Development and Access to Information 2017

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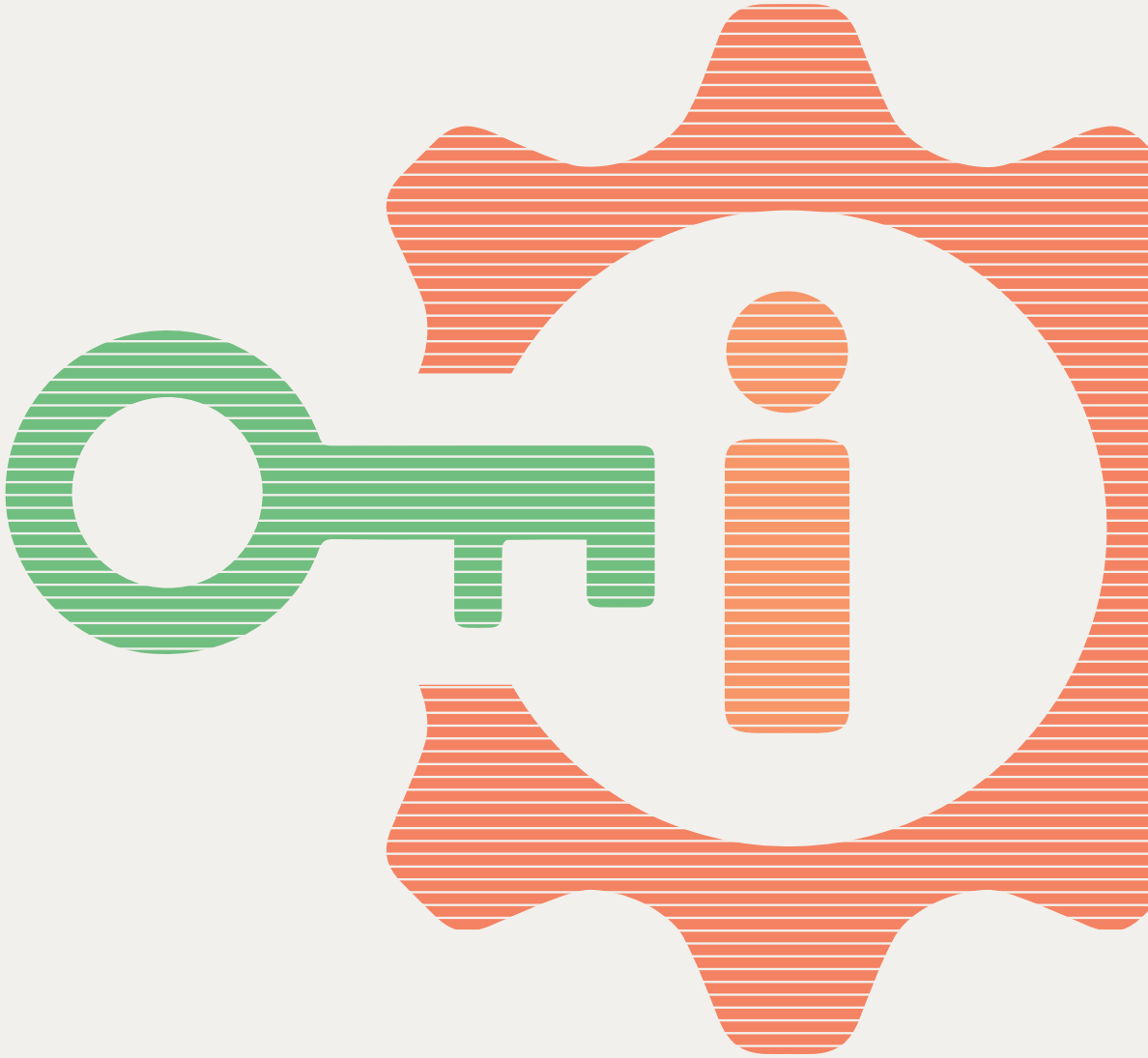
2017



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IFLA
P.O. Box 95312
2509 CH Den Haag
Netherlands
www.ifla.org

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Contact: DA2I@ifla.org
Website: https://DA2I.ifla.org

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Chapter 1:
The State of Access to Information and Development in the United Nations 2030 Agenda

Maria Garrido, Michelle Fellows, and Lucas Koepke
Technology & Social Change Group, University of Washington

Introduction

This chapter examines how access to information can advance the United Nations Sustainable Development Goals (SDGs). For the Development and Access to Information (DA2I) project, we define access to information to encompass the rights and capacity to use, create, and share information in ways that are meaningful to each individual, community, or organization. While the value of information access has been demonstrated in many settings, the adoption of the UN SDGs and the corresponding UN 2030 Agenda provides an opportune moment to consider the broader relationship between information and development.

For this project, we systematically selected 17 indicators, embedded in SDG targets, that correspond to the four dimensions of the DA2I framework – infrastructure, capabilities of use, the social context of adoption, and the legal and policy environment – to highlight the ways that access to information contributes to development. (See Table 1.1 for the list of indicators grouped by DA2I dimension.)

Together, these indicators comprise the DA2I baseline that we will track over the period of the UN 2030 Agenda. By monitoring these indicators over time, our goal is to reveal ways that access to information can contribute to sustainable development.

When individuals and communities develop the skills and resources to obtain, share, create, and express information, they are building powerful mechanisms to address the challenges that are most pressing to *them*. By promoting access to information, we strengthen a bottom-up mechanism for development that is fundamentally community-centered, customized, and localized. This is a powerful lever for progress on the SDGs generally, and specifically on the targets that are most meaningful to communities and individuals. Policymakers and development practitioners should take notice.

Research approach: Operationalizing the DA2I framework

The research process consisted of analysis to support development of the indicator baseline; stakeholder consultations; data analysis strategy (curation, processing, and analysis); and country classification.

1. **Indicator research.** We began with an extensive review of existing indicators from three dozen international organizations that research and monitor development-related indicators, such as the International Telecommunication Union (ITU), World Bank, and UN Development Programme.[1] The resulting collection of 300 potential indicators was then culled according to several criteria, including geographical coverage, recency and frequency of data collection, relevance, and availability. Table 1.1 provides a list of the indicators selected for the baseline. Appendix 1 summarizes our methodological choices, selection procedures and sources.

2. **Stakeholder consultations.** Representatives from the UNESCO Institute for Statistics, NGOs, and the International Federation of Library Associations and Institutions met with DA2I researchers to discuss the project. (See the acknowledgements page for a comprehensive list of stakeholders consulted.) The consultations were instrumental in guiding the project's approach to baseline indicator selection and data analysis.

3. **Data analysis strategy.** After selecting indicators, we amassed and processed a large body of data associated with the indicators. The variety of data sources, data types, and data collection strategies introduced comparison challenges. For example, the datasets often depicted inconsistent geographies, categories, definitions, and time periods. We tackled the inconsistencies on a case-by-case basis and documented our approaches in Appendix 2.

4. **Classification**. Global data is presented by region, applying the regional groupings used in the UN SDG report, or by income group, applying World Bank income group classifications. Country-level data is presented in instances when the associated indicator was collected in a subset of countries, such that regional grouping of this smaller number of countries would not be representative of that grouping at large. Finally, in some circumstances we apply the labels "developing country" and "developed country" in the same manner as the UN SDG report. However, we also recognize the ongoing debates around this terminology, and sometimes use other characterizations as appropriate, such as "less developed," "more developed," etc.

Limitations of our approach

Our methodological and analytical approach has shortcomings. These limitations do not invalidate the approach, but rather impose a challenge for future scholars and practitioners to account for the blind spots and counteract them over time. Limitations include:

Overreliance on information and communication technology (ICT) indicators. Conceptually, we understand access to information encompasses a variety of channels and outlets, both formal and informal, analog and digital, emergent and traditional (e.g., community radio and newspapers). In practice, our analysis is limited to data that are currently collected and publicly available, which is largely ICT-based. As such, measures of technical infrastructure, connectivity, and internet usage are prominent in our analysis. On one hand, the growth of the internet and digital networks have elevated the importance of access and introduced a crucial multiplier of scale – digital information is now available in real time, the world over. On the other hand, we acknowledge that measures focused on the internet do not and cannot tell the whole story.

Limited availability of indicators. Selected indicators cover a small fraction of the variables that could conceivably fall within each dimension of the DA2I framework. This is mostly due to the body of indicators available. Whereas measures of infrastructure and the social context of adoption tend to be more available, indicators of types and capabilities of use and the legal and policy environment are more rare and more likely to be limited in terms of geographic reach, public availability, comparability (i.e., being episodic or new endeavors without an established track record), and level of disaggregation. Some critical issues, such as language diversity on the internet, could not be addressed easily. Nor could international data on libraries, which had been collected periodically but not on an ongoing basis. There is currently data on computer usage, mobile and internet adoption, and ICT skills disaggregated by location, composition

Table 2: Indicators selected to establish the DA2I baseline, per dimension

DA2I Dimension	Indicators	Source(s)
Infrastructure	Population covered by at least a 3G mobile network, by type of network Active mobile broadband subscriptions per 100 inhabitants Fixed broadband subscriptions per 100 inhabitants Percentage of households with internet access Percentage of households with a computer	ITU
Social context of adoption	Percentage of population living below the national poverty line Gender Inequality Index Share of youth not in education, employment or training, by gender	World Bank UNDP International Labor Organization
Capabilities of use	Percentage of internet users Percentage of females using the internet Individuals using the internet, by age and gender Individuals with ICT skills, by type of skills by gender Individuals using the internet, by type of activity	ITU
Legal and policy environment	Civil Liberties Index Political Rights Index Freedom on the Net Freedom of Discussion	Freedom House Freedom House Freedom House Varieties of Democracy Index (V-Dem)

of households, education level, gender, and age, but the data are inconsistent and represent a very limited number of countries.

Exclusion of established indexes. At least a dozen relevant indexes were not selected for the DA2I indicator baseline due to the complexity involved with applying their combination of variables to the DA2I framework and analysis. Excluded indexes included the ICT Development Index (ITU), the Mobile Economy Index (GSMA), and the Inclusive Internet Index (the Economist). However, the DA2I baseline includes two indexes from Freedom House because they are critical to measuring the legal and political dimension of access to information.

Finally, it is of utmost importance to recognize that ours is one of many efforts to track the changing landscape of access to information. Many organizations collect and analyze data, prepare reports, maintain public databases, and build networks to make progress on a variety of connected issues. It's important to harmonize these efforts. Recognizing these interconnected values can magnify the impact on policymaking and support advancement of the SDGs through access to information. We want to recognize the organizations whose work is aligned with our own. (See the acknowledgements pages and the list of data sources.)

The chapter provides a baseline snapshot of the current state of development and access to information based on available data. It also describes opportunities to improve research efforts, data collection, and methodological choices as development agencies progress toward 2030. The chapter is divided into four sections, and each section corresponds to a dimension of the DA2I framework.

Section 1. Digital provides: technical infrastructure and connectivity

Section 2. Digital divides: internet users and capabilities for meaningful information use

Section 3: The social context of adoption: poverty, gender inequality, and youth opportunity

Section 4: The legal context of adoption: civil liberties, political rights, and freedom on the net

1. Digital provides: technical infrastructure and connectivity

The first dimension of access to information is physical infrastructure: the reach and robustness of information and communication technologies. Such infrastructure is critical to achieving a more equitable distribution of knowledge and resources, while also providing a platform for sustainable economic growth.

Our analysis uses two sets of indicators of technical infrastructure: mobile indicators and fixed, landline indicators. The distinction between these forms of access presents a contrasting picture of diffusion of technologies and corresponding constraints across settings. For example, telephone landlines and desktop computers were critical to the evolution of household internet access in more-developed contexts but have played smaller roles in less-developed contexts, due to the falling cost of wireless access and the explosive growth and availability of wireless handheld devices. Furthermore, each technical platform encourages certain types of use, discourages others, and launches homegrown appropriations. For example, much social networking is perfectly attuned to a handheld mobile device, while working with spreadsheets and complicated databases is much more inviting with a larger screen.

We use the following indicators to assess the infrastructure and connectivity in different regions of the world:

Mobile indicators

- Population covered by at least a 3G mobile network
- Active mobile broadband subscriptions per 100 inhabitants.

Landline indicators

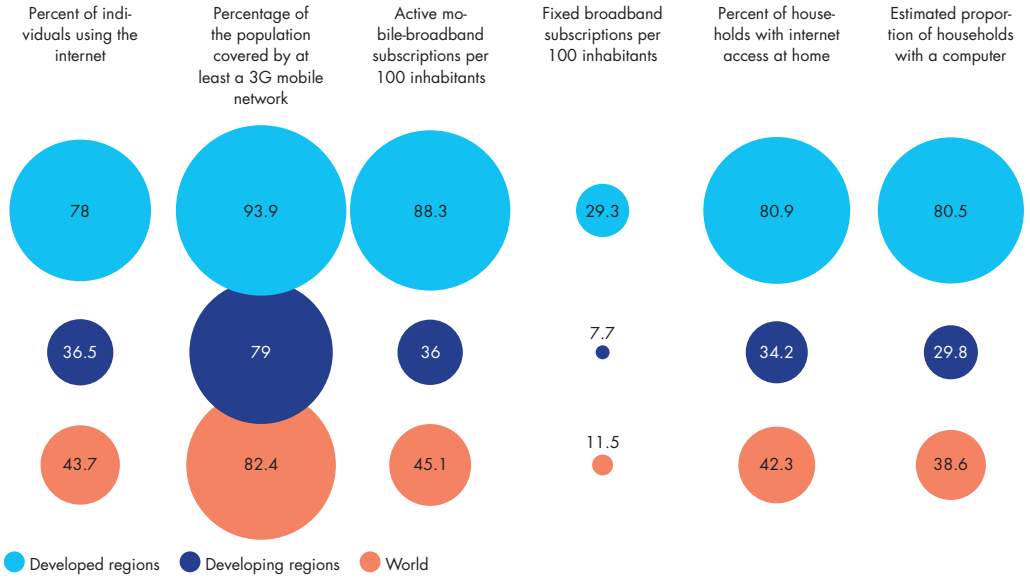
- Fixed broadband subscriptions per 100 inhabitants
- Percentage of households with internet access
- Percentage of households with a computer

Before diving into specific indicators, it's worth recognizing that globally people are increasingly using the internet to address their information needs. As shown in Figure 1.1, from 2010 to 2015 nearly 1.3 billion people came online, a majority via mobile devices. By 2016, almost 45 percent of the world's population used the internet and 80 percent of people lived in areas covered with a 3G network or better. Despite the network coverage, far fewer mobile broadband subscriptions were active in less-developed countries (36 per 100 inhabitants) than in more-developed countries (88 per 100 inhabitants). Internet access at home also grew from 14 percent to 34 percent in the same period.

1.1 Mobile indicators

Among the people of the world whom the UN SDGs are most intended to serve, mobile access is dominant. Mobile phones, and increasingly smartphones, have become the de facto information and communication tool in less-developed settings. Subsequent data demonstrate this.

Figure 1.1: Overall state of A2I infrastructure availability in 2015 worldwide



Source: ITU

Note: Data from 2015. Percentage of individuals using the internet (187 countries); fixed broadband subscriptions (196 countries); number of mobile subscriptions (189 countries); active mobile-broadband subscriptions (184 countries); percentage of population covered by at least 3G (166 countries); estimated proportion of households with a computer (185 countries); percentage of households with internet access at home (181 countries).

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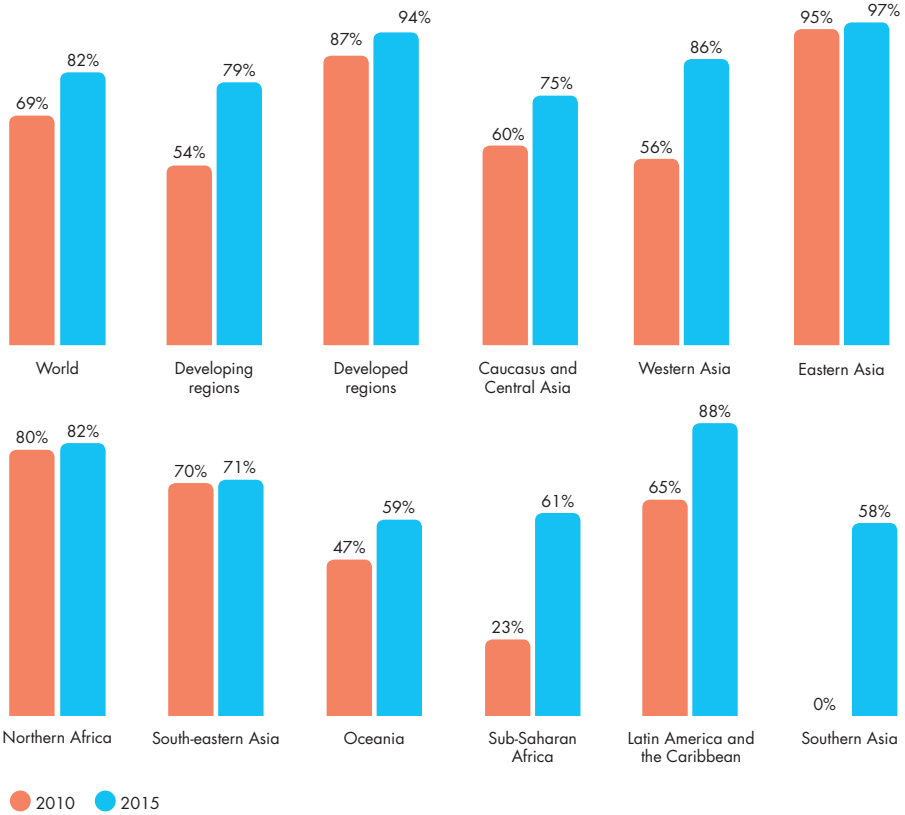
Figure 1.2: Five-year growth in percentage of population covered by at least a 3G network (2010-2015).



Source: ITU

Note: 166 countries in 2015, 84 in 2010.

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ITU Connect 2020 target: By 2020, at least 60 percent of individuals in less-developed countries and 20 percent in the least developed countries should be using the internet.

1.1.1 Population covered by at least a 3G mobile network

Third-generation wireless mobile telecommunication technology (3G) is a technical standard that enables new and advanced mobile applications, such as global positioning system (GPS), mobile video, video conferencing, etc. 3G is effectively a baseline networking technology for "smartphones" and internet-enabled mobile devices. At the end of 2015, 3.24 billion people (44 percent of the global population) were connected to the mobile internet. Of this connected population, 1.18 billion were accessing the internet using 2G networks and 2.06 billion were using 3G or 4G networks (GSMA, 2016).

As shown in Figure 1.2, in 2015 close to 80 percent of people living in less-developed countries were covered by at least a 3G mobile network – almost 30 percent more than in 2010. Southern Asia, with its dense population, exerted the biggest influence on the global statistic; the region's 3G coverage jumped from 0.4 percent to 57.9 percent of the population. Sub-Saharan Africa experienced the second largest jump – from 23.4 percent to 61.4 percent.

