AFTER ACCESS 2018

A DEMAND-SIDE VIEW OF MOBILE INTERNET FROM 10 AFRICAN COUNTRIES

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RESEARCH ICT AFRICA

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EXECUTIVE SUMMARY

Information communication technology (ICT), and particularly broadband technologies, have been identified as critical drivers of social and economic growth and development. Smartphones, in particular, have revolutionised the telecommunications industry by becoming the principal means of Internet connectivity. After years of sluggish uptake of the Internet with the high cost of fixed broadband services, requiring expensive computer connectivity and relatively high digital literacy, the initial rapid mobile Internet adoption appears to have flattened out in many countries. In addition, a number of these countries are below the 20% critical mass believed to be necessary to enjoy the network effects associated with improved efficiencies and enhanced information flows for economic growth and innovation.

Research ICT Africa's (RIA's) 2018 After Access ICT Access and Use Survey shows that several of the African countries surveyed between 2017 and 2018 are below 15%, with Rwanda and Mozambique at around 10%. The survey results show that, without complementary policies, new digital technologies and Internet-based services simply amplify existing inequalities.

Of all 10 African countries surveyed, only in South Africa is more than half the population online. The Internet penetration rate in Ghana, Kenya, Lesotho, Nigeria and Senegal is above the 20% threshold – but even this requires further investigation in a developing country context, where the unaffordability of data means that usage is generally very low and most people are using services passively, not in the high-speed, always-on environment where studies of causality in relation to penetration and economic growth have been done. In some countries, the low Internet uptake is a result of no coverage – there is insufficient broadband extension beyond the major urban centres in the case of Mozambique, Nigeria and Uganda. Yet even in countries where there is extensive coverage, such as in Lesotho, Rwanda and South Africa, the cost of devices is a major barrier to uptake. Such demand-side constraints relate not only to affordability of devices and services, but also to classical issues of human development. In several countries, including Nigeria and Tanzania, the lack of awareness or skills on how to use the Internet accounts for the large numbers of people who remain offline.

CRITICAL MASS AND NETWORK EFFECTS

Until these demand-side issues are addressed, and there is a critical mass of people online who are able to use the Internet intensively enough for the multipliers to be felt throughout the economy, expectations of the Internet contributing directly and indirectly to economic growth and job creation will not be realised. The relationship between Internet penetration and gross national income per capita can be seen in the broader After Access Survey undertaken across 22 Global South countries. With a GNI per capita of USD 11 923, South Africa aligns with other middle-income countries in Latin America, but its Internet penetration is significantly lower than that of Argentina, Colombia, Paraguay, Ecuador and Peru. Nigeria's GNI per capita income of USD 5 326 and Internet penetration of 29% sits alongside some of the more populous Asian countries with similar GNIs per capita, such as Bangladesh (GNI per capita of USD 3 677 and Internet penetration is 13%) or Pakistan (GNI per capita of USD 5 311 and an Internet penetration level of 17%). The least-developed countries, namely, Rwanda (GNI per capita of USD 1 820), Tanzania (GNI per capita of USD 2 557) and Mozambique (GNI per capita USD 1 093), have the lowest Internet penetration rates. Interestingly, despite having the lowest GNI per capita (USD 1 093), Mozambique does not have the lowest Internet penetration rate, which at 10% is slightly higher than that of Rwanda. Senegal and Lesotho, with a GNI per capita of USD 2 620 and USD 3 510, and Internet penetration rates of 30% and 31% respectively, are among some of the poorer countries that perform better than larger economies, such as Nigeria and Ghana.

MOBILE PHONE OWNERSHIP AND THE GENDER GAP

Mobile ownership also tracks GNI per capita, with the least-developed countries only meeting the halfway mark in terms of mobile phone ownership, while the Kenyan (87%) and South African (83%) markets are close to saturation. GNI also traces the mobile phone ownership and Internet access by gender, with the gap between men and women diminishing as more people are connected.

In South Africa, the gender gap in mobile ownership is negative, with more women than men owning mobile phones. South Africa also has the smallest Internet access gap, with men having 12% on women. Again, the least-developed countries have the biggest gender gap. While mobile phone ownership is between 40% and 87% among all the African countries surveyed, with a gender gap of 60%, Rwanda again has the highest Internet access gap between sexes, almost twice as much as the next-highest country, Mozambique (37%). These figures are more in the range of the extreme access gaps witnessed between sexes in Bangladesh (34%), Pakistan (37%) and India (37%).

Generally, the urban–rural gap is even higher than the gender gap. Although it is the lowest of the African countries surveyed, South Africa's urban–rural gap at 34% is triple that of its gender gap. The urban–rural gap jumps to 70–80% among least-developed countries with high gender gaps of 50–60%. This is particularly stark for Tanzania, with its relatively low gender gap of 32% for a least-developed country, which then more than doubles to 84% in relation to location. Yet, Nepal and Cambodia, which have similarly low GNIs per capita, have considerably lower urban–rural gaps at 30–40%.

HOUSEHOLD ACCESS AND USE

South Africa, at 11%, has the highest household Internet access, far above the surveyed country average of 5%. This is followed by Kenya (10%) and Ghana (6%). Mozambique (1%), Tanzania (1%) and Uganda (2%) have the lowest household Internet use. Despite having the highest percentage of households with tertiary level education (31%), Nigeria only has an Internet household penetration rate of 3%. South Africa's percentage of households with tertiary level education is 27%, while the percentage in Kenya is 20%. The barriers to household online connectivity include coverage, lack of Internet-enabled devices, the cost of the Internet connection and services, and digital illiteracy.

BARRIERS TO INTERNET USE AMONG INDIVIDUALS

The majority of individuals who use the Internet access it though smartphone devices. Seven out of ten Internet users access the Internet using a mobile phone. Affordability of devices and lack of awareness are the main barriers to Internet use in the surveyed countries. Of those who do use the Internet in Mozambique, Tanzania, Uganda and Rwanda, 76%, 64%, 51% and 43%, respectively, cannot afford Internet-enabled devices. In Ghana and Nigeria, 43% and 40%, respectively, of Internet users do not know what the Internet is, while 22% of people in Nigeria and 14% in Mozambique and Ghana are digitally illiterate. In South Africa and Rwanda, 15% and 33%, respectively, of those who do not use the Internet stated that the cost of services is unaffordable. Evidence shows that the digital divide still persists in Africa, with access and use of the Internet higher in more-developed economies, along with social differences in Internet use. There is evidence that this persistent digital divide follows historical social inequalities, thereby further widening the gap between the poor and the rich. Digital exclusion is a primarily an issue of poverty, with those at the bottom of the pyramid (women and the poor) being the most marginalised.

FINANCIAL INCLUSION

Despite 71% of Africans in the surveyed countries not having access to formal financial services, especially those in the rural areas (81%) versus 57% in urban areas, mobile money services are only successful in Kenya (85%), Ghana (55%) and Tanzania (45%), while very low in Nigeria (4%) and South Africa (8%). The poor performance of mobile money in countries such as Nigeria is mainly due to financial regulatory constraints, which requires mobile phone service providers to partner with bank or require mobile money users to open accounts with formal banks to use mobile money services. In contrast, the poor uptake of mobile money services in South Africa is due to the majority of the population having access to formal bank accounts. Use of mobile money services is also uneven, with many mobile users

not using mobile money in some of the larger markets like Nigeria and South Africa, but with some users across all countries accessing financial platforms, such as Internet banking and e-wallets.

South Africa, where 56% of the population has a bank account, has the lowest percentage of mobile money service users. Despite their uneven uptake and use, mobile money services have had a positive impact in financial inclusion in Africa. About five out of ten (46%) people in the surveyed countries have access to financial services either through a mobile money platform or a banking account. Among the surveyed countries, 129 million people are financially included and, of these, 53 million use mobile banking platforms including mobile money and mobile banking services.

Kenya is the leading country in financial inclusion, with nine tenths (87%) of the population having access to financial services, followed by South Africa and Ghana (59% each). For the other countries surveyed, less than 50% of the population is financially included. Furthermore, African residents who reside in urban areas (57%) are more likely to be financially included than those who live in rural areas (38%). Men are also more likely to be financially active than women, resulting in a 21% gender gap in the surveyed countries.

INTERNET AND VIRTUAL WORK

Digital beneficiation is still low in Africa. Despite a number of initiatives to enhance digital opportunities in Africa, such as the creation of online jobs, e-commerce and digital financial instruments, few Africans participate actively in the digital economy. The survey shows that a small proportion of economically active individuals in Kenya, Ghana and Tanzania are online or microworkers, while these low percentages continue elsewhere, with 3% in Nigeria and Uganda and 2% percent in Senegal. Mozambique and South Africa have the largest percentage of microworkers among the economically active population, with 8% and 7% respectively, but Mozambique's figure is calculated from a low online-user percentage of only 10%. The low numbers of microworkers in Africa are attributed to low Internet penetration in the region. Only three countries, Lesotho, Senegal and South Africa, have reached Internet penetration rates of 30%. Microwork is more common in Latin American countries where Internet penetration is much higher than in African and Asian countries. While Internet penetration seems to track GNI per capita, this is not the case with microwork. Colombia has the highest proportion of microworkers (13%), which is higher than Argentina's rate (5%) despite Argentina having a considerably higher GNI and Internet penetration rate of close to 100%. Microwork penetration in Guatemala and Peru, countries with a significantly lower GNI per capita, is low, with these countries having a similar proportion of microworkers (5%) to Argentina. In Rwanda, which has the lowest Internet penetration rate of less than 10%, (although not very different from Mozambique), less than 1% are microworkers.

DIGITAL INEQUALITY

Paradoxically, as more people are connected to the Internet, with the increasing number of services and applications to enhance digital wellbeing, digital inequality is increasing not decreasing.

This is not only the case between those online and offline, but those passively consuming what they are able to and those with the resources - financial and human, to put the technology to productive use, not only for their survival but for their prosperity.

This is arguably the biggest challenge facing policy makers in an increasingly globalised economy over which they have limited control.

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LIST OF ABBREVIATIONS

ADI	Affordability Drivers Index
ADSL	Asymmetric Digital Subscriber Line
ARPU	Average Revenue per User
BTS	Base Transceiver Station
EBIDTA	Earnings before interest, depreciation, taxes and amortisation
ECA	Electronic Communications Act
ECNS	Electronic Communications Network Service
ECS	Electronic Communications Service
ECTA	Electronic Communications and Transactions Act (2002)
EIU	Economic Intelligence Unit
FTTH	Fibre-to-the-home
GDP	Gross Domestic Product
GSMA	GSM Association
HHI	Herfindahl–Hirschman Index
ICT	Information and Communication Technology
IDI	ICT Development Index (of ITU)
IoT	Internet of Things
IP	Internet Protocol
ISP	Internet Service Provider
ISPA	Internet Service Providers Association of South Africa
ITA	Invitation to Apply
ITU	International Telecommunication Union
LTE	Long-term Evolution
MDDA	Media Development and Diversity Agency
MNO	Mobile Network Operator
MOU	Minutes of Use
MTR	Mobile termination rate
MVNO	mobile virtual network operator
NDP	National Development Plan
NPC	National Planning Commission
NRI	Network Readiness Index
OECD	Organisation for Economic Co-operation and Development
OTT	Over-the-top
PoP	Point of presence
POPI	Protection of Personal Information Act (2013)
RIA	Research ICT Africa
SADC	Southern African Development Community
Stats SA	Statistics South Africa
STB	Set-top Box
ToP	top of the pyramid
USAASA	Universal Service and Access Agency of South Africa
USAF	Universal Service and Access Fund
USF	Universal Service Fund
USO	Universal Service Obligations
VANS	Value-added Network Service Providers
WACS	West Africa Cable System
WOAN	Wireless Open Access Network

1 INTRODUCTION

The Global South is undergoing rapid social and economic change as a result of the confluence of mobile and Internet technologies. Across the globe, there is mounting evidence that broadband directly contributes to job creation and stimulates economic growth. Although broadband impact studies vary on the exact contribution that increases in broadband penetration make to economic growth, there is considerable evidence to support claims that broadband uptake correlates with increases in GDP, job creation, the broadening of educational opportunities, enhanced public service delivery, rural development and more.

Empirical findings suggest that investment in telecommunications infrastructure is causally related to the nation's total factor productivity, and that contributions to aggregate and sectoral productivity growth rates, due to advancements in telecommunications, are substantial. These network externalities are compounded as there are more network connections. However, for countries to enjoy the network externalities associated with broadband infrastructure investments, a critical mass has to be reached. Although, for voice, this was understood to be roughly 40%, due to the heightened effects associated with broadband, the threshold is only 20%. However, the research on network effects has been undertaken largely in the Global North, where broadband is generally 'always-on' and, on average, where intensity of use is high. Further research is needed on the impact that intensity of use, and not just connectivity, has on network effects, especially in developing country contexts where many people are minimally connected.

There is evidence of an increasing divide, not only between those with access to such services and those without, but also between those who are connected and have the means and skills to utilise the Internet optimally and those who are and do not. In fact, as technology evolves from voice to data services and over-the-top (OTT) platforms, the Internet of Things (IoT) and Artificial Intelligence – the central policy challenge is that, unless we rapidly address these human deficits as we increase ICT access and use, digital inequality becomes amplified. Without connectivity, people, be they consumers, workers or entrepreneurs, are excluded from participating in the economic and social networks that permeate modern society.

1.1 SUSTAINABLE DEVELOPMENT GOALS (SDGS)

Information and communication technologies (ICTs) are a prerequisite, then, to human development in contemporary society, and human development is a necessary condition of equitable participation by the citizenry in contemporary society. This is highlighted in the United Nations (UN) SDGs, which include goals to 'enhance the use of enabling technologies, in particular ICT, to promote women's empowerment' and 'significantly increase access to ICT and strive to provide universal and affordable access to the Internet in LDCs by 2020'[1]. ICT targets also underpin several of the other goals, such as poverty alleviation, improved health, quality education, clean energy, climate action and industry innovation[2].

Since access to the Internet is considered pivotal to human development, the United Nations 2030 Agenda recognised the spread of ICTs and global interconnectedness as having great potential to accelerate human progress, reduce inequalities and develop knowledge-based societies. In recognising the access to and use of ICTs as critical components to achieving the sustainable development goals (SDGs), the Agenda calls upon the international community to increase

1 United Nations (2015) *Global Sustainable Development Report, 2015 Edition.* Advanced unedited version. Available at: https://sustainabledevelopment.un.org/content/documents/1758GSDR%202015%20Advance%20Unedited%20Version.pdf

2 ITU (2017) *ICT-centric economic growth, innovation and job creation*. Available at: https://www.itu.int/dms_pub/itu-d/opb/gen/D-GEN-ICT_SDGS.01-2017-PDF-E.pdf?

connectivity and access to ICTs and strive to provide universal and affordable access to the Internet in low-income countries by 2020. Despite these objectives and the targets attached to them, which aim to increase Internet access and use all around the world, the majority of individuals in developing countries have no Internet access.

Yet, by and large, we do not currently have the data in the Global South to assess where we are or what progress we are making towards the proposed targets. What we do know from the limited, accurate data that is available from the least-developed and most other African economies, is that, with only two years to go to 2020, even using inflated indicators measuring active SIM cards and not unique subscribers, we are billions of people away from achieving universal access to the Internet. For many developing countries, simply getting to the 20% penetration rate to achieve critical mass would be a significant milestone.

1.2 THE GLOBAL CHALLENGE OF MEASURING SECTOR PERFORMANCE

In most developing countries, policymakers and regulators are dependent on supply-side data, which forms the basis of the administrative data collected by most operators. This is also the basis of the data usually provided to the International Telecommunication Union (ITU), the body responsible for the harmonisation of standards and indicators for the sector. The ITU uses this data to compile the ICT Development Index. As the UN body mandated to collect global indicators and the only body with a global reach, this data set is also at the core of all the major global indices, such as the World Economic Forum (WEF) Network Readiness Index, various World Wide Web Foundation indices and the new Economist Intelligence Unit (EIU) Inclusive Internet Index (3i) undertaken with Facebook. As the data underpins all these indices, the underlying data limitations are transferred to them.

Global ICT indices have become the reference point for assessing national performance. Several indices now compete with or complement the International Telecommunication Union's (ITU) ICT Development Index (IDI). The World Economic Forum's Network Readiness Index (NRI), the Affordability Drivers Index (ADI) from the Alliance for Affordable Internet, the GSMA's Mobile Connectivity Index, and most recently, the Economist Intelligence Unit's new Inclusive Internet Index (3i), all seek to measure digital developments in respect of ICTs between countries over time. Such indices are able, with differing degrees of success, to track prices, cost drivers and how conducive the environment is to investment, in order to identify sector performance at country level. However, these indices are generally not able to establish the cause of any identified problems, other than in the broadest terms. As the indices provide assessments that are not context-specific, they are generally unable to propose specific remedies for individual countries.

An example of supply-side and demand-side mismatch can be seen in relation to mobile subscribers, where supply-side data measures the number of active SIM cards on operator networks, rather than unique users. Duplicate SIMs account for at least some of the over-count of subscribers, who are measured by operators and reported to the ITU data of countries on the basis of active SIMs[3]. On the basis of such supply-side data alone, one is also unable to provide a more granular analysis (such as a breakdown by gender, location or income) of the kind required for policy planning and effective interventions. The ITU acknowledges this and urges national regulatory authorities and national statistical offices to undertake detailed surveys. It also supports the training of officials, and in the case of

3 The issue is further complicated by the rise of the Internet of Things (IoT) and the growing prevalence of M2M SIMs. Efforts to adjust active SIM numbers to reflect unique subscribers are also problematic. The GSMA-adjusted figure of 38 million unique subscribers in SA in 2017 (68% of the population), instead of the 90 million active SIMs at the time, appears to undercount the number of subscribers.

some least developed countries, the undertaking of surveys where government shows a commitment to gathering this data[4].

1.2.1. ICT Development Index (IDI)

In line with global trends acknowledging that connectivity alone will not be sufficient for countries to overcome the digital divide, the ITU's IDI seeks to look beyond simple connectivity indicators to the level of evolution of ICT development over time and within countries relative to others. It uses a number of sub-indices to assess the development potential of ICTs and the extent to which countries can use them to enhance growth and development in the context of available capabilities and skills, in particular. The ITU's IDI, for example, ranks all 11 indicators in each of its three sub-indices equally. It then weights the three sub-indices.

The country scores and rating are generated using the following ITU indicators: fixed-line subscriptions, mobile cellular telephone subscriptions, international Internet bandwidth per Internet user (bit/sec), percentage of households with a computer and percentage of household with Internet access. The use sub-index is based on the percentage of individuals using the Internet, the fixed (wired) broadband subscriptions per 100 inhabitants and the active mobile broadband per 100 inhabitants. The calculation for the IDI skills sub-index is based on the mean years of schooling, the secondary gross enrolment ratio and the tertiary gross enrolment ratio.

1.2.2. Network Readiness Index (Global Information Technology Report)

The WEF's Network Readiness Index (NRI) is, in some ways, a more comprehensive measure as it consists of four sub-indexes. As the NRI is underpinned by the same the same ITU indicators as the IDI, some of the underlying data problems are transferred to this index. Another critique of the NRI is that 50% of the scoring comes from subjective small-sample opinion surveys, primarily from business. The first sub-index is an *environmental indicator*, which measures the political and regulatory framework and the business and innovation environment. The second sub-index assesses the country's *readiness* in terms of infrastructure and digital content development, affordability and skills. The third sub-index is *Usage* and the fourth, *Impact*.

