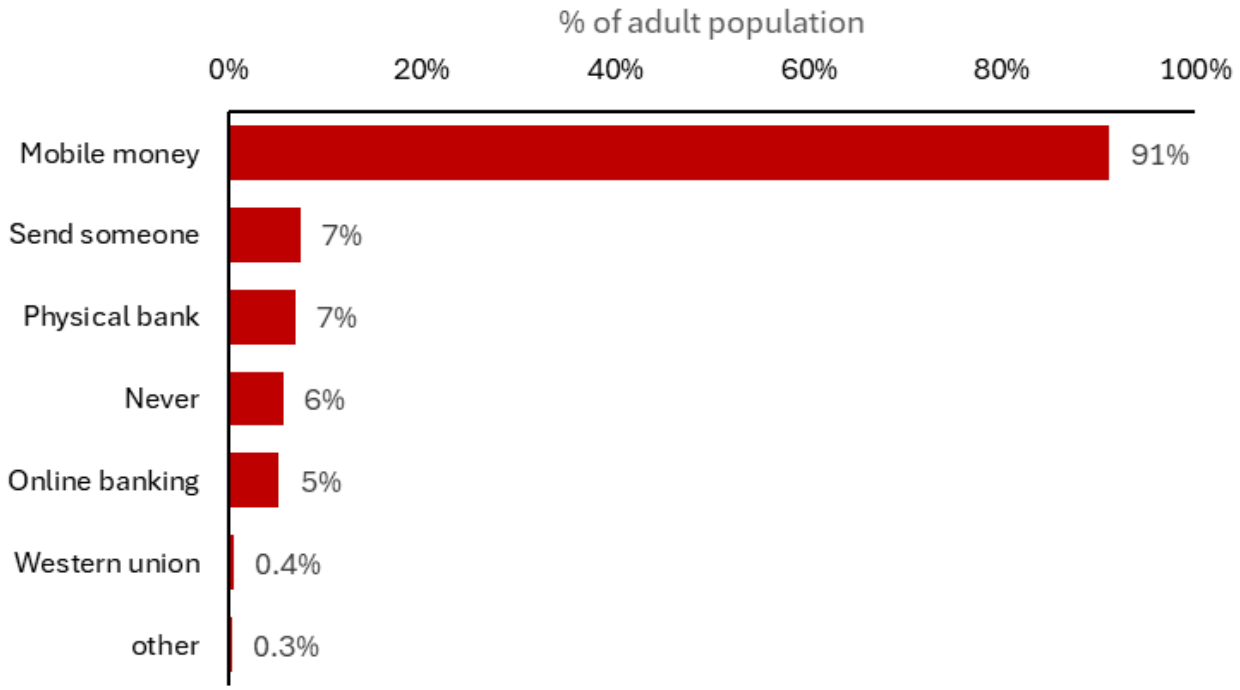
Source: RIA (2022a)

Overall online work remains low in Kenya, particularly in the sectors which absorb the most unskilled labour. A greater uptake of platform work could be catalysed by addressing the precarious employment conditions associated with it such as a lack of job security, benefits, and stable income (Codagnone & Martens, 2016; Wood et al., 2019), as well as ambiguities in the law and inadequate worker protection (De Stefano, 2015; Lehdonvirta, 2018). It is also clear that there is more need and appetite for platform work amongst marginalised groups such as females and rural dwellers who have been most underserved by the formal labour market. However they remain held back, particularly by a lack of digital skills, from being able to effectively use platforms.

8.4. Digital financial services

Figure 72 breaks down the adult population by the main way in which they claim to make and receive payments. Using mobile money (91%) was cited as the most common means to make and receive payments. All other means of making and receiving payments were used by less than 10% of the adult population. One of the most popular services used for mobile money transactions in Kenya is M-PESA. It started as a simple peer-to-peer (P2P) money transfer service designed to facilitate microfinance loan repayments. It rapidly evolved into a comprehensive financial platform due to its user-friendly interface and widespread accessibility. Today, M-PESA offers a diverse range of services including savings and credit facilities, insurance products, and international remittances, integrating seamlessly with formal banking systems. This continuous innovation and strategic expansion have solidified M-PESA's role as a cornerstone of financial inclusion and economic growth in multiple countries. According to the 2021 FinAccess survey report, the use of mobile money to make and receive payments in Kenya increased significantly between 2019 and 2021, suggesting growing reliance on digital payment systems for day-to-day transactions. This shift was likely driven by rising liquidity needs, COVID-19-related government policy interventions, waived transaction fees, and the convenience and ease of access of online platforms (Kenya National Bureau of Statistics, FSD Kenya, & Central Bank of Kenya., 2021)

Figure 72: Main way individuals make or receive payments, 2022

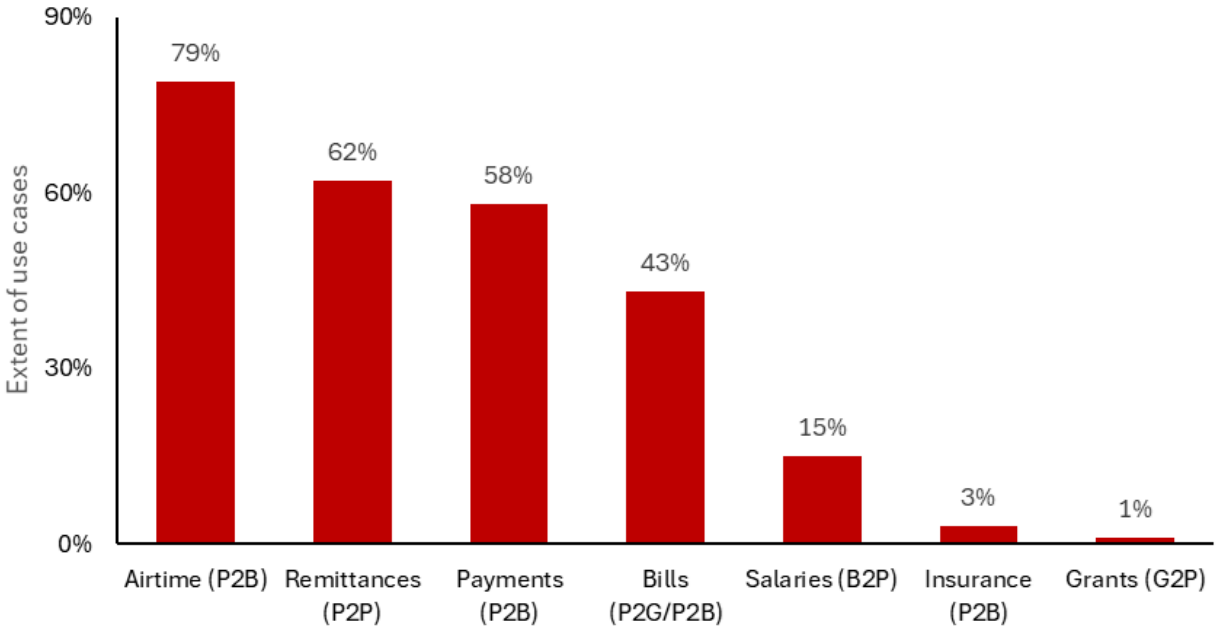


Source: RIA (2022a)

The main use of mobile money was for airtime payments, with Figure 73 showing that 79% of mobile money users used their mobile money to purchase airtime. There was also a high prevalence of the use of mobile money to send and receive remittances (62%), as well as to make payments for goods and services (58%). At the other end of the

scale, very few mobile money users utilised their mobile money to make insurance payments (3%) or to receive government grants (1%).

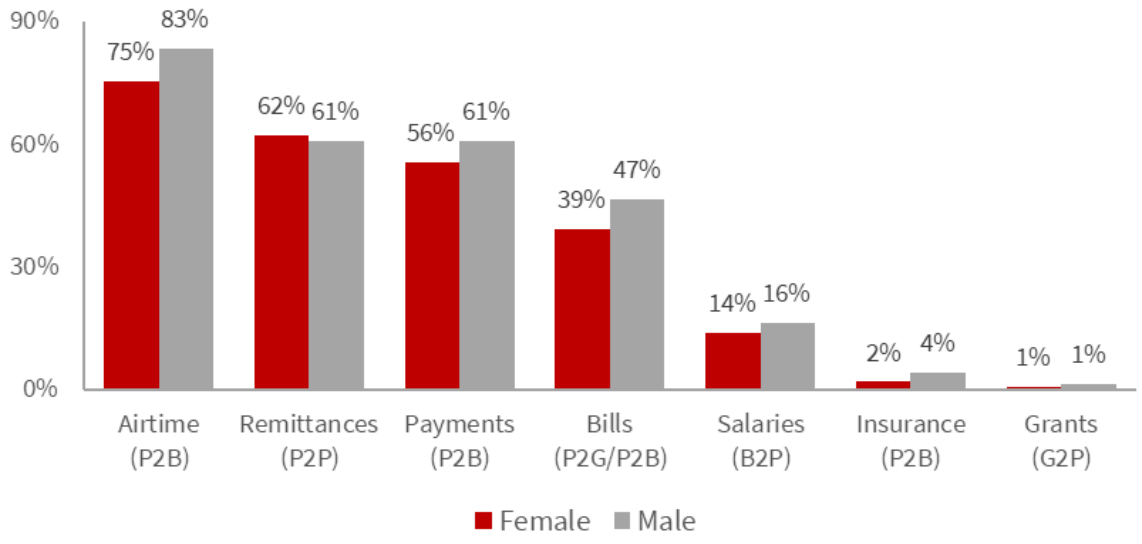
Figure 73: Main uses of mobile money amongst mobile money users, 2022



Source: RIA (2022a)

Overall the extent of mobile money use was higher amongst males than females, as evidenced by the higher shares of male mobile money users for most of the use cases in Figure 74. The exceptions were remittances, where use was marginally higher for females, and grants, where there was parity. Although overall the uses of mobile money favoured males, most use cases did not show a substantial difference between the genders. This is consistent with the 2021 FinAccess report finding that showed that the gender gap in the usage of mobile money narrowed by 5.2 percentage points in 2021 from eight percentage points in 2016.