While the growth of 3G networks has been swift, large swaths of the population are still uncovered. Also, this statistic does not describe the percentage of the population that *uses* 3G networks. Rather, it describes the coverage that the towers provide – the percentage of people who *could* get on the network if they had the right phone, data plan, and social resources to meaningfully use the network.
Although there is no specific Connect 2020 target for 3G network coverage, this indicator can serve as a proxy to assess the likelihood that the infrastructure is available for more people to connect to the internet.

Based on this parameter, the countries with the lowest 3G network coverage are at the highest risk of not achieving the target of individuals using the internet. (See Figure 1.3.)

1.1.2 Active mobile broadband subscriptions per 100 inhabitants

While 3G coverage gets at potential connectivity, *mobile broadband subscriptions* start to get at the number of individuals actually using this infrastructure. This indicator measures the number of subscriptions to mobile broadband, and as such, it represents a more accurate depiction of the percentage of individuals who are able to connect to this service. Mobile broadband has a higher penetration rate than fixed broadband and is therefore an important channel for accessing information in developed regions. (In less-developed regions, mobile broadband subscriptions numbered 36 per 100 inhabitants, representing substantially more access than fixed broadband subscriptions, which numbered only 12 per 100 inhabitants.)

From 2010 to 2015, mobile broadband subscriptions increased from 12 per 100 inhabitants to 45 per 100 inhabitants worldwide. Growth was higher in more-developed countries, where subscriptions increased from 45 per 100 inhabitants to 88 per 100. Subscriptions in less-developed countries increased from 5 per 100 inhabitants to 36 per 100, with significant regional and cross country variations. (See Figure 1.4.)

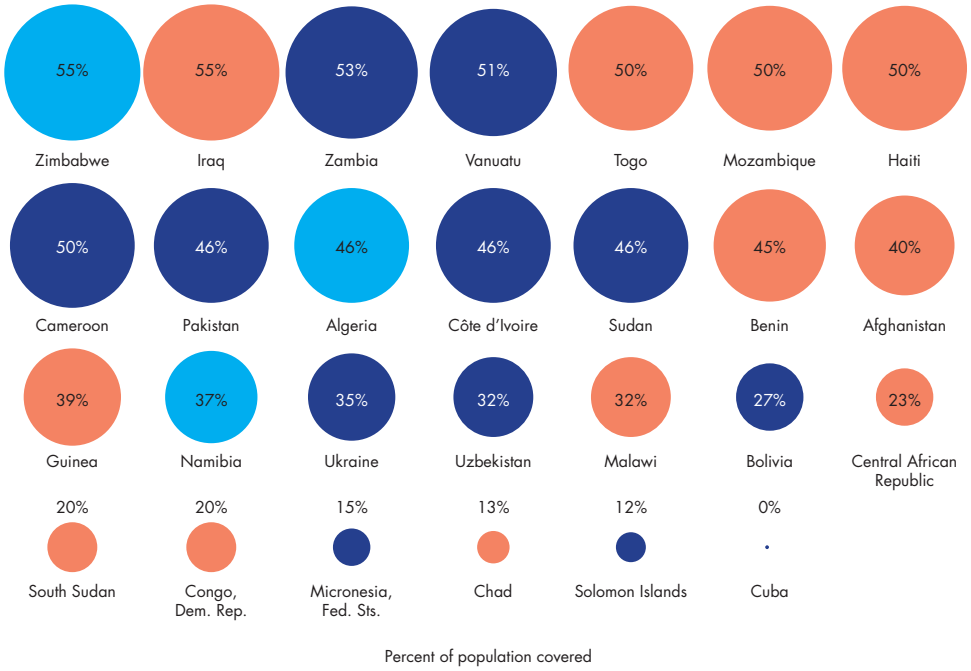
Latin America experienced the highest growth, increasing from 6.8 subscriptions per 100 inhabitants to 59.6 per 100. Eastern Asia experienced similar growth, from 6.9 subscriptions per 100 inhabitants to 57.7 per 100. Oceania and Southern Asia showed the

Box 1.1 : Rhizomatica empowers indigenous telecommunications operators in Mexico

Based on data from the Mexico Conectado program to promote digital inclusion in Mexico, in 2013 around 29 percent of urban households had access to internet in the country, while only 2 percent in rural areas could use these services. In order to address this regional gap, different organizations have promoted the consolidation of community networks to provide indigenous communities with access to connectivity. One example is Rhizomatica, an organization that has provided open-source telecommunication technologies to empower indigenous communities to become their own mobile operators and address the needs of the community. Additionally, Rhizomatica trains rural organizations to work with technology and works with rural organizations and government agencies to promote regulations that enable these groups to access services without requiring the support of bigger service providers.

Sources: Mexico Conectado, Rhizomatica

Figure 1.3: Countries with the lowest 3G network coverage by income group (2015).



Source: ITU.
Note: 27 of 166 countries selected, data from 2015
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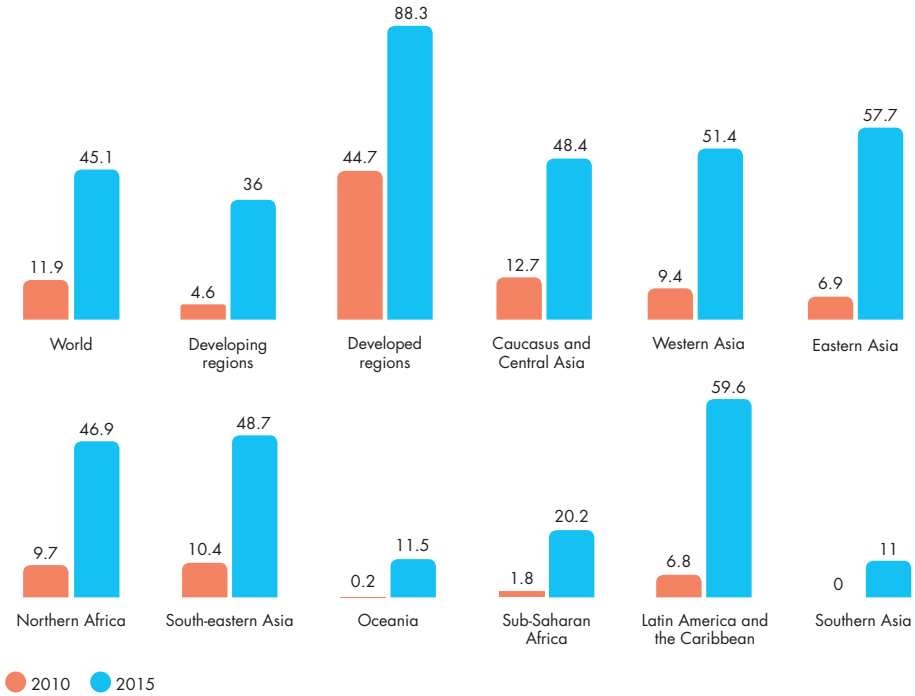
Figure 1.4: Mobile broadband subscriptions growth from 2010 to 2015 by region.



Source: ITU.
Note: Includes data from 198 countries in 2015, 184 in 2010
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Box 1.2: Kenya enables fast internet growth, but network speed and affordability are still a challenge

Internet services arrived in Kenya in 1995, when its first commercial ISP was established. By 2000, more service providers arrived in the country and cybercafés started flourishing, mostly in Nairobi. Later, the Communication Commission of Kenya was created to regulate the sector and provide licenses to broaden the market and limit the capacity of the incumbent monopoly. Over time, regulatory measures enabled additional parties to invest in upgrading infrastructure and offer services to make telecommunications more accessible. The country's efforts were supported by its participation on the Internet Governance Forum and the consolidation of a National ICT Masterplan in 2014 (renewed in 2017) to drive growth through access to connectivity services. Today, Kenya's rate of access to the internet is among the highest in Africa. Nevertheless, the speed of its network is still low in contrast with other countries, and most of the internet subscriptions there are for mobile services.

Source: Communication Authority of Kenya (2016); Souther & Kerretts-Makau (2012)

Box 1.3 Jordan's mobile subscriptions and ICT industry grow despite taxation controversies

According to Ericsson Mobility Report, June 2016, a young and growing population, rising GDP, and smartphone uptake are expected to continue encouraging mobile broadband subscription growth in the Middle East. In the case of Jordan, its ICT industry has gained significant relevance over the past few years, generating 12 percent of the country's GDP despite employing only 1 percent of the population. With its fast mobile market growth, Jordan now has four mobile operators competing next to some recently established mobile virtual network operators. At this point, 65 percent of Jordanians have smartphones, and relevant investment is taking place to increase 3G and 4G services. In this context, mobile broadband subscriptions are on the rise as well, also supported by infrastructure and market regulation to maintain high growth rates. However, Jordan continues to have one main barrier to access: a controversial special taxation on mobile services for users and providers.

Sources: Ericsson, Export.gov

slowest growth of mobile broadband subscriptions from 2010-15. Those regions also started the time period with the absolute lowest number of active subscriptions, 0.2 and 0.0 per 100, respectively, so the data probably reveal network effects – the value of the network grows in proportion to the number of people using the network. Sub-Saharan Africa increased its mobile broadband subscription base from 2 per 100 inhabitants to 20 per 100.

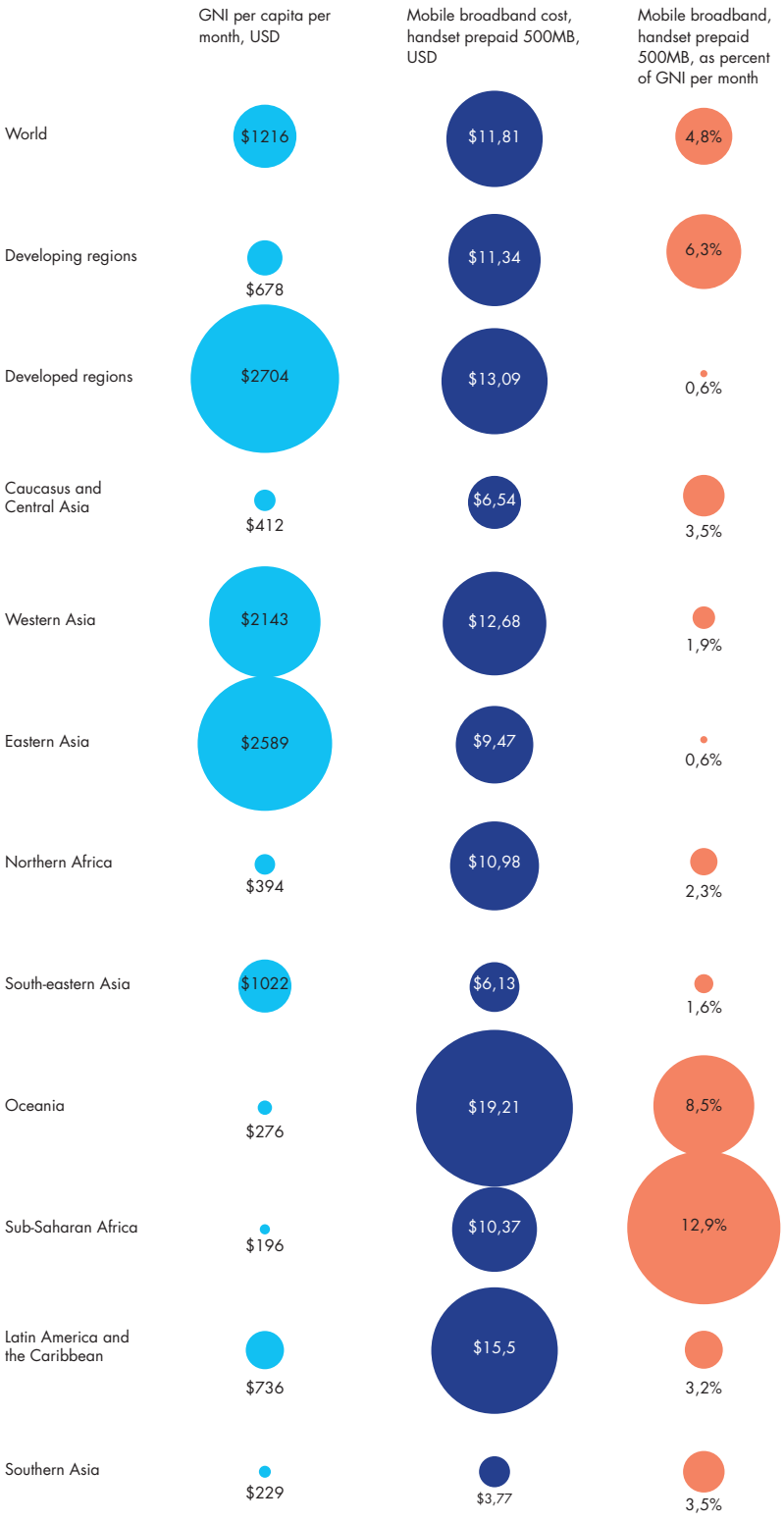
Affordability of mobile broadband subscriptions

Worldwide, mobile broadband adoption is accelerating and costs are dropping. According to the GSMA, 2016:11:

> *"There is an accelerating technology shift to mobile broadband networks across the world. Mobile broadband connections (3G and 4G technologies) accounted for almost 50 percent of total connections at the end of 2015, and are set to increase to more than 70 percent by 2020. The factors driving this migration are greater availability and affordability of smartphones, more extensive and deeper network coverage, and in some cases operator handset subsidies."*

While costs may be dropping, "affordability" means something different in each context, and the cost of services and devices remains a challenge for internet access. According to the ITU (2016), monthly average worldwide mobile broadband prices have dropped to 5 percent of gross national income (GNI), in line with the Connect 2020 target, but when that target ratio is viewed by region it reveals uneven gains. As our analysis reveals, across less-developed regions mobile broadband costs on average 6.8 percent of monthly GNI per capita. The situation is worse in Sub-Saharan Africa, where mobile broadband costs almost 13 percent of monthly GNI per capita, and in Oceania at 8.5 percent. Contrast this with more-developed regions, where mobile broadband costs just 0.6 percent of monthly GNI per capita. (See Figure 1.5: Mobile broadband costs as a percentage of monthly GNI.) Multiple factors influence broadband prices and the way mobile service is rolled out in different regions. Governments play a leading role by setting factors

Figure 1.5: Mobile broadband costs as a percentage of monthly GNI.



Source: ITU.
Note: 177 countries, data from 2015.
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Box 1.4: Mobile broadband efforts to make prices more affordable: Private industry strives to attract lower-income customers in Latin America

In Latin America, one of the main reasons why access to mobile broadband has increased over the past few years is the decreasing price of services, motivated by regulatory measures that boost competition between private providers. Within this context, market stakeholders have generated plans that adapt both to the needs of population with high purchasing power and to those located in "the base of the pyramid," a concept that is popularly utilized to describe individuals from the lower three-tenths of the income range. In countries with high levels of inequality such as Mexico, Brazil, or Argentina, this target group conforms from 20 percent to 35 percent of the population, thus representing an opportunity for organizations that can provide services at low operational costs.

Source: GSMA, 2013

such as tax policy, regulatory schemes, spectrum management, and terms of competition. Private firms can also offer creative pricing and flexible service packages to reach both wider and more narrowly targeted customer groups. When monopolistic behavior can be avoided, the growth in subscriptions can drive variation and lower prices. These forces can be mutually reinforcing – more users lead to more variation in pricing and offerings and vice versa (Alliance for Affordable Internet, 2016). It will be interesting to track this growth over time. Mexico, Argentina, and Brazil provide a useful case study for this dynamic. (See Box 1.4: Private industry strives to attract lower-income customers in Latin America.)

Mobile connectivity and use is an essential access channel for information worldwide, and especially in less-developed communities. These indicators represent the starting point for understanding access of this type. As people continue to use and appropriate these tools to serve their information needs, researchers should be vigilant for new indicators to provide a deeper understanding of how mobiles contribute to development.

1.2 Landline indicators

If global internet diffusion followed the path of more-developed communities, it would begin with computer access, then those computers would be networked together, then those networks would grow faster and become more robust. Due to a variety of social and market forces, diffusion has not followed that path. Still, those indicators are useful because they describe certain dimensions of access that are relevant for the UN SDGs.

1.2.1 Percentage of households with a computer

A personal computer in the home describes a certain social environment, with a minimum of security, electricity, space, resources to pay for the outlay and maintenance, etc. And even in settings where those material resources are present, there may be other social and personal factors that make a household computer undesirable or unrealistic. Still, in many settings people aspire to a home computer and perceive its utility.

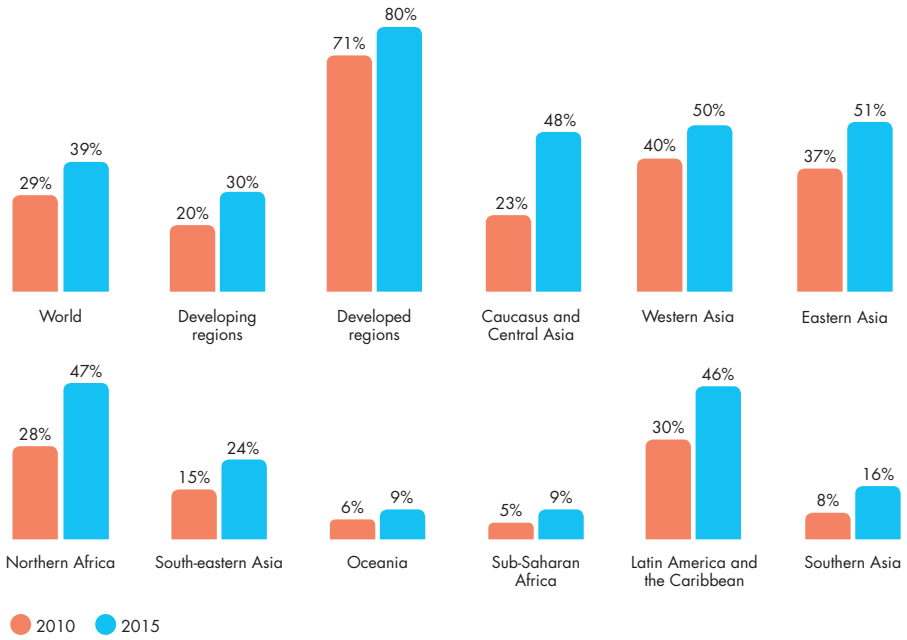
Over the period from 2010 to 2015, household computer penetration grew from 29 percent to almost 40 percent. This growth was experienced in both less-developed and more-developed countries, however with significantly different levels of penetration – almost a third of households in less-developed regions had a computer available compared to 80 percent in more-developed ones. The highest growth was in the Caucasus and Central Asia, followed by Northern Africa (25 and 19 percentage points, respectively, over 5 years). (See Figure 1.6: Estimated proportion of households with a computer.)