In 2017, the best-performing African country, Mauritius (49), followed by South Africa (65) and the Seychelles (74), were among the countries that performed far better than the much larger Nigerian (119) economy. Nigeria was on par with Ethiopia, Uganda and Zimbabwe, some of the poorest countries in the world.

1.2.3. Other issues with current index comparisons

While these rankings provide some insights into the challenges facing a country, and changes in country scores may demonstrate progress or deterioration, changes in a country's rankings have less to do with the ICT sector than with GDP per capita, which is not something ICT regulators on their own can do anything about.

Esselaar, Gillwald and Stork demonstrate that, when plotting indices against GDP per capita, the result typically shows more than 80% of the variation in index scores can be explained by GDP or GNI per capita[5].

Affordability indicators, likewise, may change, not because of price fluctuations, but because of variations in GDP per capita, something over which ICT policymakers and regulators have no control. The effect of well-designed regulatory interventions may be masked by other economic events and their impact on GDP per capita, including currency exchange rate fluctuations. This means that, although policymakers may use indices

4 The ITU worked with the Expert Group on an indicator framework, based on the first meeting of the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs). The ITU has proposed eight ICT indicators covering eight targets within goals 1, 4, 5, 9, 16, 17 (see Annex 1 on page 11 in the Economic and Social Council's online report).
ECOSOC (2017) Report of the *Inter-agency and Expert Group on Sustainable Development Goal Indicators*. Available at: https://unstats.un.org/unsd/statcom/48th-session/documents/2017-2-IAEG-SDGs-E.pdf

5 Esselaar, S., Gillwald, A. and Stork, C. (2006). "South African Telecommunications Sector Performance Review 2006". Available at: https://researchictafrica.net/publications/Telecommunications_Sector_Performance_Reviews_2007/South%20Africa%20Telecommunications%20Sector%20Performance%20Review%202006.pdf

to see general overall progress or regression of their particular country in comparison to others, to identify the sector-specific determinants of the problems or successes requires looking at individual indicators, rather than composite indices.

Generally, actual prices expressed in USD do not contribute to explaining an index score for any of the five indices reviewed. Only when expressed as a share of per capita income – in other words, affordability – are prices able to explain index scores. Here, it is not the price numerator, but the denominator, GDP per capita, which explains the index score. ICT policies and regulations can only influence the numerator (price), and not the denominator (GDP per capita), of these affordability indicators. This is reflected in the section that follows.

Another problem is that very few indices have up-to-date pricing data, especially for developing countries. Prices and other data used by the ITU, which form the basis of many other indices, for example, can be two years out of date by the time they are applied to the index – a significant error factor in dynamic, prepaid mobile markets. Also, using global standard measures, (for example, 1GB of data), to assess and compare the cheapest plans across countries, seldom reflect the way data is purchased or used in the dynamic, prepaid mobile markets, where high unit cost, low-denomination bundles cost far less[6].

Table 1, adapted from Esselaar, Gillwald and Stork (2017), shows how a number of countries in the RIA After Access Survey on various indices, along with the price of 1GB of data, active SIM cards and Internet subscriber

Table 1: Performance on ICT indicators related to other indices' rankings

	RANKINGS					ICT INDICATORS		
	ADI	3I	IDI	NRI	MCI SCORE	1GB PREPAID DATA USD	ACTIVE SIM CARDS PER 100	INTERNET SUBSCRIBERS PER 100
Nigeria	13	45	143	119	45.9	2.80	83	26
Kenya	30	51	138	86	51	2.94	82	26
Ghana	26	49	116	102	52.7	2.24	128	35
Lesotho			133	115	44	5.07	107	27
Mozambique	45	80	150	123	31	2.01	40	18
Senegal	47	69	142	107	37.3	6.35	99	26
Rwanda	21	63	153	80	40	2.39	75	20
Tanzania	39	57	165	126	39.4	2.25	72	13
Uganda	32	64	152	121	36.5	2.77	55	22
South Africa	22	39	92	65	59.9	7.84	162	54
Sources	A4AI, 2017	EIU, 2017	ITU, 2017	WEF, 2016	GSMA, 2016	RAMP Index (Q4 2016)	ITU, 2016a	ITU, 2016a

Source: Adapted from Esselaar, Gillwald and Stork, 2017.
A4AI – Access to Affordable Internet
EIU – Economist Intelligence Unit
ITU – International Telecommunication Union
WEF – World Economic Forum
GSMA – GSM Association
RAMP – RIA African Mobile Pricing Index

6 Ibid.

penetration. Three aspects of this summary highlight how misleading the index scores can be:

- Nigeria and Rwanda, which do have lower data prices than South Africa rank higher than it in the A4AI index despite Rwanda only having 10% Internet penetration and Nigeria 30% while South Africa has over 50%.
- Nigeria scores better than Ghana across the indices, but Ghana is cheaper and has higher penetration rates of SIM cards and Internet subscribers.
- Uganda only scores reasonably on the A4AI index, but is outranked by Rwanda, despite having much higher Internet penetration rates and very similar prices.

In fact, Rwanda, a best-practice infrastructure case for many multilateral organisations and development banks, outranks all other African countries listed, despite several other countries having considerably lower prices and all countries survey having higher Internet penetration rates. The most basic measures of ICT access (penetration and prices) are not reflected in the ranking of countries in this example.

The After Access findings are assessed against policy objectives, primarily those of affordable access to communication. In this way, they can be assessed as policy outcomes and the strategies being deployed for their achievement assessed against the progress being made towards them. This is done in a context-specific way that not only benchmarks indicators, where possible, against other similar countries and some best performers, but identifies the reasons for the position or ranking, and thereby points to the remedy or intervention required to address it. This exercise draws on the supply-side and administrative data available, which is triangulated with the pricing and quality of service databases gathered by RIA.

The next section examines the linkages between the size of the economy (GNI) and per capita incomes against the nationally representative demand-side indicators collected as part of the After Access Survey, providing some comparison with other large and populous countries, such as Nigeria, Bangladesh and Colombia, which appear to face similar challenges – for example, limited political or leadership capacity and socio-economic inequality.

2

INDICATORS AND INDICES

The 2030 Agenda for Sustainable Development has identified the spread of ICTs and global interconnectedness as critical to the achievement of the 17 sustainable development goals (SDGs). The mobile industry, which provides cheaper ways of achieving universal connectivity, offers a robust platform to deliver essential services like e-governance, education, health, energy and financial inclusion. For unequal societies, mobile technologies provide opportunities for inclusive growth and ensure that no one is left behind. Despite the recognition of ICTs as critical to economic growth, as well as their ability to reduce poverty and ensure inclusive growth, there is little in-depth systematic collection of ICT indicators to inform policy formulation or assess outcomes. As in most developing countries, policymakers and regulators depend on supply-side data from operators, which also forms the basis of the administrative data provided to the International Telecommunication Union (ITU), the body responsible for the harmonisation of standards and indicators for the sector. The ITU uses this data to compile the ICT Development Index. As ITU is the United Nations body mandated to collect global indicators and the only body with a global reach, the IDI data set is also at the core of all the major global indices and databases, such as the World Economic Forum's Network Readiness Index (NRI) and the World Bank's *Little Data Book on Information Communication and Technology.* With this data underpinning all these indices, the underlying data limitations are transferred to them as well.

The main challenge for these global indices is that, in the prepaid mobile markets, which make up over 90% of the market in most developing countries, it is only from nationally representative demand-side surveys that disaggregated data from gender, urban–rural ratios and income groups can be derived. In 2017–18, Research ICT

Table 2: Mobile and Internet penetration in seven African countries

COUNTRIES	MOBILE PHONE PENETRATION – AFTER ACCESS 2017	MOBILE PHONE PENETRATION – ITU STATISTICS 2016	INTERNET PENETRATION – AFTER ACCESS 2017	INTERNET PENETRATION – ITU STATISTICS 2016	AVERAGE SIM CARD PER SUBSCRIBER	MAXIMUM SIM CARDS PER SUBSCRIBER
Ghana	74%	139%	26%	35%	1.4	8
Kenya	87%	81%	26%	26%	1.2	4
Lesotho	79%	107%	32%	27%	1.3	5
Mozambique	40%	66%	10%	18%	1.3	3
Nigeria	64%	82%	30%	26%	1.6	5
Rwanda	48%	70%	8%	20%	1.5	3
Senegal	78%	99%	31%	26%	1.3	4
South Africa	84%	142%	50%	54%	1.2	5
Tanzania	59%	74%	14%	13%	1.5	5
Uganda	49%	58%	14%	22%	1.5	7

*Source: RIA After Access Survey, 2017; ITU Statistics, 2016**

* ITU Statistical database (2017). "Global Developments". Available at: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

Table 3: Internet penetration: Supply-side vs demand-side data

	AFTER ACCESS SURVEY	ITU STATISTICS	DIFFERENCE (BIAS)
Ghana	26%	35%	+9%
Kenya	26%	26%	0%
Lesotho	32%	27%	–5%
Mozambique	10%	18%	+8%
Nigeria	30%	26%	–4%
Rwanda	9%	20%	+11%
Senegal	31%	26%	–5%
South Africa	53%	54%	+1%
Tanzania	15%	13%	–2%
Uganda	14%	22%	+8%

Source: RIA After Access Survey data, 2017; ITU Statistics, 2017

Africa (RIA) conducted ICT access and use surveys in 10 African countries, Ghana, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania and Uganda, as part of a 22-country Global South survey called 'After Access'.

Table 2 shows the discrepancies or the upward bias in subscription rates when policymakers depend on the supply-side information. Without nationally representative demand-side data, it is impossible in the prepaid mobile markets, which make up over 90% of the market in most developing countries, to provide an accurate measure of access to the Internet. One of the reasons supply- and demand-side data do not match is that supply-side data measure active SIM cards on operator networks, rather than unique subscribers. Duplicate SIMs, which are measured by operators as active SIMs and reported to the ITU in the administrative data of countries, account for at least some of the over-count of subscribers. Table 3 shows the discrepancies or upward bias in subscription rates when policymakers depend on supply-side information to assess penetration.

Although all sorts of interesting data analysis can be done on the basis of the supply-side data, what cannot be done is the disaggregation of data on the basis of gender, urban–rural ratios and income, which is required for policy planning and interventions to redress digital inequality. The findings of the After Access Survey undertaken in 2017 provide the decision-makers with the identification of the demand-side challenges faced by the country, and because the data is nationally representative and can be modelled, the underlying causes of poor policy outcomes can be identified as well.

3

AFRICAN COUNTRIES IN THE GLOBAL SOUTH

As noted at the outset, ICTs and, especially, mobile technologies have been identified as critical drivers of social and economic development. Smartphones, in particular, have revolutionised the telecommunications industry by becoming the principal means of Internet connectivity. These technologies have become the primary platforms for innovation in developing countries and are contributing directly and indirectly to economic growth and job creation. As Figure 1 shows, mobile phone penetration and Internet use is broadly aligned with Gross National Income (GNI) per capita.

The nationally representative 2017–2018 After Access Survey of 22 countries in the Global South After Access Survey undertaken by DIRSI in Latin America and LIRNEasia in Southeast Asia goes some way to filling some of these demand-side gaps. The African component, undertaken by Research ICT Africa (RIA), surveys 10 African countries – Ghana, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania and Uganda. It shows that about three in 10 (28%) of the population, 15 years and above, residing in these countries use the Internet. Mobile phone penetration and Internet use is broadly aligned with Gross National Income (GNI) per capita, as Figure 1 shows.

As Figure 1 shows, mobile phone penetration is broadly aligned with GNI per capita, though with some strong outliers in each region. Argentina not only has the highest GNI per capita, but its population is almost entirely urbanised and, as a result, has the highest mobile phone penetration and Internet use, confirming this general pattern. Colombia has the second highest GNI per capita, as well as Internet penetration (along with Peru). South Africa is the only African country in same bracket as the Latin American countries in terms of GNI per capita; it has much higher mobile phone penetration than Colombia (similar to Peru),

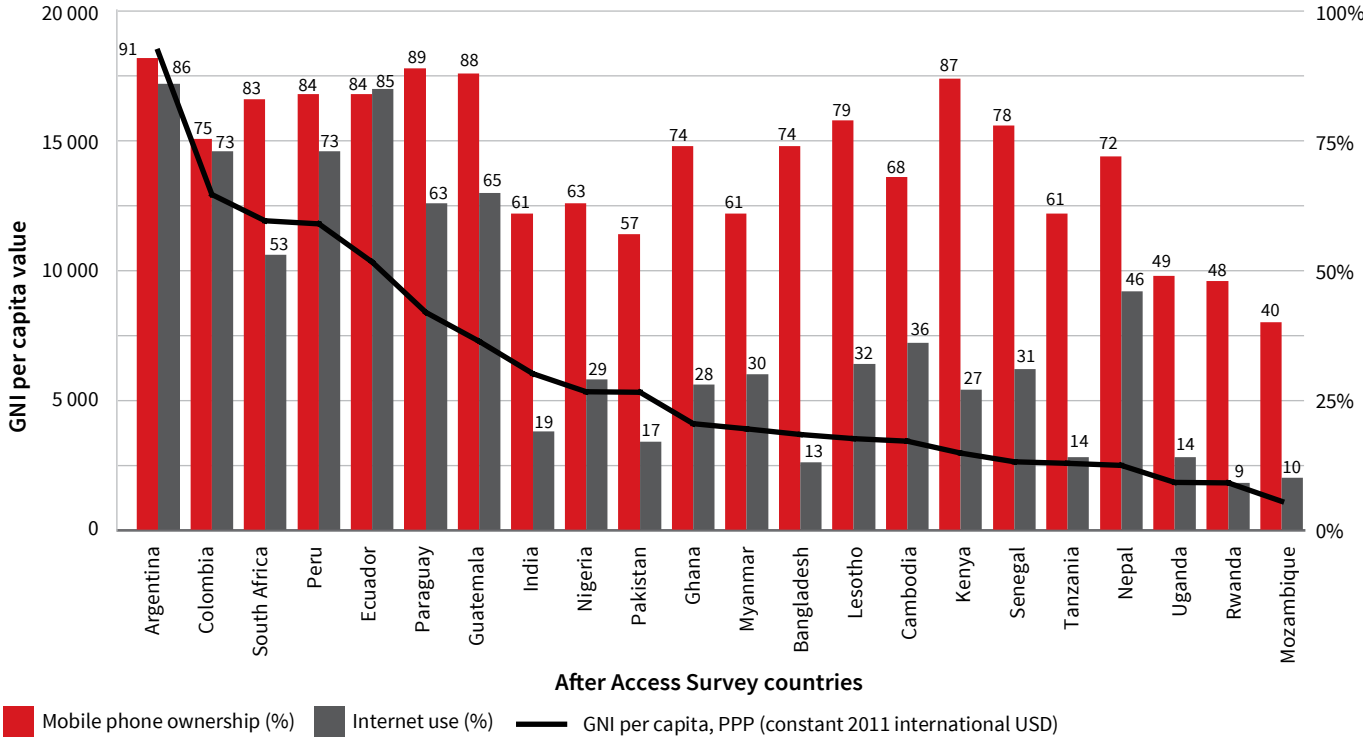

Figure 1: Mobile phone and Internet penetration overlaid on GNI per capita
Source: RIA After Access survey data, 2017, World Bank, 2017

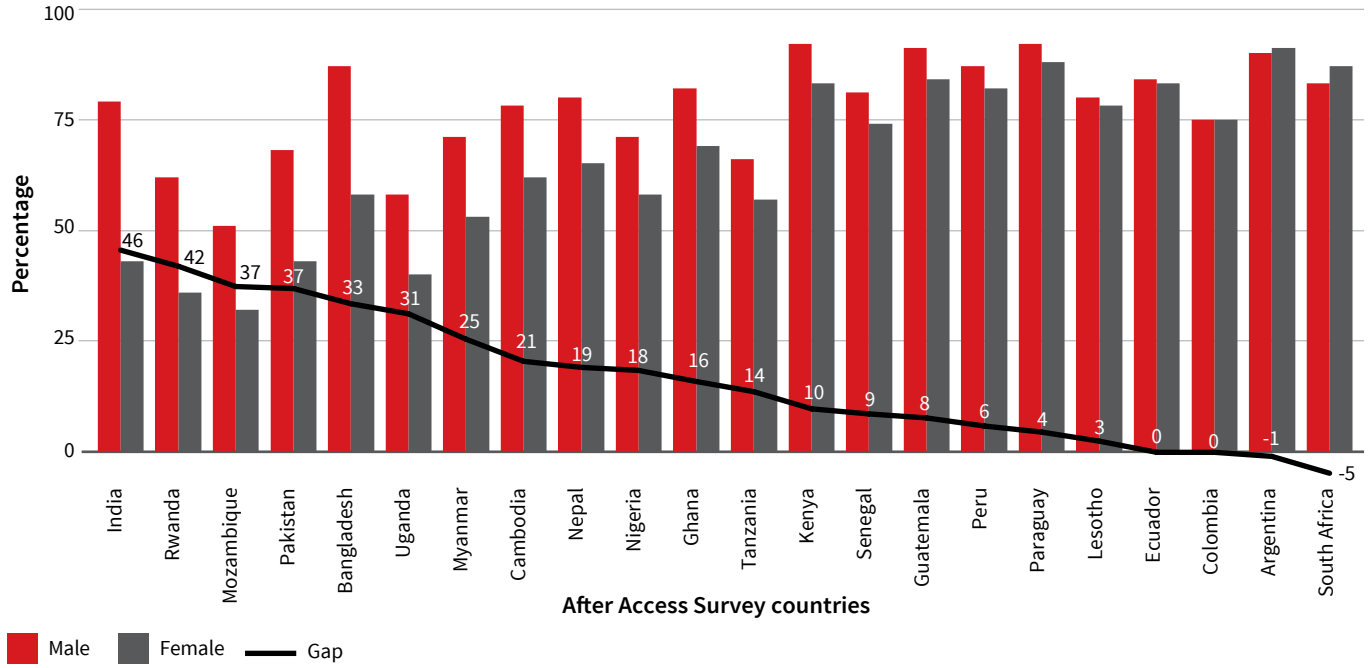

Figure 2: Gender disparity in mobile phone ownership in Africa and the Global South
Source: RIA After Access Survey data, 2017
Note: The gender gap is the gap between male and female mobile phone owners (or Internet users) as percentages of the male and female population, respectively.

but is 20 percentage points lower in terms of Internet penetration. The African countries have higher mobile phone penetration generally than the Asian countries surveyed. Kenya and Ghana show much higher mobile phone penetration than other African countries (except South Africa). However, Internet penetration stands at only 28% and 27% respectively – much lower than for Cambodia, with a similar GNI per capita, at 36%. Nigeria has significantly more Internet access than the populous Asian countries with similar GNI per capita – India, Pakistan, and Bangladesh – which have internet coverage similar to that of the lowest-income African countries surveyed. Internet use in Senegal and Lesotho is higher, with three in ten people using the Internet in these countries, than in comparatively richer countries including Ghana, Nigeria and Kenya in Africa, and Bangladesh and Pakistan. Rwanda and Mozambique have the lowest Internet penetration, less than Bangladesh, Pakistan and India.

