

**POVERTY
IS SEXIST**

Making The Connection

HOW INTERNET ACCESS COULD HELP LIFT WOMEN AND GIRLS OUT OF POVERTY.

ONE

Acknowledgements

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Why Internet Access Matters

In less than a generation the Internet has revolutionised the lives of billions of people with unprecedented speed. It has changed the way we communicate, work, learn and engage with the world around us. It has also become a vital force for empowerment. Thanks to the Internet some of the world's poorest and most vulnerable people, especially women and girls, can access networks that can help them communicate, set up businesses, and access financial and government services. The Internet helps them and their families lead healthier, safer and more prosperous lives.

Accessing the Internet using mobile technology, in particular, is proving to be effective in areas where connectivity infrastructure is limited at best. Using the Internet, health workers have been able to track patients with the Ebola disease to reduce the risk of spreading the virus in West Africa.¹ Using Internet-based training tools, non-governmental organisations (NGOs) helped upskill 4,500 nurses in a ninth of the time needed using previous methods, reducing costs dramatically.² Farmers in Kenya have been able

to increase their incomes by an average of 13% by using Internet-enabled mobile phones to better manage their supply chains.³

There are significant economic benefits to improving Internet access. According to a 2009 study by the World Bank, a 10% increase in high-speed Internet connections can increase gross domestic product (GDP) per capita by 1.3% on average for developing countries.⁴ Some 70% of small business owners surveyed in developing countries expect to hire more people as a result of using the Internet.⁵

But this digital utopia is not available to everyone. More than half of the world (53%) is still unconnected and where someone lives makes a huge difference to whether they can take advantage of the Internet's potential. Almost 75% of Africa's population is offline.⁶ And almost 85% of people living in least developed countries (LDCs) are offline compared with 19% of people living in developed countries.⁷

Whether someone is male or female matters too. Poverty is sexist – in so many ways, girls and women are hit

harder and have fewer opportunities than men, and access to the internet is no different. Women living in LDCs are 31% less likely than their male counterparts to be connected.⁸

With so much at stake the United Nations (UN), as part of its 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs), set a target to provide universal and affordable Internet access in LDCs by 2020 (9c). But this target is not on track. Today, 737 million people in LDCs are still unconnected. ONE estimates that if current trends continue, by 2020 the gender gap in LDCs will have grown leaving over 75% of women still unconnected to the Internet compared to 63% of men – that is far from equal access. ONE estimates that this gap will mean that 350 million women and girls will be left behind in this effort to connect everyone by 2020.⁹

In this report, ONE calls for an action plan to connect those 350 million women and girls in the least developed countries by 2020. Doing so would have significant benefits for everyone.

This report outlines the challenges girls and women face in accessing the Internet and proposes policy recommendations to close the gap, particularly in LDCs. If national governments, donor governments, civil society and the private sector pull together, we can meet this

target. If not, we will miss a golden opportunity to help millions of people lift themselves out of poverty and ensure they are not left behind in the global transition to a digital economy especially women and girls.¹⁰

This report makes 4 recommendations:

1 INVEST IN A DIGITAL SKILLS REVOLUTION

To ensure that women and girls have the skills to use the Internet effectively

2 BREAK DOWN BARRIERS TO ACCESSING THE INTERNET

To make sure that women and girls have relevant content and can overcome cultural barriers that stop them accessing the Internet

3 INVEST IN OPEN DATA ON CONNECTIVITY

To count the unconnected and track commitments to connect them

4 BUILD INFRASTRUCTURE FOR THE DIGITAL FUTURE

To ensure affordable access for the world's most marginalised people

- **85% of people living in LDCs are offline compared with 19% of people living in developed countries.**¹¹
- **Women living in LDCs are 31% less likely than men to be connected.**¹²
- **By 2015, 85% of people in the poorest countries lived in areas covered by a 2G mobile network but that is barely sufficient for using the web.**¹³
- **Netflix subscribers use more data in a day than the entire population of Africa uses in almost a week***

Closing the Connectivity Gap

The connectivity gap becomes a chasm when it comes to being poor and female. Women in the poorest countries are almost a third less likely to have access to the Internet than men, and the gap increased by 2% between 2013 and 2016. **Analysis by ONE suggests that, given current trends of Internet penetration, over 71% of Africa's girls and women will still not be online by 2020, pushing the connectivity gap between men and women to over 26%.**

Not being able to access the internet disadvantages not just women, but their families, communities and countries. If we don't take action to close the gender connectivity gap now, the next generation of women in LDCs will also miss out on the many potential opportunities for empowerment, education and inclusion offered by the Internet.