1.2.2 Percentage of households with internet access

The household computer is substantially more valuable when it can take advantage of the network effects of the internet. While mobile internet access is the dominant form of connectivity around the world, the percentage of households with access at home has grown. From 2010 to 2015, home internet connectivity increased from 24 percent to 42.3 percent worldwide, which is on track to achieve the ITU Connect 2020 target of 50 percent household access, particularly in less-developed countries. For the least developed nations, the target is set at 15 percent.

Despite this progress, regional variation once again reveals significant gaps. Western Asia (57 percent) and Eastern Asia (56 percent) achieved the highest growth. At the other end of the spectrum, fewer than 10 percent of households in Sub-Saharan Africa and Oceania are connected to the Internet. Jordan, Morocco, Kazakhstan, Armenia, Thailand, and Costa Rica are among the countries that experienced the highest growth (relative to where they were in 2010). (See Figure 1.7 for household internet penetration from 2010 to 2015.)

Figure 1.6: Estimated proportion of households with a computer.



Source: ITU.

Note: 182 countries in 2015, 85 in 2010.

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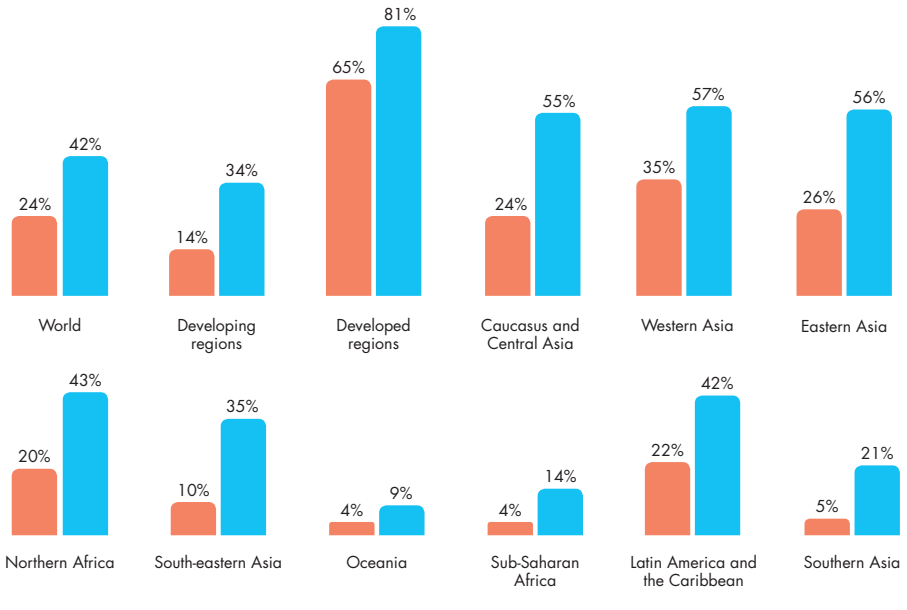
Figure 1.7: Household internet penetration growth from 2010 to 2015.



Source: ITU.

Note: 181 countries in 2015, 179 in 2010.

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Affordability of household internet access

Affordability is the key bottleneck for household internet access. "Available data from 2013 confirm that the costs of ICT equipment and services remain an important barrier in countries that track this information. In Mexico, Brazil and Colombia, populations covered by the survey indicate that either equipment costs or service costs are the most important reason for not having internet access at home" (ITU, Measuring the Info Society Report 2016).

1.2.3 Fixed broadband subscriptions per 100 inhabitants

Broadband subscribers is an indicator of the prevalence of faster, higher-capacity connections. These connections tend to be more reliable and particularly useful for digital activities that rely on intense use of resources – multimedia, data-intensive two-way communication, etc. Broadband subscriptions are often shared connections at businesses, households, apartments, libraries, or community centers. Although mobile internet connectivity is the most popular access vehicle in all regions of the world, fixed broadband is also growing, albeit at a slower pace. It also offers unique benefits: higher speeds and greater reliability (ITU, Measuring the Info Society Report 2016).

Worldwide, from 2010 to 2015, fixed broadband grew from 8 to 12 subscriptions per 100 people. Growth was slower in less-developed regions, which increased from 4.2 to 7.7 subscriptions per 100 people, than more-developed regions, which increased from 23.9 to 29.3 per 100. Sub-Saharan Africa (0.2 per 100 people) and Oceania (0.2 per 100) experienced the least growth. Eastern Asia led with 10.2 additional subscriptions per 100 inhabitants. (See Figure 1.8 for regional growth of fixed broadband.)

Affordability of fixed broadband

The primary impediment to growth of fixed broadband is cost. Worldwide fixed-broadband affordability grew until 2013; since then, affordability gains (as a percentage of per capita GNI) have stagnated. According to the ITU: "These developments, which distinguish fixed-broadband services from all other services for which ITU collects data, are alarming, since higher fixed-broadband prices will remain a major barrier to further uptake" (ITU, *Measuring the Information Society Report 2016:3*).

This situation is pronounced in less-developed countries. From the ITU: "In developing countries, fixed-broadband prices remain relatively high, and actually became less affordable during last year. In 2014, the ITU basket in developing countries represented an average of 29 percent of GNI p.c., up from 25 percent a year earlier. Globally, the fixed-broadband basket as a percentage of GNI p.c. grew from 17.9 to 20.8 percent. This average conceals huge differences between individual countries but shows that, in many developing countries, the service remains out of reach for many people, especially those with low incomes." (See Figure 1.9: Fixed-broadband prices as percentage of GNI.)

This section has assessed regional differences in the availability of information and communications infrastructure using five baseline indicators. Landline and mobile connections have followed different trajectories over the past five years, with substantial increases in availability of mobile connections relative to landline connections, driven by differences in affordability. In order to have digital access to information, technical connectivity must be present. Then, a variety of social factors converge, which further enable and constrain the quality and nature of that access. Connectivity provides many benefits, but that picture is incomplete without filling in the critical gaps in access – the divides between and within the haves and have nots that are artifacts of our social relations and the social context in which users access the internet.

2. Digital divides: internet users and capabilities for meaningful information use

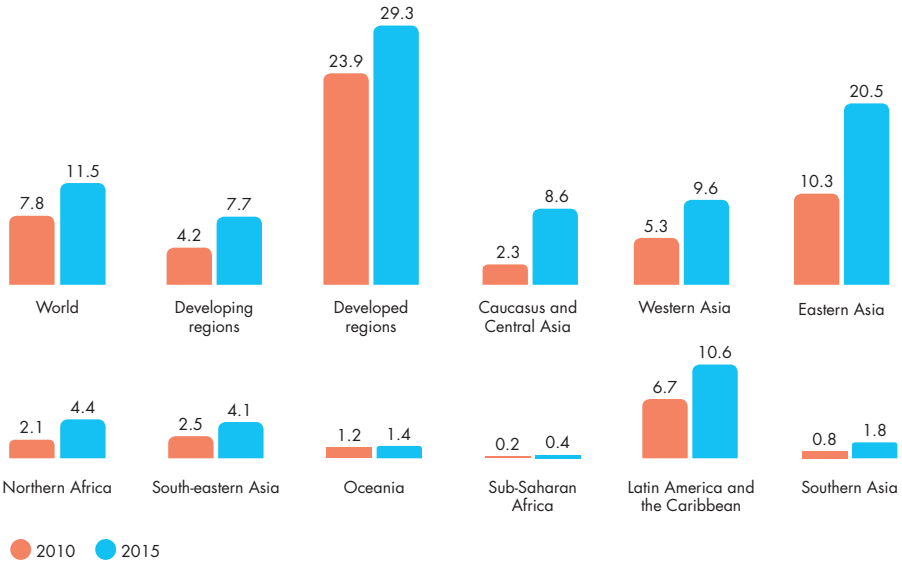
While physical connectivity constitutes a critical building block in the information access ecosystem, it is insufficient to guarantee meaningful access. The physical infrastructure is laid across a social landscape that is fraught with barriers and inequities that afford some people the resources to make use of connectivity while hindering meaningful access by others. Socio-demographic analysis helps reveal resources and barriers that affect the quality of information access.

This section analyzes the socio-demographics of the people who access, use, create, and share information via ICT, per the capabilities outlined in the DA2I framework. We also consider the other side of the equation: those on the other side of the digital divide, for whom access is insufficient.

In order to gauge the impact of the UN SDGs through the lens of DA2I, we use the following indicators:

- Percentage of population using the internet
- Percentage of females using the internet
- Individuals using the internet, by age and gender (limited data available)
- Individuals with ICT skills, by type of skills by gender (limited data available)
- Individuals using the internet, by type of activity (limited data available)

Figure 1.8: Fixed broadband growth by region 2010 - 2015.



Source: ITU.

Note: 197 countries for both years.

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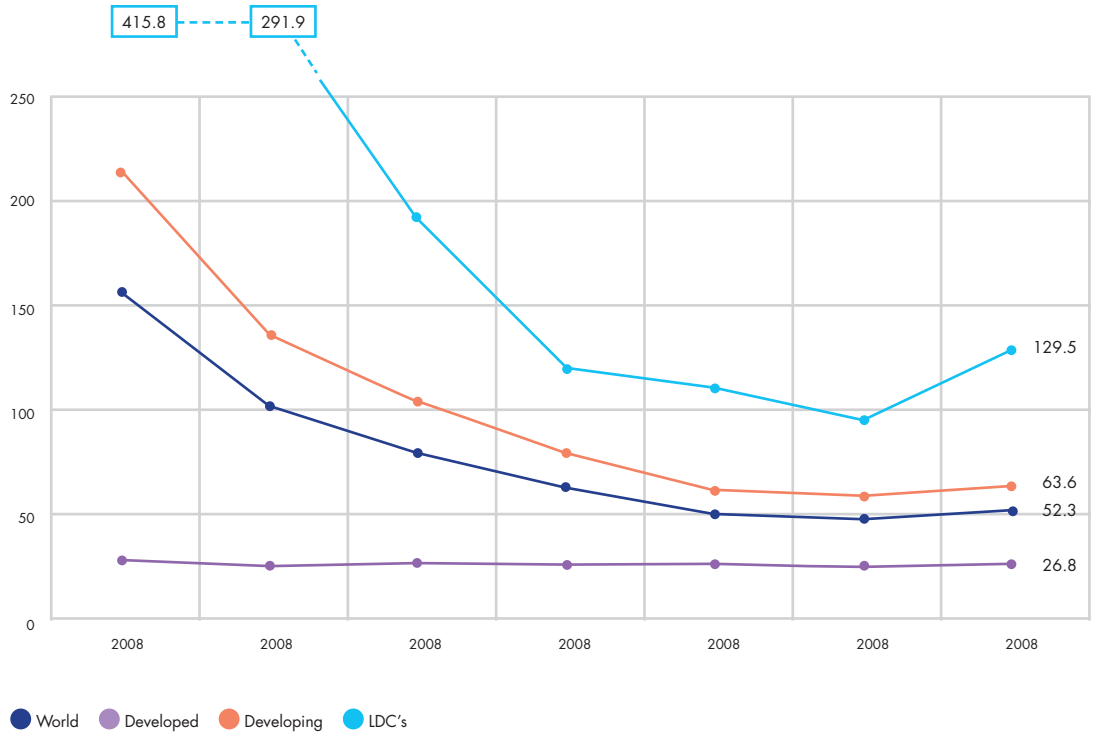
Figure 1.9: Fixed-broadband prices as percentage of GNI 2015



Source: ITU, Measuring the Information Society Report (2016)

2.1 A social demographic map of internet users in 2015

2.1.1 Percentage of population using the internet

Internet access is widely recognized as a key tool of development – for jobs, for information, for connection to people who are not near, and myriad other reasons. The lure is so powerful that the ITU's Connect 2020 agenda enshrined it in a target:

> ***Connect 2020 target: 50 percent of individuals should be using the internet in less-developed countries and 20 percent in the least developed countries.***

That target has been largely met, but once socio-demographics are taken into account, the gains are revealed to be less consistent. As our analysis of ITU data shows, by the end of 2015, almost half of the world's population was online (up from 30 percent in 2010) – more than 3 billion people. All regions experienced some growth; however, in Southern Asia, Sub-Saharan Africa, and Southeast Asia, more than 70 percent of the population still remains offline. In Oceania, that number rises to 87 percent offline – the highest percentage among all the regions.

Caucasus/Central Asia (up 27 percentage points) and Latin America (up 19 points) experienced the greatest growth. The population of internet users in Kazakhstan, Armenia, and Belarus increased from 25 percent to more than 50 percent in that time period. In Latin America, Uruguay, Costa Rica, and Ecuador experienced similar growth; it is reasonable to infer that by the growth in mobile broadband access in Latin America, as discussed in the previous section. (See Figures 1.10 and 1.11: Growth in percentage of individuals using the internet by region 2010- 2015.)

Despite the growth in internet users worldwide between 2010 and 2015, many countries are at risk of failing to achieve the Connect 2020 target. Most of these are low-income countries; however, eight of the countries at the highest risk of missing the target are low-middle income (Bangladesh, Timor-Leste, Kiribati, Djibouti, Solomon Islands, Papua New Guinea) and upper-middle income (Turkmenistan, Angola). (See Figure 1.12 below.)

2.1.2 Percentage of females using the internet

Gender is a key indicator to monitor due to the essential role that women play in development. As Nancy Hafkin succinctly states in this report: "The benefits to girls and women of increased access to information are myriad and far-reaching on both individual and collective levels and in many realms – social, economic, and political." The correlation between gender equality and development means that promoting information access for women is central to UN SDG [5], and to development generally. That is also why ITU's Connect 2020 enshrined it as a target:

> ***Connect 2020 target: Gender equality among internet users should be reached***

However, according to ITU estimates, the internet user gender gap increased from 11 percent in 2013 to 12 percent in 2016 (ITU, 2016). The region of Africa exhibited the widest gap in 2016 (23 percent) followed by Arab States (20 percent), with the smallest gap in the Americas (2 percent). In terms of actual values, the percentage of women internet users in less-developed regions (37 percent) was much lower than in more-developed regions (80 percent), which reflects general trends in internet penetration.

On a country-by-country basis using available ITU data (84 countries surveyed between 2011 and 2015), Turkey, Saudi Arabia, Palestine, Sudan, Morocco, Montenegro, and Croatia exhibit the largest internet use gender gap. (See Figure 1.12.1 for the list of countries with the widest gender gap in 2015.) At the other end of the spectrum, Finland, Ireland, Australia, the United States, Panama, and Jamaica are the first six countries where a higher proportion of women are using the internet than men (proportional to the total population of women).

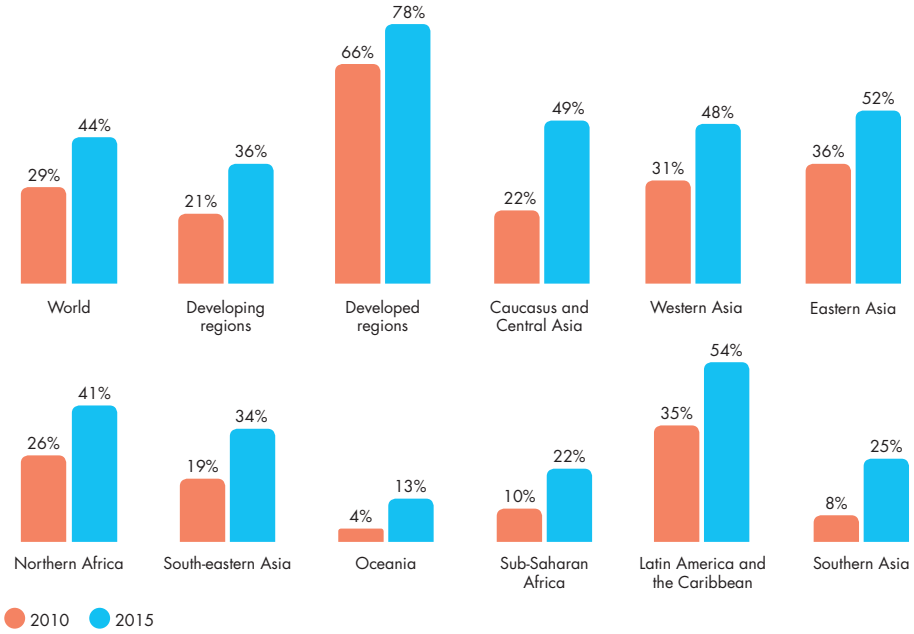
Gender disparity is a statistic that requires careful contextual examination. For example, in cases where internet use is not widespread, gender disparities may be small. This is the case in the next section of the report on capabilities; the limited data available show the skills disparity between men and women is small, but that could be explained by factors such as the education levels and household incomes of early adopters. These effects may be more pronounced than gender at first, but as digital access diffuses into the wider population, gender effects become more visible. The intersectionality of gender means that this dynamic interacts with other social forces and requires careful parsing.

2.1.3 Individuals using the internet, by age (limited data available)

We know that age influences access to resources across the board, including information. Across all 76 countries where data are available, among 15- to 24-year-olds, more than 70 percent of both women and men use the internet. In El Salvador and Indonesia, however, only 50 percent of people in that age range are online. The lowest rates of access for young people are found in Cambodia and Bangladesh, where fewer than 25 percent of those ages 15-24 use the internet.

Understanding who is using the internet, especially in various economic contexts, is valuable for understanding the potential impact of information access.

