Understanding the mobile disability gap

Insights on mobile phone access and usage by persons with disabilities in Kenya and Bangladesh

December 2019

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GSMA Assistive Tech

The GSMA Assistive Tech programme works to drive greater access and use of mobile technologies for persons with disabilities in emerging markets and maximise opportunities for social and economic inclusion. The programme works with the mobile industry and key disability and development stakeholders to address the digital inclusion gap of persons with disabilities, identify innovation opportunities and highlight the value of mobile-enabled assistive technologies. The programme is supported by the UK Department for International Development and AT 2030.

For more information, please visit **www.gsma.com/AssistiveTech**.

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This project is part of AT2030, a programme led by the Global Disability Innovation Hub (GDI Hub) and funded with UK aid from the UK government

AT2030 will test 'what works' to improve access to AT and will invest £20m to support solutions to scale. With a focus on innovative products, new service models, and global capacity support, the programme will reach 9 million people directly and 6 million more indirectly to enable a lifetime of potential through life-changing Assistive Technology.

For more information, please visit: **https://at2030.org/**

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- KSB (Kenya Society for the Blind)
- KUB (Kenya Union for the Blind)
- Machakos Technical Institute for the Blind
- NONDO (Northern Nomadic Disabled Persons Organisation)
- The Create Kenya Machakos Self-Help Group
- The Deaf Outreach Development
- Tuleane Afrika Initiative

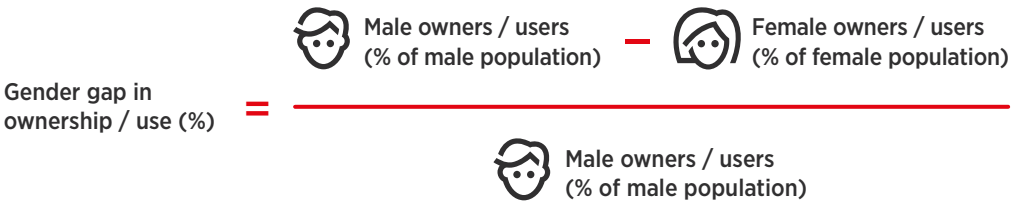
CONTENTS

Definitions

Access	An individual's potential use of a mobile phone, regardless of ownership, through borrowing or renting.
Accessibility	The characteristics of products, services or environments designed to be inclusive of persons with disabilities.
Assistive products	Products that maintain or improve an individual's functioning and independence, thereby promoting their well-being. These include wheelchairs, hearing aids and communications aids, among others.
Assistive technologies	An umbrella term covering the systems and services related to the delivery of assistive products and services and this report includes those based on digital technologies.
Blind	A person who reports or is identified as having complete vision loss.
Deaf	A person who reports or is identified as having complete hearing loss.
Digital inclusion of persons with disabilities	Actions to address the barriers to access, ownership and usage of digital products and services by persons with disabilities, including mobile phones and mobile-enabled services.
Disability	An umbrella term covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations.
Mobile disability gap (in ownership)	Refers to how much persons with disabilities are less likely to own a mobile phone than non-disabled persons. It is calculated by:

Disability gap in mobile phone ownership (%) = (**Non-disabled mobile phone owners (% of non-disabled population)** − **People with disability mobile phone owners (% of people with disability population)**) / **Non-disabled mobile phone owners (% of non-disabled population)**

Functional domains	Activity domains used in the Washington Group Questions to identify an individual's difficulty to perform basic activities. The six core domains are: seeing, hearing, walking, cognition, self-care, and communication.

Gender gap (in ownership)	Refers to how much women are less likely to own a mobile phone than men. It is calculated by: 
Hard of hearing	A person who reports or that is identified as having "a lot of difficulty" hearing.
Multiple disabilities	A person who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least two functional domains.
Non-disabled persons	A person who did not report any acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform the functional domains in the Washington Group Questions.
Ownership	An individual has sole or main use of a mobile phone, and uses it at least once a month, whenever needed and without additional cost other than use of mobile services.
Person with disabilities	A person who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Usage gap	Disparity in mobile phone usage between different segments for all mobile services including voice, SMS, mobile internet and mobile money.
Visually impaired	A person who reports or is identified as having "a lot of difficulty" seeing.
Washington Group Questions	A set of questions designed to identify people with disabilities in a survey or a census.