The Internet can be a vital tool for fighting poverty but the lack of access in Africa and particularly in LDCs significantly limits the opportunity for women and girls there to share in this bounty. Even where there is access to the Internet, whether through fixed broadband or mobile, many women are reluctant

to get online. A World Wide Web Foundation study found that women in poor urban areas, described as "offline and silent," were half as likely to use the Internet as men, half as likely to voice their opinions online, and a third less likely to use the Internet to find work.¹⁴

Women and girls don't go online for myriad reasons, many of which reflect existing gender disparities. Affordability is a significant barrier. Unconnected women in developing countries often cite high costs as a major reason why they are not using the Internet.¹⁵ Despite falling broadband prices in the poorest countries, the high number of people who live in absolute or extreme poverty means that a basic mobile broadband plan can cost around 15% of average income and up to 30% for a computer based fixed line connection.¹⁶ Given gender pay disparities around the world, obtaining basic Internet is a higher financial burden for women: in sub-Saharan Africa, for example, women earn on average 48% less than men.¹⁷

Other obstacles include the lack of relevant content – the dominant

languages of the web are English and Chinese, and Africa's many and diverse languages are vastly underrepresented online. As a result, women and girls may not be aware of valuable online services and information that can help them and their families. Women and girls also say they do not know how to use the Internet or perceive that it is of little use or relevance, suggesting that more thought must be given to locally relevant content and apps to ensure digital tools help in a woman's daily life.

Cultural barriers are also significant deterrents. Girls are expected to perform disproportionate household chores that stop them from having free time to learn to use the computer. In some cultures, gender relations mean the husband often controls the phone, and some women do not want to appear smart or "techy".¹⁸ Some women can only access the Internet in cyber cafes where they can face sexual harassment and intimidation – and that harassment may also happen online. In fact a major study highlighted security and harassment emerged as one of the top five barriers to mobile phone ownership and use for women.¹⁹

While there are many and varied reasons for women and girls' absence online, perhaps the overriding barrier is access to education. Literacy and awareness of the benefits of the Internet lie at

the heart of getting women and girls online – and out of poverty. Without literacy and digital skills women cannot use the Internet to search for information about healthcare and educational tools for themselves

and their children, expand and grow their businesses, or access financial services. In rural areas isolated by a lack of infrastructure and distance from other communities, the challenges for women and girls are even greater.

Connectivity Impact: Addressing Cultural Barriers³⁷

The Women and the Web Alliance is a public-private partnership between Intel, USAID, NetHope, InterNews, World Vision, World Pulse and UN Women that grew out of the 2014 US-Africa Leaders Summit. The Alliance plans to bring 600,000 young women online in Kenya and Nigeria by 2018 and in doing so, introduce them to opportunities for social and economic empowerment. By joining forces, the Alliance's partners provide digital literacy training, content relevant to women in these countries, work with governments to highlight the broader community benefits of having digitally-literate women, and helping Alliance participants discover social networks online so they can continue to develop their digital skills. The Alliance also operates a mentoring scheme so these young women can develop networks and continue to expand their skills.

Girls' Education & Internet Access

“The Internet is like having a library in your own home.”

Female respondent to an online survey, Veracruz State, Mexico.²⁰

We know that when girls are educated everyone benefits – incremental increases in girls' education correspond with a rise in average national GDP,²¹ a decline in infant mortality, reductions in child pregnancy and marriage, and higher personal incomes. Education, particularly for girls, has been called a “vaccine” for healthier populations.

But in sub-Saharan Africa, only two of 35 countries have reached gender parity in education.²² The Education Commission estimates that in 2016, fewer than 1 in 20 poor, rural girls in sub-Saharan Africa are likely to complete secondary school – seven times less than wealthier, urban boys.²³ And even where significant progress has been made in getting girls into school, the reality is that the quality of education and learning outcomes has lagged.