Figure 1.10: Change in percentage of Individuals using the Internet by region (2010-2015)



Source: ITU.
Note: 188 countries.
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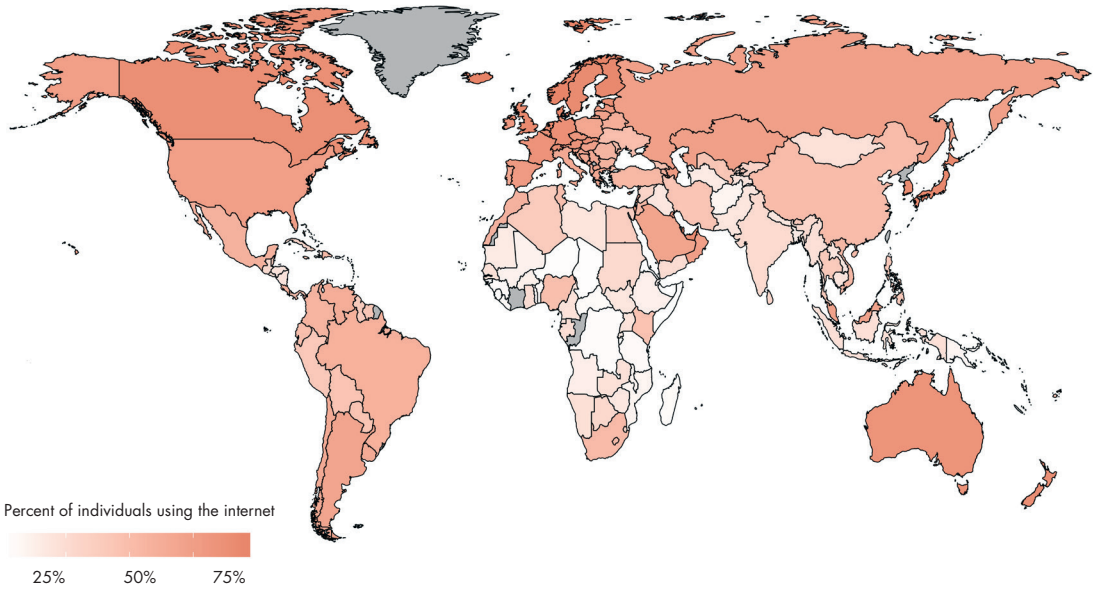
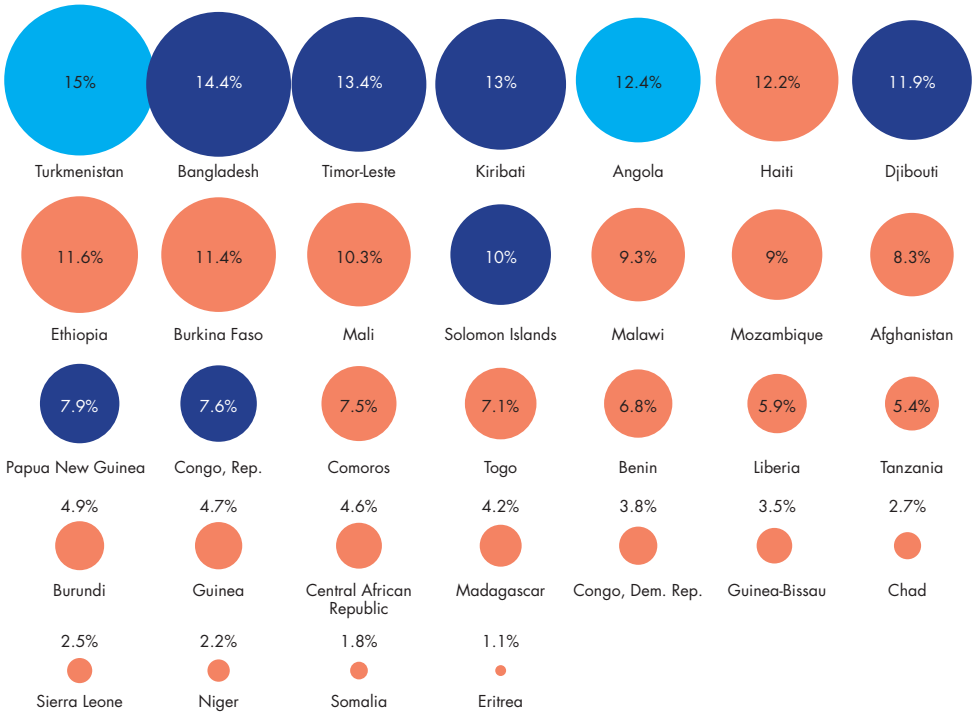
Figure 1.11: Percentage of the population using the internet (2015)



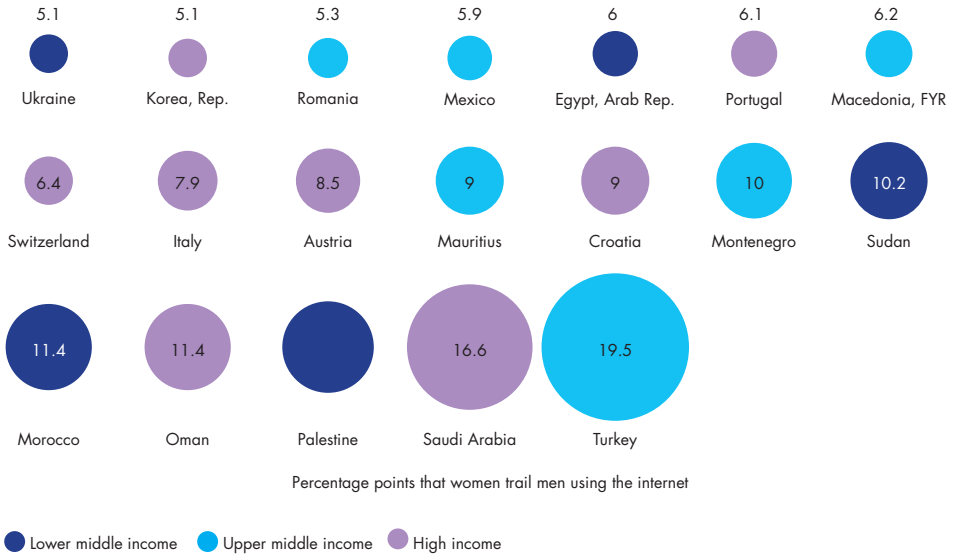
Source: ITU.
Note: 188 countries
Technology & Social Change Group, University of Washington

Figure 1.12: Countries at the highest risk of not achieving the Connect 2020 target



Source: ITU.
Note: 32 countries shown, data from 2015
Technology & Social Change Group, University of Washington

Figure 1.12.1: Countries with the widest internet access gender gaps, measured by the percentage of men using the internet minus the percentage of women using the internet (2015)



Source: ITU.
Note: 19 countries shown, data from 2013-2015, depending on country.
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Box 1.5: Digital literacy programs boost women's and girls' access to internet worldwide

Addressing the phenomenon of gender digital divide is a complex task, given that many factors beyond the price and supply must be considered. For instance, some of the main barriers that prevent women from accessing technology are cultural demands, lack of access to education, and missing digital literacy resources. As a response, the International Telecommunication Union has been promoting the Girls in ICT Day during the past few years, connecting hundreds of organizations worldwide to support women and girls accessing technology services, mainly including the internet. Additionally, governments have started to consolidate public-private collaboration with different organizations, driving initiatives that empower women through technology. Some examples are Intel's "She Will Connect" program in Kenya, Nigeria, and South Africa; Mexico's "Código X;" and India's "Internet Saathi."

Sources: One, Internet Saathi, Girls in ICT

The technological delivery systems that transport information are not neutral – they re-create and sometimes exacerbate the social dynamics of the communities they inhabit. As such, programs to leverage information access for development need to actively account for the opportunities and challenges that socio-demographics reveal in order to maximize impact.

2.2 Capabilities: The personal capacity to use information meaningfully in everyday life

Capabilities refers to an individual's ability to learn to use information and communication tools and resources, and to apply information in meaningful ways. It is an essential component of information access, and as such comprises one dimension of the DA2I framework. Capabilities are also highly dependent on the setting. The challenges and resources of individual communities (social, economic, demographic, cultural, etc.) influence the opportunities, demands, and norms that shape who possesses which skills and how capabilities are developed. Due to the limitations of data collected on capabilities globally, we focus here on ICT skills.

However, measurement of information and communication technology skills is complicated. First, there is no universal agreement on a definition of ICT skills. There are numerous definitions in use, and most of them undergo regular review and revision to keep pace with changes in technology and digital work opportunities. At one time, productivity applications may have been a reasonable approximation of work-related ICT skills; however, that definition is too limited. Today, ICT skills connote a spectrum of skills.

In other contexts, we have written about categories of skills: computer, media and information, digital, web, coding, data, mobile, and life skills (Fellows et al., forthcoming; Clark et al., 2016; Garrido & Sey, 2016; Garrido et al., 2012). All of these skills are typically united by the concept of literacies (digital literacy, information literacy, data literacy, etc.). However, even these definitions of literacies are fluid, changing over time, and overlap. For instance, mobile information literacy is composed of an emerging set of skills that incorporates elements of digital literacy, information literacy, and web literacy as they are experienced on a mobile platform. (See Box 1.6.)

The only area of agreement is that they all include skills that are relevant for work, thus making it an even more challenging task to specify which ICT skills are important for "employment, decent jobs and entrepreneurship." While capabilities are intrinsic to successful access, they are also directly named within the UN Sustainable Development Goals framework. Specifically, Target 4.4 recognizes that underlying access to information skills are central to employability and economic participation:

> *"By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship."*

Limited data further complicates our ability to gauge the capabilities of different groups across countries and regions from the perspective of access to information. The European Union is the only region that has consistently collected data on ICT skills and types of use since 2007. Between 2014 and 2015, a handful of countries followed suit, harmonizing their data methods and collection following the EU questionnaire on ICT for Households and Individuals.[2] Currently, the ITU indicators for ICT skills and use include data from 51 countries (38 from more-developed and 13 from less-developed nations).

The DA2I baseline will track progress on two indicators to gauge capabilities (albeit in a limited number of countries):

Box 1.6 Digital and information literacies for the mobile-first generation

For billions of people coming online around the world, mobile phones (and increasingly smartphones) are their point of entry to the internet. This is true in both more-developed and less-developed countries. However, the user experience on a smartphone is very different from that on a PC or a feature phone. In order to take advantage of the benefits that information and communication technologies offer, one must have the skills and knowledge to do so. TASCHA's Mobile Information Literacy – a combination of digital, internet, and information literacies for smartphone-first and smartphone-centric populations – fills a critical gap between access alone and realization of the benefits mobile technologies and applications can have. TASCHA developed Mobile Information Literacy (MIL) curricula and trainings for various geographies and audiences, taking into account local contexts and conditions. Mobile-specific information literacy is important for the reasons outlined above: (1) the explosion of mobile-first and mobile-centric users; (2) information behavior differences on a mobile phone versus a PC; (3) most digital and information literacy trainings are currently oriented to PC users; and (4) research shows that the lack of digital skills is a significant barrier to effective access, use, and uptake.

Source: Clark et al. (2017), Technology & Social Change Group, University of Washington

- Individuals with ICT skills, by type of skills by gender
- Individuals using the internet, by type of activity (using type of activity as proxy of skills)

2.2.1 ICT skills, by type of skills and gender

What types of ICT skills do people possess?
The top four ICT skills for people living in less-developed countries are:

- Copying/moving a folder, 37 percent
- Sending emails, 35 percent
- Pasting within a document, 30 percent
- Transferring files, 23 percent

The lowest rates of proficiency reported in less-developed countries are mostly related to productivity applications, such as spreadsheets (18 percent) and presentations (17 percent). It's difficult to judge whether this means that skill levels are generally low, or whether the data are merely measuring a skill that no one wants or uses. A mechanic who can't rebuild the engine of a rare car she never sees and no one drives would not be thought of as "low skilled." It's worth monitoring changes to these data over time, but it would be premature to conclude that low proficiency with productivity apps means a person is not using ICT and developing skills that are relevant for their life. Better indicators might include tasks such as sending SMS messages, accessing a VPN, transferring data between phones, or appropriating phone networks for financial purposes such as banking. Programming proficiency is low across country income levels.

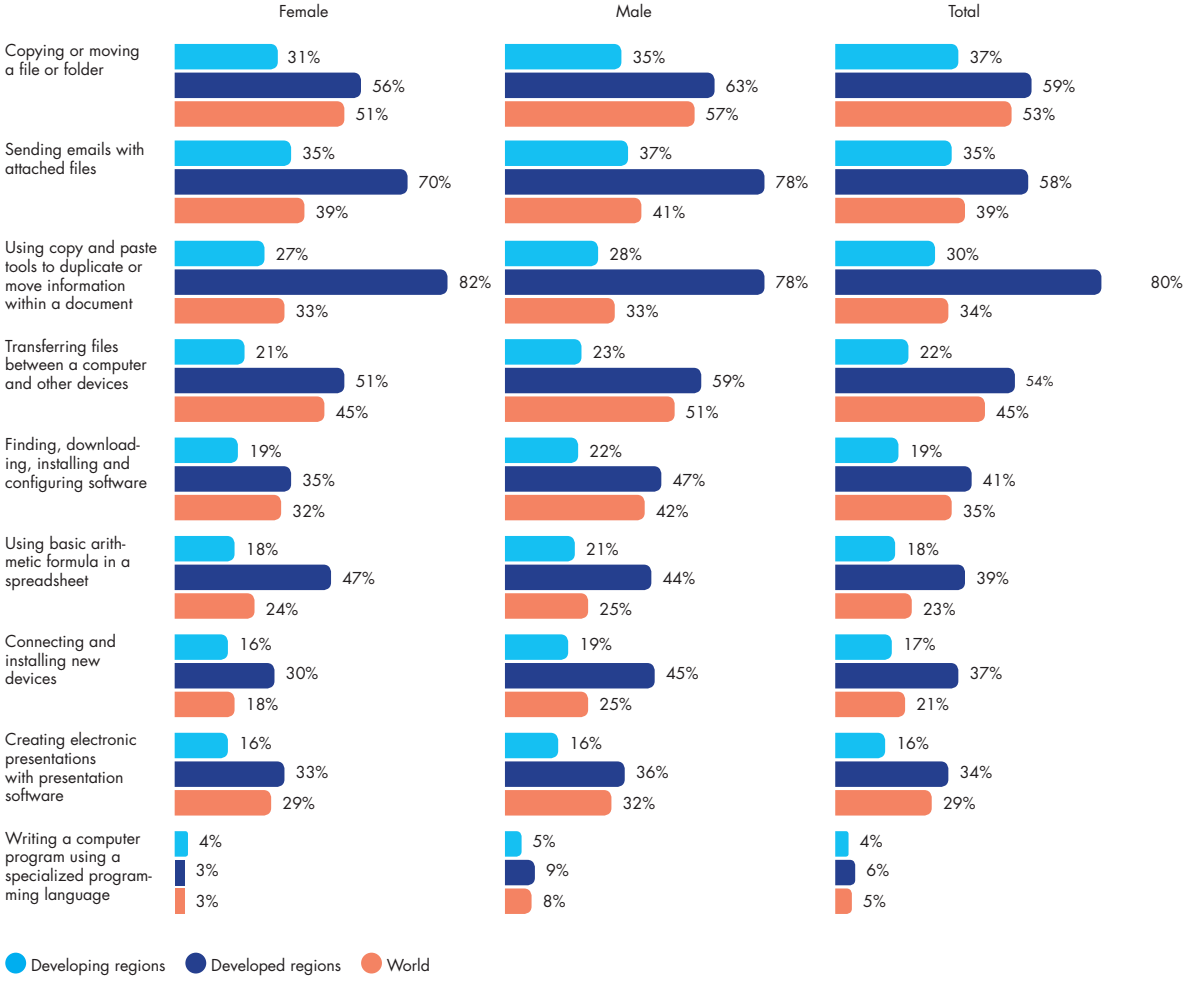
Do these data change when analyzed based on gender?
Among people from the countries sampled, only small differences in skill levels between men and women emerged in both less-developed and more-developed countries. The biggest difference is across groups, not gender. (See Figure 1.13: ICT skills by type of skill by gender.) There is generally a smaller gender gap among those sampled in less-developed countries, where women's skills in technical aspects of computer use are closer to those of men. This effect could also be explained by differences in the instruments for data collection and differences in research questions and design.

2.2.2 Individuals using the internet by type of activity.

The ways people use the internet provide insight into their purposes and skill levels. They also advance our ability to understand the ways these resources can be leveraged to achieve social goals. How people use the internet is indicative of what they want to accomplish and what information and communication tools they prefer or are able to use.

However, standardized measurement is once again thwarted by local settings, conditions, and data. Information influences development in such different ways that the activities measured in "individuals using the internet by type of activity" only begin to tell the story of how information access can advance development. Often, available data serve a particular purpose in a particular setting. For example, asking about "internet banking" may not capture the way funds are transferred via mobile phones in rural settings.

Figure 1.13: ICT skills by type of skill by gender (2015)



Source: ITU.

Note: 52 countries. Regional averages not representative of the world, but illustrate that large skill gaps exist.

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People in less-developed countries use the internet for online courses more actively than people in more-developed countries. Twenty percent of people in less-developed countries reported taking an online course compared to only 7 percent in more-developed ones.

Even as we recognize the limitations of these baseline numbers, the process of naming them and beginning to flesh out the dimensions of how people use information resources such as the internet is an important step.

- People in less-developed countries are using social networking sites more actively than people in more-developed ones (71 percent compared to 67 percent).
- Sending emails seems to be more prevalent among countries in more-developed regions (81 percent compared to 53 percent).
- Only 39 percent of people in less-developed countries use the internet to access blogs, forums, or discussion sites and to read or download news or books, compared with 75 percent in more-developed countries. The reason for this gap is unclear, but it could be a product of limited resources in certain languages, along with distrust of the media. It's also possible that users who don't participate in forums or seek out news online may focus those activities on social networking sites.
- Twenty-seven percent of those in less-developed countries look for health information online. Interestingly, this is very close to matching the 30 percent of people who do so in more-developed countries.

- Only 24 percent of people in less-developed countries use the internet to get information from government organizations, compared to 56 percent in more-developed ones. Similarly, only 14 percent use the internet to interact with government, compared to 57 percent. (See Figure 1.14.)

Our discussion of capabilities is derived from available data, which primarily comes from studies conducted in community computer labs and similar settings in Europe. Over time, it will be useful to analyze different sets of capabilities and how those capabilities relate to different technologies, development goals, and future research priorities. This calls for more robust data collection to enable more nuanced analysis in the future.

3. The social context of adoption: poverty, gender inequality, and youth opportunity

As detailed in previous sections of this chapter, physical infrastructure and technical connectivity provide the first steps to information access. Understanding the demographic makeup of internet users – such as location, gender, and age – provides a more nuanced lens, showing that access alone is not enough to overcome the barriers and inequities that hinder access by many. Further still, ICT skills (or lack thereof) represent yet another defining characteristic of access to and use of information and technology. Social context is the next essential ingredient to understand how access to information can materialize into meaningful use.

Studying the social context that enables meaningful use of information also reveals the intersectional nature of information use – where the personal dimensions of identity overlap, reinforce, and multiply the resources and barriers of people and communities. Accounting for the privilege and power dimensions of information access (poverty, race, gender, age, caste, etc.) helps tease out constraints (and opportunities) that directly affect the quality of access, equity/justice imperatives, and the ultimate success of interventions.

This section presents critical social context considerations that shape the conditions in which physical infrastructure, demographics, and capabilities exist.