Acronyms

ARPU	Average Revenue Per User
AT	Assistive Technology
ATM	Automated Teller Machine
BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi Taka
DFID	Department for International Development (United Kingdom)
DPO	Disabled Persons Organisation
GARI	Global Accessibility Reporting Initiative
GDI	Global Disability Innovation Hub
GDP	Gross Domestic Product
IVR	Interactive Voice Response
KBS	Kenya Bureau of Statistics
KES	Kenyan Shilling
KSL	Kenya Sign Language
MNO	Mobile Network Operator
NCPWD	National Council for Persons with Disabilities (Kenya)
P2P	Person to Person
UN	United Nations
UN CRPD	United Nations Convention on the Rights of Persons with Disabilities
USD	United States Dollar
WHO	World Health Organization
y.o.	years old

Executive summary

Over a billion people worldwide live with a form of disability. This represents 15 per cent of the global population; 80 per cent of whom live in a low- or middle-income country.[1] While there is growing recognition that mobile technology has the potential to deliver services to persons in need, there has been limited research to understand access to mobile phones by persons with disabilities and the impact of mobile technology in their lives. This research aims to bridge the knowledge gap and to understand the potential of mobile phones as assistive technologies (ATs) for persons with disabilities in Kenya and Bangladesh.

This report presents, for the first time, an evaluation of the gap and barriers to mobile phone ownership experienced by persons with disabilities, as well as the usage patterns of four main mobile-enabled services (voice, SMS, mobile internet and mobile money) and the role of mobile phones to enable access to basic services, such as education, healthcare, transportation, employment and financial services. Finally, the report explores the characteristics of access and usability of mobile products and services along the customer journey.

Key insights

1. **Mobile phone ownership among persons with disabilities is high in Kenya and Bangladesh**. However, they are less likely to own a mobile phone than non-disabled persons. More than 70 per cent of those who own a mobile phone have a basic or feature handset. The level of education, the type of disability, and gender are all determinants of mobile phone ownership, including the type of mobile phone owned.

2. **Those who do not own a mobile phone often access one by borrowing**. Yet, based on the present research, four per cent of persons with disabilities in Kenya and 13 per cent in Bangladesh still do not own or have access to a mobile phone, compared to three per cent and five per cent of non-disabled persons, respectively.

3. **There is no clear gap in mobile phone usage between persons with disabilities and non-disabled persons**. In fact, for certain services, persons with disabilities are "power-users" of some mobile-enabled services. In both countries, deaf and blind individuals, for instance, show particularly high usage of mobile internet. Access to accessibility features—mostly available on smartphones—seem to influence and drive usage. Persons with disabilities with access to such features also make higher usage of mobile services.

4. **Cost of handsets and services, low digital literacy, and the disability** itself are factors preventing access and ownership of mobile phones, as well as autonomous and confidential use of mobile-enabled services.

5. **The impact of gender and disability on digital inclusion varies from country to country**. In Bangladesh where the gender gap is remarkably large, being a woman is a higher determinant factor of mobile ownership than disability. In Kenya, where there is almost a non-existent gender gap in mobile ownership, disability is a greater determinant than gender.

6. In both countries, **access to basic services is limited, especially among persons with disabilities**. However, **persons with disabilities perceive that mobile phones enable access to basic services**. The perceived impact of mobile phones to access basic services is greater in Kenya, where the mobile ecosystem is more developed than in Bangladesh.

7. The main **barriers for persons with disabilities to physically attend basic services** are the additional costs and limitations due to their disability, as well as stigma and discrimination from family members, service providers or other users of basic services. The lack of inclusive design of infrastructures and physical services is an additional barrier.

8. Due to the lack of awareness of their existence, most persons with disabilities do not use accessibility features (such as screen-readers, magnifiers, voice command, etc.) which limits their capacity to use mobile phones autonomously. Furthermore, these features are almost exclusively available on smartphones. Consequently, **lack of use of accessibility features impacts the perceived value of mobile phones as assistive technologies**.

9. Mobile Network Operators (MNOs) lack awareness of the specific needs of persons with disabilities when using a mobile phone and services. **While solutions and technologies exist to make these more accessible, they are not always implemented by MNOs because of this lack of awareness**.

10. Stakeholders and the mobile and disability ecosystems need to improve the accessibility, affordability and relevance of mobile products and services for persons with disabilities. However, **to maximise the potential of mobile as an assistive tool, digital skills training for persons with disabilities is essential**.

82% and **62%**
(Kenya) (Bangladesh)

of persons with disabilities own a mobile phone

Persons with disabilities are

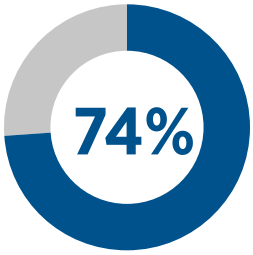
>10%
(Kenya and Bangladesh)

less likely to own a mobile phone than non-disabled persons

>70%
(Kenya and Bangladesh)

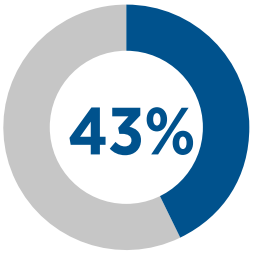
of persons with disabilities who own a mobile phone have a basic or a feature handset

In Kenya:



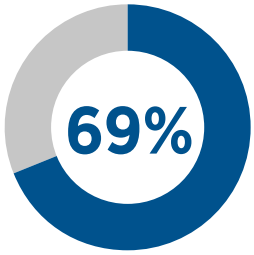
of deaf use SMS daily

(vs **61%** of non-disabled persons)



of deaf use mobile internet daily

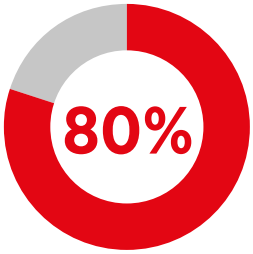
(vs **19%** of non-disabled persons)



of blind smartphone owners use mobile internet daily

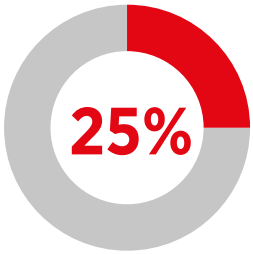
(vs **56%** of non-disabled smartphone owners)

In Bangladesh:



of blind smartphone owners use mobile internet daily

(vs **75%** of non-disabled smartphone owners)



of persons with disabilities have a mobile money registered account

(vs **14%** of non-disabled persons)

Persons with disabilities perceive a limited access to services, for instance

57% and **75%**
(Kenya) (Bangladesh)

reported not having access to employment

...but some perceive that mobile helps them access services, such as

Education for

25% of visually impaired Bangladeshis mobile users and

71% of visually impaired Kenyan smartphone owners

Financial services for

15% of Bangladeshis with disabilities and

62% of Kenyans with disabilities

~10% **of persons with disabilities in each country use accessibility features on their mobile phone**

1 Introduction

The World Health Organization (WHO) estimates that there are one billion people in the world living with some form of disability;[2] 80 per cent of whom live in a low- or middle-income country.[3] Persons with disabilities are more likely to experience adverse socioeconomic conditions and discrimination. The relationship between poverty and disability is complex and bidirectional. Persons with disabilities are more likely than non-disabled persons to have lower levels of education, poor access to healthcare and poorer health outcomes, fewer employment opportunities, and higher poverty rates.[4] Depending on the severity of the disability, persons with disabilities may also require additional care and treatment with out-of-pocket expenses.

Disability can also be a consequence of poverty.[5] Being poor delays or limits opportunities to access healthcare and treatment when needed. The most marginalised experience poor living conditions such as lack of access to clean water, poor nutrition, and lack of sanitation.[6] Additionally, their employment opportunities may lack security and comprise potentially harmful working conditions.[7] These circumstances may result in an individual's ill-health, an inability to recover, and cause disability.

Assistive technologies (ATs) are defined by WHO as the "systems and services related to the delivery of assistive products and services", which are products that "maintain or improve

an individual's functioning and independence, thereby promoting their well-being."[8] ATs support the rights of persons with disabilities to have a dignified life, and to integrate and participate fully in society by providing opportunities to access education, healthcare or employment. Access to ATs globally is limited, however, as only 10 per cent of those who need them have access.[9]

More than 5.1 billion people globally were subscribed to mobile services by the end of 2018.[10] Mobile phones have revolutionised the way in which the world communicates, removing geographical barriers and changing social systems, including the way in which services are provided, such as healthcare, education and financial services. For some people, mobile phone capabilities are also breaking existing barriers to participation in society, communication, and access to information, particularly for persons with disabilities.[11]

In our scoping study,[12] the GSMA Assistive Tech programme explored the potential of mobile phones as ATs for persons with disabilities. The study found there is growing recognition among donors, researchers, and Disabled Persons' Organisations (DPO) that mobile technology and mobile network operators (MNOs) have an important role to play to deliver ATs to persons with disabilities. But there was limited research to understand the characteristics of ownership, access, and usage of mobile phones by persons with disabilities and the impact of mobile technology on their lives. The need for research on this topic was the motivation to conduct the study presented in this report.

1.1 Purpose of study

The GSMA has launched the Assistive Tech programme to drive the social and economic participation of persons with disabilities through digital technologies and mobilise mobile operators as key actors in this area.[13] This report is delivered by the GSMA Assistive Tech programme and was conducted in collaboration with the GDI Hub.[14]

This report presents, for the first time, research conducted to better understand the digital access gap experienced by persons with disabilities, and characterise their use of mobile products and services to inform stakeholders in the mobile ecosystem. To achieve this goal, the specific objectives are:

- **Measure the gap** and barriers in mobile phone ownership and access experienced by persons with disabilities, identifying the mobile disability gap;
- Understand **usage patterns of and barriers** to different mobile-enabled services by persons with disabilities, such as voice, SMS, mobile internet and mobile money;
- Evaluate **access to basic services** by persons with disabilities and the impact of mobile phones on the lives of persons with disabilities when improving access to basic services; and
- Explore the characteristics of **accessibility** across the customer journey path, from usability of handsets to access and usage of mobile services and basic services.