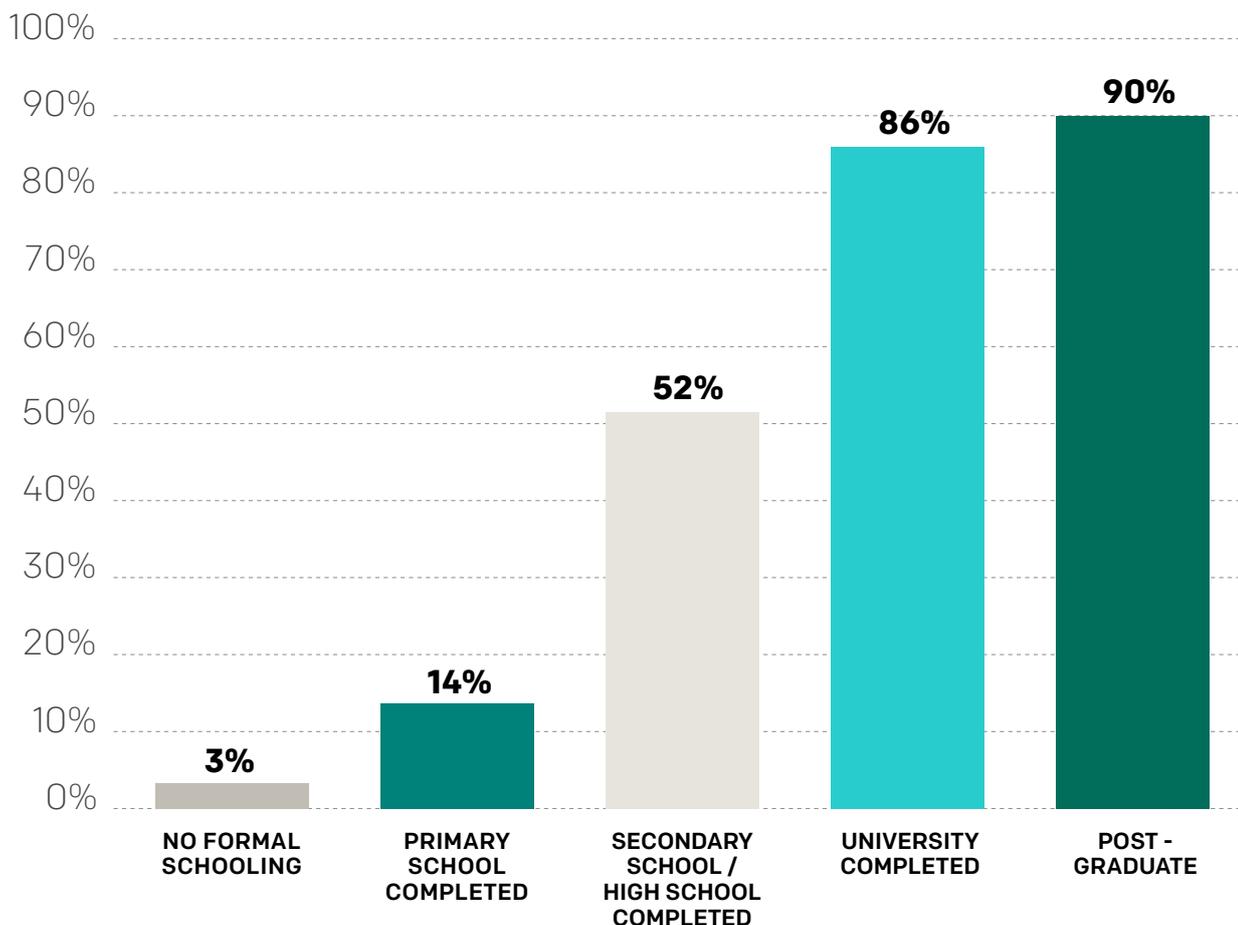
Today approximately 263 million children and youth between the ages of six and seventeen are not in school, and more than 114 million young adults cannot read.²⁴ Access to the Internet can be a powerful tool for improving learning outcomes. Academic research has shown significant increases in performance among students who took all or part of a course online, rather than with traditional classroom instruction.

Examples from the US have shown how the use of mobile computing devices to regularly assess reading progress among young children, then tailor instruction to help them develop oral fluency, resulted in an increase in kindergarten children reading at their appropriate reading age from 29% to 93%.²⁵ In India, using online games to assist in learning led to a 60% improvement in test scores.²⁶ A recent study of the efficacy of tablets loaded with literacy apps in three schools – two in Africa and one in the US – found that the test scores of children using the tablets improved significantly compared with those who did not use the devices.²⁷ Access to the Internet can also help enhance educational administration, automating manual tasks, and reducing the costs of printing and distributing textbooks.²⁸

Changes in education approaches spurred by innovative learning methods and online tools have the potential to improve skills, characteristics and attitudes such as perseverance, motivation and self-control, and spur learning outside of the classroom and into adulthood.²⁹ Surveys by Intel in Egypt, India, Mexico and Uganda suggest that between 77% and 84% of women and girls use the Internet to further their education with many reporting an improvement in grades as a result of using online resources.³⁰ Using Information and communications technologies in classrooms help teachers learn too and, despite the evidence that technology improves education outcomes, it is also clear that, online learning should be blended with face-to-face instruction.³¹

Yet without even basic literacy, access to the Internet does little good. There is a direct correlation between levels of education and Internet use. In Africa, only 3% of people with no education access the Internet regularly, compared with 52% who have completed secondary school. Women who have some secondary education or have completed secondary school are six times more likely to be online than women with primary or no formal schooling.³²

FIGURE 1: PERCENT OF AFRICAN POPULATION USING INTERNET BY EDUCATION ATTAINMENT (2014/2015)



Women and girls who have some education are also more likely to get involved in political and civic activities – an essential factor in helping women and girls feel empowered.³³ A 2015 survey of nine cities in developing countries found that women who are politically active “offline” are twice as likely to use the Internet and three times as likely (after taking into account factors such as education and income) to express opinions online than women who are not politically active offline.³⁴

As more government, financial and social organisations move their activities online, women must be

able to access those sources or risk becoming even more marginalised. A survey by Intel, which looked at women’s use of the Internet in India, Mexico, Uganda and Egypt, found that, in India, 49% of women surveyed looked for information on accessing government services and 54% sought information on financial services and banking. Nearly 60% of female Internet users in India reported using the Internet to search and apply for jobs, and 38% in Mexico reported that they had used the Internet to generate additional income.³⁵ These results suggest that the Internet is a gateway to other useful services.