We use the following indicators to examine the social context of use across different regions:

1. Percentage of population living below national poverty line

2. Gender Inequality Index

3. Share of youth not in education, employment or training by gender

3.1 Poverty through the lens of access to information

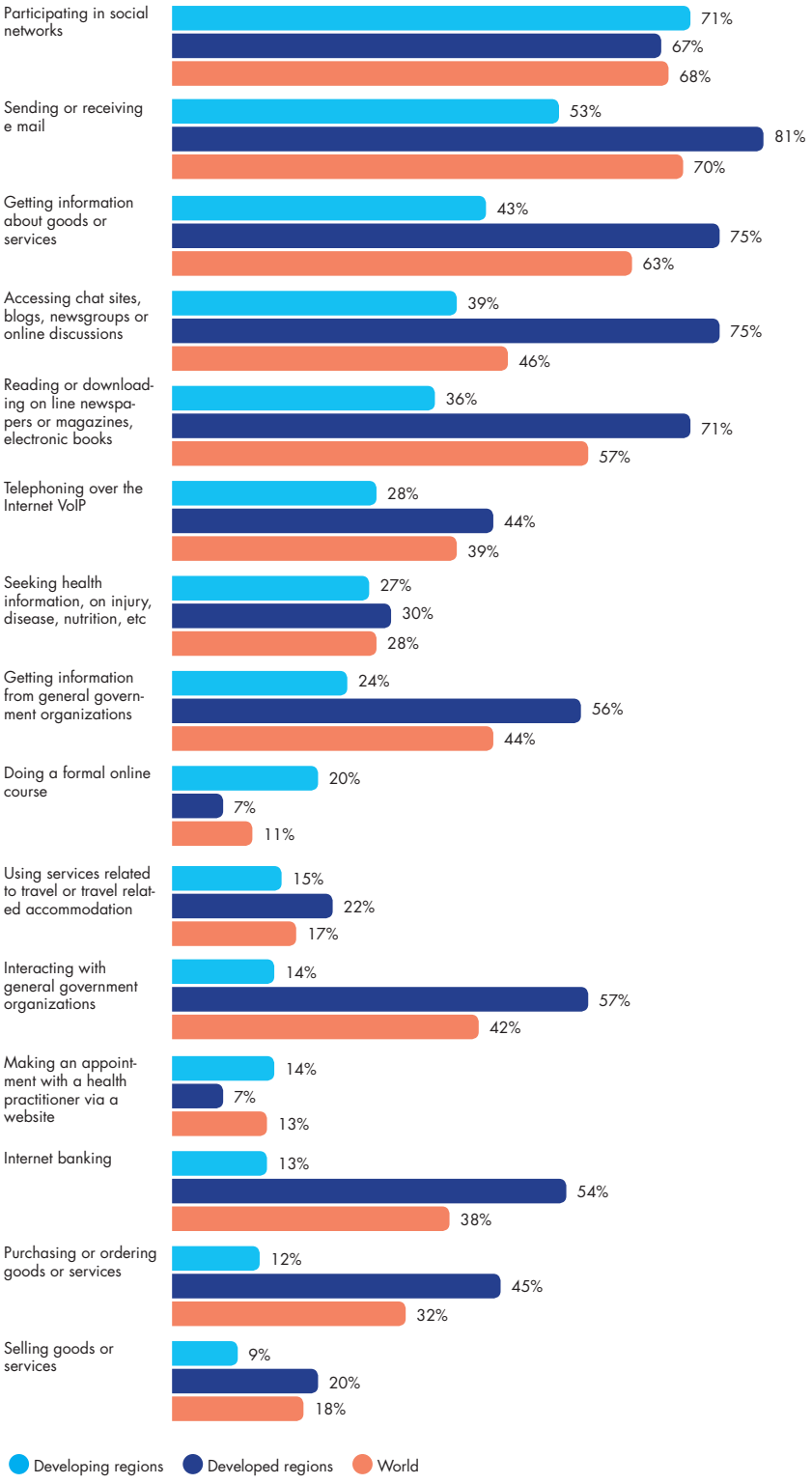
Poverty affects all aspects of life. Poverty and inequality are among the main drivers constraining people's agency to live the lives they choose to live (Sen, 2001). From 2002-2012, the share of people in abject poverty (living below the international poverty line) dropped from 26 percent to 13 percent (SDGs 2016 Report). If economic growth rates of the past decade continue for the next 15 years and this growth benefits everybody equally, poverty could fall to 4 percent of the population (ibid). Despite this optimistic forecast, poverty still affects the lives of almost 1 billion people around the world today. Regional poverty rates provide a clearer picture of persistent poverty that is masked by international estimates. By 2015, close to a third of people around the world lived below national poverty lines – 45 percent in Sub-Saharan Africa, 37 percent in Oceania, and 27 percent in Latin America. (See Figure 1.15 for national poverty rates by region.)

While more revealing than international estimates, regional rates still mask significant variations by country. For example, in Mexico, one of the richest countries in Latin America in terms of GDP, 53 percent of the population lives below the national poverty line. This percentage is almost double the regional average of 28 percent. In Sub-Saharan Africa, poverty rates range from a high of 76 percent in Equatorial New Guinea to a low of 19 percent in Botswana.

It would be simplistic to assume that merely expanding internet access will mitigate the structural dimensions of poverty. While improvements in infrastructure and connectivity expand resources and opportunities to a wider segments of the population, the gains that access provides are bounded by larger societal forces. For example, internet access may mean that a resident of Mexico City might be able to produce a great resume and learn from YouTube videos how to impress an interviewer, but there still may not be that many jobs available. While we don't want to denigrate many of the personal victories that access enables, we also want to acknowledge the nuance of the storyline – access is important, but transformational effects require systemic changes. Access is just one piece.

Even though this holds for the poorest countries in the world, it not as clear when we look at countries in the lower-middle-income and upper-middle-income levels. (See Figure 1.16.) Countries such as South Africa, Brazil, Colombia, Turkey, Costa Rica, Mexico, and Romania, which in general exhibit higher income per capita, have less than 60 percent of their population online. This indicates that access to the internet is not enough, in itself, to improve the lives of people. There is no question that the highest need at all levels is in the poorest countries. However, the variance in the economic position of several upper-middle and lower-middle-income countries begs the question of what is the true impact of access to information on the reduction

Figure 1.14: ICT activities by type of activity



Source: ITU.

Note: 61 countries. Regional averages not representative of the world, but illustrate that large gaps exist.

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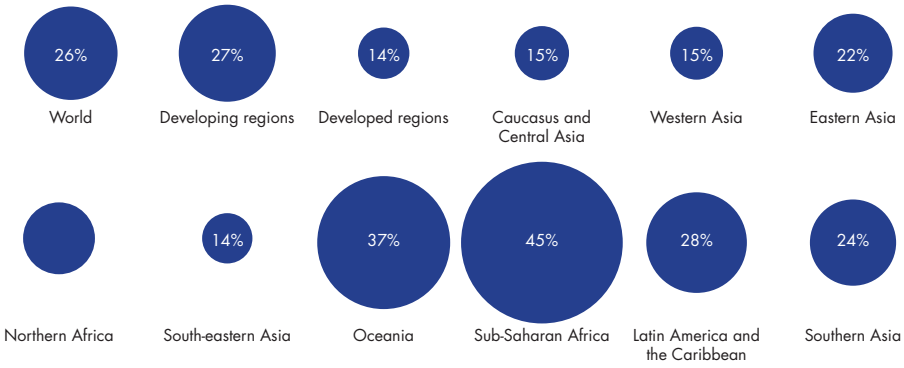
Figure 1.15: Percentage of people living below the national poverty line by region.



Source: UN

Note: 122 countries, year varies between 2005 and 2015, depending on country. Latest year available used for each country.

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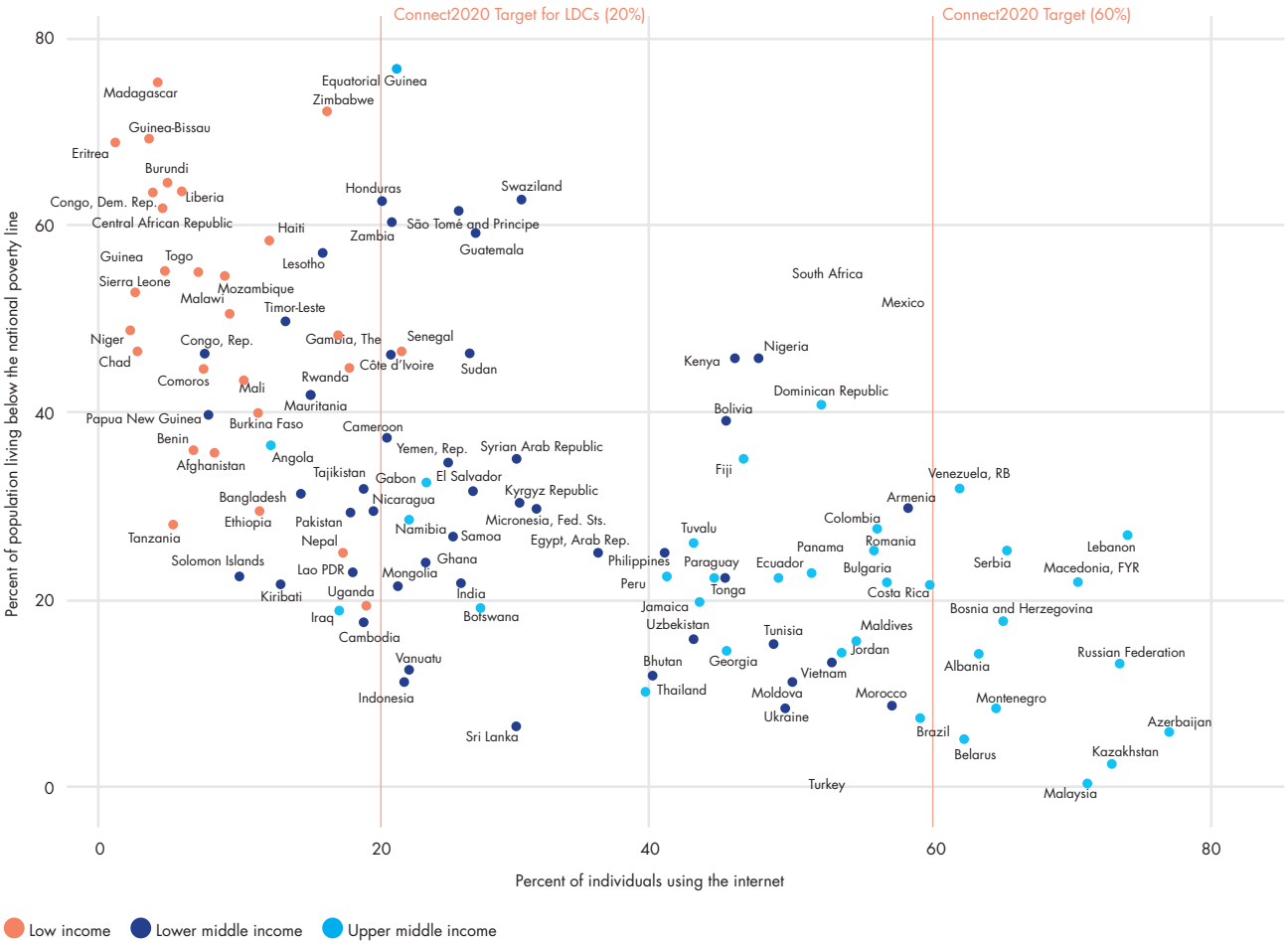
Figure 1.16: Percentage of people using the internet vs. percentage living below the national poverty line.



Sources: ITU (percentage using the internet), UN (percentage living below the national poverty line), World Bank (income groups).

Note: 113 countries (graph excludes high-income countries); data from 2015 for percentage using the internet, data from 1993-2015 for the percentage living below the national poverty line.

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of poverty. In short, access to the internet doesn't necessarily reflect reduced poverty.

Poverty and economic standing significantly affect people's ability to use information meaningfully. At the same time, access does offer an avenue for reducing poverty and creating economic opportunity, though what people can do with this access is still bounded by structural inequalities.

3.2 Gender through the lens of access to information

Gender inequality is another critical facet of the social context of access to information. As seen in section 1 of this chapter, a gender digital divide is alive and well. It is important to examine this gender gap further to understand why this gap exists by exploring gender inequality in a broader sense. Access to information can and does offer enormous benefits for more equal participation of women and girls in society, as Chapter 5 of this reports details.

Gender inequality must be addressed to achieve not only Goal 5, but all of the SDGs, as well as the Connect 2020 target. As the UN Development Programme notes, "Gender inequality remains a major barrier to human development. … The disadvantages facing women and girls are a major source of inequality." Reducing this gender gap is not as simple as distributing more smartphones and data plans to women. Araba Sey, principal research fellow at the United Nations University, Computing and Society, elaborates:

> *"To adequately address digital divides, it is essential to recognize that inequalities do not manifest uniformly across social groups. For example, the intersection of gender with other social identities (such as race, class, socioeconomic status, age, or sexuality) has a profound impact on how gender is experienced in real life (see Shields, 2009; Bilge, 2010; Warner & Shields, 2013 for more discussion of the intersectionality perspective). This has implications for how one approaches the relationship between gender, access to information, and social development" (Sey, Araba. Personal communication. May, 2017).*

This section uses the Gender Inequality Index (GII) to examine gender in the context of access to information. The GII measures gender inequalities in three areas of human development:

- Reproductive health, measured by maternal mortality ratio and adolescent birth rates;
- Empowerment, measured by proportion of parliamentary seats occupied by females and proportion of adult females and males aged 25 years and older with at least some secondary education; and
- Economic status, expressed as labor market participation and measured by labor force participation rate of female and male populations aged 15 years and older.

Our intent is not to map all the factors that exacerbate gender inequality, but to model the approach we took with poverty above. (For a more thorough analysis on gender inequality, refer to Nussbaum (2001); and for gender and ICT, refer to Hakfin & Huyer (2006), Garrido et al. (2009), and Garrido & Sey (2016), to name a few.)

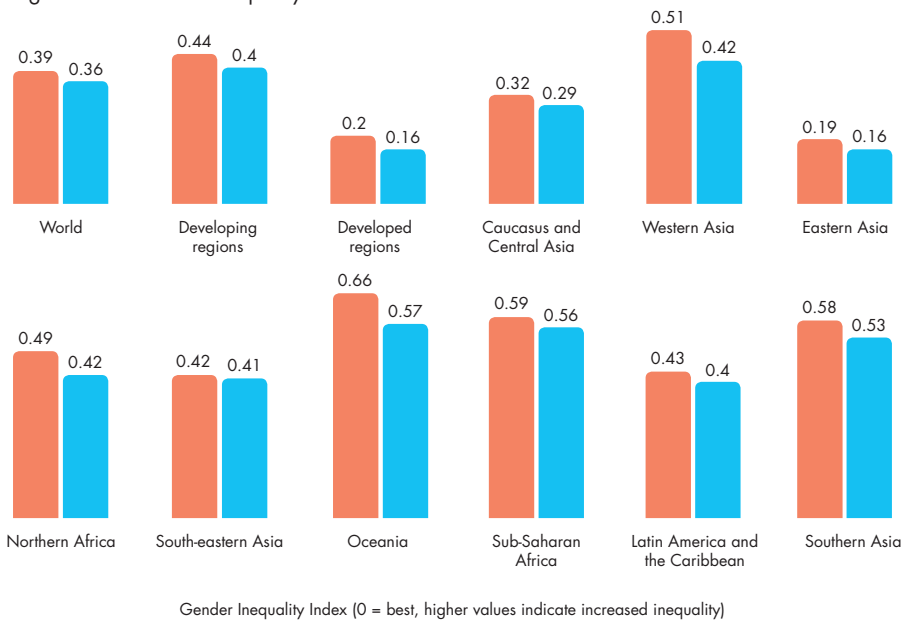
The story of gender inequality follows the storyline of economic inequality and poverty. In spite of progress, greater in some countries than in others, countries in the upper-middle-income level and below are far from reaching the targets. The GII data from 156 countries is not promising for achieving the SDGs, particularly Goal 5. Between 2010 and 2015, gender inequality across the globe, as measured by the GII, has only decreased by .03 on the GII scale of 0 to 1, where 0 represents the least inequality. Both more-developed and less-developed regions have only seen .04-point decreases. While progress has been slim overall, some regions show more promise than others. Oceania, Western Asia, and Northern Africa have witnessed decreases in inequality of almost .10, well above Southeast Asia (a decrease of only .01), Latin America, Sub-Saharan Africa, and Central Asia (all .03). Aside from more-developed regions and Eastern Asia, most of the world is far from achieving zero inequality. (See Figure 1.17: Gender inequality trends 2010-2015.)

Women need access to the internet and the resources that information and communication provide. Access promotes economic self-sufficiency for women. It allows them to make informed decisions about their bodies, their health, and their families. It is a tool that increases opportunities for employment, entrepreneurship, and social good that is increasingly embedded in everyday life – from financial transactions, to government forms, to communicating with family members abroad. However, without concerted efforts on other fronts, access alone will not achieve gender equality. Access can mean real gains for women, but it represents only a small step toward gender equality writ large.

3.3 Youth opportunity through the lens of access to information

The issues of poverty and gender inequality are critical considerations when trying to understand the full, nuanced picture of access to information, barriers to it, and opportunities it provides. Another dimension of the social context regarding access to information is youth, opportunities they do or do not have, and the implications that has on fully realizing meaningful access to information. This is especially important when considering Goal 4 and Target 4.4, to substantially increase youths' skills in order to strengthen their employment prospects. It has been widely reported that youth unemployment is high,

Figure 1.17: Gender inequality trends 2010-2015



Source: UN

Note: 154 countries (2015), 147 countries (2010)

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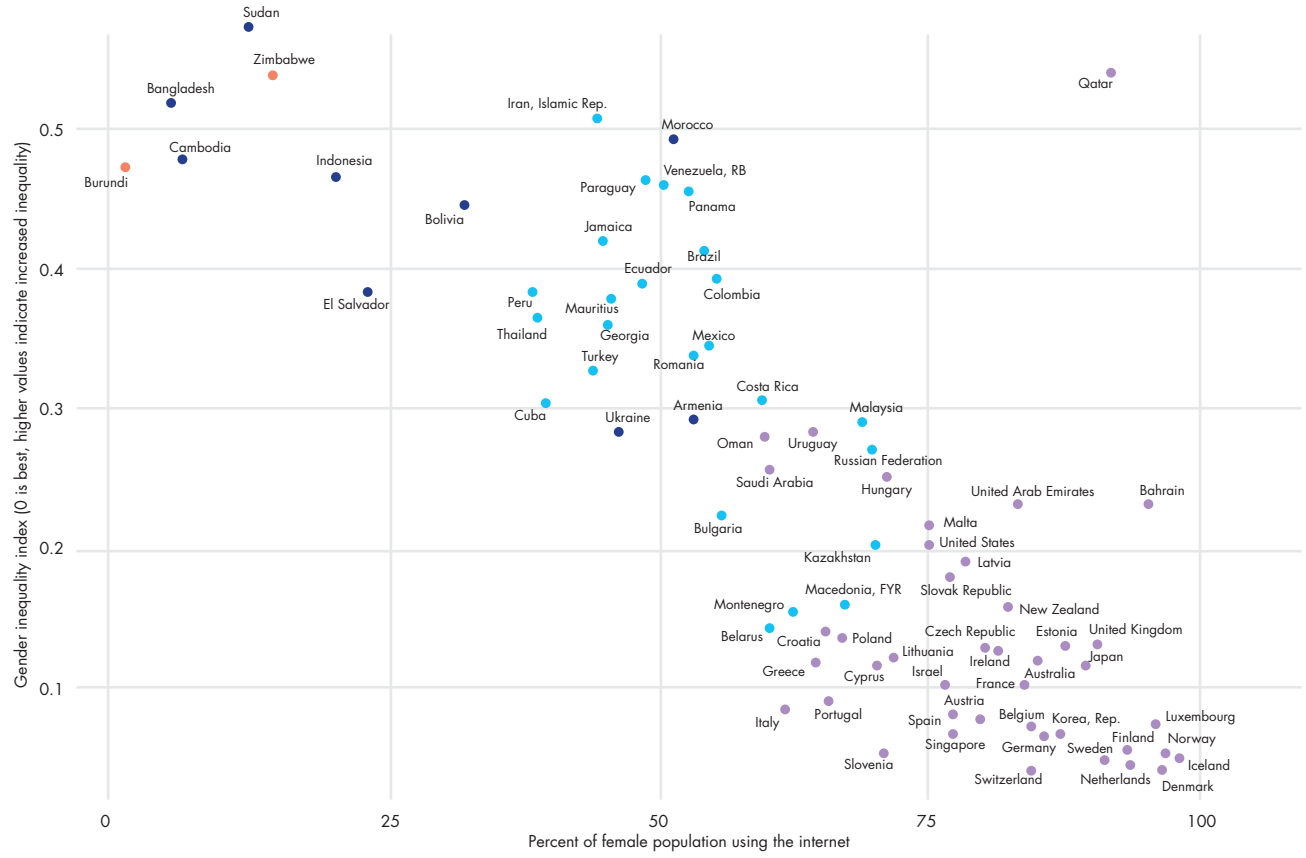
Figure 1.18: Percentage of females using the internet vs. the Gender Inequality Index



Sources: UN (Gender Inequality Index), ITU (percentage using the internet by gender)

Note: 78 countries, data from 2012-2015, depending on country.