Although South Africa's Internet penetration levels compare well with other African and Asian developing countries, it does not perform as well when compared with countries in Latin America with similar incomes. The reason for this is because national aggregations of income such as GNI per capita mask inequalities that, in South Africa, are extreme. This means that large numbers of people live below the national income averages. With less than a third of the population online, the potential of the Internet to drive social and economic integration in a developing economy is not optimally tapped.

While an increased number of Internet connections suggests there is a bridging of the digital divide, paradoxically as more people are connected, digital inequality increases. This is not only the case between those online and those offline, but also between those who have the skills and financial resources to use the Internet optimally and those who are barely online. Without policy interventions to reduce these disparities, offline inequalities will simply be mirrored online – or potentially amplified. Therefore, as the information society matures, not everyone is equally well-served by ICTs. Many individuals and households do not use the Internet, or do not have the devices they need to access the Internet. (Gillwald, Mothobi & Rademan 2018) The After Access Survey finds that South Africa has the highest mobile phone (84%) and Internet penetration rates (53%) among surveyed countries.

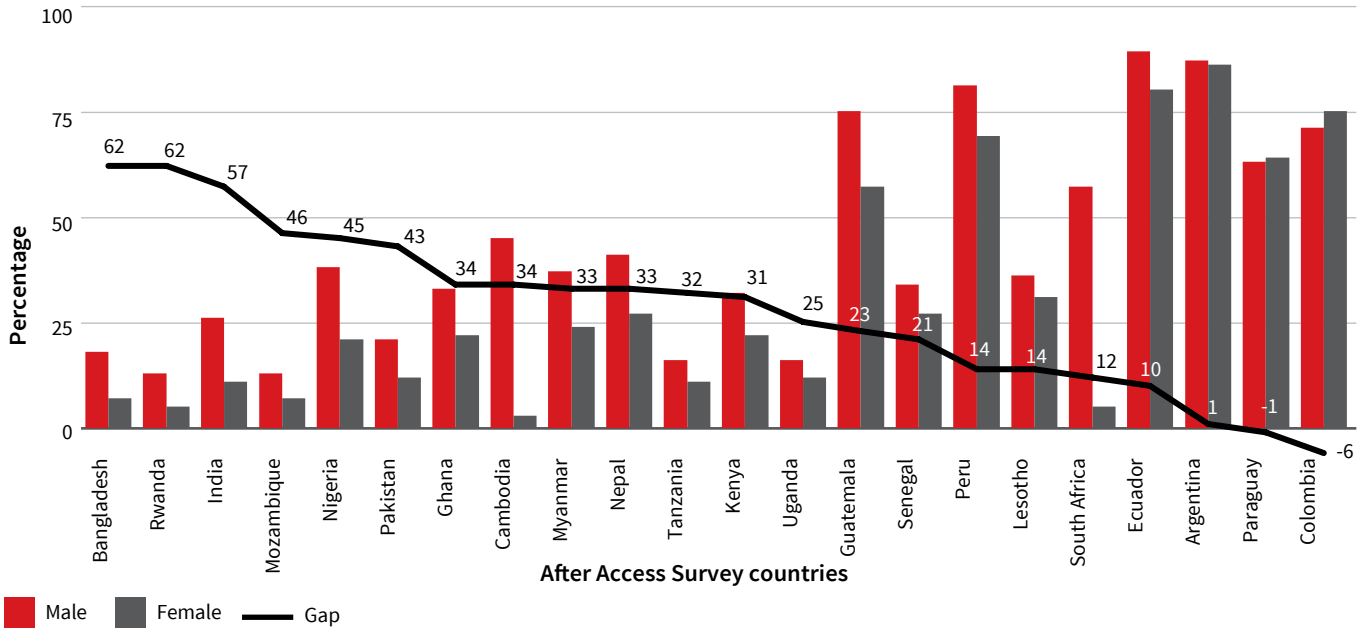

Figure 3: Gender disparity in Internet use in Africa and the Global South
Source: RIA After Access Survey data, 2017
Notes: The Internet gender gap for African countries is measured based on 15 years+ while Global South countries only consider ages 15–65.

Of all the countries surveyed, India, Rwanda, Mozambique and Pakistan show the highest gaps between men and women in mobile phone ownership (see Figure 2). Rwanda and Bangladesh show the highest gender gap in Internet use, followed by India, Mozambique, and Nigeria, which has by far the largest population in Africa (comparable to that of Bangladesh) (see Figure 3). These populous nations therefore account for a large number of unconnected women in the Global South, with gender gaps greater than in some of the least-developed countries in Africa. The highest gender variance in African mobile ownership is in Rwanda and Mozambique. The Internet gender gaps in Rwanda and Mozambique are double those of other developing African countries. Besides South Africa, of the African and Asian countries surveyed, the only country within range of the Latin American countries is Kenya, with a relatively low mobile phone gender gap of 10% and mobile phone penetration rate in line with the lower- and middle-income countries of Latin America. Ghana – with a similar GNI per capita in 2016 to Kenya – follows, with a gender gap of 16%. Nigeria, with a GNI per capita twice that of Kenya or Ghana, has a mobile gender gap of 18% and a penetration rate similar to Cambodia. Cambodia has the lowest GNI per capita (and penetration rate) of the countries surveyed in Asia, roughly in line with Ghana and Kenya. Nevertheless, Cambodia's gender gap for mobile phone ownership is just 20%, by far the lowest of the Asian countries surveyed – 15 percentage points below Pakistan and Bangladesh, and 25 percentage points below India. With the highest GNI per capita of nearly USD 2 000 in 2016, India has a staggering gender gap: 46% in mobile phone ownership, and 57% in Internet access.

Overall, the five Latin American countries surveyed, together with South Africa, are the richest among the countries surveyed and they show the lowest gender gap (see Figure 2). In contrast, the poorer African countries show high gender disparity in mobile and particularly Internet use. However, these disparities are lower than in some higher-income Asian countries, where we see some of the greatest disparities in income. The GNI per capita in India and Bangladesh is more in line with that of Ghana and Kenya, but both countries, together with Tanzania, which is also among the poorest countries surveyed, have much lower gender disparities than the Asian countries surveyed. Figure 2 shows an overall negative correlation between the level of mobile phone penetration and the gender gap in mobile ownership, with some exceptions. Although Colombia has lower mobile phone ownership than other Latin American countries, it has gender parity in mobile

ownership. South Africa, with GNI similar to the Latin American countries — despite having one of the highest income disparities in the world — has more women than men who own mobile phones.

However, there are interesting anomalies. Although Argentina's GNI per capita, at over USD 10 000, is more than double the other top performers that cluster around the USD 5 000 mark, Argentina performs only marginally better than Colombia in terms of mobile phone ownership gender parity. Although overall mobile penetration is lower in Colombia than its Latin American counterparts, it has gender parity therein. South Africa, which has a similar average GNI per capita to the Latin American countries, despite having one of the highest income disparities in the world, has more women who own mobile phones than men (After Access Survey, 2017).

Besides South Africa, of the African and Asian countries surveyed, the only country within range of the Latin American countries' Internet gender gap is Kenya, with a relatively low 10%. This correlation between higher Internet penetration and a lower gender gap is also reflected in the Kenyan case, which also has one of the highest mobile phone penetration rates. With a similar GNI per capita in 2016 to that of Kenya, Ghana follows with an Internet gender gap of 16%. The Internet gender gap of Cambodia is a good 15% below Pakistan and Bangladesh, and 25% below India. With the highest GNI per capita of nearly USD 2 000 in 2016, India has a staggering 46% mobile phone ownership and 57% Internet gender gap. Digital inequality is even higher among urban and rural area dwellers. Even in South Africa, with over 95% broadband coverage, less than half of South Africa's rural population is connected to the Internet. While the gender gap is relatively low at only 12%, the urban–rural gap is 36%. While gender disparity in Tanzania is relatively low for a least-developed country at 32%, the urban–rural disparity is 84%. Mozambique has the highest urban–rural gap at 87%, while Nepal, which has similarly low GNI per capita, only has a 32% location gap and Cambodia 40%. Rwanda and Lesotho have high urban–rural divides, despite extensive strong supply–side interventions that have resulted in extensive mobile broadband coverage across the countries (see Figure 4). This indicates that other demand-side factors contribute to the digital marginalisation of rural people. Those at the intersections of various forms of exclusion – women, rural dwellers, the poor and, in the case of South Africa, race — are the worst off.

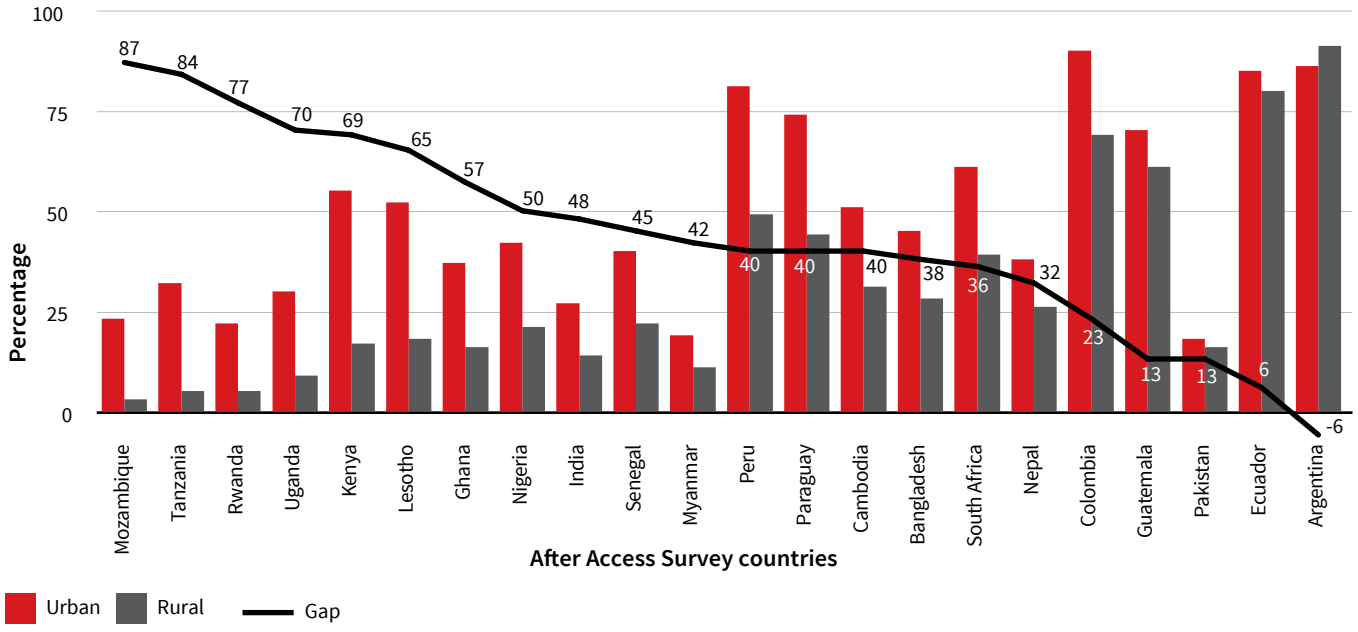

Figure 4: Urban–rural disparity in Internet use in the Global South countries surveyed
Source: RIA After Access Survey data, 2017

4

THE USE OF ICTS IN AFRICAN COUNTRIES

The International Telecommunication Union (ITU) claims about eight in ten of the population living in developed countries use the Internet, while four out of ten people residing in developing countries are Internet users, and less than two in ten people use the Internet in least-developed countries (LDCs)[7]. Regionally, Internet use is lowest in Africa. Africa remains the only region with most countries below the 20% penetration level required to benefit from network effects. It also has considerably lower intensity of use than the developed countries, where correlations between Internet penetration and growth were identified[8] suggesting that the network effects may not be as significant.[9]

Despite significant investment in infrastructure and coverage, Internet use in Africa remains low, when compared to other regions. The Research ICT Africa (RIA) 2017 After Access Survey, a nationally representative survey on the access and use of ICTs with a special focus on Internet use conducted in 10 African countries – Ghana, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania and Uganda – shows that about three in ten (28%) of the population 15 years and older residing in these countries use the Internet. This is part of a wider After Access Survey undertaken by DIRSI in Latin America and LIRNEasia in Southeast Asia. While the survey demonstrates the same trends as the ITU data, the After Access data is significantly different in several respects. Focusing on the African data specifically, the difference between the ITU data and the RIA data can be attributed to number of factors. Most obviously, the ITU data is based on all African countries, while the RIA data only covers 10 African countries. The other major difference is that the ITU's mobile and, particularly, Internet data is collected from multiple sources, but is mostly supply-side administrative data provided by operators to regulators, which is often passed on to the ITU unedited.

In prepaid mobile markets, supply-side data cannot identify unique subscribers, even where there is SIM registration as the registered person is not necessarily the user and the user may have multiple SIMs. Such data cannot be used to disaggregate information on issues relating to income levels, gender and location. Nevertheless, such supply-side data provides the basis of all the major global indices and databases, such as the World Economic Forum's Network Readiness Index (NRI) and the World Bank's *Little Data Book on Information and Communication and Technology* and the Facebook 3i Index. The After Access Survey undertaken by RIA in Africa as part of a wider study of 22 Global South countries in 2017 and 2018 provides a basis for analysing the digital gap and the causes of digital inequalities across the countries surveyed.

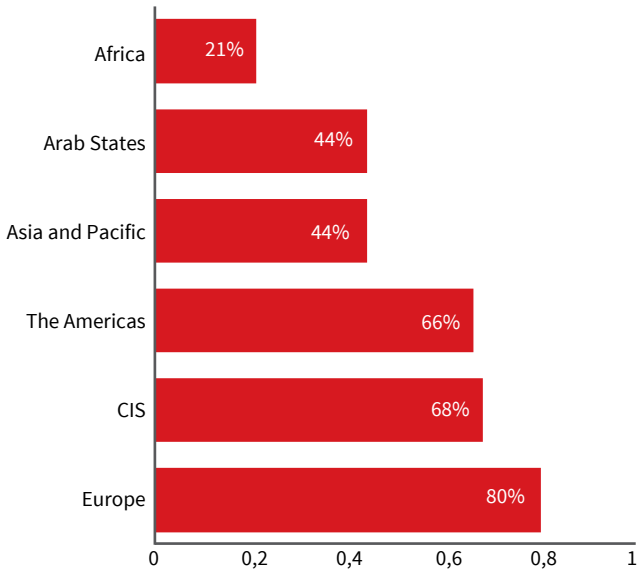

Figure 5: Individual use of the Internet across regions
Source: ITU Statistics, 2018

7 See: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

8 Roller L & Waverman L (2001) Telecommunications infrastructure and economic growth: A simultaneous approach. American Economic Review 91(4): 909–23. Available at: https://www.aeaweb.org/articles/pdf/doi/10.1257/aer.91.4.909

9 Studies have shown that a 10% increase in the use of telecommunication services leads to a 2.8% increase in GDP, but only if a minimum threshold of 24% has been reached. See: Torero M, Chowdhry S & Bedi AS (2002) Telecommunications infrastructure and economic growth: A cross-country Analysis. Available at: https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=lasm2003&paper_id=159

5

HOUSEHOLD ACCESS AND USE

While mobile phones have increased access to broadband services as it did with voice, following an initially rapid take-up among first adopters in the RIA 2012 survey, Internet is growing relatively slowly in most jurisdictions other than South Africa, with Kenya's Internet use only increasing by 2% from 26% in 2012 to 28% in 2017. The smart devices that revolutionised the sector and provided cheaper, portable and easier access to the Internet than computers, remain simply unaffordable for most Africans. With the cost of fibre down dramatically, there is increased FTTH take-up, but fixed copper services continue to decline. As a result, household Internet penetration as opposed to individual ownership of mobile phones, at aggregate level, remains very low (5%) (see Figure 5).

Other than the low landline Internet connectivity (2%) among African households, the high cost of devices and services hampers significant Internet take-up. Among the households that do not have Internet connections, 28% stated that the cost of Internet-enabled devices such as smartphones, desktop computers and laptops are unaffordable. Other than affordability, a significant proportion of households stated they do not need the Internet, while 20% do not know how to use the Internet. This is despite the Internet being recognised as providing economic benefits such as platforms for job searches, educational applications and sites for children and adults, and many more benefits such as e-commerce and other personalised functions. Another factor that is a significant barrier to Internet use is affordability of services, with 14% of the population in the surveyed African countries stating that Internet services are too expensive (see Figure 6).

South Africa has the highest household Internet use, far higher than the surveyed country average of 5%, at 11%, followed by Kenya at 10% and Ghana at 6%. Mozambique, Tanzania and Uganda have the lowest household Internet use. There is evidence of a persistent gap due to income differentials, with relatively higher-income countries such as South Africa, Kenya and Ghana having relatively high ICT use compared to low-income countries. Large, populous countries, such as Nigeria, seem to face additional challenges. Nigeria's household Internet connection is below 4% – lower than that of Lesotho (see Table 4) despite being far wealthier and having the highest level of education within households.