Kenya and Bangladesh were selected as the research contexts. While these countries have similar GDP per capita, they have striking differences in terms of the maturity of their mobile ecosystems as well as their policies for inclusion of persons with disabilities. Details are provided in Section 2.

1.2 Structure of report

The report begins with a summary of the research methodology and the definition of the technical terms used throughout (Sections 1.3 and 1.4). This is followed by an overview of the two research contexts: Kenya and Bangladesh (Section 2). Guided by the research objectives, the analysis is divided into four main objective areas, each detailed in a specific section of the report. Section 3 focuses on the characteristics of mobile phone ownership and access, Section 4 on usage of mobile-enabled services, Section 5 on access to basic services and Section 6 on accessibility of products and services. Section 7 presents an analysis of the intersection of gender, disability, and the mobile disability gap in the research contexts. The report concludes with a section detailing how mobile technology bridges the inclusion and participation gaps for persons with disabilities (Section 8), what the potential market size is (Section 9) and final considerations and recommendations for the industry (Section 10).

1.3 Summary of methodology

This research was conducted in two countries: Kenya and Bangladesh. Following a mixed methods approach, the research combined quantitative and qualitative data collection and analysis methods (see Annex 1 for detailed methodology). Data was collected between June and August 2019. The quantitative part of this research used a survey methodology, while the qualitative component of the research employed a semi-structured interview and photovoice study. Through close collaboration with local DPOs, participants were identified and mobilised to contribute to this research.[15]

Table 1

Overview of research methods employed and sample sizes in each country

	Kenya	Bangladesh	Total
Quantitive interviews with persons with disability	816	800	**1616**
Quantitative interviews with non-disabled persons (control group)	189	25	**214**
Qualitative interviews with persons with disability	40	41	**81**
Urban Interviews location	Nairobi	Dhaka, Chittagong	
Rural interviews location	Rural parts of Machakos county	Rural areas around Dhaka and Chittagong (upazillas of Savar, Anwara, etc.)	
Photovoice study with persons with disabilities	8	8	**16**

1.3.1 Sampling for survey

Conducting disability research poses challenges, such as choosing an adequate sampling method. Due to the exploratory nature of this research, the objective was to capture the perspectives of different populations based on type of disability (visually impaired and blind, hard of hearing and deaf, physically impaired, other types of disability), gender, environment (urban/rural), age and income level.[16] For this reason, **quota sampling** was employed for defining the sample for the survey.

A sample size of 1,000 participants was defined, of which 800 were persons with disabilities and 200 were non-disabled persons as a control group.[17] The primary quotas were defined for four disability categories (n=200, for each category): mobility impairment, visual impairment, hearing impairment, and others, which covered speech, psycho-social and multiple disabilities. For the qualitative component, 40 interviews were conducted (n=10, per category). Only adults above 18 years of age were interviewed for this research. Adults with all types of disability who were able to give informed consent were eligible to participate in this research. This excluded adults with severe intellectual disability from the study.

1.3.2 Survey data collection

All interviews were administered **in person**. Quantitative interview data was collected digitally, while qualitative interviews were recorded and transcribed. The duration of interviews varied depending on the need for sign language interpretation or more time for respondents with speech impairment and mild intellectual disability. Quantitative interviews lasted on average 20 minutes, and 90 minutes for qualitative interviews. Interviews were conducted in English and Kiswahili in Kenya, Bangla in Bangladesh, and the national (or community) sign language, depending on the participant's preference.

1.3.3 Quantitative analysis

To enable the research team to draw conclusions at the **national level**, both databases were **post-weighted**. Weighting criteria in Kenya included gender, environment, level of education[18]

and type of disability (for respondents with disabilities). The weights were computed using data from the Kenya 2009 Population & Housing Census, which included a specific section on disability.[19] In Bangladesh, weighting criteria included gender, environment, type of house and type of disability (for respondents with disabilities). The weights were computed using data from the Bangladesh 2011 Census, which included a section on disability.[20]

While different approaches exist to assess disability, **this report uses the Washington Group Questions**[21] for identifying and assessing the severity of disability for the purpose of data collection and analysis. However, as part of the protocol and prior to the interviews, DPOs were asked to assess if an individual had a disability and if so, to categorise the disability/disabilities. This information was used during data processing to re-categorise those individuals who reported having no disability during the interview using the Washington Group Questions, but had been identified as having a disability by the DPOs. This was an important step for inclusion and to ensure the representation of individuals with psycho-social disabilities, which are often underreported due to stigma.