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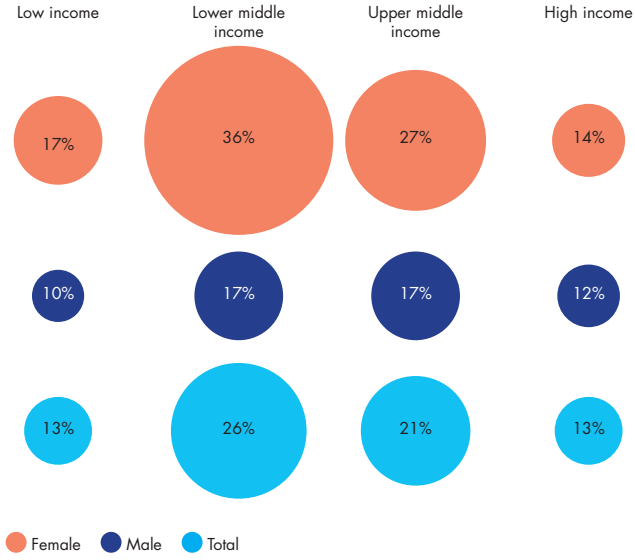
Figure 1.19: Proportion of youth not in employment, education or training by gender and income group



Source: ILO
Note: 119 countries
Technology & Social Change Group, University of Washington

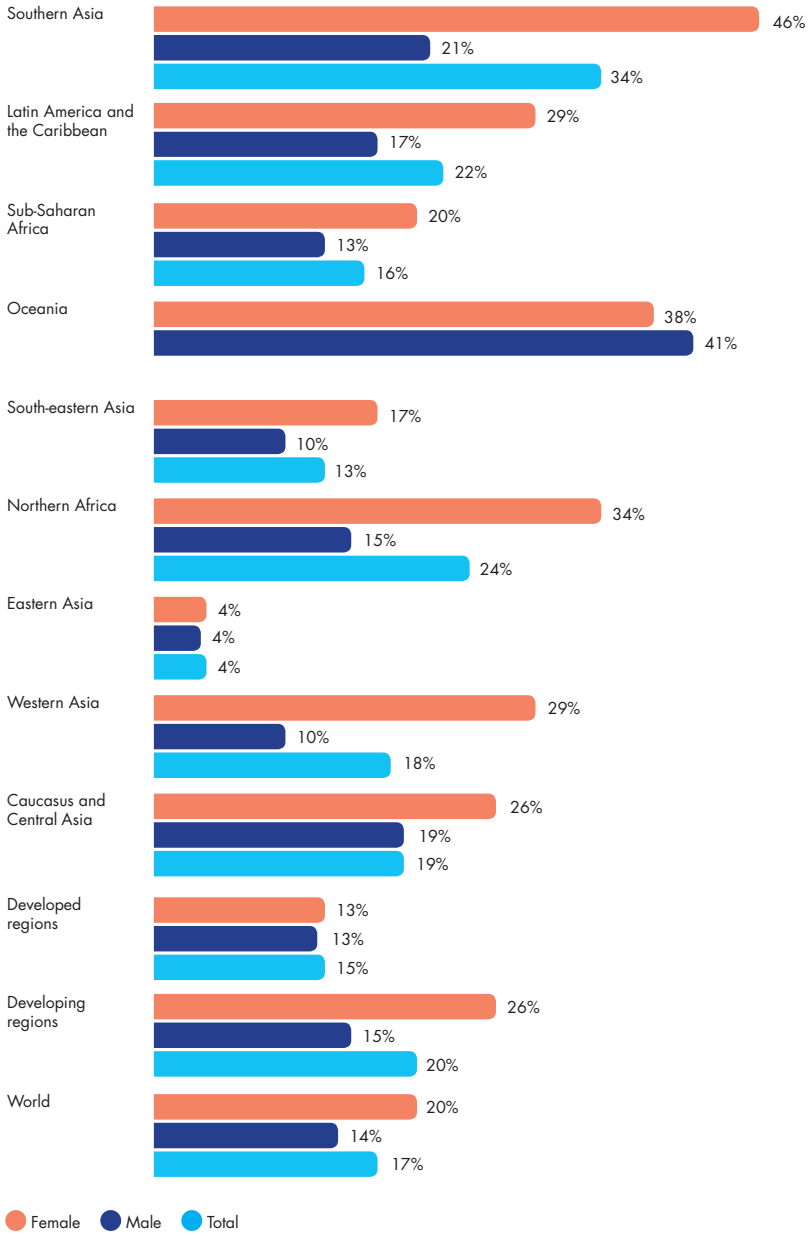
particularly in less-developed regions. The International Labour Organization (ILO) estimates that in 2014, 37 percent (about 75 million) of all unemployed people around the world were young people (Mourshed et al., 2015:11). Contributing to unemployment levels among youth are distinct gaps in accessing education and training opportunities. At the same time, it is assumed by many that access to information can contribute to developing employable skills and overall employability. However, access to information is clearly not enough if opportunities for education, training, and employment do not exist or if there are barriers to accessing them. Not surprisingly, the same trend of poverty and gender inequality increasing as income levels decrease can be seen with youth opportunities in employment, education, and training. Figure 1.19 details the share of youth not participating in employment, education, or training in 119 countries, broken down by countries' level of income. High-income countries enjoy the lowest levels of youth excluded from employment, education, and training, while upper-middle-income countries and below see higher rates of youth exclusion from opportunities. This is particularly the case in middle-income countries – both upper and lower. Eastern Asia leads the world with only 4 percent of youth not in employment, education, or training, while in Southern Asia and Oceania, more than one-third of youth are not engaged in employment, education, or training.

As Figures 1.19 and 1.20 demonstrate, gender again is a factor, with female youth far more likely to not be engaged with employment, education, or training. This inequality is particularly pronounced in low-middle-income countries. The figure below shows this most strikingly in Southern Asia, where almost half (46 percent) of female youths are not in employment, education, or training, whereas only 21 percent of male youths are not. Dramatic differences can also be seen in Northern Africa, Western Asia, and Latin America and the Caribbean. Only developed regions and Eastern Asia enjoy equality among male and female youth, and Oceania is the only place where more female than male youths are engaged with opportunities. (See Figure 1.20.)

As with poverty and gender inequality, it would seem that as internet use increases, the number of youth left behind would decrease. Largely, this is the case, as Figure 1.21 depicts, particularly in more-developed and high-income countries. However, there are again some outliers where this is not the case. This can be seen in Trinidad and Tobago, Albania, Armenia, South Africa, Macedonia, and Bosnia and Herzegovina. (See Figure 1.21 for the proportion of youth NEET compared to individuals using the internet.) While it would require additional analysis that is outside the scope of this report to understand the conditions of these different countries, it is safe to assume that there are barriers that can only be addressed with policies that increase employment, education, and training opportunities for youth.

Exploring social context, specifically poverty, gender inequality, and youth opportunity, provides a further nuanced landscape of access to information, unearthing some of the major underlying problems that must be addressed before equal, meaningful access to information can be achieved and can contribute further to meeting the SDGs. While poverty, gender inequality, and youth opportunity are just some of the social context needed to understand how complicated access to information is, these issues are not exhaustive. However, highlighting these three critical facets of social context proves that simply providing infrastructure and technical connectivity is not enough. Those working

Figure 1.20: Share of youth not in employment, education or training (NEET) by sex (%) by region.



Source: ILO

Note: 119 countries

Technology & Social Change Group, University of Washington

to understand how access to information can truly be equal, meaningful, and a significant contributing factor to the SDGs must take into account that problems of poverty, gender inequality, and lack of youth opportunity are significant barriers to realizing these goals and targets, both in regard to access to information and to development as a whole.

4. The legal context of adoption: civil liberties, political rights, and freedom on the net

Internet access is always shaped and colored by political factors, such as decisions on infrastructural investment and consumer protections. However, in many countries governments intentionally limit the internet's effectiveness as a resource for the free pursuit and sharing of information through a variety of policies and practices, such as blocking specific applications or technologies, manipulating online content, surveilling online activities, and punishing users for expressing their voices.

Excessive limits on freedom of expression matter not only because access to information is critical to the choices people make as they live their everyday lives, but also because freedom of expression is a cornerstone of civil liberties and political rights, and the relationship between these three types of freedoms are mutually reinforcing. Just as a country with strong political rights can create a safe environment for freedom of expression, freedom of expression helps protect civil liberties and advance political rights. These are principles reflected in the SDGs – particularly in Goal 16 and Target 16.10, which seeks to "ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements."

As more people around the world come online, can we say that people are experiencing greater levels of freedom of expression, civil liberties, and political rights? This analysis shows that the expectation of higher internet use leading to higher freedoms is, at the global level, not mapping out. Rather, for the majority of internet users in the world, political factors directly limit people's ability to access, use, create, and share information that they could otherwise use, whether for personal development, collective action, or any other purpose.

This section focuses on information access as it pertains to fundamental freedoms, and specifically in regard to internet use, civil liberties, and political rights. In doing so, it references the legal dimension of the framework as measured by these indicators:

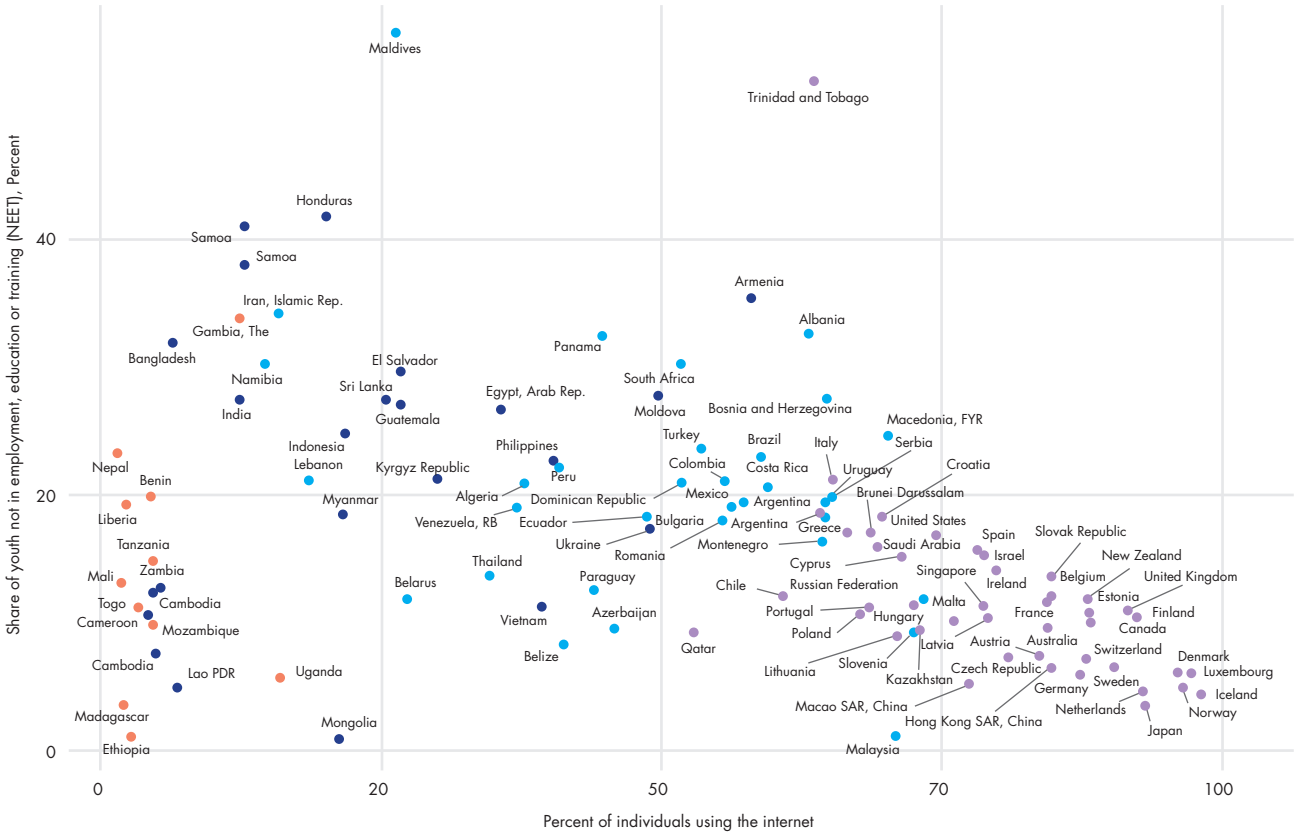
- From Freedom House, the **Freedom on the Net Rating** tracks obstacles to internet access, limits on internet content, and violations of user rights in 65 countries.
- Freedom House's **Civil Liberties Rating** rates 195 countries on civil liberties that correspond with rights protected under the Universal Declaration of Human Rights, including the extent to which people can exercise freedoms of expression and belief, freely assemble and associate, have access to an established and equitable system of rule of law, and enjoy social and economic freedoms, including equal access to economic opportunities and the right to hold private property (Freedom House, n.d.).
- Freedom House's **Political Rights Rating** assesses 195 countries on the basis of people's ability to vote freely in legitimate elections, participate freely in the political process, and have representatives who are accountable to them.
- From the Varieties of Democracy project (V-Dem), the **Freedom of Discussion Rating** measures people's ability to openly discuss political issues aloud in their private homes and in public spaces. It considers the extent of harassment from public authorities, government restrictions, and cultural constrictions.

4.1 Freedom of Expression

Information access has been espoused as a right when associated with freedom of expression. In 1948, Article 19 of the Universal Declaration of Human Rights established that "everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and *to seek, receive and impart information and ideas through any media and regardless of frontiers (The Universal Declaration of Human Rights, n.d.)*.[3] Freedom of expression has also been officially extended to the internet by the United Nations Human Rights Council in a resolution on "the promotion, protection, and enjoyment of human rights on the internet" in 2012 (United Nations Human Rights Council, 2012). Two years later, the 604 signatories of the Lyon Declaration called on UN member states to further acknowledge the public's right to access information and its importance in promoting democratic societies and sustainable development (IFLA, 2014).
What can we learn about freedom of expression when comparing offline speech (i.e. V-Dem's Freedom of Discussion score) and online speech (Freedom House's Freedom on the Net rating)?
First, we see that offline freedom of discussion seems, on average, to have been on an upward trend for the past three decades. Figure 1.22 shows the sharpest rise coinciding with the fall of the Iron Curtain in the late 1980s, as well as a downturn beginning in 2011. We do not know if the advancement of the internet (after 2005) played any role in loosening or tightening restrictions around offline discussion.