The barriers to household online connectivity include lack of coverage, absence of Internet-enabled devices, and cost of the Internet in terms of connections, services and digital literacy. Despite Rwanda being one of the

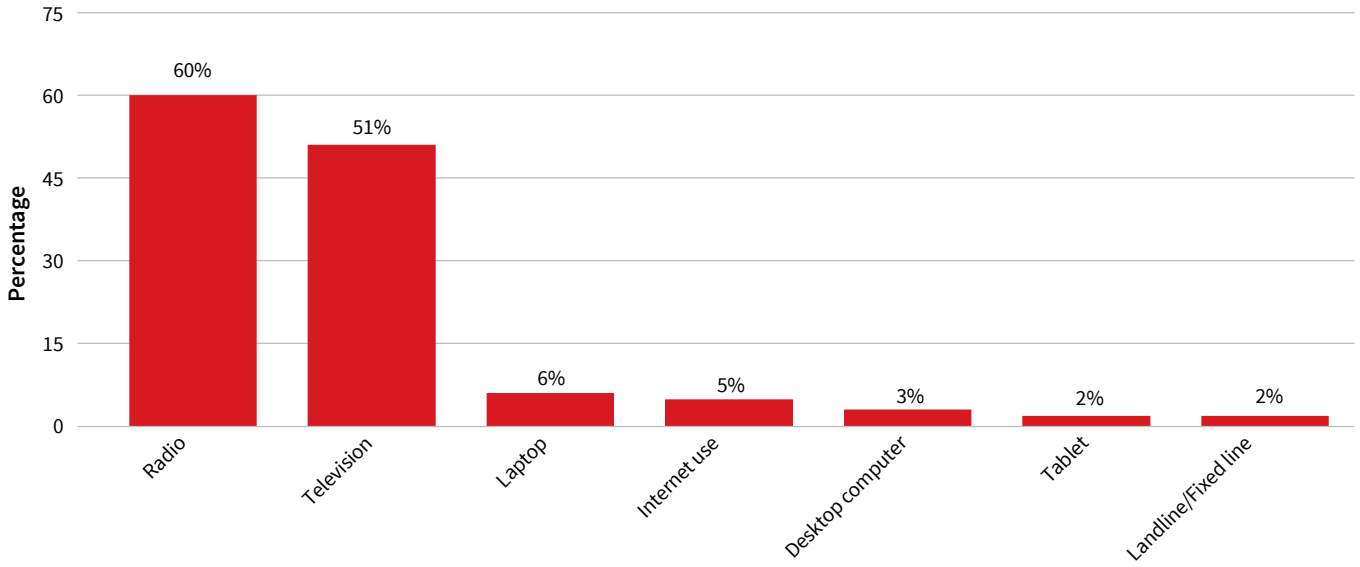

Figure 6: Ownership and use of ICT among surveyed countries
Source: RIA After Access survey data, 2017

countries with most of the population (95%) covered by the 4G, LTE services, only 3% of household have a working Internet connection, while 11% of those who do not have Internet connections stated that they do not have Internet coverage in their area. In Nigeria, now recognised as Africa's biggest economy and also the most populous, household Internet penetration remains significantly lower than that of South Africa, Kenya and Ghana. Moreover, household Internet use in Nigeria remains lower than that of smaller economies Lesotho and Senegal, but higher than in Mozambique, Tanzania and Uganda. Affordability of devices and services is a major barrier to Internet use and access by household in most African countries. About six in ten households in Mozambique, four in ten in Uganda and three in ten in Rwanda stated that they cannot afford the necessary

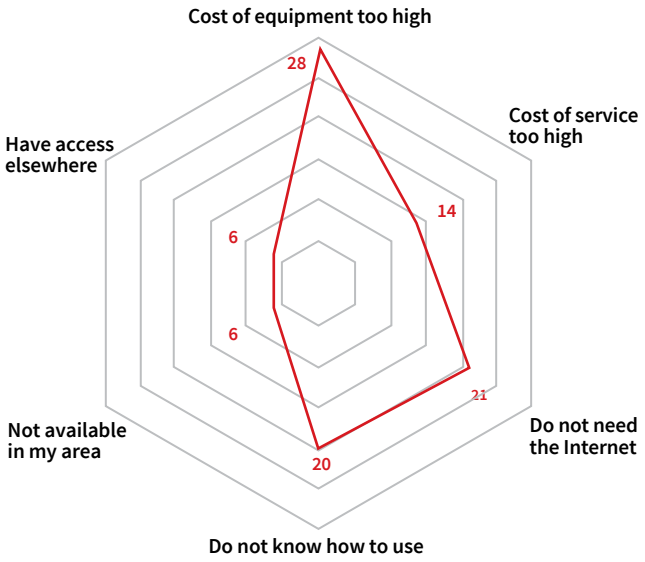

Figure 7: Barriers to Internet use within households
Source: RIA After Access survey data, 2017

Table 4: Aggregate household device ownership statistics across nine African countries

TELE-COMMUNICATION DEVICES	HOUSEHOLD INTERNET CONNECTIONS	TERTIARY EDUCATION (HIGHEST LEVEL OF EDUCATION)
Ghana	6%	21%
Kenya	10%	20%
Lesotho	4%	-
Mozambique	1%	4%
Nigeria	3%	31%
Rwanda	3%	7%
Senegal	5%	-
South Africa	11%	27%
Tanzania	1%	-
Uganda	2%	14%

devices required to access the Internet. In South Africa, more than a quarter (27%) of those who do not use the Internet stated the cost of data is a main barrier to household Internet use. Significant numbers of households in Lesotho (35%), Rwanda (25%) and Nigeria (23%) are digitally illiterate, while a quarter of Ghana (25%), Kenya (27%) and Nigeria's (24%) household heads gave not needing the Internet as their reason for not having it. Yet, with dedicated household connectivity only a fraction of overall Internet access, mobile broadband connectivity remains the primary means of Internet connectivity.

Table 5: Main reasons why the household does not have Internet

COUNTRIES	COST OF EQUIPMENT TOO HIGH	COST OF SERVICE TOO HIGH	DO NOT NEED THE INTERNET	HAVE ACCESS TO THE INTERNET ELSEWHERE	NOT AVAILABLE IN MY AREA	DO NOT KNOW HOW TO USE IT	PRIVACY OR SECURITY CONCERNS
Kenya	22%	17%	27%	4%	10%	18%	1%
Mozambique	61%	14%	3%	2%	4%	6%	
Ghana	23%	16%	25%	5%	6%	15%	1%
Nigeria	24%	10%	24%	7%	5%	23%	1%
Rwanda	34%	9%	16%	1%	11%	25%	
South Africa	24%	27%	19%	6%	4%	13%	1%
Lesotho	21%	6%	15%	17%	7%	35%	
Uganda	38%	6%	19%	3%	4%	29%	
Senegal	42%	13%	15%	7%	7%	5%	

6 MOBILE PHONE AND INTERNET USE IN AFRICA

The advancement in the telecommunications industry in Africa, driven by the reduction in the price of equipment and devices, has accelerated the adoption of mobile phones, with about seven out of ten (66%) people residing in the surveyed countries having a mobile phone. The 2017–2018 aggregate mobile phone ownership in the surveyed countries is higher than the sub-Saharan Africa mobile phone penetration, which is estimated by GSMA Intelligence to be 44%[10]. The results show that Africa has reached a critical mass in the adoption of the mobile phone, suggesting that African countries are already enjoying the network benefits of mobile phone adoption. The mobile phone is estimated to have contributed about 7% to the GDP of sub-Saharan Africa countries[11].

Mobile phones have now become the commonplace, providing users with portable and easy-to-access services, such as voice, text and USD-based mobile financial services. Yet, with Internet penetration still low, there is inequality not only between those connected and not connected, but also between those with the educational and financial means to use the Internet more productively to enhance their well-being. Among the 10 surveyed countries, less than a third (28%) of the population uses the Internet.

Surveys conducted by Research ICT Africa in 2007 and 2012 show that mobile phone penetration has been increasing over time. In 2007, about five in ten (45%) owned a mobile phone, but this increased in 2017 to about seven in ten (66%) individuals owning a mobile phone in the surveyed countries, which represents a 21% increase in 10 years and a mobile phone growth rate of 2.1% per year. A higher growth of mobile phone adoption was observed between 2012 and 2017, with mobile phone penetration increasing by 12% from 54% to about seven in ten (66%).

The data shows that, over time, both urban–rural and gender gaps have been increasing with a persistent and significant urban–rural gap, rather than gender gap, in Africa. The urban–rural gap in Africa increased from 34% in 2007 to 61% in 2017 and stood at 40% in 2012. The significant urban–rural divide is mainly due to lack of coverage in the rural areas, as mobile operators deem rural areas unprofitable. The survey shows that rural areas remain largely underserved in Rwanda and Kenya, where the urban–rural divide remains the largest over time. In 2008, Rwanda had the largest mobile phone urban–rural gap (77%) followed by Mozambique (69%). The survey findings indicate that over time, however, the urban–rural gap is shrinking. The Rwandan urban–rural gap declined to 61% in 2012 and Mozambique's fell to 55%. Among the surveyed countries, Nigeria had the lowest urban–rural gap in 2007 at 7%, but this ballooned to 15% in 2012 (see Figure 7).

GENDER GAP

The survey finding shows that, at low levels of mobile phone penetration, men are more likely to own mobile phones than women, a result that can be explained by inequalities in income and education. Modelling of the survey data over the years confirms that ICTs are more likely to be adopted by those who are educated and have higher incomes. Countries that have passed early stage of adoption – Kenya, Nigeria and South Africa – are found to have a lower gender gap than countries with low mobile phone penetration rates. In 2012, Ghana had the lowest gender gap at 5%, followed by Nigeria (13%) and Kenya (15%). Interestingly, the 2008 survey shows that, in Mozambique, females were more likely to own a mobile phone than males, resulting in a gender gap of 50% in favour of women. In 2012, the gender gap was reduced to 2% with more men owning

10 https://www.gsma.com/r/mobileeconomy/sub-saharan-africa/

11 GSMA Intelligence (2018) *The Mobile Economy Sub-Saharan Africa*. GSMA Association. Available at: https://www.gsmaintelligence.com/research/?file=809c442550e5487f3b1d025fdc70e23b&download

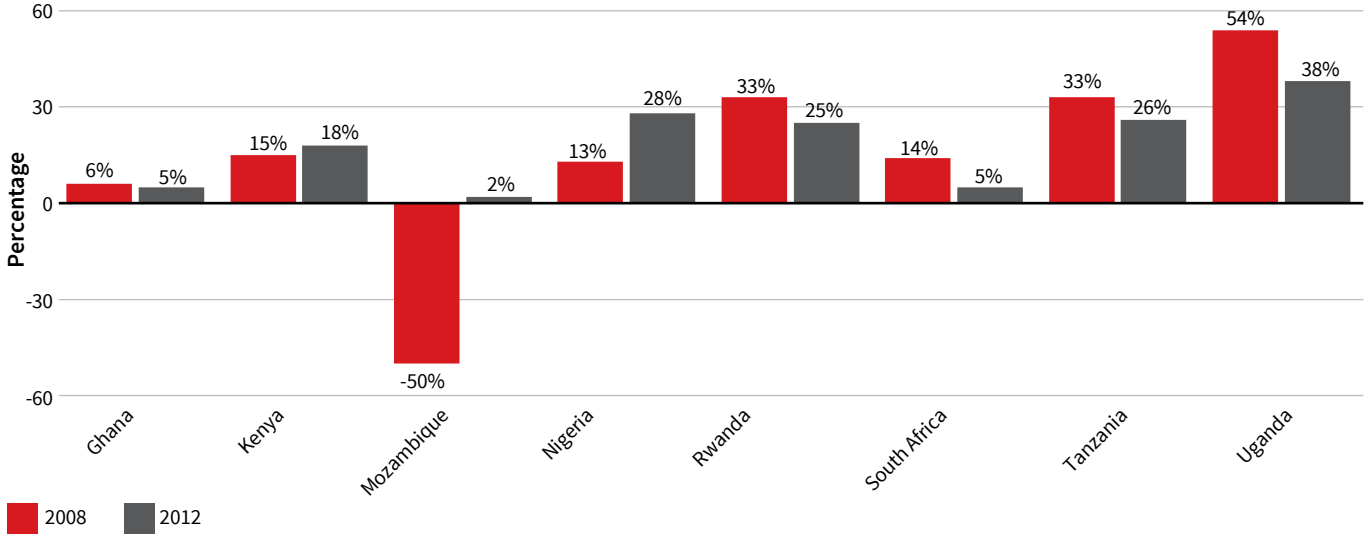

Figure 8: Mobile phone gender gap in Africa
Source: RIA After Access Survey data, 2007, 2012

phones with the growing number of smart phones (see Figure 7). According to the 2018 After Access survey, Lesotho (3%) had the lowest gender gap among all the surveyed countries, followed by South Africa, which reduced the gender gap between 2008 and 2012 to 5% in favour of men. Mobile phone ownership changed in 2017 to marginally favour women. The gender gap in Ghana has more than tripled between 2008 and 2017, reaching 16% in 2017. In Rwanda, the mobile phone gender gap increased from 25% in 2008 to 42% in 2017, while in Kenya, the mobile gender gap declined from 18% in 2017 to 10% (see Figure 2 and Figure 7).

6.1 INTERNET ACCESS AND USE

Although the advancement of technology has led to the rapid adoption of the mobile phone in Africa, with an increasing proliferation of smartphones, Internet use in Africa has remained below average in comparison to other continents. Internet penetration in most African countries is below the proportion necessary for meaningful benefit from network effects and significant economic growth. Among the surveyed countries, South Africa is the only country with barely more than 50% of its population using the Internet. However, due to significant disparities in the country,

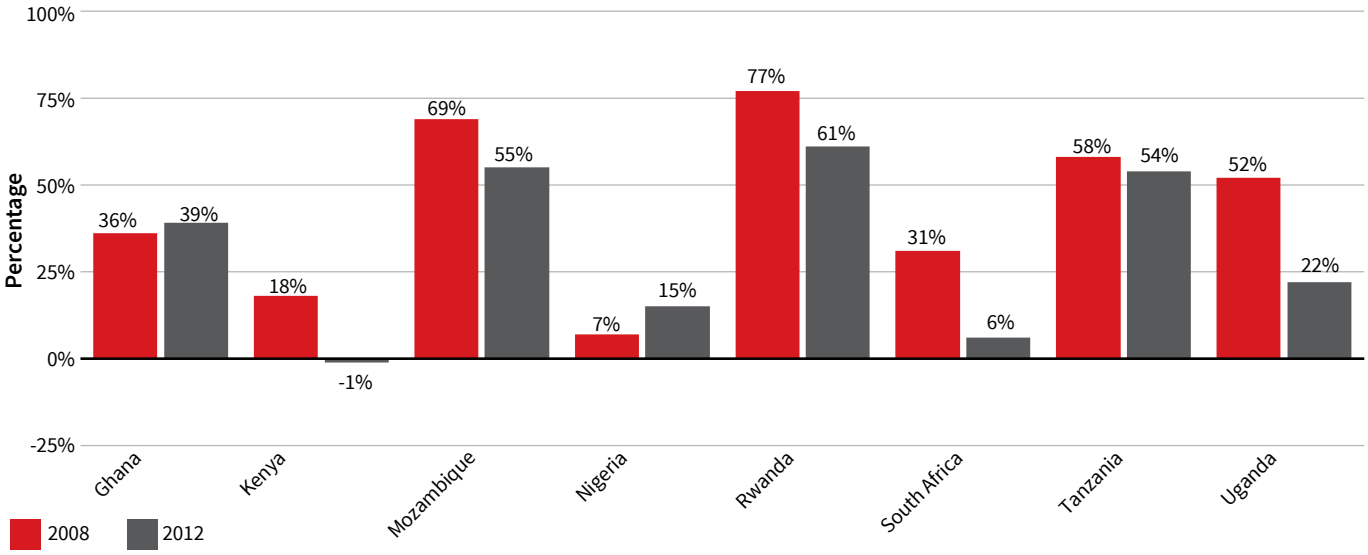

Figure 9: Mobile phone urban-rural gap in Africa
Source: RIA After Access Survey data, 2008, 2012

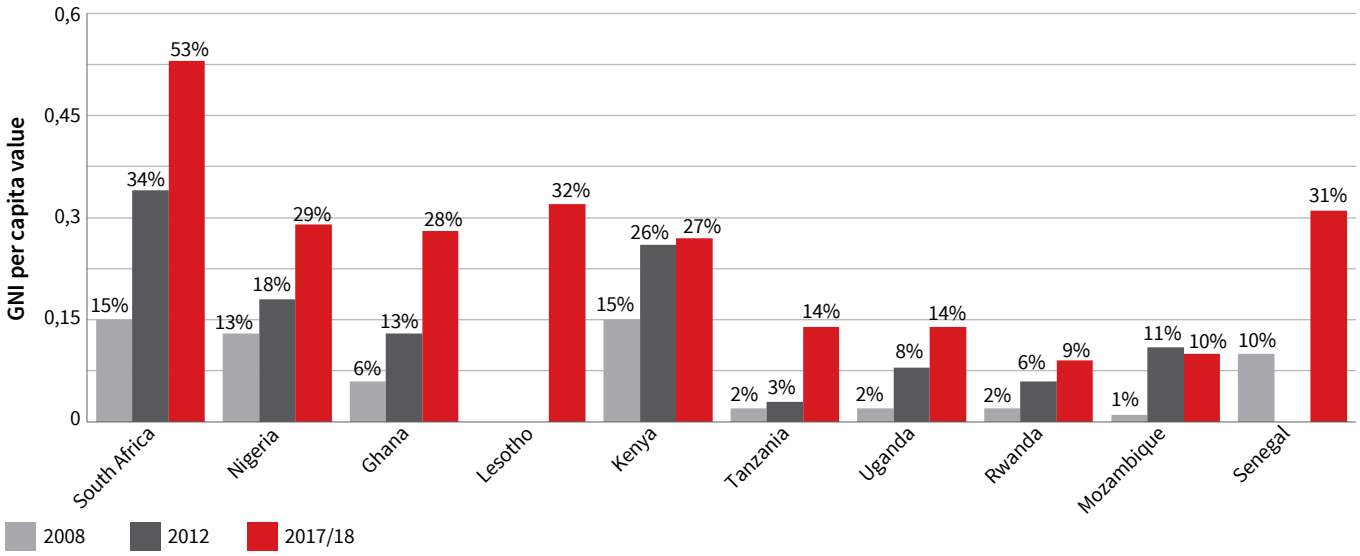

Figure 10: Internet penetration in African countries
Source: RIA After Access Survey data, 2017

while all individuals in high-income brackets use the Internet, the majority of the population, which falls into the low-income bracket, does not use the Internet. Interestingly, the survey shows that Internet use in Senegal and Lesotho, at 31% and 32% respectively, is higher than in some of the large African markets – Ghana, Kenya and Nigeria.

Despite the strong supply-side interventions and sizeable broadband investments in Rwanda[12], it has the lowest Internet use (9%) among the surveyed countries, followed by Mozambique (10%) and lastly Uganda and Tanzania (14% each). Internet use only increased by 3% from 6% in 2012 to 9% in 2017/18, and only increased by 4% between 2007 and 2012. While the country claims to have 95% coverage of 4G/LTE according to the survey results, there is evidence that Internet use is only concentrated in the urban area, Kigali, with a very small portion of the population residing in rural areas using the Internet. Similar to mobile phone ownership, Rwanda has the largest urban–rural gap, 100% in 2007, 80% in 2012 and 77% in 2017.

Mozambique is significantly underdeveloped, especially in rural areas. This is evidenced by the use and adoption of telecommunication services. The country's Internet use is 10%, a percent higher than Rwanda in 2017. With rural inhabitants largely subsistence farmers, the urban–rural divide in Mozambique is significant and this is reflected in the access to infrastructure, with the majority of rural households (66%) reporting that they do not have access to electricity, while only a third (32%) of urban households reported the same. The survey shows that very few households in rural areas have access to telecommunication services.

Despite the rural access strategy to require the third entrant, Movitel, to cover the under-serviced Northern provinces, the penetration of ICT services and devices remains very low nationally, with a significant location gap in access of telecommunications in Mozambique. In 2007, the location gap was 100%. The urban–rural gap was reduced to 88% in 2012. Just over a quarter (26%) of the urban population used the Internet versus

12 In 2014, the president of Rwanda declared the Internet to be a public utility in the same way as water. In 2011, it was also reported that the national fibre-optic backbone network, which connects to the undersea network, landed in all 30 districts of the country and nine border posts. Furthermore, the country negotiated with three fibre-optic submarine cables operators SEACOM, TEAMS and the EASSy to finance the extension of fibre-optic cables to every part of the country. In 2013, the country signed a collaboration agreement with a South Korean telecommunications operator to deploy a high-speed 4G/LTE broadband network across the country. Under the deal, the Korean Telecom operator invested USD 140 million in infrastructure, while the government provided fibre-optic network assets, spectrum and a wholesale licence. As of 2018, four years after the initial signing of the project, 95% of the country is covered with 4G/LTE broadband.