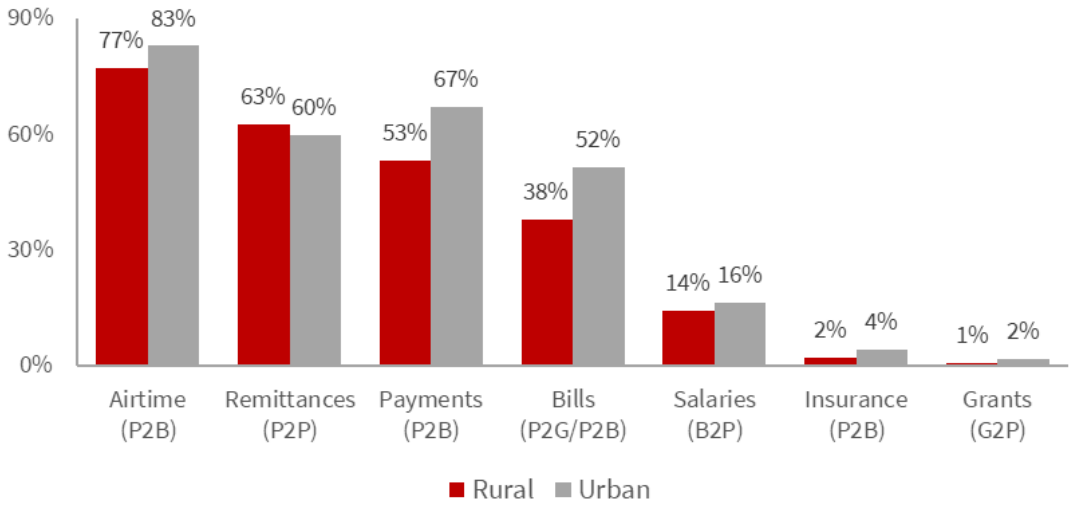
Figure 74: Main uses of mobile money by gender, 2022



Source: RIA (2022a)

The gendered pattern in mobile money use was similar to that observed across geographic location types in Figure 75. However, the differences were slightly more pronounced between urban and rural areas in uses such as for paying for goods and services and paying bills. There was also a marginally higher use case prevalence of remittances in rural areas. These findings again align with the 2021 FinAccess survey results which show that although rural residents are well-connected through mobile money, their access to a diverse range of financial service providers remains limited. They primarily use digital tools for essential or interpersonal transactions, such as sending and receiving remittances.

Figure 75: Main uses of mobile money by geographic location, 2022

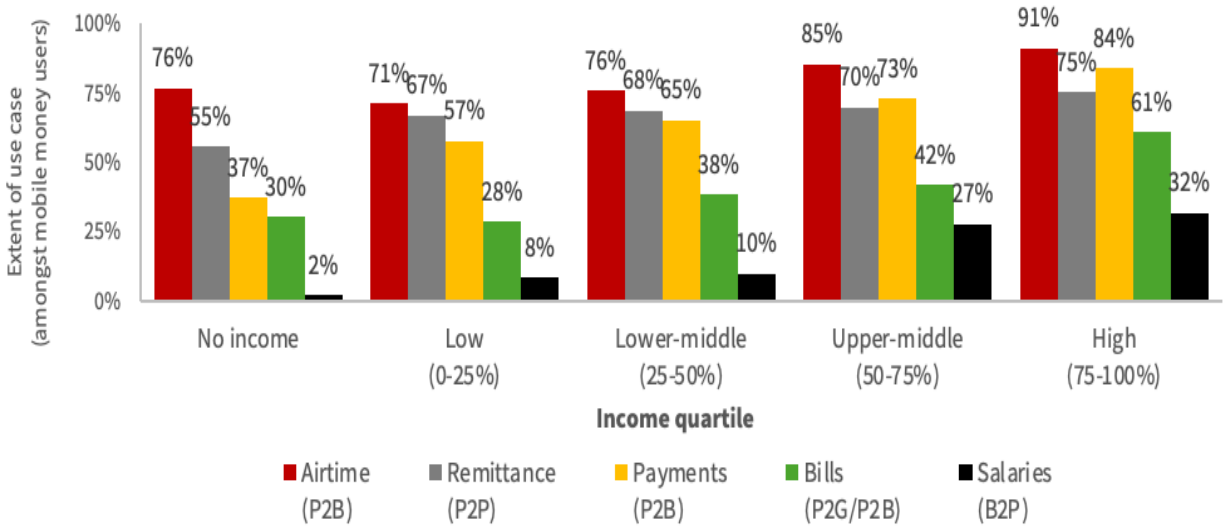


Source: RIA (2022a)

Higher income earners exhibited more intense use of mobile money with a higher adoption amongst mobile money users in this income category for all the main use cases[16] (Figure 76). Although this held across all use cases, the increase moving into higher income quartiles was particularly noticeable in terms of the use of mobile money to make purchases of goods and services. These results corroborate the 2021 FinAccess survey that showed that the highest wealth quintile recorded the largest proportion across all the mobile money use cases. There are several potential reasons for this including transaction costs as well as the locality of low-income individuals in low-income communities where vendors may be more likely to be cash reliant and not offer digital payment options.

Figure 76: Main uses of mobile money by income quartile, 2022

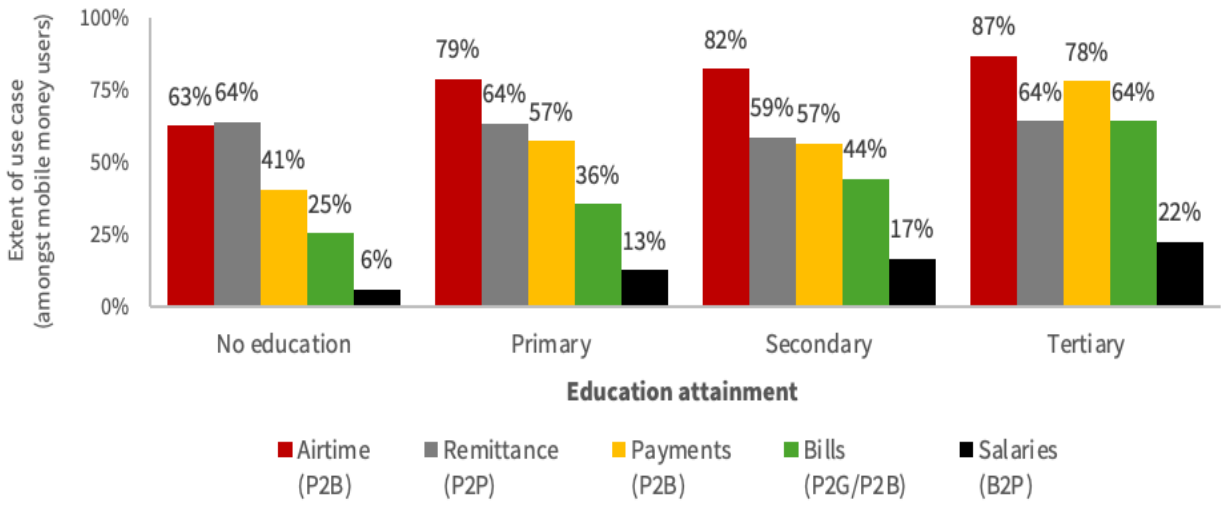
[16] Insurance and grants were excluded from this assessment due to the low level of use case adoption across the Kenyan population.



Source: RIA (2022a)

The increase in the likelihood of using mobile money for the purchase of goods and services was also notable in terms of education levels (Figure 77). Interestingly, however, use case adoption increases sharply between those with no education and those that have completed primary education, then remains flat between those with primary and secondary education, before jumping sharply again for those with a completed tertiary education. The use of remittances does not increase at all across the different education levels, remaining flat other than a dip for individuals with a secondary education. The 2021 FinAccess survey results show that adults with tertiary education are more likely to use mobile money compared to those with lower levels of education.