The sooner women and girls can acquire digital skills and Internet access, the greater the benefits. The Intel survey also found that women who had used the Internet for ten years or more were 32% more likely to earn additional income than those who had used it for less than a year.³⁶ The next generation of African girls must be able to understand and use emerging digital technologies if they are to be able to take advantage of all the opportunities offered by the Internet.

Figure 1 Sources: Afrobarometer 2014/15. Note: Total percentages of the 36 countries in Africa surveyed.

Connectivity Impact: “Kio Kits” from Kenya

Lack of access to technology, poor or non-existent network connections, unreliable electricity supplies, high mobile data costs and a lack of technological literacy are significant barriers to providing digital material to schools. Kenyan start-up BRCK Education is a global network that delivers engaging and interactive books and video content for students in remote areas of Kenya and Tanzania. Its “Kio Kit” consists of a trunk case containing 40 Kio tablets, headphones and a BRCK router. The kit, which costs around \$5000, is designed to survive tough rural conditions – the tablets can survive a drop from 70cm and are water and dust resistant – and the whole system is charged by a single plug. The router serves a mix of the Kenyan curriculum and engaging international content. BRCK works closely with local content providers to ensure learning is contextualised and culturally relevant and the tablets can be updated with new material when connected to the router. Although designed for Africa, Kio Kits are attracting attention from countries across the globe, including the US, and BRCK hopes that the kits could be used in refugee camps or in areas where natural disasters have occurred. The kits are also being used by adult students. BRCK recently joined forces with Intel and Airtel Kenya as part of a travelling ‘digital caravan’ programme to teach digital skills to women teachers and children. So far, around 150,000 women in Kenya, Nigeria and South Africa have received training through the project.⁴²

Four actions to connect girls & women in LDCs

The world needs an ambitious plan to identify and connect the unconnected and ensure that everyone has the skills and literacy to use the Internet – and we are not yet on track. In fact, in its most recent survey of Internet usage, the ITU found that the global Internet user gender gap widened between 2013 and 2016.³⁸ Given current trends, to meet the SDG target would require connecting an additional 725 million people in Africa alone by 2020.³⁹ Current trends in LDCs suggest that 350

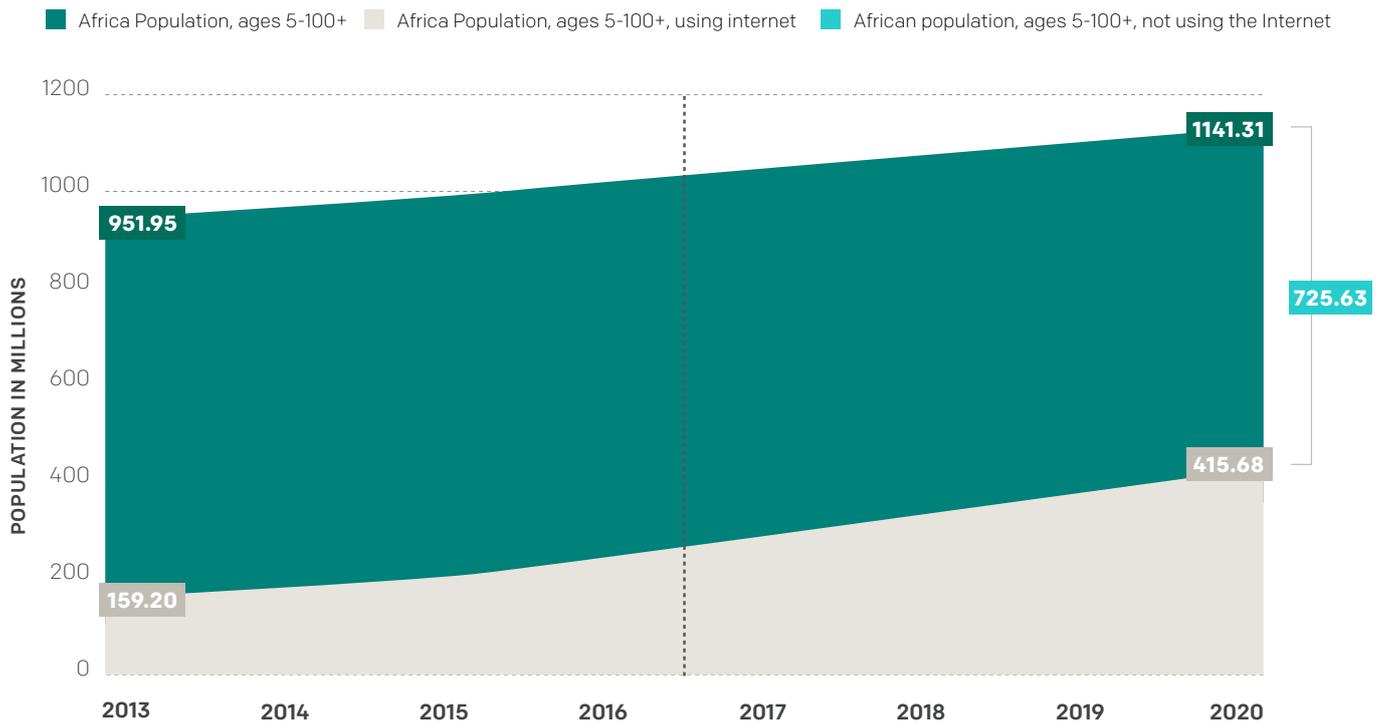
million women and girls will remain unconnected by 2020.⁴⁰ Given women and girls are most likely to be left behind, ONE believes that an explicit focus on connecting women and girls will lead to benefits for everyone.