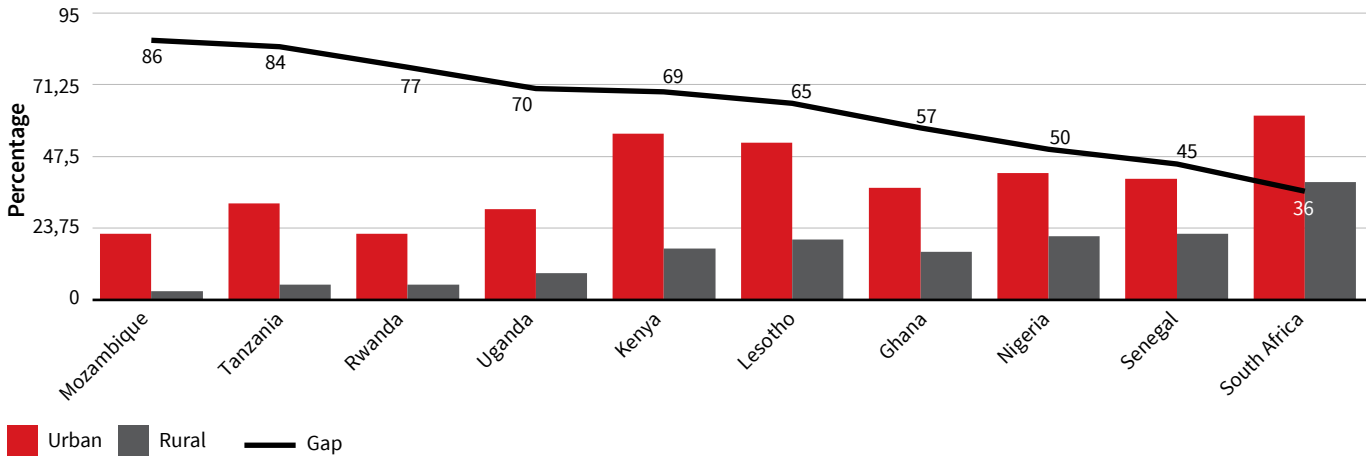

Figure 11: Location disparity in the use of Internet in African countries
Source: RIA After Access Survey data, 2017

3% in rural areas, while Internet use stood at 11%. At the early adoption stage of Internet, the disparity in the use of Internet was 33%, but more than doubled in 2012 to 77% and increased to 84% in 2017. The survey findings indicate that the urban–rural digital disparity is closely related to the urban–rural development gap. Mozambique and Rwanda, countries with the lowest Internet penetration, have the highest urban–rural gap – 50% and 61% respectively. Only two in ten rural households in Rwanda are connected to the grid, while six in ten households in the urban areas are connected to electricity. In Mozambique, there is also evidence that developments are concentrated in the urban areas, with seven in ten households connected to electricity versus three in ten in rural areas.

While some results, such as those for South Africa, show that an increase in the proportion of Internet users leads to reduction in location gap, the conclusion does not always hold. The survey shows that use of the Internet depends on disparities in the development of infrastructure across urban and rural areas. In Mozambique, where infrastructure in rural areas is underdeveloped, the divide increases with the increase in Internet use. Yet, in countries that are spatially equally developed, an increase in Internet use will lead to reduction in the location and gender gaps. The Internet gender gap is low in South Africa (12%), Lesotho (16%) and Senegal (21%), which are best-performing countries in terms of Internet use among the surveyed countries (see Figure 11).

6.2 EDUCATION AND ICT TAKE-UP

Furthermore, the ICT gap can be strongly linked to other forms of social and economic exclusion, such as low income, unemployment, poor education and isolation. The survey findings show that the level of

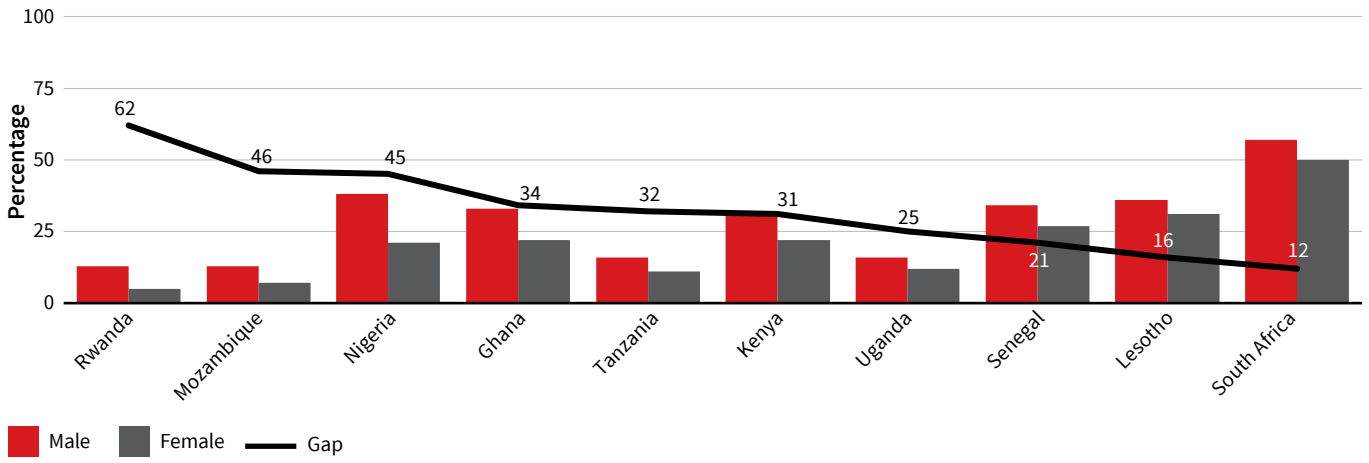

Figure 12: Gender disparity in Internet use in African countries
Source: RIA After Access Survey data, 2017

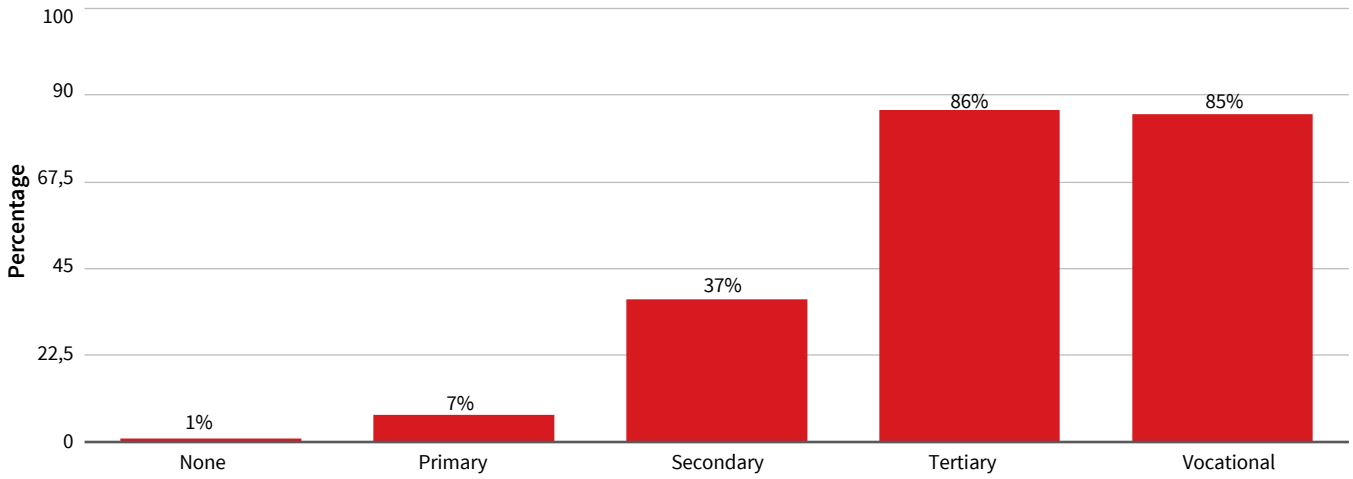

Figure 13: Internet use by level of education
Source: RIA After Access Survey data, 2017

Internet use increases with the level of education. It is interesting to note that widespread use only happens at tertiary and vocational level, whereas most indices trying to assess skills or e-literacy use school throughput as their indicator. Perhaps surprising too is the significant gap between secondary and vocational use (see Figure 12).

The After Access Survey findings indicate that Internet penetration is highly aligned with smartphone penetration, while smartphone penetration is highly aligned with GNI per capita. South Africa, which has the highest GNI per capita among the African countries surveyed, has the highest smartphone penetration (55%), aligning with the 53% Internet use, compared to the other countries surveyed. In contrast, Rwanda has the lowest smartphone penetration at 9%.

The survey findings indicate that smartphones have had a positive effect in the adoption of Internet use in Africa. For the population that uses the Internet in the African countries surveyed, seven out of ten (72%) use a smartphone to access the Internet. Only three out of ten (27%) Internet users depend on desktops and laptops, and 1% of users access the Internet via tablets.

Despite Nigeria being classified as the largest economy in Africa and Kenya being perceived as the most innovative country in the region, smartphone penetration in these countries is considerably lower than in South Africa and Ghana. Nevertheless, Nigeria has a higher Internet penetration rate than Ghana, which at 28% Internet penetration matches Kenya (27%). The survey findings show that while mobile ownership increases with age, the youth is more likely to own smartphones and use the Internet than the older generation.

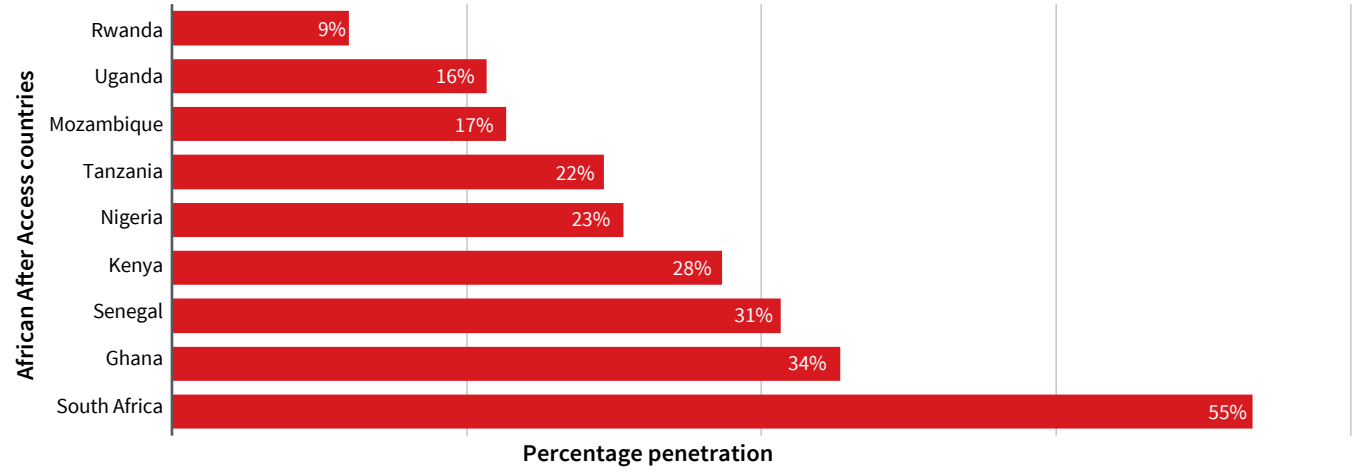

Figure 14: Smartphone penetration in African countries
Source: RIA After Access Survey data, 2017

Table 6: Device ownership and Internet use across age brackets

	SMARTPHONE	INTERNET	MOBILE PHONE OWNERSHIP
15–24	39%	36%	57%
25–34	36%	35%	73%
35–44	27%	28%	76%
45–54	22%	19%	74%
55+	17%	11%	60%

6.3 BARRIERS TO MOBILE PHONE USE

While the main barrier to Internet access has been the lack of devices such as computers, laptops and tablets, the survey shows that the majority of those who use the Internet access it through smartphone devices – seven in ten Internet users (68%) access the Internet through a mobile phone. Yet, the evidence indicates that smartphone devices are unaffordable to the majority of people, with only 19% of the combined population in the surveyed countries using smartphones. This masks considerable differences in take-up. While more than 50% of South Africans are connected to the Internet, less than 10% of Rwandans and Mozambicans are connected. Basic phones are still common in Africa and make up 30% of all phones, followed by feature phones (16%) (see Figure 14).

The digital divide is still persistent in Africa, with access and use of the Internet better in more developed economies, while there are also social differences in Internet use. Furthermore, there is evidence that the persistent digital divide follows historical social inequalities, thereby further widening the gap between the poor and the rich. Digital exclusion is primarily an issue of poverty. Those at the intersections of class, gender and location are the most marginalised. They tend to be those with the least education and correlated factor of income – the primary determinants

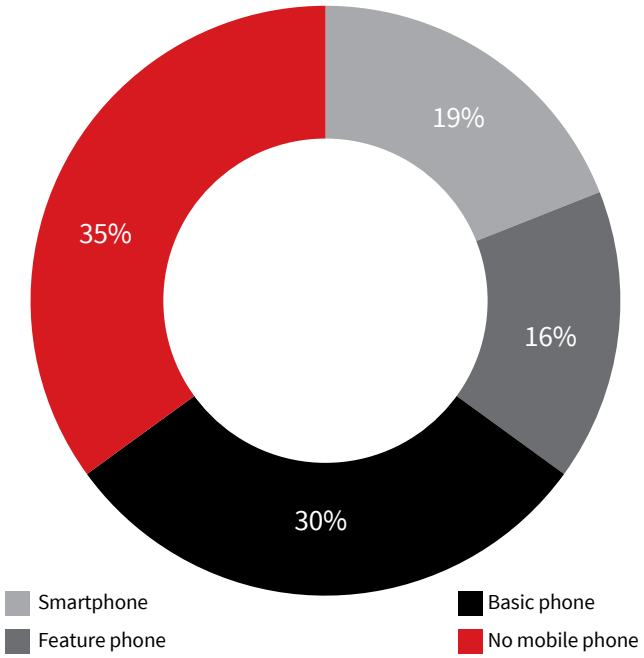

Figure 15: Mobile phone penetration by type
Source: RIA After Access survey data, 2017

of Internet access and use. The survey shows that, among the surveyed countries, almost half (44%) of the population living in urban areas uses the Internet. while less than two in ten (16%) of rural residents use the Internet, resulting in a 64% urban–rural digital gap for the surveyed countries.

Table 7: Aggregate Internet use and mobile phone ownership

	SURVEYED COUNTRIES	MALE	FEMALE	URBAN	RURAL
Internet	28%	33%	23%	44%	17%
Mobile phone	66%	72%	61%	79%	58%

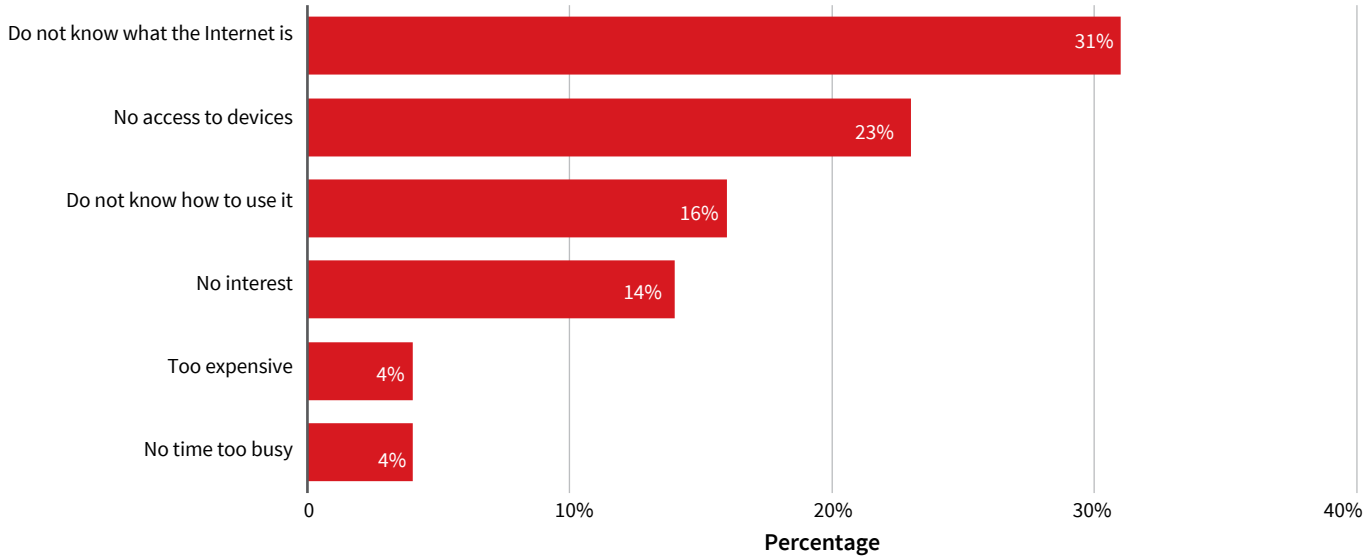

Figure 16: Barriers to Internet use in Africa
Source: RIA After Access Survey data, 2017

6.4 BARRIERS TO INTERNET USE

The survey findings show that the main barriers to Internet use in the surveyed African countries are the lack of Internet-enabled devices (23%) and lack of digital literacy (16), while 14 of those who do not use the Internet said they had no need for it (see Figure 15). Nearly a third (31%) of those who do not use the Internet stated that they do not know what the Internet is (see Figure 15). These results show that low levels of Internet use in Africa are mainly due to lack of awareness and education. Among those who use the Internet in the countries surveyed, well over a third (36) stated that the cost of data is the main barrier to Internet use. As much as 19 of people not using the Internet stated that a lack of time limits their use of it and 15% are limited by the poor speed of Internet (see Figure 16).

The survey findings show that affordability of devices and lack of awareness are the main barriers to Internet use in the surveyed countries (see Table 8). Of those who do use the Internet in Mozambique, Tanzania, Uganda and Rwanda, 76%, 64%, 51% and

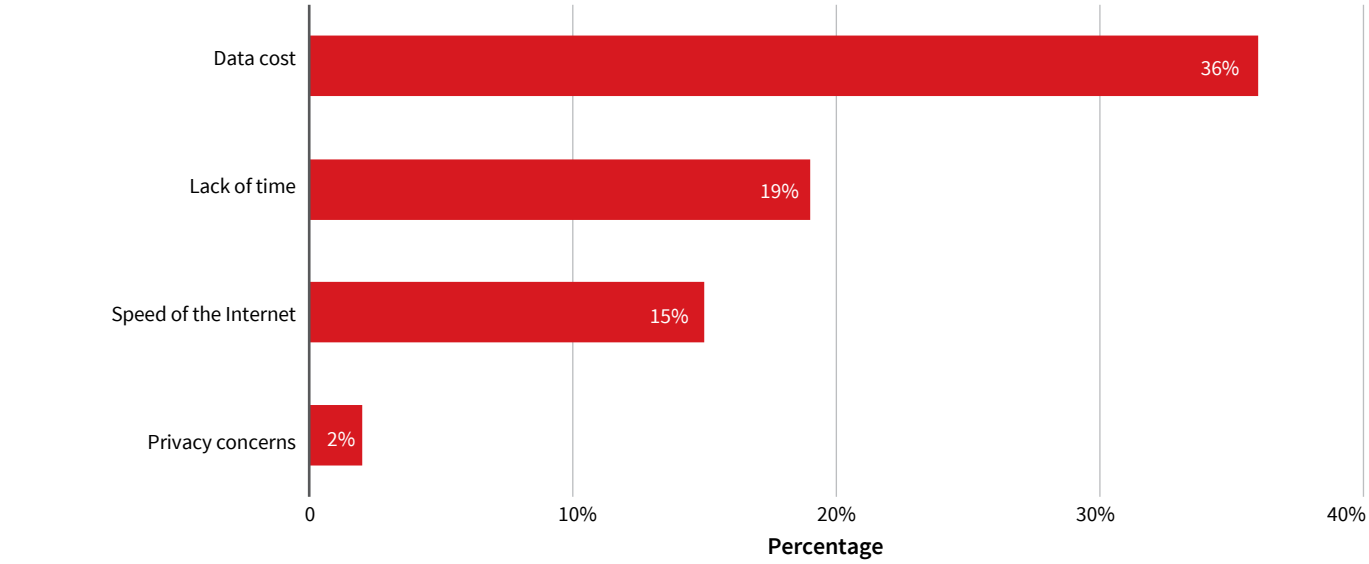

Figure 17: Limitations of Internet use in Africa
Source: RIA After Access Survey data, 2017

Table 8: Reasons given for not accessing the Internet

	NO ACCESS DEVICES	DON'T KNOW WHAT THE INTERNET IS	DON'T KNOW HOW TO USE THE INTERNET	NO INTEREST/ NOT USEFUL	TOO EXPENSIVE
Ghana	22%	43%	14%	9%	2%
Kenya	21%	27%	12%	26%	4%
Lesotho	13%	53%	13%	13%	1%
Mozambique	76%		14%	3%	1%
Nigeria	13%	40%	22%	10%	4%
Rwanda	42%	9%	3%	4%	33%
Senegal	16%	50%	13%	9%	1%
South Africa	36%	-	9%	16%	15%
Tanzania	64%	1%	13%	15%	2%
Uganda	51%	-	23%	12%	4%

42%, respectively, cannot afford Internet-enabled devices. In Ghana and Nigeria, 43% and 40%, respectively, of those who do use the Internet do not know what the Internet is, while 22% in Nigeria and 14% in Mozambique and Ghana have high levels of digital illiteracy. In South Africa and Rwanda, 15% and 33% respectively of those who do not use the Internet stated that the cost of services is unaffordable.