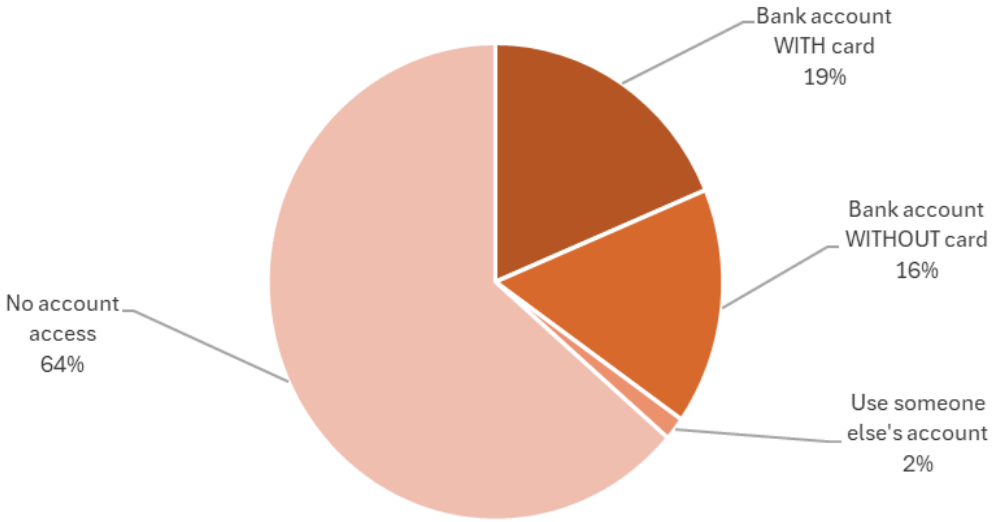
Figure 77: Main uses of mobile money by education, 2022



Source: RIA (2022a)

Figure 78 breaks down the Kenyan adult population by bank account ownership status, distinguishing between bank account owners who have a credit or debit card from those who do not, and breaking down those without a bank account by those who are able to use another person's bank account and those who are not. The findings show that although more people with a bank account had a debit or credit card, approximately 16% of bank account owners did not and therefore may be limited in the amount of digital financial services they are able to access. The findings also show that most individuals without a bank account did not have access to another person's bank account and therefore did not have any bank account access.

Figure 78: Bank account ownership status, 2022



Source: RIA (2022a)

Kenya's financial system is driven significantly by mobile money and mobile-intensive banking services, with Safaricom's M-PESA leading the charge. However, most Kenyans still prefer making payments in person at banks (59%), followed by online banking (24%).

Mobile money is predominantly used for purchasing airtime (79%), sending and receiving remittances (62%), and making payments for goods and services (58%). Gender differences show higher overall usage among males, except for remittances, which are slightly higher among females, and for grants, where there was parity. Geographic disparities reveal higher mobile money usage for remittances in rural areas, while urban areas lead in other use cases. Higher income and education levels also correlate with increased mobile money adoption, particularly for purchasing goods and services. However, a significant portion of the population lacks access to digital financial services, with many bank account holders without debit or credit cards and a majority of those without bank accounts unable to use others' accounts. Our findings corroborate the 2021 FinAccess survey that indicates that access to formal financial inclusion in Kenya rose to 83.7% in 2021 from 82.9% in 2019.

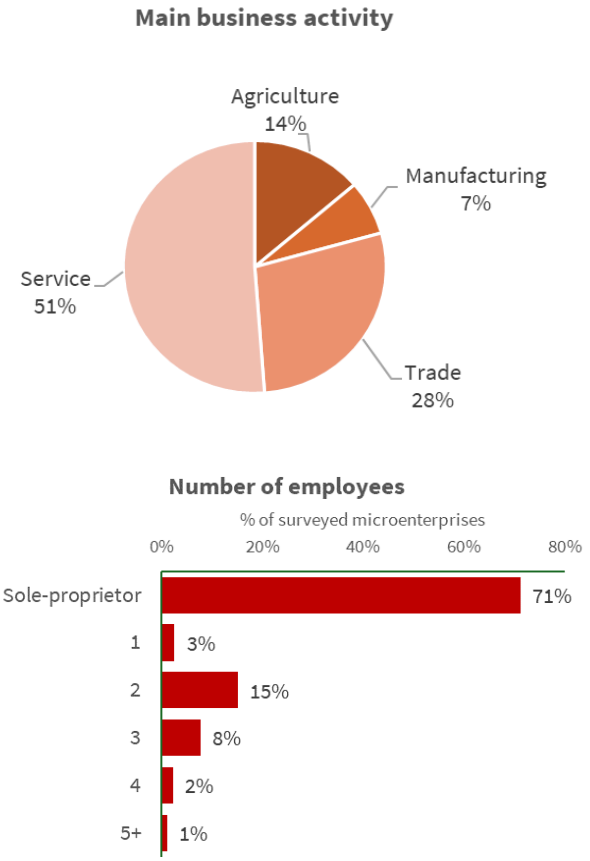
9. Digital technology adoption by microenterprises

9.1. Microenterprise characteristics

The microenterprises surveyed[17] in Kenya were primarily service providers, accounting for 51% of all entities, with a further 28% made up by traders and sellers. As Figure 79 shows, only a small percentage of surveyed microenterprises were involved in agricultural production and manufacturing. Approximately 71% of microenterprises were sole proprietors, defined as having one employee who was also the owner of the enterprise. There was a further 3% that had only one employee separate from the owner (with the owner not actually working for the business), and another 15% with two employees. Only 11% of microenterprises had between three and ten employees.

Figure 79: Type and size of microenterprises surveyed, 2022

[17] A total of 547 microenterprises were surveyed in Kenya.

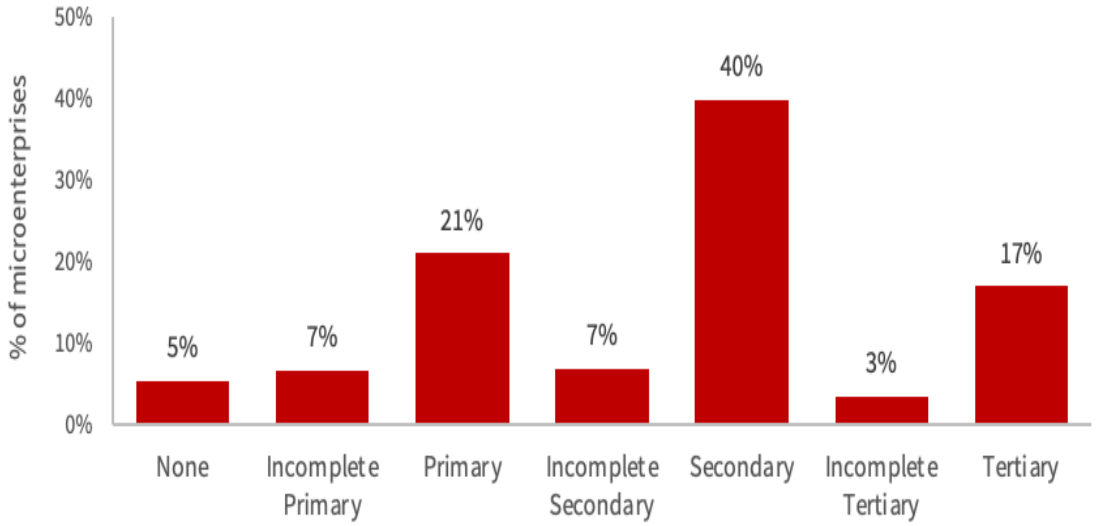


Source: RIA (2022b)

There were more microenterprises surveyed in urban areas (59%) compared to rural areas (41%). There was also a higher share of firms which were male-owned (56%), compared to female-owned (44%), where female ownership was defined as 50% or more of the owners being female. Most microenterprises surveyed were operating in the informal sector with only 23% identified as formal enterprises based on the criteria of being registered for at least one of: VAT, with the national revenue authority, and/or the local authority (e.g. the municipality).

As can be seen in Figure 80, most microenterprise owners (60%) had completed at least a secondary school education and only a small portion in total (12%) had not completed primary school. A total of 17% had completed a tertiary level education.