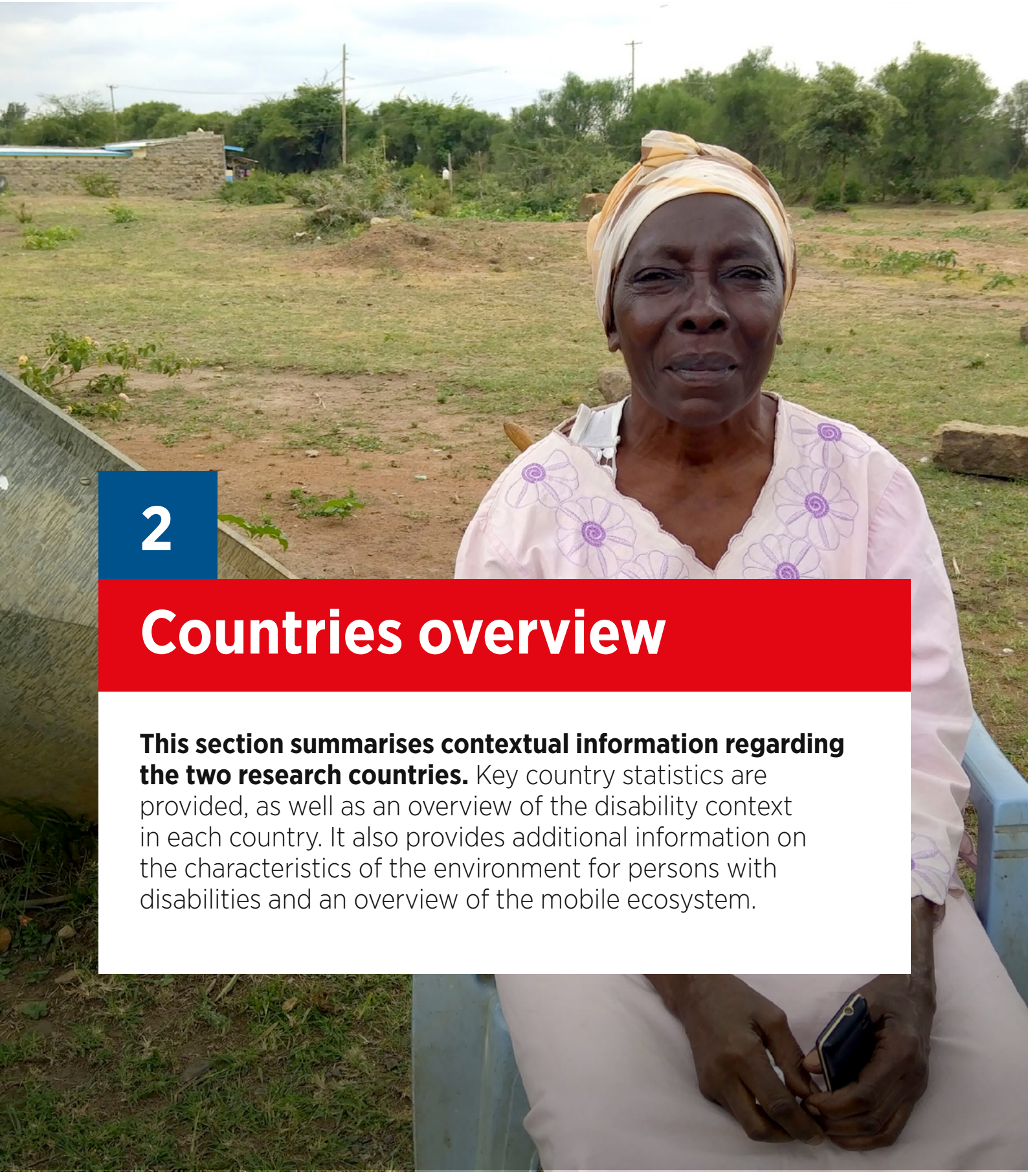
1.3.4 Qualitative data collection and analysis

Forty semi-structured interviews were conducted in each country to gather further participant insights in both countries. Similar to the survey, the interview duration varied—depending on the type of disability of the participant—from 45 minutes to two and a half hours. Interviews were recorded and transcribed. Transcriptions were analysed using **thematic coding**, following the objectives of this research.

Additionally, **a photovoice study** was conducted, led by the participants, and facilitated by a researcher. Cameras were provided to eight persons with disabilities in each country to capture their experiences with mobile phones. Participants were selected to represent different profiles by type of disability, living environment (urban, rural and slum), gender and age.[22] The pictures taken were discussed with the participant, who described their experiences with mobile technology. These informed the stories presented in this report (Section 7).

1.4 Clarification of terms

In this report, some specific terms are used that require clarification. The term **accessibility** refers to the characteristics of a product or service that ensure their use by anyone, regardless of disability. **Access**, on the other hand, refers to the contextual possibilities that facilitate the use of mobile products and services, regardless of personal ownership or duration. Finally, in this report, the term **assistive technologies** is used inclusively of digital products and services that support the participation of persons with disabilities in society.