Ensuring Internet access for everyone means investing in the necessary infrastructure to provide high quality and reliable connectivity. But it also requires an investment in digital skills and relevant content, as well as new

regulations that reduce costs and expand access. Underpinning all of these is an investment in open data so that governments, businesses and civil society understand who is connected, who isn't, and why.

In the following section, ONE outlines four areas that must be prioritised by the international community to ensure that we remain on track to achieve the UN target of connecting everyone in the LDCs by 2020.

FIGURE 2: PROJECTIONS OF CONNECTIVITY IN AFRICA BY 2020



Connectivity Impact: She Will Connect

Organ donation is a taboo subject in Kenya. There is no national organ donor programme and people are often forced to go through the black market to find matching organs. A group of schoolgirls, who learned to code through Intel’s She Will Connect programme, used IntelXDK, a mobile programming language to develop an app that connects patients to donors, and donors to hospitals. The app is now being used by Kenyan hospitals. This is one positive outcome of Intel’s programme which has reached more than 150,000 women through face-to-face training and a further 15,000 women through online training. The programme began in Kenya, Nigeria and South Africa but aims to reach 5 million women in the sub-Saharan region.

Figure 2 Source: ITU 2016, UN Statistics 2015, ONE’s own calculations.

1

invest in a digital skills revolution

Today approximately 263 million children and youth between the ages of six and seventeen are not in school, and more than 114 million young adults cannot read.⁴¹ Without access to education the Internet will do them little good.

At the same time, technological advances and access to the Internet are powerful tools that can be used to improve learning outcomes.

Combining a focus on digital education and literacy has two significant benefits: students will be equipped to participate in the digital economy and access higher-paid jobs, and, when children take their skills home, they can share this knowledge with family members and the broader community. Improving education and digital literacy particularly in the poorest countries in the world, will take commitment from national governments, and creativity on the part of donor governments, civil society and the private sector to bridge both the education gap and the digital divide. Building on the work on the Alliance for Affordable Internet we recommend:

Connecting every classroom

National governments must work with donor governments and the private sector to connect every classroom to the Internet. Leaders should commit to providing every classroom, not just every school, with a broadband connection and the appropriate hardware to use it by 2020. This means children can benefit and not just administrators and offices, which can be the case when a broadband connection simply connects the school.

Prioritise digital literacy

National governments must prioritise digital literacy and education in their schools by developing an ICT curriculum to improve digital skills. These should be taught from primary schools upwards alongside literacy education. Learning digital skills from an early age will prepare and enable students to compete in the digital economy. Training materials should be provided in libraries and stakeholders should promote the creation of online peer networks.

Training teachers in digital skills

National governments should ensure that all teachers are equipped with digital skills so they can use technology to maximise learning outcomes. Without adequately trained teachers, Internet access alone will not improve learning outcomes or revolutionise education in LDCs.

2

break down barriers to accessing the internet

While much of the focus has necessarily been on addressing the infrastructure and cost issues involved in bridging the digital gap, what happens once Internet access becomes more widely available is only now being looked at in any depth. Investment in infrastructure, cheaper access and the wide availability of mobile technology means that more people than ever in Africa can access the Internet but adoption rates are stagnating or even falling in some places. This is an especially worrying trend for sub-Saharan Africa which has a much lower number of Internet users to begin with, with an online population of 25.1%, compared with the global average of over 47.1%.⁴³

When Research ICT Africa surveyed non-users in 12 African countries, about a lack of knowledge about how to access or use the Internet, two of the more frequently cited reasons were either “no knowledge of what the Internet is”, or “no interest in using it”.⁴⁴ Cost and a lack of time are also factors in not using the Internet, so unless content is relevant to the user’s life, there is no compelling reason to spend time and money going online.⁴⁵ As a recent Internet Society report stated, a significant barrier to connecting the next generation of Internet users may be more one of relevance than infrastructure.⁴⁶

The ITU, the UN’s agency for Information Communications Technology has a number of positive initiatives to address these challenges. ‘Girls in ICT’ Day has been running since 2010 to encourage more girls to take up careers in ICT.⁴⁷ The annual GEM-TECH Awards showcases best practices in using technology to empower women and girls around the world. EQUALS is a new initiative of ITU and UN Women to bridge the gap.⁴⁸ But more needs to be done to meet the scale of the need.