Figure 80: Education level of microenterprise owners, 2022



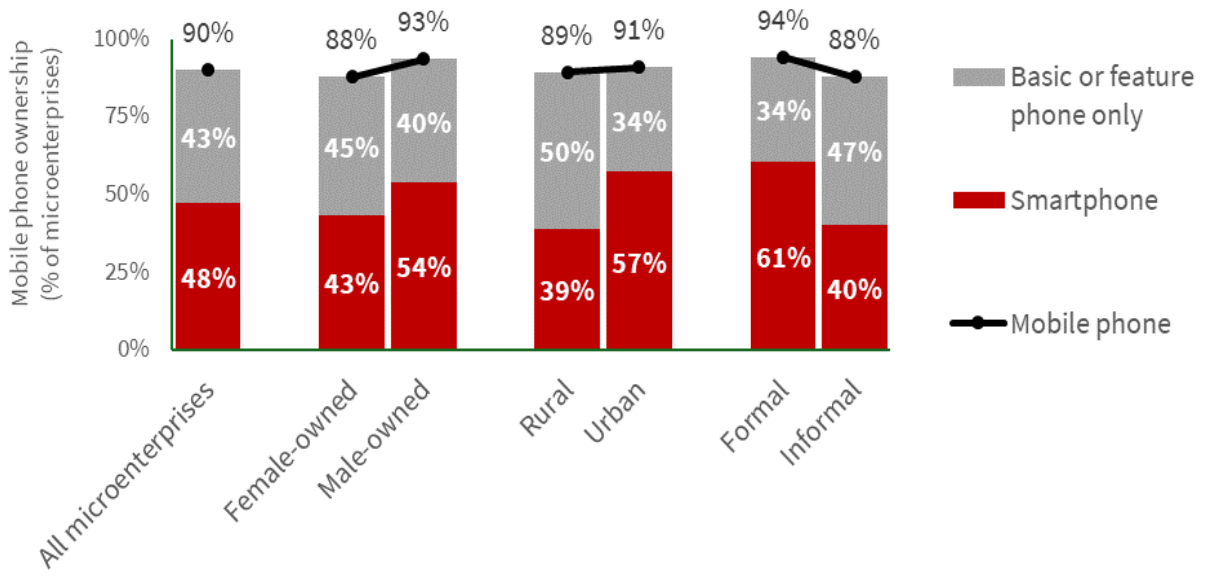
Source: RIA (2022b)

Almost all (99%) of microenterprises sold their goods and services to individual customers. Only a small portion had diversified their customer base type, with 8% selling to informal businesses, 7% selling to small formal businesses, 3% to public enterprises and only 1% selling to medium formal businesses. No microenterprises in the survey claimed to sell goods and services to large formal businesses. There was more diversity in terms of supplier types, with 31% of microenterprises claiming to procure supplies from informal businesses, 32% from small formal businesses, and 17% from medium formal businesses. The high concentration of businesses providing services resulted in a significant share (28%) claiming they did not need to source supplies.

9.2. ICT access

Most microenterprises surveyed had at least one mobile phone which was used for business activities. Moreover, there was a high observed level of smartphone ownership, with 48% of enterprises claiming to have a smartphone which was used for the business. As Figure 81 shows, mobile phone ownership was higher for male-owned compared with female-owned microenterprises, both when considering all mobile phones (93% vs 88%) or specifically looking at smartphones (54% vs 43%). Although overall smartphone ownership was higher than the ownership of a basic or feature phone, smartphone ownership was lower for rural microenterprises (39% vs 57%) and for informal businesses compared to those formalised (40% vs 61%).

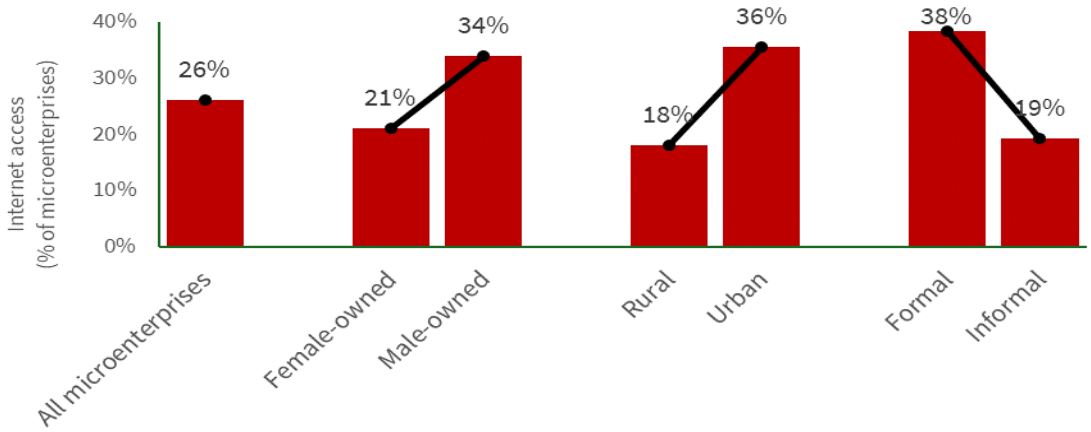
Figure 81: Mobile phone ownership amongst microenterprises, 2022



Source: RIA (2022b)

The level of internet access displayed in Figure 82 shows that only 26% of microenterprises claimed to use the internet in their business. While this is higher than the 24% observed in the 2018 survey (RIA, 2018b), it still means that most microenterprises were not using the internet for their businesses in any way. Moreover, it is worth noting that internet use was substantially lower than smartphone ownership (26% vs 48%), meaning that a large share (approximately half) of microenterprises with smartphones were not using the internet for their businesses despite having the means of doing so.

Figure 82: Microenterprises using the internet by business demographics, 2022

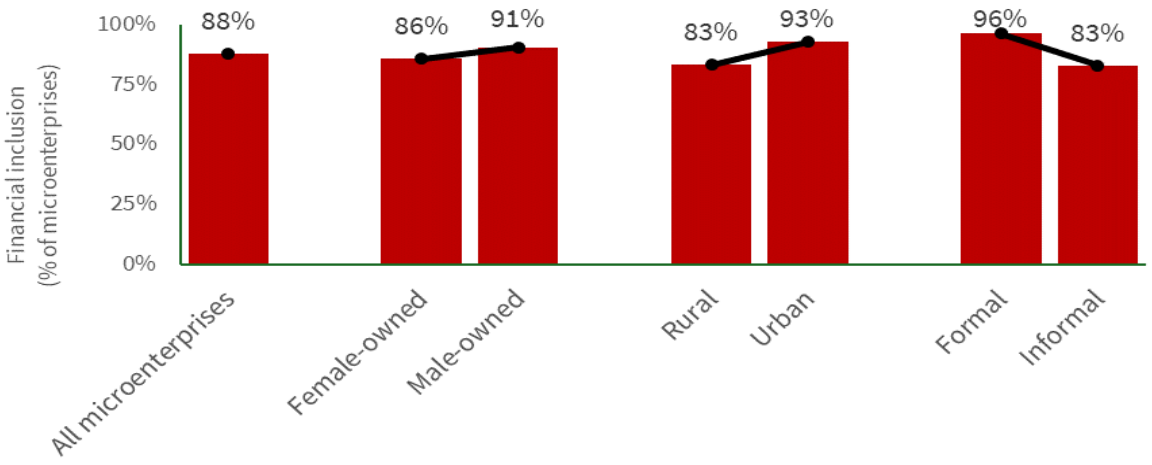


Source: RIA (2022b)

Internet use was slightly higher for male-owned microenterprises compared to those owned by females, resulting in a gender gap of 12%. There was a more notable difference between urban and rural microenterprises, with the location gap standing at 28%. There was a similar gap observed between formal and informal microenterprises, with an informality gap of 29%.

Financial inclusion amongst microenterprises was relatively high, with 88% of microenterprises claiming to have either a mobile money or bank account. As can be seen in Figure 83, the level of inclusion was slightly higher for male-owned microenterprises than female-owned (91% vs 86%), was higher for businesses in urban areas compared to rural areas (93% vs 83%), and was higher for formal microenterprises compared to those operating informally (96% vs 83%).

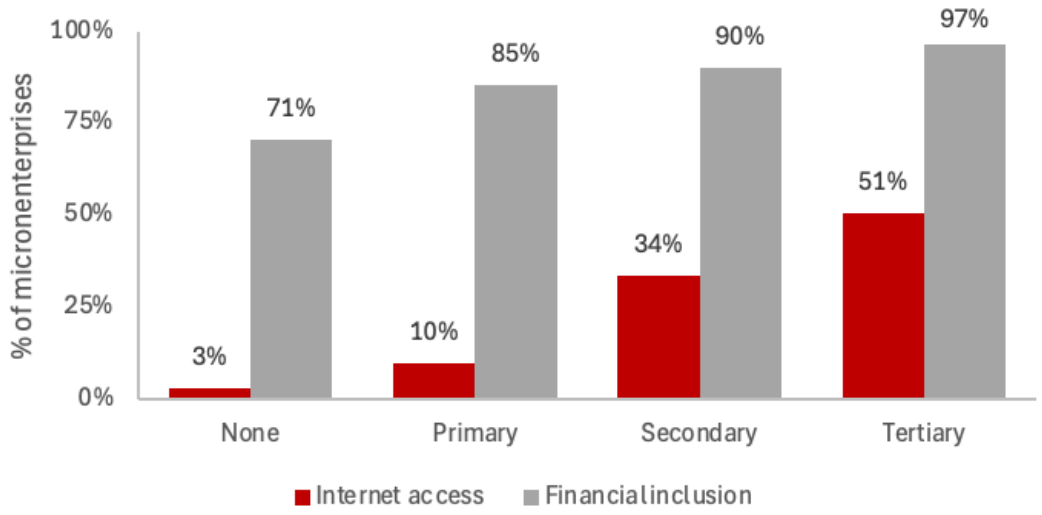
Figure 83: Financial inclusion of microenterprises, 2022



Source: RIA (2022b)

There appears a clear relationship between digital access and the education of the business owner (Figure 84). This is particularly noticeable for internet access, which increased from 3% to 10% with the completion of primary school, increased further to 34% with the completion of secondary school, and to 51% for a tertiary education. The increase in financial inclusion was less sharp, starting at a much higher base of 71% for microenterprises with no education attainment. However it did increase significantly with each level of education attainment, reaching 97% where the owner had a tertiary education.