2 Countries overview

This section summarises contextual information regarding the two research countries. Key country statistics are provided, as well as an overview of the disability context in each country. It also provides additional information on the characteristics of the environment for persons with disabilities and an overview of the mobile ecosystem.

Table 2

Summary of country data

		Kenya	Bangladesh
Country statistics	**Population (in m)**[a]	51.4	161.4
	GDP/capita (in current USD)[a]	1,710	1,698
	% rural population[a]	73	63
Disability statistics	**Disability prevalence**	3.5%[b] (15.2%)[d] (10-15%)[e]	1.4%[c] (39.9%)[d] (10-15%)[e]
	#people with disabilities (in m)	1.8[b]	2.3[c]
	% with visual impairment/blindness	25[b]	20[c]
	% with hearing impairment/deafness	14[b]	10[c]
	% with speaking impairment	12[b]	13[c]
	% with physical impairment	25[b]	39[c]
	% with intellectual impairment	11[b]	12[c]
	% with other types of impairment	13[b]	6[c]
Access to basic services *(by persons with disabilities and non-disabled persons)*	**Literacy rate (among adults aged 15+)**[f]	79%	73%
	Hospital bed per 1,000 people[f]	1.4	0.8
Enabling environment for persons with disabilities *(ratification of the UN CRPD and legal frameworks)*		Persons with Disabilities Act in 2003	Disability Welfare Act of 2001
		Ratified the UN CRPD in 2008	Ratified the UN CRPD in 2007
		The Persons with Disabilities (Amendment) Bill, 2019	Persons with Disability Rights and Protection Act of 2013
Mobile ecosystem	Market penetration (total,%)[g]	98	96
	Smartphone market penetration (total, %)[g]	46	37
	3G network coverage (total population, %)[g]	88	95
	Average revenue per user (ARPU by subscriber, USD)[g]	$8.67	$2.97
	Registered mobile money accounts (total population, %)[h]	72	18
Gender disparity *(in participation in the society, in digital inclusion, etc.)*	% girls married by 15 y.o.[f]	4	22
	Mobile gender gap[i]	6%	33%

a. World Bank (2018). World Bank Open Data. See: https://data.worldbank.org
b. Kenya Bureau of Statistics (2012). Kenya 2009 Population & Housing Census, Analytical Report on Disability, Volume XIII, March 2012
c. Bangladesh Bureau of Statistics (2011) Population & Housing Census 2011 (National Series). Socio economic and Demographic Report: Volume 4
d. World Health Organization (2011) World Report on Disability
e. Estimated by key experts interviewed
f. World Bank (2018). World Bank Open Data. See: https://data.worldbank.org
g. GSMA Intelligence (2019). Markets (Q3 2019). See: https://www.gsmaintelligence.com/markets/
h. Financial Inclusion Insights (2017). Data Fiinder
i. GSMA (2019). The Mobile Gender Gap Report 2019

2.1 Kenya

Located in East Africa, Kenya is the seventh most populated country in Africa with a population of 51.4 million.[23] A largely rural country with one of the fastest growing economies in Sub-Saharan Africa, Kenya has seen great social, economic and political progress in recent years,[24] yet access to basic services is limited for most Kenyans. For instance, the literacy rate is 79 per cent, below the 86 per cent global average,[25] and there are only 1.4 beds in hospital per 1,000 inhabitants, compared to the global average of 2.7 beds per 1,000.[26] However, in terms of gender equality, the percentage of girls married by the age of 15 is lower in Kenya (four per cent), a smaller gender disparity than the global average of five per cent.

2.1.1 Prevalence of disability

According to the Kenya Bureau of Statistics (KBS), almost 3.5 per cent of the Kenyan population –nearly 1.8 million – have a disability.[27] However, WHO estimates a prevalence of 15.2 per cent in Kenya.[28] Based on the KBS data, the most common types of disability in Kenya are visual impairment and blindness, and physical impairment, with each group representing around 25 per cent of persons with disabilities.[29] Hearing impairment and deafness is the third most common type of disability (14 per cent), followed by other types of disability (13 per cent), speaking impairment (12 per cent) and intellectual impairment (11 per cent). While these are the most current available statistics of the prevalence of disability in Kenya, KBS acknowledged possible underreporting and methodological challenges during the 2009 census.[30]

2.1.2 Disability context and policies

In Kenya, persons with disabilities are more disadvantaged than non-disabled persons. They are less likely to work for pay and tend to live in households with less access to utilities such as piped water, electricity, and equipment, etc. (see Table 3).