6.5 INTERNET USE

Internet in Africa is driven by the high demand for social media. The 2017 After Access survey shows that of the 77 million Internet users in the surveyed countries, 70 million are on social media (Facebook, WhatsApp or Twitter), which represents 90% of Internet users. More than half (55%) of people using the Internet in the surveyed countries, excluding Rwanda, spend most of their time on social media. Only 21% of users access educational content on the Internet, while 15% use the Internet for work (see Figure 17).

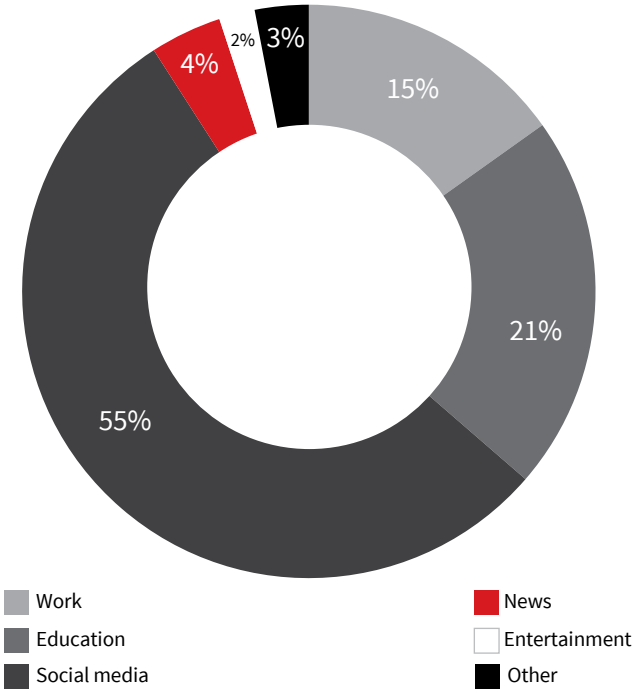

Figure 18: Internet use in the African countries surveyed
Source: RIA After Access Survey data, 2017

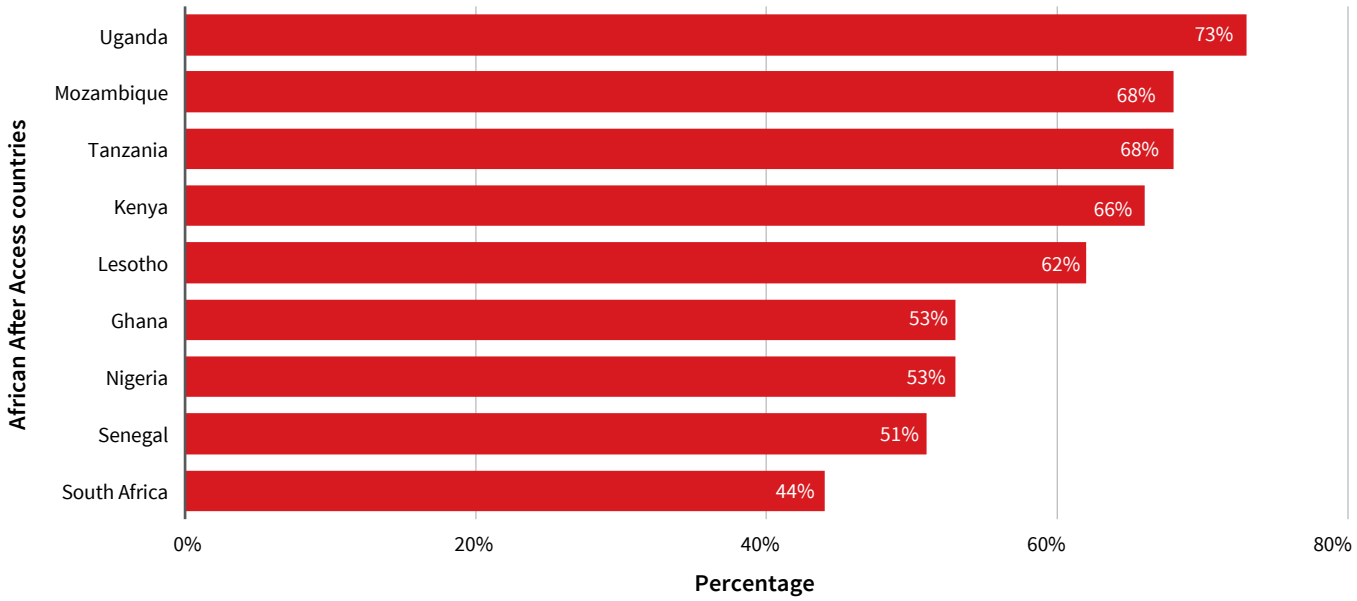

Figure 19: The percentage of individual Internet users who spend most of their time on social media
Source: RIA After Access Survey data, 2017

The share of Internet users who spend most of their time on social media is found to be higher in relatively low-income countries than in those countries where GNI per capita is higher, with Senegal being an exception. This suggests that Internet users in developed economies are more likely to be using the Internet for multiple purposes. In particular, 44% of Internet users in South Africa spend most of their time on social media, 53% in Nigeria and Ghana while 73%, 68% and 66% in Uganda, Tanzania and Kenya and six in ten (62%) in Lesotho spend most of their time on the Internet chatting, making new contacts and gossiping on social media.

The 2017 After Access Survey finding suggests that six out of ten individuals aged 15–34 years who use the Internet spend most of their time on social media (see Table 9). Three in ten (30% of Internet users aged 15–24 years) spend most of their time on the Internet searching for educational content. Internet users aged 45–54 years spend most of their time on the Internet accessing work-related content.

Table 9: Breakdown of time spent on different online activities by age group

	15–24 YEARS	25–34 YEARS	35–44 YEARS	45–54 YEARS	55+
Work	3%	18%	25%	40%	23%
Educational	30%	15%	14%	14%	23%
Social media	60%	57%	48%	32%	37%
News	4%	4%	4%	6%	6%
Entertainment	2%	3%	2%	3%	1%
Other	1%	3%	7%	5%	10%

7

THE DIGITAL ECONOMY

Although technology over the past 10 years has drastically changed the way in which business is conducted, these disruptive technologies also build on the existing social and economic inequalities among countries and individuals who lag behind in terms of adoption. While there is huge potential for technology to have a positive impact on digital job creation in Africa, the foundations for a digital economy need to be put in place – digital infrastructure, basic and higher education, literacy and skills, financial services, platforms, and digital entrepreneurship and innovation[13].

The 2017 After Access Survey shows that Internet penetration in Africa is very low (28%) for the continent to benefit fully from the digital economy. However, some comparatively wealthier countries, such as South Africa, have reached the necessary penetration levels necessary to benefit from the digital space and economy. The majority of African countries remain below the Internet penetration threshold required to harness the benefits from the digital economy. Besides focusing on infrastructure extension, the findings of the RIA 2017 After Access Survey show that it is critical for policymakers to develop policy that aims to advance the microeconomic issues of African residents, such as digital literacy and skills, awareness and education, which will build the base for vibrant entrepreneurship.

In Africa, the online economy was kick-started by a mobile phone banking revolution. The Kenyan mobile money company M-Pesa developed this concept realising the enormous profitability to the company but at the same time financially including largely unbanked Kenyans. In a similar way to mobile phones, which rapidly became substitutable for fixed lines – today about 63% of Africa population own a mobile phone as compared to 2% who own a fixed line – M-Pesa gave the majority of Kenyans who had never had access to financial services the opportunity to send, transfer and transact using their mobile phone number as a financial transaction account. Today, in Kenya, there are tens of thousands of small M-Pesa agents[14] providing services that the banks failed to offer to the majority of Kenyans, especially those living in the rural areas, as they were regarded unprofitable.

FINANCIAL SERVICES

The 2017 After Access survey indicates that while only three out of ten Africans surveyed (29%) have access to formal financial services, nearly nine out of ten Kenyans use mobile money services to send and receive money, pay bills, transact, and pay or receive salaries. In 2018, the Central Bank of Kenya (CBK) announced that the country has more than 45 million active mobile money accounts. The CBK further reported that deals worth Sh 3.90 trillion (USD 38.9 billion) were settled via mobile phone. Drawing on the central role of mobile money services in Kenya's economy, Chakravorti and Chaturvedi (2017) found that the country's digital economy had high momentum and excellent potential for growth, emerging as the fourth-fastest growing digital economy in the world after China, Malaysia, and Bolivia[15]. It was perhaps appropriate then that UNCTAD's inaugural Africa e-Commerce Week was held in Nairobi

Table 10: Urban-rural breakdown of mobile money use versus ownership of a bank account

	AFRICA	URBAN	RURAL
Mobile money	21%	23%	19%
Bank account	29%	43%	19%

13 See: http://blogs.worldbank.org/voices/african-leaders-committed-to-building-digital-economy

14 See: https://medium.com/@jakubsimek/the-social-innovation-of-m-pesa-and-digital-currencies-28a3984b5623

15 See: https://sites.tufts.edu/digitalplanet/executive-summary/

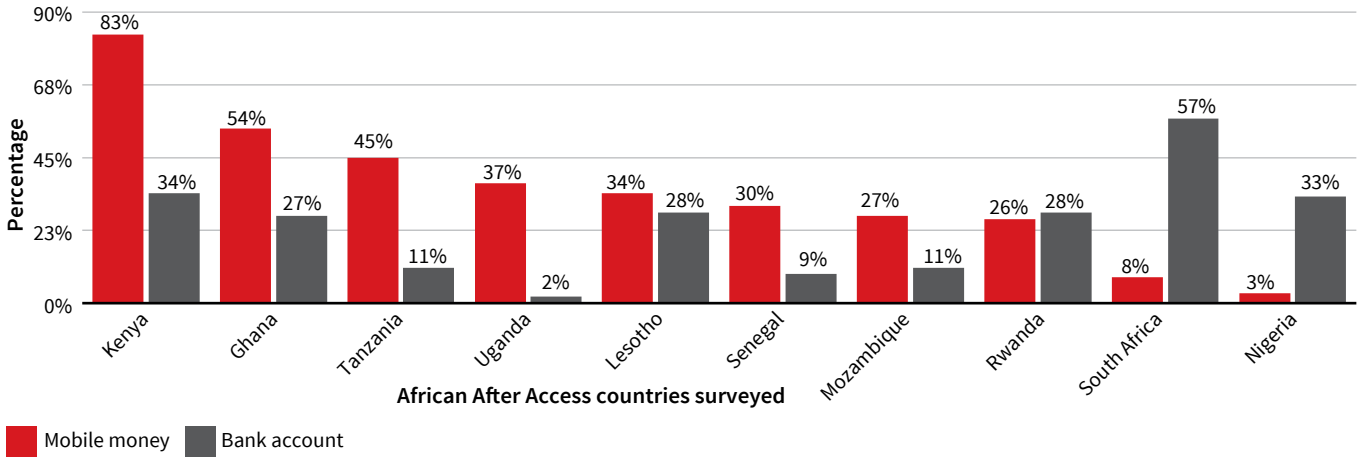

Figure 20: Mobile money services and bank account ownership in Africa
Source: RIA After Access Survey data, 2017

in December 2018. Under the theme of 'Empowering African Economies in the Digital Era', it set out to examine ways to enhance the ability of African countries to engage in and benefit from e-commerce and the evolving digital economy.

The findings of the After Access Survey demonstrates that even though the majority (71%) of Africans in the surveyed countries do not have access to formal financial services, especially those in the rural areas (81%) versus 57% in urban areas, mobile money services are only successful in Kenya (85%), Ghana (55%) and Tanzania (45%), but have had very little success in Nigeria (4%) and South Africa (8%). Furthermore, the RIA 2017 After Access survey shows that the success of mobile money services is dependent on banking account ownership, with countries that have the majority of their population financially included less likely to have a high mobile money penetration rate. Mobile money's success rate is low in Nigeria (4%), as a result of inhibiting financial regulations. This is also true of South Africa (8%), although mobile money's low success rate is also as a result of South Africans largely being banked (56%), while only 34% of Kenyans and 33% of Nigerians are banked. In Nigeria, the poor performance of mobile money is attributable to regulatory requirements, which require mobile phone service providers to partner with banks[16]. The new financial regulations, which will allow mobile operators to transfer cash, are expected to increase the use mobile money in Nigeria significantly.

According to the World Bank Findex survey conducted in 2017, financial inclusion was found to have increased from 23% to 43% in sub-Saharan Africa countries[17]. Similarly, the After Access survey findings suggests that mobile money services have indeed led to an increase in financial inclusion in Africa. The study finds that five out of ten (46%) people in the surveyed countries have access to financial services either through a mobile money platform or a banking account.

Studies by the IFSC and Mastercard Foundation report that a total of USD 300 million in monthly transactions are made in Africa by the 7.2 million new people using digital financial services and the 45 000 new banking agents[18]. The RIA After Access findings indicate that 129 million people in the surveyed countries are financially included and 53 million use mobile banking platforms including mobile money and mobile banking services.

The survey shows that mobile money innovations in Kenya have boosted financial inclusion. Mobile money innovations have led to Kenya reaching the highest levels of financial inclusion, with close to nine out of ten

16 See: https://techcentral.co.za/nigeria-to-open-the-floodgates-to-mobile-money/86385/

17 See: https://globalfindex.worldbank.org/#about_focus

18 See: https://www.forbes.com/sites/tobyshapshak/2018/05/16/mobile-drives-financial-inclusion-in-africa-growing-20-in-past-six-years/#73c7e613312

(87%) of Kenyans having access to financial services. South Africa, which has a highly developed and effectively regulated banking sector trails behind Kenya, with about six out of ten South Africans having access to a bank account.

In 2018, the government of Ghana was granted a USD 30 million loan by the World Bank for Ghana to improve its financial stability, financial inclusion and private competitiveness[19]. According to a report by Global Findex Database, financial inclusion in Ghana reached 58% in 2017[20]. An estimate that is similar to the 2017 After Access survey, which shows that 59% of Ghanaians 15 years and older are financially included.

Despite the performance of innovations in the financial market, less than 50% of most populations surveyed are financially included. As shown in Figure 19, people are more likely to use mobile money services than a bank account. Furthermore, Africans who reside in urban areas (57%) are more likely to be financially included than those who live in rural areas (38%). Financial inclusion disparity is also observed between males and females. The survey shows that five out of ten men in the African countries surveyed are more likely to be financially active as compared to only four out of ten females, resulting in a 21% gender gap in the surveyed countries.

The survey results as seen in Figure 22 show that the urban–rural financial inclusion gap is very low in Kenya, which has succeeded in bringing financial equity to its population through the use of mobile money services at 9% followed by South Africa at 34%. These results suggest that mobile phone platforms play a very important role in servicing areas that were initially excluded by formal banking services. Mozambique, which has lowest financial inclusion among the surveyed countries at 18%, also has the highest urban–rural gap in financial inclusion gap at 79%. This is followed by Lesotho, which in many areas of ICT shares the characteristics of its subsuming more developed neighbour South Africa but on this indicator has an enormous urban-rural gap of 62% (see Figure 22).