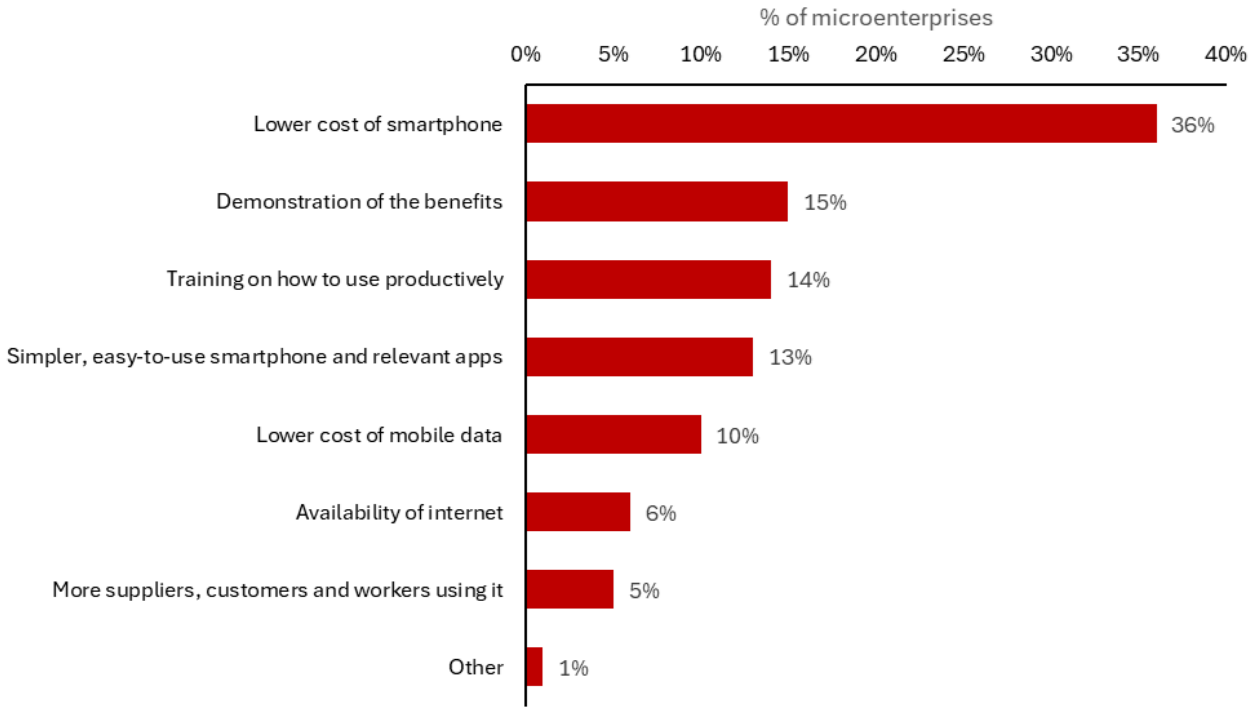
Figure 84: Microenterprises using the internet by education of business owner, 2022



Source: RIA (2022b)

The main factor that microenterprises cited as needing to be addressed to enable them to use the internet was the cost of smartphones (36%). This was followed by the need to demonstrate how to use the internet productively in a business context (15%), training in how to use digital tools effectively for the business (14%), and access to simpler digital tools (13%). Together these three issues account for 42% of microenterprises and could be effectively addressed simultaneously through training and awareness interventions.

Figure 85: Main factors that need attention to enable microenterprises to start using the internet, 2022



Source: RIA (2022b)

The improvements and overall high level achieved in internet access at the household and individual level only seem to be trickling down to the microenterprise sector. Although there is promise in the high level of smartphone adoption amongst microenterprises, there is still a lot of room for improvement when it comes to them using digital technologies in their businesses.

9.3. ICT use

Business tools are used by businesses to perform standard business operational activities. In the survey microenterprises are asked about the application of digital technologies to their business tools. There are five core activities which are assessed in this regard:

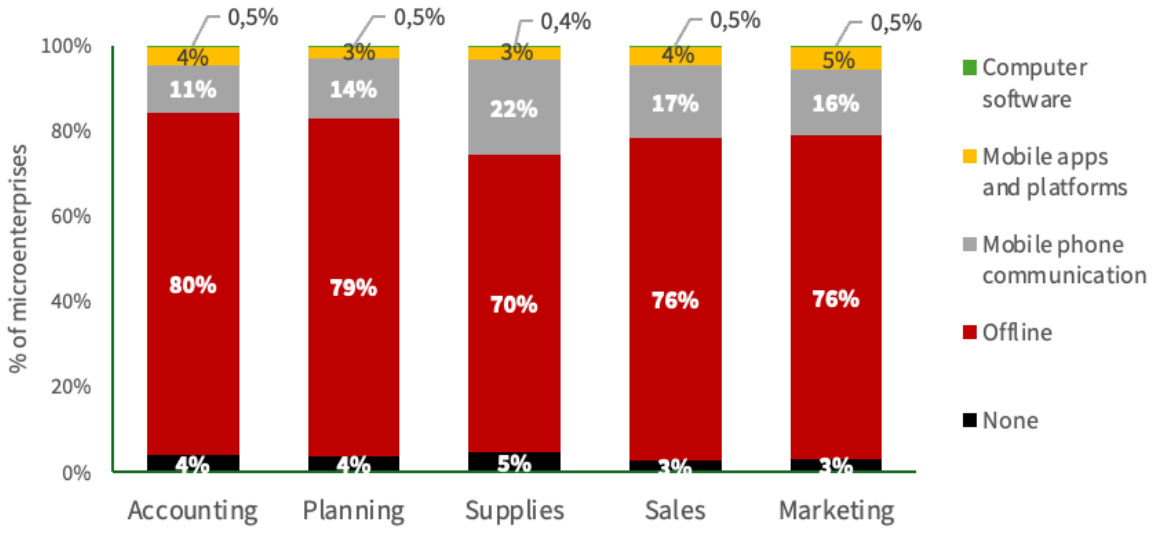
- Accounting is how a business records, organises, and understands its financial information. For example, this can be done by keeping a written record of money coming in and money going out in a notebook, by keeping track of income and expenses in a spreadsheet, or by using a specialised accounting software. Any form of keeping a record of financial transactions and information counts as accounting;
- Planning is how a business makes financial decisions. For example, whether to buy more or less stock, spend more money on materials, or push for more sales;
- Supplies refers to supply chain management or procurement, and includes keeping track of suppliers, sourcing materials and finding service providers. Almost all businesses have to source materials or services before they can produce their own products or offer their own services. This includes businesses buying products to resell;
- Sales is how businesses sell some form of product or service in order to generate revenue. This could happen face to face, on a phone call, via an e-commerce platform accessed through a mobile phone, though the business's own website, or through other channels; and
- Marketing is how a business promotes its products or services to its potential customers. Examples include telling people about the products or services in person, printing leaflets or posters, placing an advertisement in a newspaper or buying advertising space online. Any form of informing potential customers about product and service offerings counts as marketing.

For each of these tools a microenterprise has a range of channels available to them and may use a combination of different channels to perform the activity. In the data there are five different types of what we call tools (both online and offline) which are listed below in increasing order of technicality or sophistication:

i. None: Business does not perform the particular activity at all;
ii. Offline: Doing it manually, or dealing with people face to face, or using paper without the help of phones or computers;
iii. Mobile phone communication: Making phone calls, sending SMSes or messages;
iv. Mobile apps and platforms: Using apps or online platforms on the phone other than making phone calls, sending SMSes or messages; and
v. Computer software: Using standard office or communication software or apps on a computer (e.g. word processor, spreadsheets, e-mail), or using specialised software or apps on a computer developed for a specific business activity.

In Figure 86, businesses are classified according to the most sophisticated type of tool used. Depending on the activity, only between 3% and 5% of the surveyed microenterprises indicated that neither offline nor online tools applied to their business activities. Where tools were used, most microenterprises claimed to rely exclusively on offline tools to complete the five core activities. Although there appeared to be greater use of digital technologies for sourcing supplies, the 26% of microenterprises that did utilise digital technologies did so mainly through communicating via mobile phone calls and SMS services, with only a small portion using the more advanced mobile applications and platforms.