Table 3

Comparison of access to employment and utilities by persons with disabilities and non-disabled persons in Kenya

Kenya	Persons with disabilities	Non-disabled persons
% of women who work for pay *(excl. those who have a family business or work in argriculture)*	7%	9%
% of men who work for pay *(excl. those who have a family business or work in argriculture)*	14%	18%
% who have piped water at home	15%	24%
% who have electricity as main lighting power source	11%	23%
% who live in a household that has a TV	15%	29%

Source: Kenya 2009 Population & Housing Census, Analytical Report on Disability. Volume XIII, March 2012, Kenya Bureau of Statistics – https://www.knbs or ke/download/analytical-report-on-disability-volume-xiii-2/

In recent years, however, the Kenyan Government has taken several steps to protect the rights of persons with disabilities. Since 2003, the Persons with Disabilities Act[31] has been the main legal framework enacted to protect their rights, provide rehabilitation, and promote equal opportunities for persons with disabilities. Furthermore, the Kenyan Government has signed a number of treaties on the rights of persons with disabilities, such as the UN CRPD (United Nations Convention on the Rights of Persons with Disabilities)[32] and the Marrakech Treaty,[33] which aims to increase both the number of and access to books in accessible formats (Braille, audio or large print).

The Persons with Disabilities Act is the basis for the creation of the National Council for Persons with Disabilities (NCPWD), a government body in charge of representing and providing support to persons with disabilities. The NCPWD oversees a registration of persons with disabilities, manages the cash transfer programme, provides persons with disabilities with ATs and coordinates the multiple DPOs working in Kenya. The Persons with Disabilities Act also gives a salary tax exemption for persons with disabilities as well as the annulment of import duties for ATs.

In addition to the Persons with Disabilities Act, the government has actively been working on other areas of inclusion such as the recognition of Kenya Sign Language (KSL) and Braille as official languages in the 2010 Constitution[34] and the development of special needs and inclusive education pathways.

The implementation of many of these frameworks and policies remains a major challenge. In recent years, Kenya has made great progress to increase access to education

nationally, including for children with disabilities through the development of a special needs education system. Students with disabilities are taught Braille or KSL and follow the standard curriculum in a more accessible environment. However, despite these efforts, **it is estimated that only between 20 to 30 per cent of children with disabilities[35] have been identified and receive the education pathway that meets their needs.**

Furthermore, the registration process for persons with disabilities is a lengthy process. As of June 2019, only 480,000 persons with disabilities were officially registered,[36] out of the estimated 5.1 to 7.7 million Kenyans living with a disability. This means that only a small number of individuals receive the benefits provided by the NCPWD. The situation is further challenged by limited resources from the NCPWD, resulting in delays in programme delivery. The demand for ATs, for instance, is much higher than the NCPWD can supply and the waiting lists are long. Also, while the Persons with Disabilities Act establishes an employment quota of five per cent of persons with disabilities for private and public organisations, only a few organisations are working towards complying with this number.

2.1.3 Mobile ecosystem

Kenya is one of the most mobile-enthusiast countries in Africa. Mobile penetration is very high, with 98 per cent[37] of adults above 15 y.o. owning a mobile phone.[38] Mobile internet usage is also high, with 88 per cent of the population covered by 3G, and a smartphone penetration of 46 per cent.[39] In Kenya, the first African country that adopted mobile money, 72 per cent[40] of adults have a registered account.

2.2 Bangladesh

With a population of 161.4 million,[41] Bangladesh is one of the most densely populated countries in the world with 1,240 persons per square kilometre.[42] The country's population is mostly rural (63 per cent) and the economy relies largely in agriculture.[43] Seventy-three per cent of Bangladeshi adults are literate, below both the world average and Kenya.[44] Access to health services is more limited compared to Kenya, with only 0.8 hospital beds for every 1,000 inhabitants. Furthermore, 22 per cent of girls are married by the age of 15 in Bangladesh, compared to the five per cent world average,[45] indicating a great gender disparity in the country.[46]

2.2.1 Prevalence of disability

According to official data by the Bangladesh Bureau of Statistics (BBS), around 1.4 per cent or 2.3 million of Bangladeshis have a disability. Similarly to Kenya, estimates by WHO indicate a higher prevalence and put this figure at 31.9 per cent.[47] The BBS has acknowledged some limitations in their estimations of the prevalence of disability, including differing definitions of disability, varying methodologies of assessment (self-identification, diagnosable condition, activities of daily living, instrumental activities of daily living, participation, etc.) and quality of the study design.[48] Based on the BBS data, the most common type of disability in Bangladesh is physical impairment, which represents 39 per cent of persons with disabilities, followed by visual impairment/blindness (20 per cent), speaking impairment (13 per cent), intellectual impairment (12 per cent), hearing impairment/deafness (10 per cent) and other types of disability (six per cent).

2.2.2 Disability context and policies

As in Kenya, persons with disabilities are more disadvantaged in Bangladesh than non-disabled persons. According to the 2011 census conducted by BBS, persons with disabilities are less likely to have attended school or to have a job than non-disabled persons. Furthermore, the prevalence of disability is higher among lower income households (defined as those without piped water or flush toilets; see Table 4).