Creating and distributing relevant content is essential if non-users are to be encouraged to join the digital revolution. But for that to happen, several issues must be addressed:

Language:

Over half of all Internet websites are in English despite it being the native language for only about 5% of the global population (though it is spoken by many for whom it is not a native language and is an official language for many more). But this is especially an issue in sub-Saharan countries where people often do not speak the official language. In Senegal, for example, less than 10% of the population speak French, the official language.⁴⁹ The problems don't just apply to international content—local or domestic content, such as e-government services are often not in languages that their intended users can understand.⁵⁰

Local content:

Content developed by local producers where, for example, people could find local market prices and news or information about nearby health resources would encourage people to go online. But this requires a cohort of people with the literacy and technical skills to create this content and building such a cohort will take time. There are other considerations to take into account when developing local content: technical issues around the lack of payment mechanisms to purchase content and goods; legal restrictions such as copyright; and technical challenges in creating content in languages that are not widely used. GSMA, the industry association for mobile operators, predicts that locally relevant content will be the main driver in dramatically boosting use of the Internet and mobile-enabled services.⁵¹

Distribution:

The majority of content, regardless of whether it is internationally or locally developed, is hosted outside the country usually because domestic hosting costs are more expensive. When content is hosted abroad, however, download speeds can be much slower, resulting in higher costs and a poor user experience, which then deters further Internet use. An Internet Society study of Rwanda showed that, in this case, locally hosting content actually lowered the cost and latency of access while increasing the usage.⁵² Governments should promote an environment that makes local hosting a viable option, including intermediary liability protection for hosts of third-party content, and investments in reliable electricity. Internet should be extended to marginalised communities and public access such as community Wi-Fi should be provided.

Safe spaces:

Harassment and cultural barriers undermine the ability of women to use the Internet effectively. Countries and businesses should seek to create online and offline “safe spaces”, and offer training to help women and girls to overcome and challenge such behaviour. Countries should also implement serious punishments for online harassment of women. Legislation should define online harassment as a crime by putting in place punitive measures.

Connectivity Impact: HiviSasa⁵⁴

HiviSasa.com is a free online newspaper in Kenya that provides local news from and to readers in ten counties. HiviSasa is tailored for use on mobiles and designed for use on 2G connections. “Citizen reporters” from local communities can submit news stories and articles using their phones, which are then fact checked and edited by HiviSasa’s editors before publishing it online. Contributors are then paid via M-Pesa. Readers can easily access information on local news, job opportunities, political and local events.

Connectivity Impact: Girls Delivering Technology and Entrepreneurship Training in Kenya⁵⁵

Ajra Mohammed and Lilian Kalekye worked with Digital Opportunity Trust (DOT), a youth-led movement, to deliver technology and entrepreneurship training to other young people in their home community of Mombasa, Kenya. While working in their community, Ajra and Lilian learned that young female entrepreneurs who are interested in learning more about technology are often too intimidated to access the training and resources available to them. Ajra and Lilian saw this challenge as an opportunity, and launched a women-only technology training centre at the local technology incubation hub. Because of their social innovation, hundreds of young women are now gaining the skills they need to launch digitally-enabled businesses.

Connectivity Impact: iMlango⁵³

iMlango is an e-learning programme developed for African schools. It delivers high-speed broadband Internet access via satellite, electronic monitoring of attendance and progress, online maths and literacy tools, and resources and support for teachers. The first phase has been rolled out to 150,000 children in 195 Kenyan primary schools. The programme is delivered by a number of companies in Kenya and the United Kingdom – working in partnership with the UK's Department for International Development (DFID) - and is supported by the Kenyan Ministry of Education, Science and Technology.

3

invest in open data on connectivity

Given the amount of information the Internet generates, it is surprisingly hard to find accurate and verifiable data on connectedness at a subnational, gender disaggregated level. The current data on Internet connectivity in LDCs - particularly for women and girls - is too sparse to be useful. For example, only two out of 48 LDCs report gender disaggregated data to the ITU. The constraint in expanding the collection of data on how women use communication technologies, including the Internet, lies largely with governments. Only 29% of countries covered in the 2013 Broadband Commission Working Group on Broadband and Gender report have policies that include references to gender – though initial indications from new research suggest this is improving.⁵⁶

In the meantime, technology companies have a wealth of data that could be used to supplement the gaps in gender data available from governments. Most of this data is not made public due to commercial confidentiality but agreements could be put in place where this data could be used while respecting the intellectual property of the company and the privacy of individual users.

If resources are to be allocated and implemented in the most effective way, we must know and understand where unconnected women and girls live and find out what their needs are. The following policies are recommended to improve the collection of gender-related ICT data:

Developing country governments must increase their collection of gender disaggregated data

By following the guidelines of the ITU Partnership on Measuring ICT for Development governments should place gender equality at the core of their national broadband plans so that they can measure such data against targets. This requires appropriate budget allocations and partnering with local research institutions, such as Research ICT Africa, LIRNEasia and the Regional Dialogue on the Information Society (DIRSI), to collect data and combine efforts. Donors should consider investing in a global online platform that can collate and present this subnational data in open data formats.