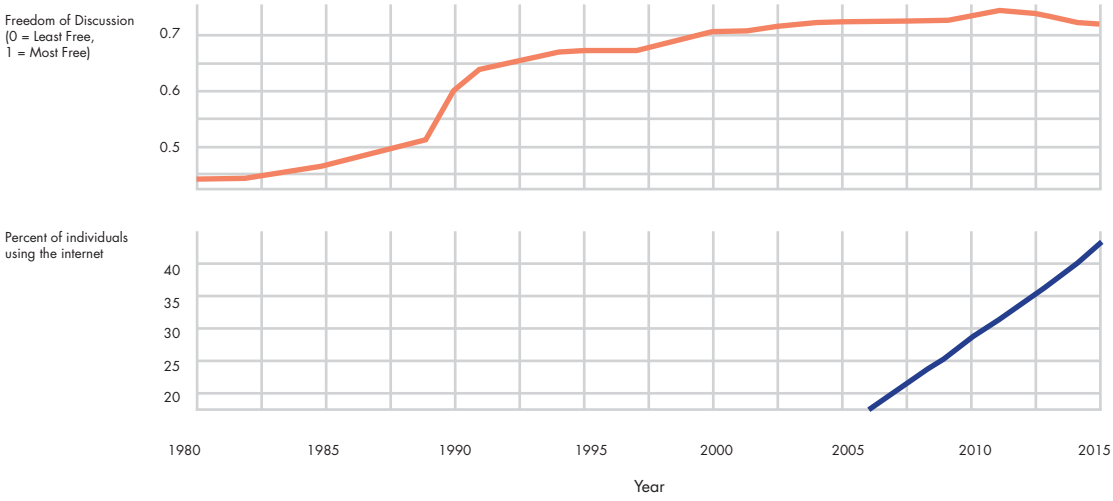
Second, it appears the freedoms that protect civic dialogue offline may also manifest online, as Freedom of Discussion scores are strongly correlated with Freedom on the Net ratings (correlation = 0.79). When plotted

Figure 1.21: Share of youth not in employment, education or training (NEET) versus percentage of individuals using the internet



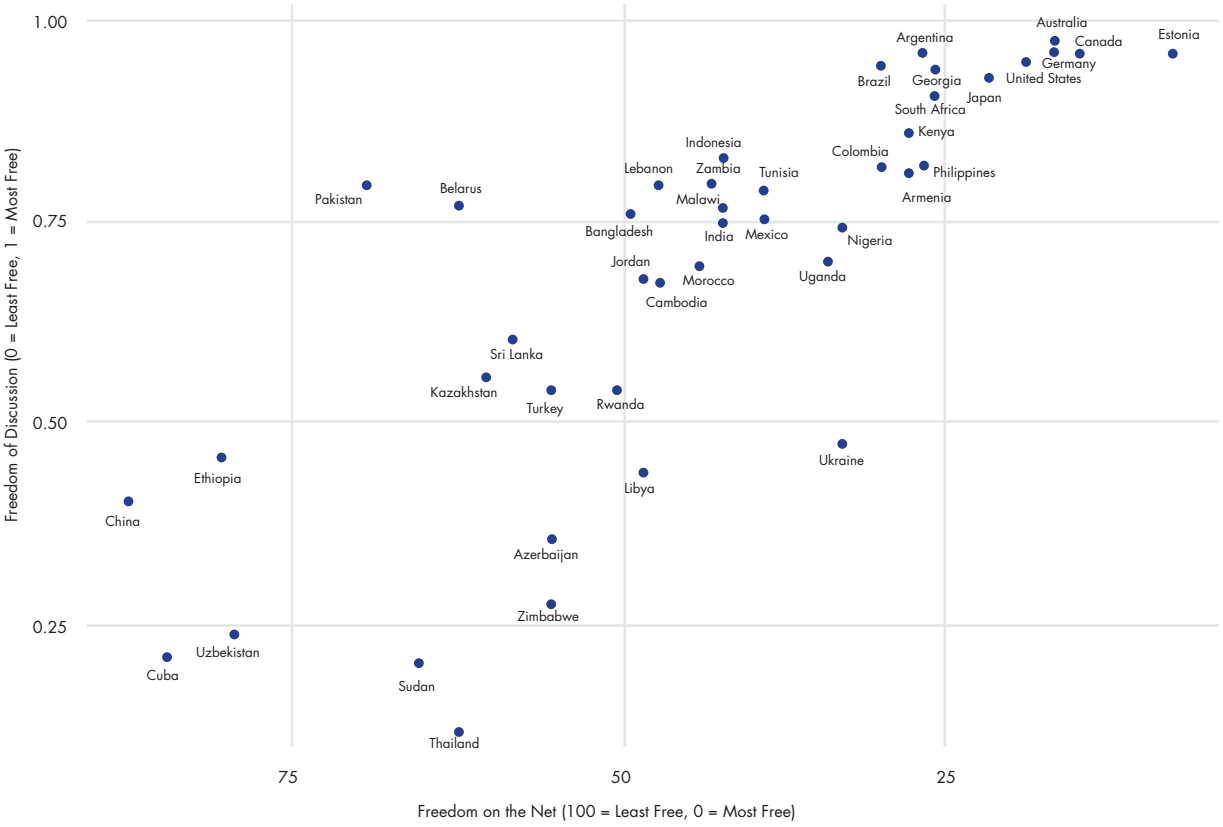
Sources: ILO (NEET), ITU (percentage using the internet), World Bank (income groups)
Note: 104 countries; data from 2007-2015, depending on country.
Technology & Social Change Group, University of Washington

Figure 1.22: Freedom of discussion vs percentage of population using the internet



Sources: Varieties of Democracy (Freedom of Discussion); ITU (percentage using the internet)
Note: 171 countries for Freedom of Discussion, 191 for percentage of individuals using the internet
Technology & Social Change Group, University of Washington

Figure 1.23: Freedom of Discussion vs. Freedom on the Net



Sources: Freedom House (Freedom on the Net); Varieties of Democracy (Freedom of Discussion)
Note: 43 countries, data from 2014
Technology & Social Change Group, University of Washington

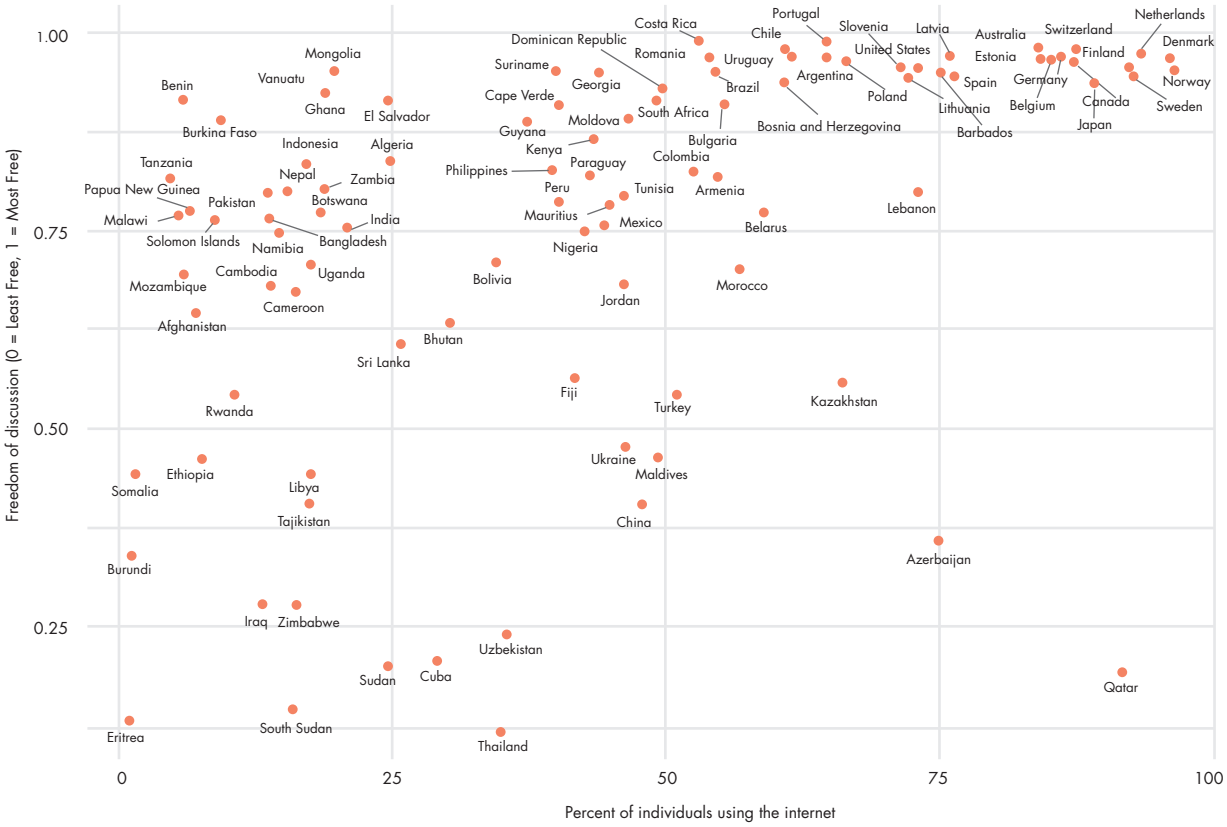
as in Figure 1.23, most countries fit within a fairly clear diagonal line, suggesting some congruence between offline and online protections. We do see several outliers, however: In Ukraine, Zimbabwe, and Thailand, (offline) freedom of discussion appears to be relatively more restrictive; whereas in Pakistan and Belarus, online freedoms of discussion are rated lower. For instance, in Belarus, the Media Law was amended, which "significantly expanded the authorities' ability to restrict critical online content, including imposing intermediary liability for illegal content posted online and the ability to block websites without court authorization" (Freedom House, 2015).

Third, higher Freedom of Discussion scores may have some relationship with the proportion of individuals who use the internet in a country. As shown in Figure 1.24, freedom of discussion seems to be a characteristic of countries that already have the majority of their citizens online (more than 60 percent online) or are working toward achieving this (more than 40 percent online). In contrast, there is a cluster of countries on the chart with somewhat high Freedom of Discussion ratings but less than a quarter of their populations online, due at least in some part to economic and infrastructural limitations. Finally, the group of countries with below average Freedom of Discussion scores vary in regard to internet penetration rates. Of these, all but two, Azerbaijan and Qatar, are countries where less than half of the population used the internet.

4.2 Freedom on the Net

According to Freedom House's 2016 report, internet freedoms have been declining for six years, with Freedom of the Net scores falling in at least half of the countries monitored each year. The implications are glaring: Freedom House estimates that, in the previous 12 months, 60 percent of internet users lived in countries where people were arrested or imprisoned for posting content on political, social, and religious issues; while 49 percent of users live in countries where people have been attacked or killed for their online activities (Internet Society, 2017). (See Figure 1.25 for a world map on the state of Freedom on the Net.)

Figure 1.24: Freedom of Discussion vs. percentage of individuals using the internet (2014)



Sources: Varieties of Democracy (Freedom of Discussion); ITU (percentage using the internet)
Note: 98 countries, data from 2014
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Do countries with a higher percentage of individuals using the internet and/or more wealth score better on Freedom on the Net? As shown in Figure 1.26, neither of these conditions alone guarantees more internet freedoms. Although a cluster of countries in the top right of the chart represents a sweet spot where high national income, high proportion of internet users, and high degree of internet freedoms are all aligned, countries are otherwise dispersed across the chart. For instance, in the bottom right quadrant we see several relatively wealthy countries (high and upper-middle income) with high internet usage that score below average on internet freedoms. These include Venezuela and Bahrain, both countries where more than 1,000 websites have been blocked and Twitter users have been punished for criticizing the government (Freedom House, 2015). Conversely, countries with lower incomes (mostly low-middle income) in the top left quadrant, such as Zambia, Indonesia, and India, were found to have more internet freedoms, but a smaller proportion of people who were actually using the internet to realize the benefits of those freedoms.

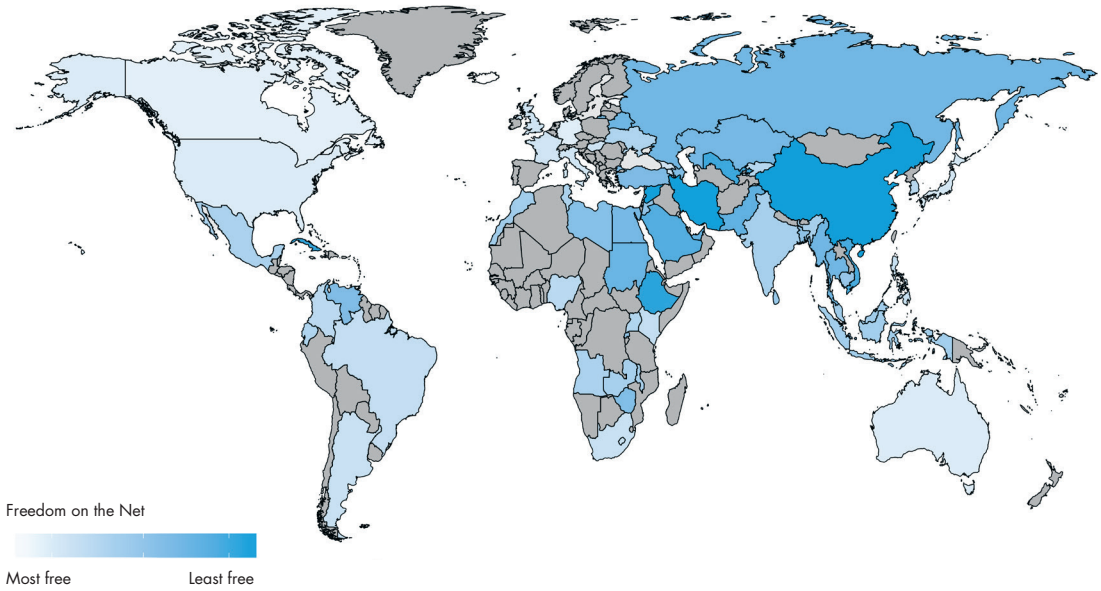
Other regional and national highlights include the following[4]:

- The Caucasus region rates well on Freedom on the Net, with **Georgia** leading among upper-middle-income countries, and with **Armenia** rated second among lower-middle-income countries, as well as having the highest proportion of individuals using the internet for its income group. And although **Azerbaijan** rates on the bottom half of Freedom on the Net, it is the only upper-middle-income country with more than three-quarters of its population using the internet.

- In South and Central America, only two countries score as "free" (i.e., with a score of 30 or less): **Argentina** and **Brazil**. Likewise in Africa, the two countries are **South Africa** and **Kenya**.

- In **Kenya** and the **Philippines**, low-middle-income countries where less than half of the population uses the internet, Freedom on the Net is quite favorable, with ratings just a few points below France and the U.K.

Figure 1.25: Freedom on the Net in the world in 2015



Source: Freedom House
Note: 65 countries, data from 2015
Technology & Social Change Group, University of Washington

- The **Kyrgyz Republic** has a relatively strong score on Freedom of the Net, unlike its bigger and wealthier neighbors, **Uzbekistan, Kazakhstan**, and **China**.

Iceland and Estonia are clear standouts, scoring the best ratings on internet freedoms by a wide margin of nine points over the next highest-rated country, Canada.

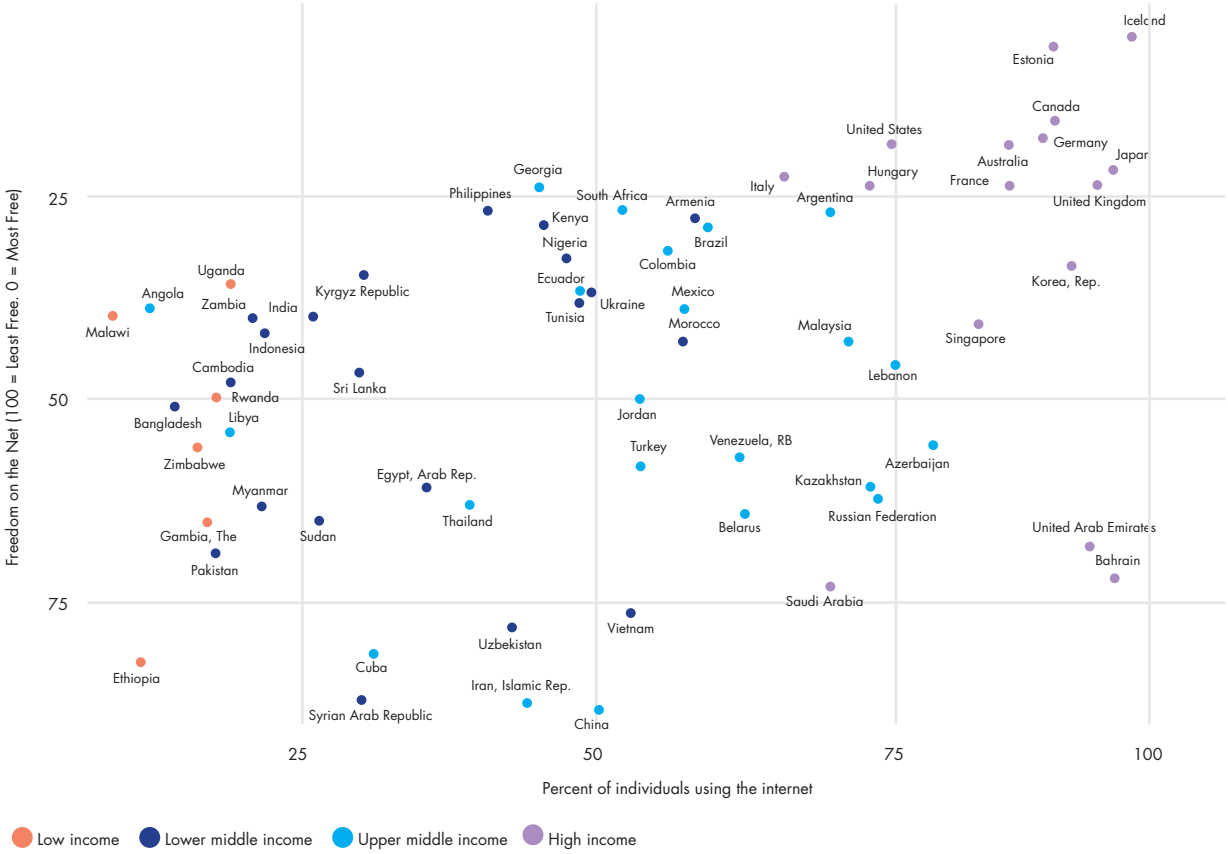
Figure 1.27 shows how Freedom on the Net ratings have changed as the percentage of individuals using the internet has changed over time, from 2011 to 2015.5 To interpret this graph, upward sloping lines indicate that as the percentage of individuals using the internet went up, Freedom on the Net also improved. Lines sloped downward are the opposite. For example, Estonia shows a steady increase in the percentage of individuals using the internet, and a corresponding steady increase in Freedom on the Net. Ethiopia, however, shows worsening Freedom on the Net as the percentage using the internet increases. Overall, Tunisia, Sri Lanka, and Georgia have seen some of the most striking improvements of online freedoms in recent years, while Turkey, Venezuela, and Ukraine show some of the largest declines. The vast differences between the shapes of these lines illustrate the complex relationship between these two indicators.

4.3 Civil liberties and political rights

At the global level, civil liberties and political rights did not change substantially between 2010 and 2015, using data from Freedom House's *Freedom of the World* project. The global average has been consistent, near 3.8 for all countries, 1.8 for more-developed countries, and 4.3 for less-developed countries (on a scale of 1 to *7*, with "1" as the strongest rating, "*7*" as the weakest). Regionally, the biggest shifts in civil liberties were positive, with notable improvements in Western Asia (0.8 points), Sub-Saharan Africa (0.4 points), and Southeast Asia (0.4 points). However, for political rights, the biggest shifts were negative, with political freedoms declining in North Africa (0.4 points) and Oceania (0.3 points).

Given the great potential of the internet to be used to find, create, and share information, as well as regular news coverage on ways people use information and communication technologies to organize for collective

Figure 1.26: Freedom on the Net vs. percentage of individuals using the internet



Sources: Freedom House (Freedom on the Net); ITU (percentage of individuals using the internet)
Note: 65 countries, data from 2015
Technology & Social Change Group, University of Washington

action, we might expect to see access to information associated with high degrees of civic and political freedom. Indeed, Freedom House reports this is happening in some areas:

> *The internet remains a key tool in the fight for better governance, human rights, and transparency. In 2/3 of measured countries internet-based activism led to citizen-successes including: defeat of restrictive free speech legislation, advancing women's rights, and increased citizen journalism (Freedom on the Net).*

Likewise, freedom of information and expression can also be understood as a product of strong institutions and fair governmental processes.

In contrast, governments wresting political, social, or economic control from citizens do so in part by limiting the flow of information along with other fundamental rights, whether in the form of internet blackouts, blocked social media apps, or approaches such as "censorship, restrictive press legislation, and harassment of journalists, bloggers and others who voice their opinions, as well as crackdowns on religious minorities" (Freedom House, n.d.). According to CIVICUS, only 3 percent of people "live in countries where the rights to protest, organize and speak out are respected, protected and fulfilled," and serious violations of these rights have occurred in 106 countries (CIVICUS, 2017).