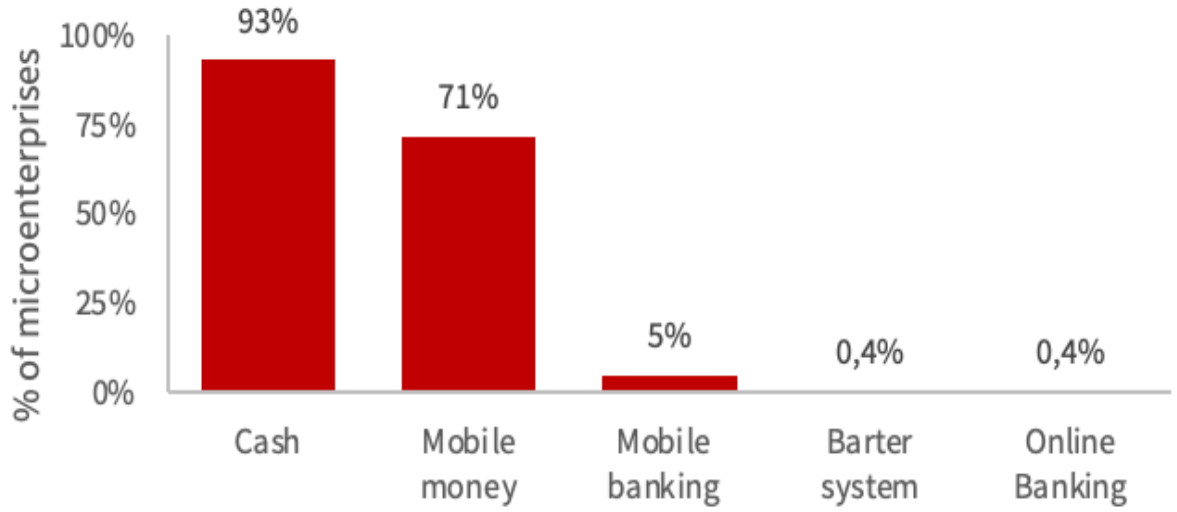
Figure 86: The use of business tools by level of sophistication, 2022



Source: RIA (2022b)

While most microenterprises (93%) transacted in cash, there was a high level of mobile money adoption for payments (Figure 87). Other digital payment channels were far less prevalent, with only 5% making or receiving payments through mobile banking and less than 1% through online banking. Only a minimal share of the surveyed microenterprises claimed to make and receive payments through a barter system.

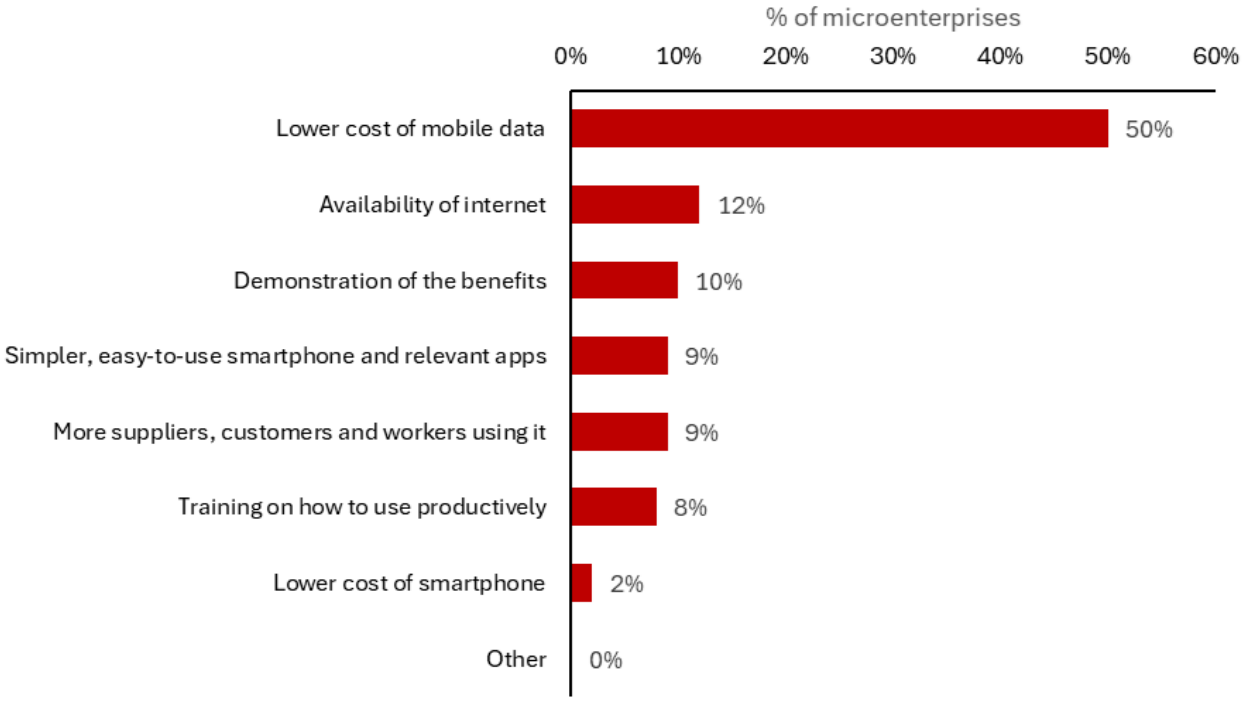
Figure 87: Channels used by microenterprises to make and receive payments, 2022



Source: RIA (2022b)

The microenterprises that used the internet mainly cited the cost of mobile data as the main factor limiting them from using it more. Half of the surveyed microenterprises claimed that lower data costs would be the main factor enabling them to engage more with digital technologies in their business activities. The next most cited factor was the availability of internet services, but this was only cited by 12% of microenterprises.

Figure 88: Main factors that need attention to enable microenterprises to use the internet more, 2022



Source: RIA (2022b)

Overall, Kenyan microenterprises are well positioned to leverage digital technologies given the high level of mobile phone ownership and basic digital skills, as demonstrated by their widespread use of mobile money for transactions. However, the adoption of digital technologies beyond payments remains extremely limited, particularly with respect to accessing business tools that could enhance productivity and expand market reach. This low uptake may not only stem from a lack of awareness or resources, but could also be influenced by the

predominantly informal nature of these businesses where concerns about increased visibility and potential tax liabilities may discourage the use of more structured digital systems.

10. Conclusions and recommendations

Kenya has made considerable progress in the policy, legal and regulatory framework that impacts digital technologies since the 2018 After Access report, which was conducted before the COVID-19 pandemic. However, demand-side evidence from the 2022 survey suggests there are important gaps that need to be attended to. The pandemic exacerbated socio-economic inequalities, bringing to light disparities with regards to access and affordability which disproportionately affect vulnerable segments of the population. While the country has achieved almost universal mobile phone ownership, with a rise in smartphone ownership, access to the internet still remains a challenge. Digital access in Kenya is driven primarily by income, education, age and geographical location. The gender gap in digital access, though decreasing, persists, with the research findings pointing to structural inequalities for women concentrated in the lower education and income brackets. Internet use for small business purposes also remains relatively low and many microenterprises are financially excluded. Stronger interventions are therefore necessary to allow all citizens to benefit from digitalisation, regardless of gender, geographical location, income and education level. To this end, the following recommendations are made:

- **Strengthen policy, legal and regulatory frameworks:** While appreciating the existing and comprehensive policy, legal and regulatory frameworks that cover the telecoms, data and cybersecurity ecosystems, there remains a need to strengthen these in light of the global trend towards a data-driven economy. In particular, the National Data Policy needs to be passed, and its corresponding Data Protection Act (2019) updated to respond to the current realities. Agile regulatory mechanisms such as regulatory sandboxes also need to be explored across regulatory interventions. A critical, evidence-based analysis of the development outcomes of the various initiatives and programmes by government, the private sector, academia and other stakeholders is also necessary to inform policymaking in the digital sector.
- **Address data and device costs:** Despite a reduction in data prices over time, many Kenyans still cite the cost of data and devices as a limitation to the use of the internet. This is particularly the case with respect to data prices. The regulator should ensure mobile network operators offer more affordable and competitive tariffs and packages, collaborate to address common challenges in infrastructure, spectrum, and resources, and explore opportunities to deepen inclusion. While smartphone ownership has increased amongst microenterprises, many still say that the high cost of the devices hinders access. Therefore public-private cooperation to mobilise and deploy capital in the provision of affordable digital devices may also need to be explored.
- **Review taxation policies:** In recent years the government has introduced taxes that may have constrained digital access and use. There is a need to reassess the current taxation framework, especially the digital service tax and the excise duty on imported mobile phones and SIM cards, to alleviate the financial burden on consumers and businesses.
- **Invest in digital infrastructure with a focus on rural and underserved areas:** There is a need to invest in digital infrastructure, including last-mile infrastructure, to bridge the digital divide. In particular:
    - The National Digital Master Plan (2022) committed to build 100 km of fibre network across the country. A clear roadmap and milestones are needed to actualise this commitment. There is huge broadband capacity from the submarine cables with landing points in Kenya. However their use is mainly concentrated in urban areas, causing many in the rural areas to rely on mobile connectivity for internet access. Moreover, there are still many counties across the country that face connectivity challenges. Investing in the roll-out of fibre-optic networks to these less-connected counties is therefore necessary.
    - Sustainable models of investment in the deployment of broadband infrastructure to enable equitable access to high-speed internet should be explored, particularly in rural and underserved areas. This should include fostering public-private partnerships to facilitate nationwide deployment of 4G and 5G mobile networks.