Technology and Internet companies must make relevant data public

While governments have a responsibility to collect data, technology companies already have a wealth of data that could help speed up efforts to identify where unconnected women and girls live, so that resources and funds can be deployed most efficiently. They should together disclose this subnational data in an open data format in a way that doesn't undermine the privacy of their customers.

Connectivity Impact: Growing Girls and Women in Nigeria (G-WiN)⁵⁷

The Nigerian government wants to close the gender gap in ICT by committing to “monitor specifically the number of women without access to the Internet; provide incentives for private educational centres and civil society organisations to train more women in the use of the Internet, and have dedicated centres at local government headquarters to serve as safe technology access centres for women. Courses on safe use of the Internet for girls will also be delivered using ICT.”

The G-WIN programme supports projects such as SmartWoman Nigeria, Digital Girls ICT and Federal Ministry of Communications/Huawei 1000 Girls. These initiatives seek to bridge the gender gap in digital access and empowerment by providing women essential health, education and agricultural information online; and training girls to develop ICT skills to increase employability.⁵⁸

4

build infrastructure for the digital future

Without targeted investment in the necessary infrastructure, most African countries will never be able to bridge the connectivity gap. The extraordinary rate of mobile adoption in Africa is due in no small part to the limitations of power supplies, communications, banking and postal services and inadequate roads. But even access to mobile technology is scattered at best. By 2015, 85% of people in the poorest countries lived in areas covered by a 2G mobile network but that is barely sufficient for using the web. Only 29% of those living in rural areas had access to an adequate mobile broadband network.⁵⁹

Given the scale of mobile usage across the continent it would be easy to think that mobile is the only technology that matters, and that Africa has “leapfrogged” the infrastructure limitations around fixed broadband. This is true to some extent, but as the Internet Society highlighted in its policy framework for promoting an environment that enables Internet access, investments in terrestrial fibre infrastructure and other aspects of domestic connectivity, such as Internet exchange points (IXPs) to connect local traffic, are essential in creating an effective fixed broadband platform.⁶⁰

Public investment in fixed broadband access does repay the effort.⁶¹ Where regulatory policies and frameworks are put in place to enable and encourage the sharing of infrastructure such as mobile phone masts and fibre optic cables, the proportion of households with Internet access increases significantly.⁶²

The goal of providing affordable, universal Internet access focuses specifically on connecting people across the world’s LDCs, yet 70% of people in these countries cannot afford a basic, 500MB per month broadband plan.⁶³

Google's Project Loon⁷²

Google's Project Loon consists of a fleet of helium balloons that float through the stratosphere to provide Internet coverage to people in areas too remote to be reached by the more typical communications infrastructure. High speed Internet is transmitted up to the nearest balloon from Google's telecommunications partner on the ground, relayed across the balloon network, and then back down to users on the ground. Google has demonstrated data transmission between balloons over 100 km apart in the stratosphere and back down to people on the ground with connection speeds of up to 10 megabytes per second, directly to their long term evolution (LTE) phones.

This is particularly a problem for women, who often have less financial independence than men, showing how overall gender inequality impacts on a woman's ability to connect to the Internet. In Africa, the average mobile phone owner spends over 13% of their monthly income on calls and text messages.⁶⁴ To put this into perspective, 13% of the median US citizen monthly income is \$366⁶⁵ and for the UK it is \$422 (£247).⁶⁶ And this cost is likely higher for sub-Saharan Africa women who, on

average, earn 48% less than men - further exacerbating affordability of the Internet for women in the region.⁶⁷

The Alliance for Affordable Internet reports that the level at which Internet access is defined as affordable for most income earners is when it is the equivalent of 2% of the average national median income. Investment in ICT infrastructure is crucial to close this gap. It has been shown that for countries that included public investment

in backbone and aggregation in national broadband plans, prices dropped by 4% of gross national income per capita in four years versus 1% for countries that had not invested public money.⁶⁸

Monopolies typically have sole access to networks, closing opportunity for competition to bring down the cost. Many of these networks are also old and inefficient in transferring data. Strong leadership is crucial to encouraging infrastructure investment.

Facebook's Connect the World Initiative⁷³

Free Basics, which is available in 53 countries, provides basic websites via mobile phones that feature local news, information about jobs, health or education. The sites are designed to be simple enough that they don't incur data charges. The Connectivity Lab is researching ways of using satellites, airplanes and lasers to deliver Internet access to remote areas. "Express Wi-Fi" currently being tested in India will allow people to buy cheap data packages from local providers. Facebook says that these initiatives have already brought 25 million unconnected people online.⁷⁴

To expand access to the Internet and reduce costs of access for consumers in LDCs, we recommend the following policies:

Governments must cumulatively increase investment in technology infrastructure by approximately \$1 billion by 2030 to achieve universal access⁶⁹

The Center for Global Development estimates that this is roughly the figure countries will have to invest to extend access to all.⁶⁹ This should be financed through domestic budgets and official development assistance (ODA) where appropriate. In addition to investment in access to infrastructure, local traffic exchanges and hosting services must be improved as these affect costs and the quality of services, and locally relevant content must be promoted.