The story isn't so simple when we look at national data, using internet usage as a proxy for general access, creation, and sharing of information. The correlation between the "percentage using the internet" and civil liberties ratings is moderately strong (0.54), yet looking at the distribution of these scores [Figure 1.28] we see the relationship is inconsistent. Namely, countries with the strongest civil liberties ratings (i.e., rated "1" on a scale of 1 to 7) have the highest proportion of internet users in their countries (an average of 77 percent), and countries with the next strongest rating (i.e., rated "2") have the second highest proportion of internet users (an average of 52 percent). Yet for countries rated "3" through "6" on civil liberties, the proportion of internet users is similar, around 35 percent.

When examining the relationship between political rights and internet use, we see a similar pattern [see Figure 1.28]. Countries rated with a "1" or "2" in political rights have a higher proportion of internet users

than those with weaker political rights ratings. However, the proportion of internet users for countries scoring between "2" and "7" falls within a noticeably narrower range (from 48 percent to 32 percent). Indeed, the countries with the poorest political rights scores (rated "7") have nearly the same proportion of internet users (32 percent) as countries with political practices rated in the 3-6 range (i.e., those rated a "3" average 35 percent of their population online). The correlation between the Political Rights Rating and the proportion of internet users in a country is also slightly weaker (0.47) than is the case with civil liberties.

How to interpret this? Greater freedoms don't necessarily accrue in countries with higher internet penetration, ICT infrastructure, or income. Likewise, governments in low-income, low-internet penetration countries with a relatively high degree of freedom may not be adequately investing in the ICT infrastructure, affordability, and equal access required for full participation in evolving forms of freedom of expression, including digital (e.g., sub-Saharan countries and parts of Asia).

Still, there remains a concentration of countries characterized by strong civil liberties, political rights, and high online participation, comparatively speaking. They include most European countries, along with some countries in Southeast Asia, Latin America, and Oceania. It may be that they operate above a kind of threshold where these characteristics are leveraged to further advance fundamental freedoms and uphold progress toward Target 16.10. Meanwhile, countries that are not realizing the benefits of internet access and civil freedoms may be stymied from similar rates of progress.

In this section, we have demonstrated that national measures of internet usage correspond with internet freedoms, civil liberties, and human rights only in countries that score high on all of these measures. Those countries tend to be wealthy, as well. Countries with high internet use but low internet freedoms, or low internet use and high internet freedoms, generally do not achieve the same levels of civil liberties and human rights ratings as the countries that score well on both. As this project moves forward, we will continue to track the baseline indicators discussed above, including those that measure access to information (internet usage and Freedom on the Net) and those that measure the extent to which fundamental freedoms are upheld (Freedom of Discussion, civil liberties, and political rights). As countries work toward expanding their internet infrastructure, we hope to see progress not only in terms of ICT access and usage, but also in terms of freedom and equality.

5. The road ahead

Our purpose in this research was to examine the UN SDGs through the lens of access to information (the DA2I framework). This process introduced relevant indicators for monitoring the ways access to information can advance the SDGs.

We also operationalized those indicators by selecting data (as available) to establish a baseline assessment, which will be enhanced and monitored going forward. We expect future work, both ours and of our colleagues, to improve the quality and specificity of indicators, account for variations in context, and increase the availability and quality of relevant data. By documenting these trends, we hope this report will contribute to the momentum and effectiveness of policies that leverage the power of access to information.

These data point to progress in terms of expanded infrastructure, tempered by the persistent challenge of affordability of technology, particularly in settings where development needs are most acute.

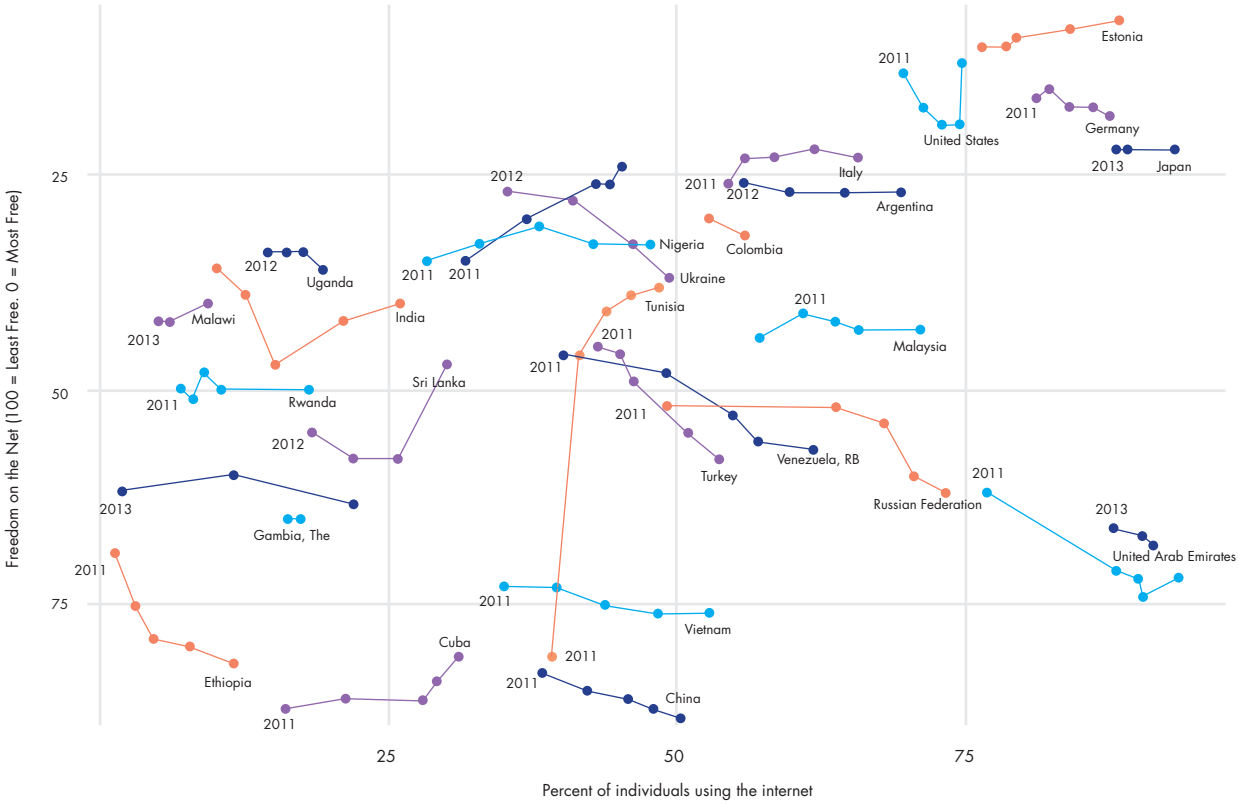
We are less willing to draw conclusions regarding "progress" around other indicators in this study. The more closely we examine the data, the more strongly we want to call for better data. We don't know as much about the world as we think. While our indicators and baseline measurements are a necessary first step, we want to track these indicators and generate better contextual understandings before drawing too many normative conclusions.

This analysis represents the first, skeletal phase of measuring the relationship between access to information and development. We are mapping the bones of this relationship. Subsequent analyses will further define the contours of this relationship and flesh out the details. Toward that end, we call on researchers, practitioners, and policymakers to help advance this agenda in the following ways:

More theoretical clarity between information, access to information, and information and communication technologies. Information is an intangible resource that can be applied in myriad ways to improve life and impact development. Access to information describes the ecosystem that makes information available, actionable, relevant, and useful to individuals and communities. Information and communication technologies are a powerful delivery system, under the access to information umbrella, that multiply the scale and impact of information. Over time, as more data become available and the DA2I lens is applied and refined, we think the conceptual clarity of these interrelated concepts will improve and so will subsequent analysis and insights.

Standardized, unstandardized, overlapping, and stand-alone data. The world is overflowing with data. Advocates of evidence-based policy are blessed and beleaguered by the amount and complexity of data available. Policy agents and service providers are increasingly aware of the power of data to improve their efforts and to make the case for funding, and are increasingly partnering with researchers to gather data based on their organization and their unique setting.

Figure 1.27: Freedom on the Net versus percentage of individuals using the internet. (2011 - 2015)



Sources: Freedom House (Freedom on the Net); ITU (percentage of individuals using the internet)

Note: 28 of 65 available countries selected; data is from 2011 to 2015, depending on country. Lines show change over time from the earliest data available (2011-2014, depending on country) through 2015. Lines sloped upward indicate increasing Freedom on the Net as the percentage of individuals using the internet also increases. Color was added to lines just to help differentiate countries, and has no additional meaning. The year that data begins for each country is labeled, and each black dot in the line marks a year.

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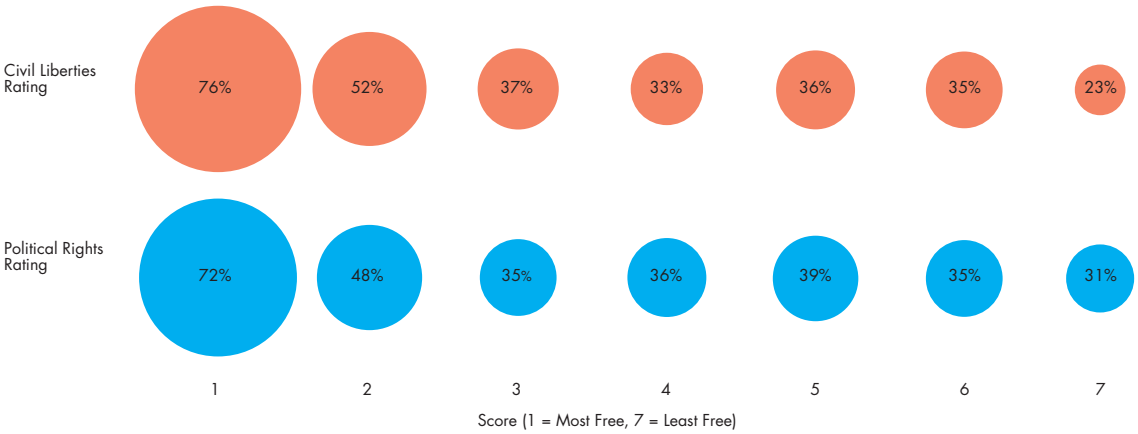
Figure 1.28: Average percentage of individuals using the internet, by sub-score on the Political Rights Rating and the Civil Liberties Rating.



Sources: ITU (percentage using the internet); Freedom House (Political Rights Rating and Civil Liberties Rating sub-scores)

Note: 185 countries

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Further, the internet and movement toward open data allow for a wealth of data to inform and complement programs generally. While we are swimming in data, the challenges of comparing data built on different questions, methods, samples, etc. are daunting.

Ultimately we are lucky that so many diverse parties value and collect data – overlapping data is an asset. Going forward, our work and the work of others who follow this lead, should explicitly grapple with the challenges of triangulating between various data sources. Because the power of information is hyper-localized, often the most important breakthroughs come from localized and customized access-to-information efforts. The challenges of generalizing and providing useful "state of access" assessments will be more useful as we are better able to use all available data and account for local differences, even as we speak to global standards.

Private sector participation. The private sector "owns" incredible data, gathered from simple choices users make about what to click, or apps such as maps that actually improve based on the number of users who participate. The more people carry smart devices around and use them, the more private companies will know. In many ways, through the aggregation of private data, companies will know more about us than we know about ourselves.

Private companies could substantially contribute to development goals, beyond the checks written as part of corporate social responsibility campaigns. They could share data. We understand the incentives not to share, but we think there is ample opportunity to collaborate with the development research community to use private data to improve life for many without reducing profits – and ultimately, as development progresses, to increase profits.

Furthermore, we expect in future years to see more data disaggregated by income, sex, age, race, ethnicity, migratory status, disability, and geographic location. Without disaggregation, averages can mask the reality of how resources and results are unevenly distributed. To achieve the foundational tenet of the UN 2030 Agenda, that "everybody counts," it is critical that the level of data disaggregation improves, as has been recognized by the Inter-agency and Expert Group on Sustainable Development Goal Indicators and most UN member states (United Nations Economic and Social Council, 2016).

Access to information can transform lives. It can help lift people out of poverty, promote gender equality, and create countless opportunities for youths. However, its transformative ability is bounded by local, social, political, and economic forces. While ICT infrastructure is key to achieving the Sustainable Development Goals, the tools that provide access to information are not enough. To help create more just and equal societies, the access must be meaningful.

References

Alliance for Affordable Internet. (2016). A*ffordability Report. Washington, D.C.* Retrieved from http://a4ai.org/affordability-report/report/2015/.

CIVICUS. (2017). Findings – April 2017. Retrieved from https://monitor.civicus.org/findings/.

Clark, M., Coward, C., & Rothschild, C. (2017). Mobile Information Literacy: Building Digital and Information Literacy Skills for Mobile-first and Mobile-centric Populations through Public Libraries. *In Proceedings of the 2nd AfLIA Conference & 4th Africa Library Summit:* **Yaoundé, Cameroon.** Retrieved from http://tascha.uw.edu/publications/mobile-information-literacy-building-digital-and-information-literacy-skills-for-mobile-first-and-mobile-centric-populations-through-public-libraries/#sthash.vKNd6X8P.dpuf.

Communication Authority of Kenya. (2016). *ICT Access Gaps Study Final Report.* Retrieved from http://ca.go.ke/images/downloads/RESEARCH/ICT%20Access%20Gaps%20Report-April%202016%20.pdf.

Fellows, M., Davis, K., and Russell-Sauve, C. (Forthcoming). *Learning and leading: An evaluation of the digital skills for digital librarians project.* Seattle: Technology & Social Change Group, University of Washington Information School.

Freedom House (2015). *Freedom on the Net 2016.* Retrieved from https://freedomhouse.org/report/freedom-net/freedom-net-2015.

Freedom House (2016). *Freedom on the Net 2016.* Retrieved from https://freedomhouse.org/report/freedom-net/freedom-net-2016.

Freedom House. (n.d.). *Freedom of Expression.* Retrieved from https://freedomhouse.org/issues/freedom-expression.

Freedom House. (n.d.). "Freedom in the World: Aggregate and Subcategory Scores." Retrieved from: https://freedomhouse.org/report/freedom-world-aggregate-and-subcategory-scores

Garrido, M., Rissola, G., Rastrelli, M., Diaz, A., & Ruiz, J. (2009). *Immigrant women, e-skills, and employability in Europe: The case of Hungary, Italy, the Netherlands, Romania, and Spain.* Seattle: Technology & Social Change Group, University of Washington. Retrieved from http://tascha.uw.edu/publications/immigrant-women-e-skills-and-employability-in-europe-the-case-of-hungary-italy-the-netherlands-romania-and-spain/#sthash.DdLllNz7.dpuf.

Garrido, M. & Sey, A. (2016). *Coding bootcamps: A strategy for youth employment.* Geneva: ITU Telecommunication Development Sector. Retrieved from http://tascha.uw.edu/publications/coding-bootcamps-

a-strategy-for-youth-employment-in-developing-countries/#sthash.VoXSfREx.dpuf.

Garrido, M., Sullivan, J., & Gordon, A. (2010, December). Understanding the links between ICT skills training and employability: an analytical framework. In *Proceedings of the 4th ACM/IEEE International Conference on Information and Communication Technologies and Development* (p. 15). ACM.

GSMA. (2013). La Banda Ancha Móvil en la Base de la Pirámide en América Latina. Retrieved from http://www.gsma.com/latinamerica/wp-content/uploads/2013/07/gsmalatambomesp.pdf.

GSMA. (2016). The Mobile Economy. London. Retrieved from https://www.gsma.com/mobileeconomy/archive/GSMA_ME_2016.pdf.

Hafkin, N. J., & Huyer, S. (2006). *Cinderella or cyberella?: Empowering women in the knowledge society.* Kumarian Press, Inc.

International Federation of Library Associations and Institutions (IFLA). (2014). Lyon Declaration on Access to Information and Development. Retrieved from http://www.lyondeclaration.org/.

International Telecommunication Union. (2015). *The Connect 2020 Agenda.* Geneva: ITU Retrieved from http://www.itu.int/en/connect2020/Pages/default.aspx.

International Telecommunication Union. (2016). *ICT Facts and Figures 2016.* Geneva: ITU Retrieved from http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf.

International Telecommunication Union. (2016). *Measuring the Info Society Report 2016.* Geneva: ITU. Retrieved from http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2016.aspx.

Internet Society. (2017). Reviewing Freedom on the Net Report — Our View. Retrieved from https://www.internetsociety.org/reviewing-freedom-net-report-%E2%80%94-our-view.

Ministry of Information Communications and Technology of Kenya. (2014). *The Kenya National ICT Master Plan: Towards a Digital Kenya, 2013/14 - 2017/18.* Retrieved from https://www.kenet.or.ke/node/132.

Mourshed, M., Farrell, D., & Barton, D. (2015). *Education to Employment: Designing a System that Works.* Retrieved from https://mckinseyonsociety.com/downloads/reports/Education/Education-to-Employment_FINAL.pdf.

Nussbaum, M. C. (2001). *Women and human development: The capabilities approach (Vol. 3).* Cambridge University Press.

Sen, A. (2001). *Development as freedom.* Oxford Paperbacks.

Shields, A. S. (2008). *Gender: An Intersectionality Perspective. Sex Roles, 59, 301–311.*

Souther, D., & Kerretts-Makau, M. (2012). *Internet Governance in Kenya: An Assessment for the Internet Society.* Nairobi: ICT Development Associates. Retrieved from https://www.researchictafrica.net/multistake//Souter_Kerretts-Makau_2012_-_Internet_governance_in_Kenya_-_an_assessment_for_the_Internet_Society.pdf.

United Nations Human Rights Council (2012). 20th regular session of the Human Rights Council (18 June - 6 July 2012, p. 23). Retrieved from http://www.ohchr.org/EN/HRBodies/HRC/RegularSessions/Session20/Pages/20RegularSession.aspx.

United Nations Economic and Social Council (2016). *Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators.* Statistical Commission Forty-seventh session, 8-11 March 2016. Retrieved from https://unstats.un.org/unsd/statcom/47th-session/documents/2016-2-IAEG-SDGs-Rev1-E.pdf.

The Universal Declaration of Human Rights. (n.d.). Claiminghumanrights.org. Retrieved from http://www.claiminghumanrights.org/udhr_article_19.html.

Warner, R. L. & Shields, A. S. (2013). *The Intersections of Sexuality, Gender, and Race: Identity Research at the Crossroads. Sex Roles, 68, 803–810.*

Endnotes

[1] For a complete list of organizations from whom we reviewed development indicators, see Appendix 1.

[2] Eurostat: ICT for households and individuals. http://ec.europa.eu/eurostat/cache/metadata/en/isoc_i_esms.htm

[3] This right to expression has been extended to vulnerable groups, such as children, migrant workers, and people with disabilities. http://www.claiminghumanrights.org/opinion_expression_definition.html

[4] The most recent country reports are available at https://freedomhouse.org/report/freedom-net/freedom-net-2016.

[5] For some countries, data only cover the years from 2013 to 2015.