- There is a need to address challenges encountered during 5G pilot tests, such as device compatibility and coverage limitations.
- The Communications Authority should consider using the universal access fund to extend last-mile connectivity to community centres, public schools, health centres and public administration offices across the country to facilitate access.
- There is a need to assess the current mode of digital infrastructure development and address the emerging challenges including the meaningful involvement of the private sector and targeted communities to ensure sustainability.

- **Develop targeted programmes to address intersectional digital inequalities:** There is a need to develop targeted programmes at different levels to address the digital divide, with a focus on gender, income and geographic disparities. This could entail supporting women in tech initiatives, subsiding internet access for low-income households, and deploying mobile internet access points in remote areas. The shift from basic and feature phones towards smartphones over the years is something that can be leveraged to promote internet access and use as well as financial inclusion.
- **Promote innovation and digital entrepreneurship:** There is a need to support the growth of digital entrepreneurship by providing start-ups with mentorship programmes through development partners and access to capital and markets to encourage the development of local content and applications that are culturally relevant. Notably, the internet is still primarily used for social networking and entertainment purposes with limited use for activities associated with economic benefits. The extent to which social media can be leveraged as an access channel and an opportunity to reach internet users with other digital products and services should be explored.
- **Address barriers to digital literacy and awareness:** The lack of digital literacy has been identified as one of the hindrances to increasing internet use, affecting both males and females. There is also a need and appetite for platform work amongst marginalised groups such as females and rural dwellers. However they remain held back by their lack of digital skills to effectively use the relevant applications and platforms. This highlights the need to invest in digital literacy and awareness programmes for citizens and to introduce these early in the education curriculum. Consumer rights and civil society groups should collaborate with the government, regulators, operators and development partners to implement these programmes widely. There is also an opportunity to better leverage digital technologies effectively within the microenterprise sector to promote growth and competitiveness. Therefore digital literacy and awareness programmes should also be tailored for microenterprises, including offering examples of how the use of digital technologies can improve business practice.

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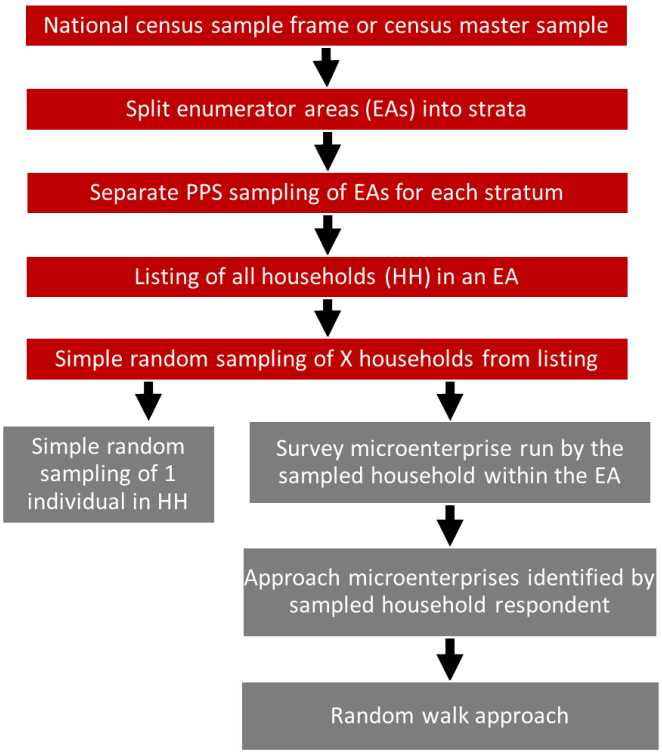
Appendices

Appendix A1: Survey methodology

RIA conducted the first After Access survey between 2005 and 2008 covering a total of 17 countries across the African continent. Since then, additional surveys have been conducted for 2010 to 2012 and for 2017 to 2018. The latest round of the survey was conducted in 2022 to 2023. The survey provides detailed accounts of how individuals interact with ICTs and the barriers holding them back from tapping into the benefits of digitalisation. For each country surveyed, a nationally representative household and individual survey was accompanied by a microenterprise survey which contains questions on the ways in which microenterprises use ICTs within their businesses.

The random sampling for households, individuals and businesses is based on Census sample frames. A Census divides a country into EAs which roughly have a household density of 200. A random sample of EAs stratified by urban/rural was selected based on a complete list of EAs from the National Statistical Office. Households in EAs were randomly selected with the help of satellite imagery and remote sensing of rooftops. Software specialised in the detection of roof types from satellite imagery was used to create a list of the locations of all dwellings in a sampled EA. A random sample of 22 dwellings was then drawn from the EA.

Figure A1: Sampling steps



- Step 1: The national census sample frames were split into urban and rural EAs;
- Step 2: EAs were sampled for each stratum using probability proportional to size (PPS);
- Step 3: Households in EAs were listed through the use of a software that detects roof types from satellite imagery. The listing process for businesses was compiled manually through a random walk process. The listings served as sample frames for the simple random selections of households and businesses;
- Step 4: *X* Households and *Y* businesses were sampled using a simple random sample for each selected EA; and
- Step 5: One individual from all household members 16 years or older was randomly selected for the individuals survey based on simple random sampling.

The desired level of accuracy for the survey was set to a confidence level of 95% and a margin of error of 5%, which yields a minimum sample size per tabulation group of 385.

Table A1: Minimum sample size for variables expressed as proportions for large populations

Margin of error	95%	99%
+-1	9 604	16 577
+-2	2 401	4 145
+-3	1 068	1 842
+-4	601	1 037
+-5	385	664
+-6	267	461
+-7	196	339
+-8	151	260
+-9	119	205
+-10	97	166

Source: (Rea & Parker, 2005)

Three weights were constructed: for households, individuals, and microenterprises. The weights were based on the inverse selection probabilities[18] and gross up the data to national level when applied.

Household weight: $$HH_w = DW \frac{1}{P_{HH} * P_{EA}}$$

Individual weight: $$IND_w = DW \frac{1}{P_{HH} * P_{EA} * P_I}$$

Business weight: $$Bus_w = DW \frac{1}{P_{Bus} * P_{EA}}$$

Household selection probability: $$P_{HH} = \frac{n}{HH_{EA}}$$

EA selection probability: $$P_{EA} = m \frac{HH_{EA}}{HH_{STRATA}}$$

Individual selection probability: $$P_I = \frac{1}{HH_{a15+}}$$

Business selection probability: $$P_{BUS} = \frac{q}{BUS_{EA}}$$

DW = design weight compensation for over-sampling of urban EAs and under-sampling of rural EAs;

HH_{EA} = number of households in selected EA based on information of last census or updated listing by field team;

HH_{STRATA} =number of households in strata (urban, rural);

HH_{a15+} =number of household members or visitors 16 years or older;

[18] See page 119 of the UNSD's handbook on *Designing Household Survey Samples*: *Practical Guidelines* (2005). https://unstats.un.org/unsd/publication/seriesf/seriesf_98e.pdf

m = target number of EAs for each strata;

n = target number of households in EA; and

q = target number of businesses in EA.

The target number of households in each EA varied from country to country. Usually, a maximum of 20 households and 10 businesses were selected from each EA.

Table A2: Survey counts for After Access 2022 as at February 2024

Country	Population	Data collection status	Household surveys completed	Microenterprise surveys completed	Country surveyed in 2017/2018?
South Africa	59 893 885	Complete	1 933	566	Yes
Nigeria	218 541 212	Complete	2 230	718	Yes
Uganda	47 249 585	Complete	1 031	520	Yes
Ethiopia	123 379 924	Complete	2 095	499	No
Kenya	54 027 487	Complete	1 703	547	Yes
Tanzania	65 497 748	Complete	1 821	510	Yes
Ghana	33 475 870	Complete	1 062	544	Yes

Appendix A2: Comparison with census and other national statistics

The FinAccess Household Survey is a nationally representative survey conducted by the Kenya National Bureau of Statistics (KNBS). The sample was drawn from the Kenya Household Master Sample Frame (K-HMSF), based on the 2019 Kenya Population and Housing Census, to ensure representation at both national and county levels. Of the 25 724 eligible respondents, 22 024 interviews were successfully completed, yielding an overall response rate of 85.6% – with 88.6% in rural areas and 80.5% in urban areas.