While there is a significant urban–rural divide, which can be explained by lack of financial institutions to serve the rural areas, the gender gap in financial inclusion among the surveyed countries is lower in comparison in most surveyed countries except for. Nigeria where mobile money use is anyway limited, like some of the populous countries in South East Asia is has a gender

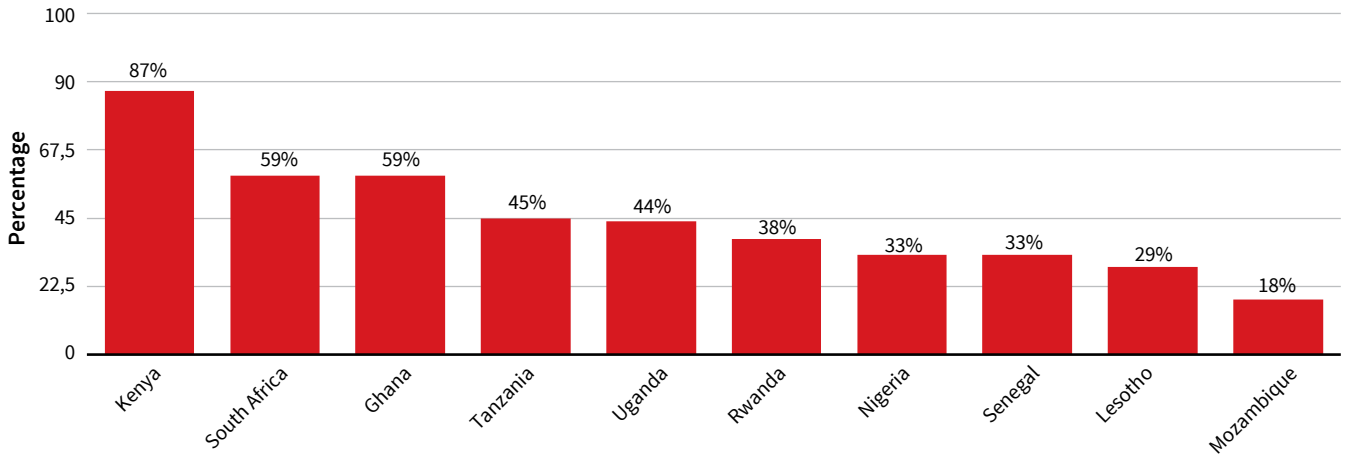

Figure 21: Financial inclusion in African countries
Source: RIA After Access Survey data, 2017

19 See: https://www.worldbank.org/en/news/press-release/2018/09/20/ghana-receives-support-to-strengthen-its-financial-sector-and-promote-inclusion

20 See: https://www.myjoyonline.com/business/2018/June-27th/financial-inclusion-in-ghana-improves-by-58-report.php

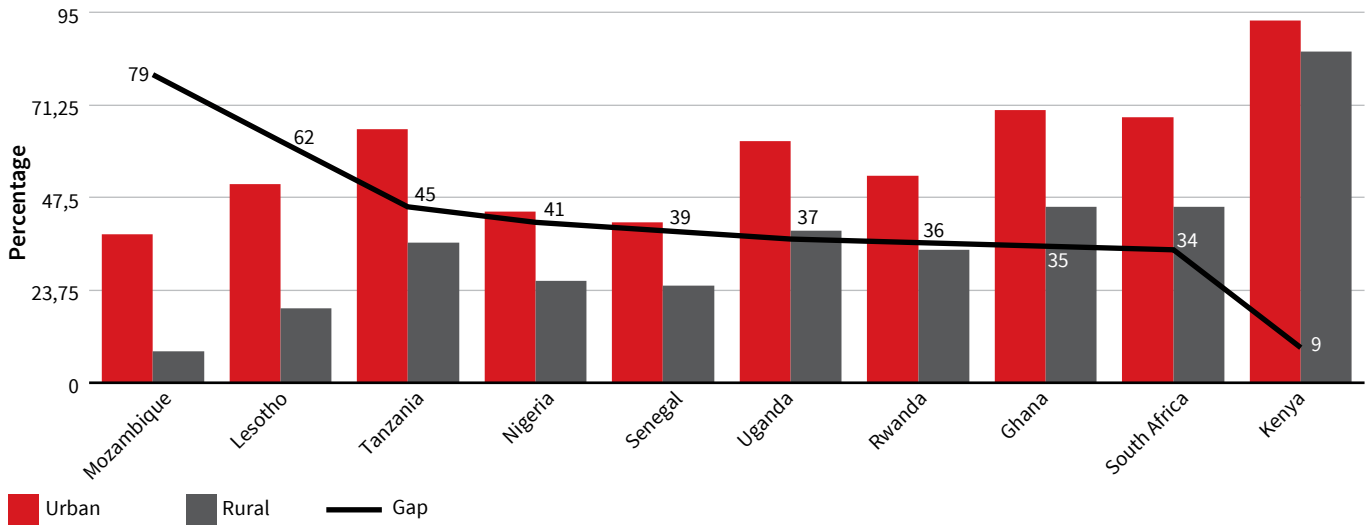

Figure 22: Urban–rural financial inclusion gap in African countries
Source: RIA After Access Survey data, 2017

gap of 35% - similar to some of the least developed countries such as Mozambique (48%), Uganda (32%), and Rwanda (30%). The financial inclusion gender gap in South Africa, Kenya and Ghana is considerably lower at 9%, 11% and 14% respectively.

Using access to a credit card to measure the ability to access credit in the formal banking system, the After Access survey shows that majority (80%) African residents do not have access to a credit card, although we do not ask about hire purchase. South Africa is the best-performing country in this measure, with 34% of its population having access to a credit card, followed by Nigeria at 27% and Lesotho at 25%. Access to a credit card in other countries is below 20%, with Uganda having the least access to a credit card at 4%, followed by Tanzania at 7%. Although mobile money services have played a significant role in creating financial inclusion on the continent, Africa remains a small player in the digital economy with less than 1% of people residing in the surveyed countries using digital finance platforms, such as Internet banking, using the Internet to transact with government, and purchasing or ordering goods and services online. These results are due to the fact that Internet use in Africa is very low (28%). This is evidence that a number of online platforms and services rolled out so far in Africa, such as e-government and e-commerce, have yet to reach a critical mass where the benefit of reduced transaction costs and improved information flows would be witnessed in the economy.

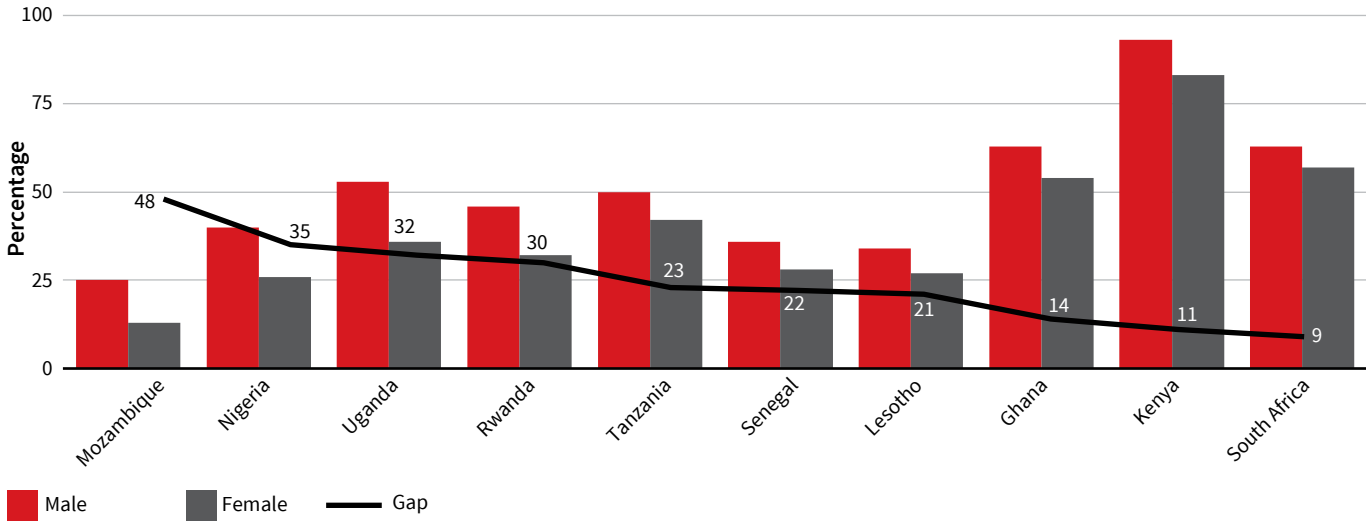

Figure 23: Gender disparity in financial inclusion among African countries
Source: RIA After Access Survey data, 2017

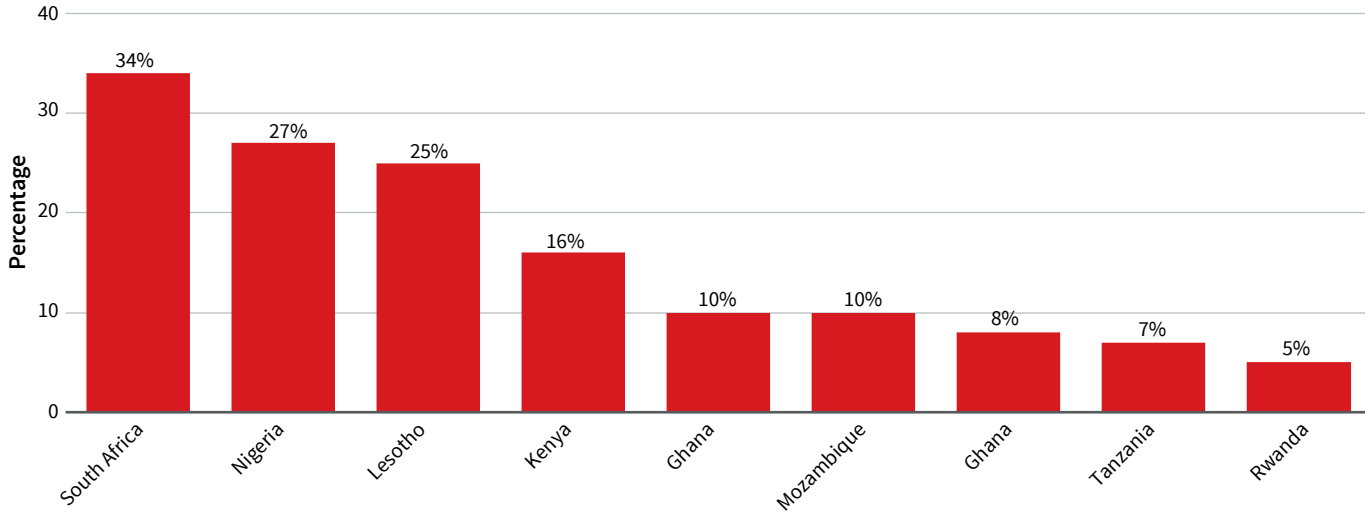

Figure 24: Access to a credit card among African countries surveyed
Source: RIA After Access Survey data, 2017

The business-to-consumer (B2C) e-commerce market in Africa remains poorly developed. Although worth about USD 5.7 billion in 2017, it makes up less than 0.5% of GDP, far below the world average of over 4%[21]. Nevertheless, Kenya ranks relatively well at 7th out of the continent's 44 economies, behind Mauritius, Nigeria and South Africa, but ahead of Uganda, Botswana and Namibia[22]. The transformative role of mobile money, in Kenya in particular, plays large part in this: 'While mobile money initially enabled people to make financial transactions on their phones, thereby eliminating travel costs, it now extends to mobile credit, insurance, cross-border remittances, bill payments, airtime top-ups, and savings'[23]. As a result, UNCTAD notes that 'the digital economy, including electronic commerce, is growing quickly in Africa, creating new opportunities for entrepreneurs and businesses to expand their market access and join value chains'[24].

The first UNCTAD E-Africa conference held in Nairobi in 2018 resulted in a number of recommendations that focused on:

- developing national e-commerce strategies
- bridging the digital divide through digital skills
- investing in sustainable and secure ICT infrastructure that is conducive to innovation
- fostering cooperation among all stakeholders in support of the digital transformation
- creating an enabling regulatory environment to promote the adoption of mobile payments solutions[25].

Overall, the future of Africa's e-commerce market is considered bright, and the steps taken by the specific countries will dictate its success.

21 See: https://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=2304
22 See: https://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=2304
23 See: https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1960
24 See: https://unctad.org/en/pages/PressRelease.aspx?OriginalVersionID=498
25 See: https://unctad.org/en/pages/PressRelease.aspx?OriginalVersionID=498

8

THE INTERNET AND VIRTUAL WORK IN AFRICA

While many African countries have made significant progress towards creating an Internet-driven economy by promoting broadband sectoral reforms and focusing on increasing broadband availability, the Internet's contribution to gross domestic product (GDP) in Africa is low relative to other developed and emerging economies. In 2012, the Internet sector contributed about 4% to developed economies, but only contributed 1% to Africa's GDP[26]. As shown above, Internet infrastructure in no longer the roadblock to Internet. Some countries such as Lesotho, Rwanda and South Africa have invested heavily in infrastructure resulting in broadband coverage over more than 95% of the population. Although Rwanda's 4G/LTE coverage has reached 95% of the population[27], only 10% of Rwandans have access to the Internet.

Given the potential of the Internet to contribute to economic growth and job creation, there have been a number of initiatives, including the USD 100 million Rockefeller Foundation in partnership with the World Bank, which aims at improving the lives of Africans by accelerating ICT-enabled employment and skills training for high-potential African youth. The digital space has also seen a growth in the number of digital platforms including Amazon Mechanical Turk, Short Task, Text Eagle and Clickworker, Uber, Lyft, TaskRabbit, eBay and Alibaba, who outsource microwork to users and provide supplementary income to global virtual workers[28]. The majority of online workers are located in Asia and one of the platforms TxtEagle announced that it has reached 2.1 billion people in emerging markets[29]. Despite the hype generated around the digital economy and it potential to create employment, 72% of Africans do not use the Internet and are therefore excluded from the digital economy and online work or microwork.

The adoption of microwork or online work in Africa is minimal as a result. Only 2% of the population in the surveyed countries are online workers, representing 3% of the economically active population. Much of this work is manual work, such as domestic work or e-hailing, which is simply sourced online, but this is not the kind of online work understood in the context of microwork – namely, piecemeal online work that is distributed among geographically untethered freelancers.

The survey shows that even in countries that directly benefitted from the World Bank and Rockefeller Foundation online job generation initiatives (South Africa, Kenya, Nigeria and Ghana), the level of participation in online platforms is very low. For instance, the World Bank in partnership with the Digital Jobs Africa initiative undertook a number of activities to increase and enhance opportunities for digital job creation in Africa. This included the development of an information technology (IT) park in Ghana and online microwork awareness building and training in Nigeria.

FEW AFRICAN MICRO-WORKERS

Despite these initiatives, only a small proportion of Internet users in these countries are microworkers. The 2017–2018 RIA After Access Survey indicates that only 1% of economically active individuals in Kenya, Ghana and Tanzania are microworkers, 3% in Nigeria and Uganda and 2% in Senegal. Mozambique and South Africa have the largest percentage of microworkers among the economically active population, with 8% and 7% respectively (see Figure 24).

The survey shows that females in Kenya, Ghana, Nigeria, and Tanzania are more likely to be microworkers than males. This is not as surprising as it may seem, as work flexibility is important for women working from

26 See: https://www.internetsociety.org/resources/doc/2017/africa-internet-economy/

27 See: https://www.telegeography.com/products/commsupdate/articles/2018/01/05/rwandan-4g-network-hits-95-coverage/

28 See: http://blogs.worldbank.org/ic4d/education/ic4d/partnerships-and-opportunities-digital-jobs

29 See: https://olc.worldbank.org/sites/default/files/Microwork%20in%20MENA_0.pdf

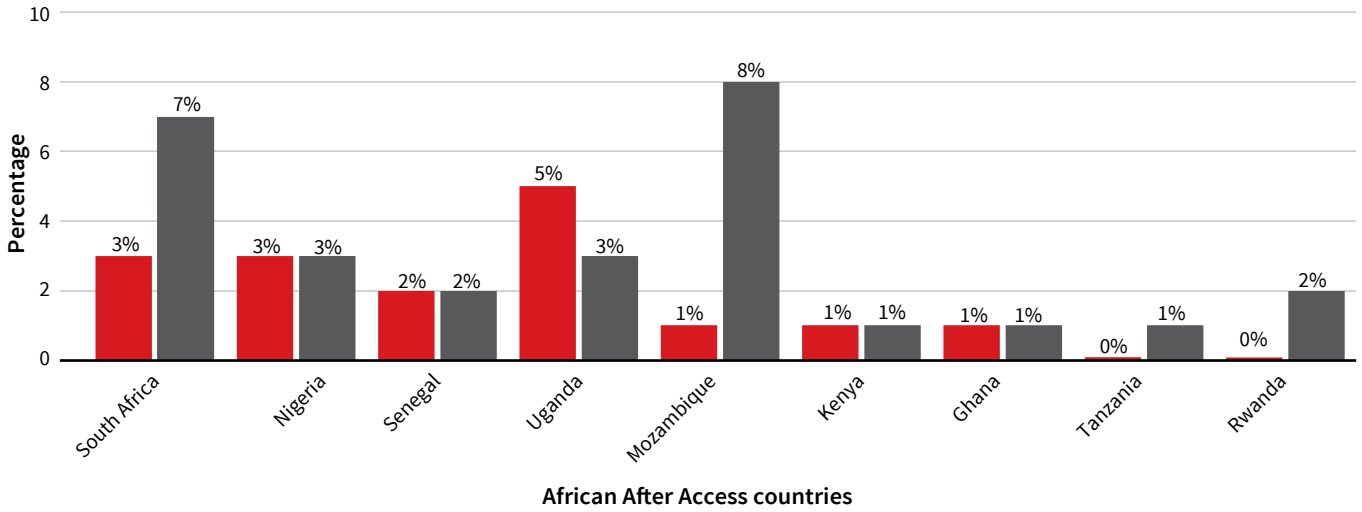

Figure 25: Microworkers in the African countries surveyed
Source: RIA After Access Survey data, 2017

home, often only part-time. Despite an insignificant proportion (0.56%) of individuals who use online platforms to get jobs, the microwork gender gap in Tanzania is high (–355%), which means that there is a higher proportion of women are working online than men. In Nigeria, the microwork gender gap is at –63%. In Mozambique, Rwanda and South Africa the gender gap in microworkers follows the Internet gender gap. Mozambique, which is the country with the second highest Internet gender gap in Africa after Rwanda, has a significant microwork gender gap (69%) followed by Rwanda (37%).

Education is one of the main determinants of digital inclusion and to utilise it for productive purposes requires more than just basic digital literacy. As evidence, the survey results show that people with no education and those with a primary school certificate are less likely to participate in microwork jobs, manual or otherwise, compared to those with at least a secondary school certificate. Only in Nigeria did 1% of people with masters and PhDs participate in microwork.

Table 12 shows that the majority of microworkers are secondary school certificate holders. Approximately 65% of microworkers in Rwanda are secondary school

Table 11: Breakdown of online work by gender

COUNTRY	ONLINE/PLATFORM WORK (%)	MALE (%)	FEMALE (%)	GENDER GAP (%)
Ghana	1.99	1.93	2.08	–7
Kenya	3.36	2.99	3.79	–26
Mozambique	7.90	10.81	3.34	69
Nigeria	7.63	6.26	10.21	–63
Rwanda	3.74	4.25	2.64	37
South Africa	6.48	7.45	5.56	25
Tanzania	0.56	0.22	1.00	–355
Uganda	3.04	3.27	2.74	16
Senegal	0.54	0.91	0	100

Source: Research ICT Africa Beyond Access Survey, 2017
Notes: This is a representation of the number of observations in the restricted sample, and the shared distribution of the microwork and gender populations.

certificate holders, and about 56% of microworkers in Ghana and 50% in Kenya and Tanzania have secondary school certificates. While a few bachelor's degree holders participate in microwork jobs in most of the countries, in Nigeria about 47% of microworkers are bachelor's degree holders. Of particular interest is that, in Ghana, only secondary school certificate holders and certificate or diploma holders participate in microwork jobs.

Generally microwork is expected to benefit those who are left out by the traditional employment system and lessen the burden of unemployment. Furthermore, microwork is likely to be done by students as part-time jobs to supplement allowances. The majority of microwork participants are students, employed and self-employed individuals.

The results further show that microwork does not only provide direct employment opportunities, but it has the potential for entrepreneurship. The results show that the majority of microworkers are self-employed. More than 40% of microworkers in Kenya, Nigeria and Tanzania are microworkers. Only 4% of microworkers in Mozambique are self-employed, with the majority (51%) being students. These results show the potential that microwork has in reducing unemployment in developing countries.

Respondents were also asked to state which sort of jobs or tasks they had performed. The results show that most (22%) of microworkers in Africa perform online tasks such as completion of online surveys or data entry, while 17% get their work cleaning someone's home or doing laundry services through the Internet. A few (10%) work on Internet platforms that enable them to do shopping for household delivery. The uptake of driving for a ride-hailing application is still low among the countries surveyed. Only five percent of microworkers drive for a ride-hailing app such as Uber, Lyft or Taxify.