Internet and mobile markets should be opened up by establishing laws that require infrastructure and network sharing

This will give smaller companies and new entrants the opportunity to compete with bigger providers and bring down prices. Public procurement for connectivity should implement open contracting principles.

Internet infrastructure should be included as a key part of other infrastructure projects

As governments plan to construct or expand roads, bridges and power lines, they should include connectivity as part of the project plan. For example, when power lines are laid, broadband cables can be laid at the same time. To achieve this, governments should incorporate “dig once” policies and address right-of-way issues in legislation.

Alongside investment in connectivity infrastructure, innovative alternatives to Internet delivery should be investigated and evaluated for future investment

Innovative business models such as BRCK, ARPU, and Avanti⁷⁰ are extending connectivity to underserved areas by showing how existing technologies can be profitable. Community-owned networks also offer a viable alternative. For very remote areas, programmes are starting to show how infrastructure limitations can be overcome to more quickly connect the unconnected. Examples are Google’s Project Loon, which transmits Wi-Fi signals from a weather balloon over remote unconnected areas, and Facebook’s Connectivity Lab, which uses drones, satellites and lasers to transmit Wi-Fi signals. But these are ten to 15 years away from large-scale roll out.

Avanti’s Every Child Online (ECO)⁷¹

Avanti’s Every Child Online (ECO) project has been established to provide very low cost broadband Internet eventually to every school in Africa. Schools are fitted with solar cells to power the system that provides the broadband connection to classrooms. A transmitter also connects communities through Wi-Fi. People in a community can download the ECO app to buy and trade credits to access Avanti community Wi-Fi hotspots. Top-ups convert to subsidised broadband for schools. Thanks to initial funding from the European Space Agency, the programme aims to deliver the ECO programme to 1400 communities across Africa over the next two years.

Appendix 1

Methodology for calculating the number of girls and women estimated to be unconnected by 2020

Using data from the International Telecommunications Unions (ITU), we calculated the weighted average rate of decline of the percentage of people not using Internet in the World and Africa between 2013 and 2016. For least developed countries (LDCs) we calculated the average rate of decline between 2015 and 2016, as ITU only publicly publishes data for LDCs at the aggregate level for these two years. We then took these averages for each aggregate group (World, Africa, & LDCs) to project their respective inverse percentage of people using the Internet annually from 2017 to 2020. We then assumed that the growth rate of people using the Internet for each aggregate group from 2017 to 2020 would be the same for men – allowing us to project the percentage of the male population using the Internet for each aggregate group from 2017 to 2020. Then the growth rate of the Internet gender gap for each aggregate

group between 2013 and 2016 was used to project the Internet gender gap for each aggregate group from 2017 to 2020.

The percentage of the female population using the Internet for each aggregate group from 2017 to 2020 was calculated by taking the projected percentage of the male population using the Internet and deducting the projected Internet gender gap differential from 2017 to 2020.

Finally, UN Population projections to 2020 for each aggregate group, ages 5-100+, was then multiplied by these respective Internet usage projections. We excluded the 0-5 age category as this population is unlikely to use the Internet and that the ITU only surveys people over the age of five.

Appendix 2

Methodology for calculating the comparison between data use by Netflix subscribers and that of the population of Africa

Netflix reported to shareholders in Quarter 4 of 2015 that Netflix members streamed 42.5bn hours of content in 2015 or 116.4mn hours per day.⁷⁵ Netflix website suggests that streaming content can use between 0.3 GB per hour (low quality), 0.7 GB per hour (medium), 3 GB per hour for HD and 7 GB per hour for Ultra HD.⁷⁶ Assuming that these four levels of quality are used equally among the hours watched per day, Netflix members used approximately 320.2mn GB per day on average in 2015.

Separately, we used data from CISCO which estimates that that in the Middle East and Africa (including Saudi Arabia and South Africa), data usage per capita is 1.3GB per month or 0.043 GB per day.⁷⁷ If we multiply this by the population of Africa in 2015 from UN Population Data (1.186bn),⁷⁸ we can estimate daily data use for the whole continent

of 51.4mn GB on average in 2015. Alternatively, CISCO estimates that in 2015, total Internet traffic in the region of 'Middle East and Africa' was 1.7bn GB per month, or 56mn GB per day in 2015.

Data usage in 2015 estimated from Netflix on a daily basis (320.2mn GB on average) is between 5.7 and 6.2 times larger than African daily data usage estimate based on 2015 CISCO data (51.4mn or 43mn GB on average).

We believe this to be a conservative estimate due to the fact that the users in the Middle East are likely pulling up the average data usage per capita per month figure provided by CISCO.

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