Table A3: Comparison of After Access demographics with 2021 FinAccess survey

	Kenya National Bureau of Statistics (KNBS): 2021 FinAccess Household Survey	RIA: After Access
Gender		
Female	41%	47%
Male	59%	53%
Age		
16 - 30 years	39%	42%
31 - 45 years	31%	29%
46 - 60 years	16%	16%
Over 60 years	14%	13%
Education		
None	18%	17%
Primary	40%	28%
Secondary	30%	39%
Tertiary	12%	17%

Source: RIA (2022a); KNBS (2021)

Appendix A3: Calculation of asset index

The asset index is calculated based on the household survey, where it is asked:

> *"Which of the following items does the household have in working condition? They must be available for all household members to use."*

There are five asset groups used in the calculations, listed in the table below.

Table A4: Assets included in asset index

Asset group	Included assets as per questionnaire	Total ownership
TV or radio	TV	84%
	Radio	
Refrigerator	Refrigerator	15%
Cooker	Microwave / electric or gas stove / cooker	16%
Motor vehicle	Car or truck	20%
	Motorcycle or 3-wheeler	
Washer	Washing machine or dishwasher	4%

The following assets were not considered relevant for the asset index calculations:

- Fixed (line) telephone;
- Bicycle; and
- Air conditioner.

The scoring is then calculated as the sum of the number of asset groups the household has, ranging from 0 where the household has none of the assets in their possession, to 5 where they possess all of them.

Table A5: Assets index score totals

Asset index	Observations	Weighted sum	Share of population
0	235	1 839 307	14%
1	972	7 207 776	56%
2	272	2 007 014	16%
3	114	882 302	7%
4	62	520 827	4%
5	37	378 698	3%
Missing	11	88 923	--

Appendix A4: Calculation of digital literacy scores

The digital literacy score is calculated as the average score across three different sub-indicators. Each sub-indicator, and the final digital literacy score, is a score out of 100 where the lowest possible score is 20 out of 100 and the highest would be 100. The questions that are used to calculate the sub-indicators, and the associated scoring, is provided in the table below.

Table A6: Indicators for digital literacy scoring

Sub indicator	Description	Aggregation	Components	Question	Scoring	
Security	Measures the awareness of the respondent to digital security threats and the ability to take protective measures to ensure their security when engaging with ICTs	Percentage calculated as the average score across all components multiplied by 20	Passwords	1234abcd is a secure password	1	Strongly agree
					2	Agree
					3	Neither agree nor disagree
					4	Disagree
					5	Strongly disagree
			Threats	I am aware of the threat of viruses or malware to my devices (e.g. my smartphone or computer)	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
			Two-factor	I use two-factor authentication (two-step verification) for at least one of my accounts	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
			Media privacy	On social media accounts, I am able to control who can see my posts	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
			Location privacy	I can disable the option to show my geographic/GPS position in mobile apps	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree

Sub indicator	Description	Aggregation	Components	Question	Scoring	
			Report abuse	I know how to report abuse on the internet if there are posts or messages that contain negative/harmful content or are detrimental to me	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
Data	Measures the subjective ability of the respondent to work with data	Percentage calculated as the average score across all components multiplied by 20	Searching	I am able to search for data, information and content according to my needs on the Internet, and to decide what are the best keywords to use for online searches	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
			Data storage	I am able to save/store data, information, and content in digital mediums	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
			Loading	I am able to upload, download or save files, and open downloaded files	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
			Online forms	I am able to fill in an online form to register my details on a website	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
ICT	Measures the subjective ability of the respondent to engage with ICTs	Percentage calculated as the average score across all components multiplied by 20	Network	I know how to connect to a Wi-Fi network or via Bluetooth or to change which mobile network I am connecting to	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree

Sub indicator	Description	Aggregation	Components	Question	Scoring	
			Apps	I know how to download and install/ uninstall and configure apps/ software to my devices	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree
			Browser	I know how to operate a browser (e.g. open a new tab in my browser, navigate to the previous and next page when browsing)	1	Strongly disagree
					2	Disagree
					3	Neither agree nor disagree
					4	Agree
					5	Strongly agree

Appendix A5: Calculation of "Gaps"

Gaps provide a means of estimating the difference in an indicator between two different groups. There are several ways in which a gap can be estimated and the optimal selection depends on the nature of the analysis and the indicator of focus.

Below some common methodologies are discussed. To illustrate the strengths and weaknesses of each method the following hypothetical example is used for a hypothetical indicator i:

Table A7: Hypothetical example for population gap calculations

Group	Population X	Population Y	Population Z
A	20%	60%	40%
B	40%	80%	20%
Total population (p)	30%	70%	30%

The most straightforward method is simply taking the difference between the two groups:

$$gap^{i}_{a,b} = i_b - i_a$$

By this method, the following gaps are obtained:

- Population X: 20%
- Population Y: 20%
- Population Z: -20%

The main issue here is the lack of scale consideration. In Population X group b has a score double that of group a, in Population Y the a is much higher than 50% of group b and therefore the relative gap is much smaller, yet they receive the same score.

One way of making the scoring more relative is to make the difference a percentage difference:

$$gap^{i}_{a,b} = \frac{i_b - i_a}{i_a}$$

By this method, the following gaps are obtained:

- Population X: 100%
- Population Y: 33%
- Population Z: -50%

While this has now accounted for the relative difference in the size of the gap between Population X and Population Y, a new issue arises in that the size of the gap in favour of group b in Population X is double the size of the gap in favour of group a in Population Z, despite the scorings being the exact reverse. This is problematic in two ways, firstly it does not allow comparison of the magnitude of gaps which run in different directions. Secondly, the analysis then becomes dependent on the choice of population group used as the base. If the bases are switched, the formula becomes:

$$gap^{i}_{a,b} = \frac{i_b - i_a}{i_b}$$

Then the gaps become:

- Population X: 50%

- Population Y: 25%
- Population Z: -100%

As is clear, this is not just a case of switching between negative and positive as would be optimal, but the whole nature of the analysis changes.

As this study aims to look across multiple countries, and to look at differences across multiple indicators, it is important to be able to conduct gap analyses which are comparable and avoid the issues with the above-mentioned methodologies.

To be able to achieve this, the relative gap formula is grounded in the population aggregate level:

$$gap^{i}_{a,b} = \frac{i_b - i_a}{i_p}$$

By this method, the following gaps are obtained:

- Population X: 67%
- Population Y: 29%
- Population Z: -67%

If the reference group is switched, it is just a case of the gap changing from a positive to a negative and similarly a negative and positive gap can be compared to ascertain differences and similarities in magnitudes.

Appendix A6: Regression outputs - Determinants of digital access

Table A8: Full regression results for the core drivers of digital access

	Mobile phone		Internet		Financial inclusion	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Female	0.0534	0.00550	-0.241	-0.0377	0.0433	0.00297
	(0.222)	(0.0229)	(0.172)	(0.0267)	(0.283)	(0.0194)
Rural	-0.535**	-0.0550**	-0.399**	-0.0626**	-0.616*	-0.0423*
	(0.255)	(0.0266)	(0.191)	(0.0301)	(0.356)	(0.0251)
Remittances	0.179	0.0184	0.660**	0.103**	-0.0587	-0.00402
	(0.412)	(0.0423)	(0.303)	(0.0469)	(0.511)	(0.0350)
Grants	-0.242	-0.0248	0.331	0.0518	-0.454	-0.0311
	(0.372)	(0.0384)	(0.290)	(0.0454)	(0.419)	(0.0289)
Electricity	0.290	0.0298	0.105	0.0164	0.326	0.0224
	(0.242)	(0.0248)	(0.195)	(0.0305)	(0.308)	(0.0210)
Language barrier	0.368	0.0378	-0.706***	-0.111***	0.0721	0.00495
	(0.288)	(0.0295)	(0.186)	(0.0279)	(0.348)	(0.0238)
Marital status	0.960***	0.0987***	0.266	0.0416	1.336***	0.0916***
	(0.226)	(0.0225)	(0.184)	(0.0290)	(0.309)	(0.0211)
Income (log)	0.351***	0.0361***	0.176***	0.0275***	0.377***	0.0259***
	(0.0492)	(0.00491)	(0.0407)	(0.00633)	(0.0662)	(0.00463)
Household wealth	0.0273	0.00280	0.188*	0.0295*	0.246	0.0168
	(0.168)	(0.0173)	(0.112)	(0.0173)	(0.195)	(0.0133)
Education	0.514***	0.0529***	0.615***	0.0963***	0.391***	0.0268***
	(0.0963)	(0.00958)	(0.0646)	(0.00884)	(0.123)	(0.00826)
Age	0.0137*	0.00141*	-0.0306***	-0.00480***	0.0196**	0.00135**
	(0.00768)	(0.000782)	(0.00606)	(0.000923)	(0.00946)	(0.000641)
Constant	-1.370**		-1.427***		-0.689	
	(0.570)		(0.394)		(0.765)	
Observations	1,431	1,431	1,433	1,433	1,433	1,433

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1