The results further show that the income earned from microwork jobs meets the basic needs of 52% of microworkers, and 31% stated that they can live comfortably without their microwork income. About

Table 12: Distribution of microwork participants by education and employment status

	GHANA	KENYA	MOZAMBIQUE	NIGERIA	RWANDA	SOUTH AFRICA	TANZANIA	UGANDA	SENEGAL
EDUCATION									
Primary					4.11		1.17		1.12
Secondary	2.23	3.66		6.59	5.02		0.68		0.38
Certificate/ Diploma	4.25	5.01		2.79	4.11				1.99
Bachelors		0.28		20.18	1.77		0.62		
Masters				4.22					
EMPLOYMENT									
Student/ Pupil	0.85	4.42	11.79	2.94		16.71	1.08		0.45
Unemployed, active	8.14	3.81	5.08	13.57	11.20	15.17		9.98	5.31
Employed	0.59	1.75	5.84	9.65	6.29	60.08	0.30	5.46	
Self-employed	5.29	17.84	4.96	18.56	6.51	7.31	1,23	3.84	

Source: Research ICT Africa Beyond Access Survey, 2017
Note: Those with no education and PhD holders are not presented in the table, as there were no microworkers in these groups for all the surveyed countries. On the employment status, unemployed discouraged, retired and disabled are also not presented.

Table 13: Percentage of microworkers across tasks

COUNTRY	OBSERVATION
Driving for a ride hailing app, Uber, Taxify	5%
Shopping for delivering household items	10%
Performing tasks online, completing surveys or doing data entry	25%
Cleaning someone or doing laundry	22%
Other	15%

Source: Research ICT Africa Beyond Access Survey, 2017

30% of microwork participants stated that there are instances where they participate in these platforms and never get paid.

The 2017 RIA After Access Survey findings suggest that a higher proportion of females (63%) who are microworkers rely on the income derived from online work as their primary source compared to males (42%). About 40% of male microworkers have other sources of income and stated that they can live without it, while only 20% of females stated that they can live without it.

This is further evidence that microwork has the potential to improve the welfare of those who were initially sidelined by the market. Of the Internet users in Africa, 6% are microworkers, with the majority living in urban areas (8%) and only 2% living in rural areas. The survey shows that 54% of microworkers living in rural areas depend on income generated from online platforms as an important component of their budget, while 55% of microworkers in urban areas live on income generated from microwork platforms.

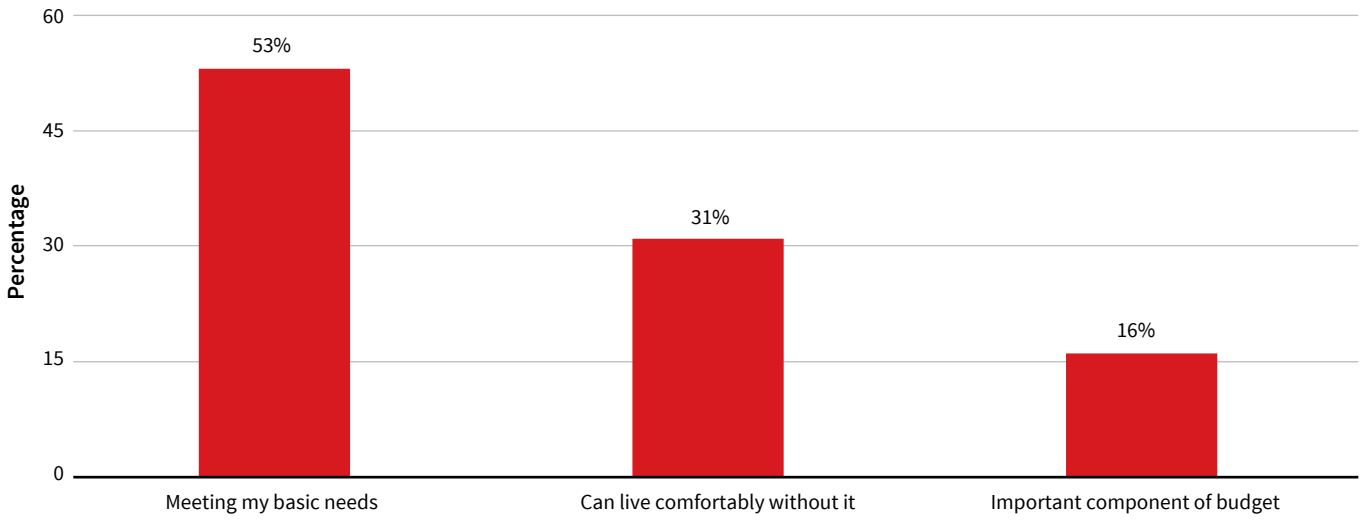

Figure 26: The importance of income earned from online services
Source: RIA After Access Survey data, 2017

9

CONCLUSIONS

In recognising access and use of ICTs as critical component to achieve the sustainable development goals (SDGs), the Agenda calls on the international community to increase connectivity and access to ICTs and to strive to provide universal and affordable access to the Internet in low-income countries by 2020. Despite these objectives and the targets attached to them, which aim to increase Internet access and use around the world, the majority of individuals in developing countries have Internet penetration rates below the required target to derive technological dividends. Despite the acknowledgement of ICTs as critical to inclusive economic development and social cohesion, we do not currently have the data in the Global South to assess where we are or what progress we are making towards the proposed targets.

Global ICT indices have become the reference point for assessing national performance despite the incompleteness of data on developing countries. Several indices now compete with or complement the International Telecommunication Union's (ITU) ICT Development Index (IDI). The World Economic Forum's Network Readiness Index (NRI), the Affordability Drivers Index (ADI) from the Alliance for Affordable Internet, the GSMA's Mobile Connectivity Index, and most recently, the Economist Intelligence Unit's new Inclusive Internet Index (3i), all seek to measure digital developments relating to ICTs between countries over time. Such indices are able, with differing degrees of success, to track prices, cost drivers and establish how conducive the environment is to investment, in order to identify sector performance at country level.

FAR OFF GLOBAL TARGETS

Evidence from these indices suggests that with only two years to go to the ITU connect 2020 agenda, even using inflated indicators that measure active SIM cards and not unique subscribers, we are billions of people away from achieving the 50% broadband penetration target. For many developing countries, simply getting to the 20% penetration rate to achieve critical mass would be a significant milestone.

However, too often, the potential of ICTs is not realised due to lack of evidenced-based policies to ensure that adequate attention is paid to ensuring that the requisite complementary elements for success are in place. Evidence from the 2017 Research ICT Africa (RIA) After Access Survey, a nationally representative survey conducted in 10 African countries – Ghana, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania and Uganda – shows that supply-side issues such as ICT infrastructure development and coverage do not necessarily ensure digital beneficiation, but demand-side factors such as digital skills, education and affordability are equally critical elements to ensure a sustainable and a welfare-enhancing ICT sector.

Despite ICTs having been identified as catalysts of economic growth and social cohesion, the nationally representative Access Survey of 20 countries in the Global South After Access Survey shows that ICTs amplify the existing social and economic inequalities. Large economies and fairly wealthy and educated individuals are more likely to benefit from the digital economy than the poor. Mobile phone penetration and Internet use is broadly correlated with Gross National Income (GNI) per capita. Argentina, Colombia, South Africa, Peru, Paraguay and Guatemala, which are fairly rich countries compared to other countries surveyed, have a large proportion (more than eight in ten) of their population aged 15 years and older who use mobile phone devices. Mobile phone and Internet use remains low in Africa. Despite South Africa being among the relatively wealthier countries, positioned below Argentina and Colombia, Internet use is significantly lower, with close to half the population (53%) using the Internet, which is significantly lower than Internet use in Argentina (83%), Colombia (73%) and Peru (73%).

Rwanda and Mozambique have the lowest Internet penetration, 9% and 10% respectively – lower than Bangladesh, Pakistan and India – and the highest gender Internet gaps, at 62% and 46% respectively, similar to the very high gaps in Asia. This is despite Rwanda having 95% of its population covered by 4G/LTE services and progressive gender policies. Senegal, a country with a lower GNI per capita than Ghana, Kenya and Nigeria, has a higher Internet penetration rate, with about a third of the population using the Internet. Relatively developed countries, specifically the Latin American countries surveyed together with South Africa, have the lowest gender gaps. In contrast, the poorer countries from Africa shows higher gender disparity in mobile phone ownership, and particularly Internet use. Overall, of all the surveyed countries, India, Pakistan and Bangladesh account for the highest gender gaps in mobile phone ownership. The mobile phone ownership gender gap in these countries exceeds some of the least-developed countries in Africa, such as Mozambique and Rwanda. The biggest gender gap of all countries surveyed is Bangladesh, which is closely followed by Rwanda, then India, Mozambique and Nigeria.

The emergence of affordable mobile phone devices allowed the majority of Africans to access voice and text services for the first time, but the uptake of the much more expensive fixed telephone services is happening more slowly. Together with minimal landlines and desktop ownership, which remains unaffordable for the majority of African residents, the uptake of the Internet, in the African continent, has remained very low, below 30%.

AFFORDABILITY

Aggregated household Internet penetration among the surveyed African countries is very low, at 5%. Other barriers to Internet use among African households are affordability and the lack of digital skills. Among the households without access to the Internet, a third do not have Internet-enabled devices and about two in ten do not know how to use the Internet. Similarly, a lack of Internet-enabled devices among individuals is the main barrier to Internet use. About 23% of those who do not use the Internet stated that they cannot afford Internet-enabled devices, such as smartphones and computers, while 16% lack the requisite digital skills, and 14% of those who do not use the Internet gave a negative assessment of the need for Internet.

The survey shows that, at individual level, the majority of those who use Internet access it though smartphone devices, with seven out of ten Internet users accessing the Internet through a mobile phone. However, the evidence indicates that these devices are unaffordable to the majority, with only 19% of the combined population in the surveyed countries owning smartphone devices. Evidence shows that the digital divide is still persistent in Africa, with access and use of the Internet higher in more developed economies, while there are also social differences in Internet use. There is evidence that the persistent digital divide follows historical social inequalities, thereby further widening the gap between rich and poor. Digital exclusion is a primarily an issue of poverty, with those at the bottom of the pyramid (women and the poor) being the most marginalised.

Despite the majority (71%) of African residents in the surveyed countries not having access to formal financial services, especially those in the rural areas, mobile money services are only successful in Kenya, where about nine in ten use mobile money services. About half of the population in Ghana uses mobile money services and four in ten people in Tanzania use these services. Mobile money services, despite being common in East African countries, have had a positive effect in increasing financial inclusion in Africa. The survey shows that 46% of the population in the surveyed countries has access to financial services either through mobile money services or access to a bank account.

The survey further shows that digital beneficiation is still low in Africa. Despite a number of initiatives to enhance digital opportunities in Africa, such as creation of online jobs, few African residents participate in the digital economy. The survey shows that a small proportion of economically active individuals in Kenya, Ghana and Tanzania are microworkers, with 3% in Nigeria and Uganda, and 2% in Senegal. Mozambique and South Africa have the largest percentage of microworkers among the economically active population, 8% and 7%, respectively, although Mozambique's 8% is a minuscule number as only 10% of the population was online in 2018.

DIGITAL CONNECTIVITY PARADOX

Finally, it is important from a policy perspective to realise that connectivity will not redress digital inequality, though it is a precondition for it. As a result of its historical underdevelopment, Africa highlights the policy paradox that as more people are connected and can access more information and services, at higher speeds than ever before, digital inequality is being amplified, not reduced. This is not only the case between those online and those left offline. As we move from basic voice services to broadband services with Over-the-Top applications offering low-cost voice and text substitution, as well as microwork platforms offering labour mobility and digital platforms enabling financial inclusion, the gap is not only between the connected and unconnected, but between those who have the skills and financial resources to use the Internet optimally and those barely online. This is arguably the biggest policy challenge facing countries in an increasingly globalised digital economy and society.

Traditional supply-side focused policy interventions, which fail to address demand-side challenges, will simply perpetuate the existing inequalities. Analysis of the 2017 After Access Survey data shows that education, income and locational inequalities are simply being mirrored online – and arguably amplified, as the economic and social value of being digitally networked increases exponentially.

10 RECOMMENDATIONS

As access to digital communication becomes strategically valuable to both the public and private sectors, the importance of ensuring that everyone has access to affordable connectivity increases. What is evident from the nationally-representative demand survey undertaken by RIA in 2017, is that in many African countries, the number of Internet users has not even met the roughly 20% Internet critical mass required to enjoy the network effects associated with economic growth and development.

A major barrier to Internet access and use is the affordability of both smart devices and data services, despite 3G coverage of over 95% of the population. The barriers to use for many people are therefore not that they are not covered by a signal, but that people do not have the resources to get online. The primary barrier to this is the cost of devices, as well as the price of data.

The fact that there is extensive coverage and yet a large percentage of the population remains unconnected suggests challenges with the current commercial model of exclusive spectrum licensing and universal service strategies. To address this problem, complementary regulatory and delivery strategies will be required to enable different types of services to be offered by different kinds of operators.

- Spectrum policy should be reviewed to ensure more optimal co-existence of licensed and unlicensed spectrum that will optimise spectrum for diverse use, as well as prioritise affordable access to communications. Licensed spectrum required for the evolution of existing services needs to be assigned at a competitively-determined (efficient use) price to ensure the build out of capital-intensive networks benefitting from economies of scale and devices. With evidence that even cost-based GSM prices are not affordable to most South Africans, spectrum should be made available for secondary use. Nationally allocated spectrum not in use in remote areas must be made available through low-cost or licence-exempt spectrum for communities, non-profit providers or micro-networks. Extending unlicensed spectrum to new frequency bands can spur investment and innovation, lead to the introduction of technologies that can complement licensed networks, (for example via the hand-off from GSM to public Wi-Fi, which now also has backhaul applications), and expand broadband access in low-cost, last-mile access. Enabling the deployment of dynamic spectrum is a critical aspect of spectrum management seeking to optimise the use of spectrum in the context of providing exclusive use required by operators for large sunk investments, as well as the expanded licence-exempt spectrum that can reduce digital inequality by enabling access, but also complementing high-cost, private use.
- The effective development of these alternatives requires institutional arrangements to enable capacitated regulators to regulate an increasing complex and adaptive globalised environment without state or industry capture and without succumbing to pressures from state to enforce retrogressive taxes that undermine their digital futures or be lobbied by operators who act anti-competitively or place securing extractive rents above the national public policy objectives.
- This will also require data and information about what exists and in what form, how much it costs, its price at the point-of-sale, and what gaps exist in the reach of services from an economic, social and cultural perspective. An integrated and co-ordinated data-gathering procedure for the sector, and ICT across sectors, is required, which clearly allocates responsibilities for the collection of data, and makes this publicly available on a national indicator data portal, with the underlying dataset available according to open data access principles.
- In order to fulfil this precondition, there is a need for the policy and regulatory entities in Africa, to standardize the process and frequency of collecting data; to stipulate what data needs to be publicly available and what information from the public and private sectors should remain confidential; and to define the format in which data needs to be presented. The

telecommunications sector needs more transparency and would be well-served by the strategic release of the key data sources mentioned above. This is something that could easily be integrated into global Open Government Data initiatives.

- It is also important to note that connectivity on its own will not reduce economic inequality, as connectivity is a precondition for participation in a modern economy and society. Further barriers include the skills to utilise services for passive consumption but, more particularly, for productive use. This will require a cross-sectoral approach that builds capacity not only for digital literacy, but also advanced skills to support optimal use of software and local content development to meet local needs and in local languages. It will increasingly require skills and realignment of skills to deal with increased automation of work, artificial intelligence, big data analysis and robotics.
- African economies need to formulate policies with the aim of removing barriers that prevent full engagement in the digital economy and optimising the benefit. The policies must target the enhanced participation of Africans in e-commerce and microwork to boost Africa's long-term competitiveness. Critical to achieving this objective is that policymakers should look beyond supply-side and infrastructural issues, although pervasive infrastructure is a precondition for digital inclusion. This will require greater state coordination across sectors and between the public and private sectors, to ensure that policies and the implementation thereof will align skills and improve the readiness for citizens, the state and companies for digital technology mobilisation.
- The legislation necessary to build a trust-based environment for e-commerce, e-government, digital finance and personal use must be drafted, the necessary consultations done, and then finalised. This process requires the introduction of legislation and guidelines in the areas of cybersecurity, privacy, protection of data and access to information. This needs to be framed in the context of an open data policy that safeguards these rights and which will enable the free flow of information required for more effective planning by government and service delivery entities, increase the uptake of online rather than face-to-face transactions, and create opportunities for entrepreneurialism and innovation.
- Africa needs to develop initiatives towards attaining harmonised regional strategies to make smaller markets more attractive for investment and which take into account generation, storage, processing and transfer of data locally and across boundaries, e-government, taxation in the digital economy, and inclusive access and use. The policy should take into consideration and reflect the changes occurring in the production process and the increasing digitisation of production and consumption processes, and international trade. Enabling cross-border trade and reciprocal financial and taxation regimes will be critical to realising the Africa's digital future.
- African countries need to adjust their competition and taxation policies to accommodate the development of digital markets and cross-border trade to guard against oligopolistic and monopolies, with a clear focus to protect consumer and citizen interests, as well as local online businesses. This will help to ensure that the benefits of the digital economy do not only accrue to global platforms and the countries in which they are located.

APPENDIX: METHODOLOGY

The 2017 After Access Survey, which builds on the surveys conducted in 2008 and 2012, uses the same methodology as the previous surveys in 2008, and 2012. This allows for some level of longitudinal comparison. Using a random sampling technique, in the first stage, the national census sample frames are split into urban and rural enumerator areas (EAs). Secondly, EAs are sampled for each stratum using probability proportional to size (PPS). For each EA, two listings were compiled – one for households and one for businesses. The listings serve as sample frame for the simple random sampling. A target of 24 households and businesses are sampled for each stratum, using random samples for each selected EA. From the listed household, members 15 years and older or visitors staying the night were randomly selected based on simple random sampling techniques[30].

Using the above-mentioned process, in 2017, a total of 13 644 households and individuals were selected. Having applied weights to adjust the sample for non-responses and over- or under-representation of urban or rural residents, the survey showed that the populations in the countries surveyed consisted of more women (52%) than men (48%). Generally, the percentage difference between males and females is minimal in all countries except Lesotho.

According to the United Nations, about half (55%) of the world's population live in urban areas. As of 2018, the most urbanised regions are Northern America, with 82% of its population living in urban areas, followed by Latin America and the Caribbean coming in second, with each having 81% of their population living in urban areas, along with Europe (74%) and Oceania (68%). In Asia, half of the population live in rural areas. Despite rapid urbanisation in Africa, in terms of infrastructure development, Africa remains mostly rural, with only 43% of its population living in urban areas[31]. The 2017 After Access finds a similar statistic to the United Nations estimates. The survey shows that six out of ten Africans reside in rural areas. Despite Nigeria being classified as the biggest economy ahead of Lesotho, South Africa and Ghana, the country is mostly rural, with about 60% of its population (15 years and older) living in rural areas. Nigeria, however, is ahead of Mozambique, Kenya, Rwanda, Tanzania and Uganda in terms of urbanisation. By continental standards, South Africa is highly urbanised, with close to seven out of ten South Africans living in urban areas, followed by Ghana with 55% of its population living in urban areas (see Table 14).

Table 14: Sample distribution across the surveyed countries

	MALE	FEMALE	URBAN	RURAL
Ghana	48%	52%	55%	45%
Kenya	45%	55%	26%	74%
Lesotho	27%	73%	43%	57%
Mozambique	44%	56%	33%	67%
Nigeria	50%	50%	40%	60%
Rwanda	47%	53%	22%	78%
Senegal	53%	47%	47%	53%
South Africa	45%	55%	64%	36%
Tanzania	47%	53%	33%	67%
Uganda	49%	51%	24%	76%

30 See: https://www.researchictafrica.net/docs/Survey%20Methodology%202011:12.pdf

31 See: https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html