Table 4

Characteristics of access to education, employment and utilities by persons with disabilities in Bangladesh

Access to employment and education	Persons with disabilities	Non-disabled persons
% with no education	62	32
% do not work	43	18

Prevalence of disability by household characteristics. **By source of water:**		
Tap water	Tube-well	Other (pond, river, etc.)
0.81%	1.45%	1.87%

Prevalence of disability by household characteristics. **By toilet facility:**			
Sanitary with water	Sanitary without water	Non sanitary	None
1.21%	1.32%	1.55%	2.06%

Source: Bangladesh 2011 Census

Since the early 2000s, there has been significant work in Bangladesh to advance the rights of persons with disabilities. The Disability Welfare Act of 2001, the ratification of the UN CRPD[49] in 2007, and Persons with Disability Rights and Protection Act[50] of 2013 were fundamental steps towards recognising equal citizenship, the need for proper accessible services, and the right to education, training and employment without discrimination. Despite political commitment, progress has been slow.

The Ministry of Social Welfare is responsible for designing and implementing disability policies in the country and, since 2013, the government has kept a registry of persons with disabilities. Registered persons with disabilities receive benefits such as a monthly allowance of 700 BDT ($8.5)[51] or an education stipend. Government records show that as of July 2019, 1.7 million people were registered as having a disability,[52] from the estimated number of 16.1 million to 24.2 million persons with disabilities in the country. This is in part due to the government's definition of disability, which is applicable only to those with severe or multiple disabilities.

In terms of employment and education, persons with disabilities face different challenges. Unlike Kenya, there are no employment quotas specific for persons with disabilities in Bangladesh. In public organisations, there is a 10 per cent quota for employing "vulnerable" individuals, which includes persons with disabilities. In general, employment opportunities for persons with disabilities in Bangladesh are limited. There is a small network of schools for children with special needs (or mainstream schools with inclusive classes) but this is insufficient to serve the needs for all. For hard of hearing and deaf children, for instance, there are only 1,000 places in public special needs schools,[53] whereas the population of hard of hearing and deaf under 15 years old is estimated between 500,000 and 700,000 children.[54] **As a result, it is estimated that only 20,000 hard of hearing and deaf children attend school**, mostly in mainstream schools unable to address their needs.[55]

2.2.3 Mobile ecosystem

Mobile penetration is high in Bangladesh, but the mobile ecosystem is less developed than in Kenya. Ninety-five per cent of the country's

population is covered by 3G and 96 per cent of adults above 15 years old own a mobile phone. However, the Average Revenue Per User (ARPU) remains small—almost a third of that in Kenya—and mobile money is still in its infancy, with only 17 per cent of adults with registered accounts.

2.3 Conclusion

In both Kenya and Bangladesh, despite steps taken by their governmments, **a strong disability bias remains disadvantaging persons with disabilities**. High mobile penetration rates in both countries suggest that mobile technology could be well positioned to be leveraged for the socioeconomic inclusion of persons with disabilities. With high smartphone penetration and connectivity in both countries, there is potential to provide sophisticated accessibility features that enable mobile technology to be an AT to persons with disabilities.

Absence of a standardised Bengali Sign Language

- There is no standardised Bengali Sign Language for the hard of hearing and deaf in Bangladesh. Each community uses its own signs.
- Under the British Raj (up to 1948), deaf Bengalis used to go to Kolkata—a Bengali speaking city now located in India—to learn Bengali Sign Language.
- After the partition of India, deaf Bengalis were not allowed to travel to Kolkata to learn sign language, and Western Pakistan started to promote Urdu in Bangladesh. There was therefore no institution to maintain and teach the common Bengali Sign Language from Kolkata spoken by deaf Bengalis, and each community started to develop its own signs.
- An ongoing initiative to standardise Bengali Sign Language has inventoried close to 4,000 signs. Once approved, it could be considered as the official Bengali Sign Language and taught by all special schools and organisations throughout the country, thereby enabling all (trained) deaf Bengalis to communicate with each other.
- The lack of a standardised sign language has implications on the access to basic services, including education, and opportunities for the deaf community (see further details in the textbox on pg 37)

3

Mobile phone ownership and access

This section summarises the key trends in **mobile phone ownership and access by persons with disabilities**, comparing the gap in ownership and access between persons with disabilities and non-disabled persons in both Kenya and Bangladesh, highlighting the similarities and differences between these markets and between people with different types of disabilities. Insights from mobile access and ownership also reveal key barriers faced by persons with disabilities.

Key findings

- Mobile phone ownership levels by persons with disabilities are high, with 82 per cent of adults with disabilities in Kenya and 62 per cent in Bangladesh owning a mobile phone. Persons with disabilities are, however, less likely to own a mobile phone than non-disabled persons in their country.
- Most mobile phone owners have a basic handset, with 60 per cent and 41 per cent of persons with disabilities owning one in Kenya and Bangladesh respectively, and less than a third owning a smartphone in either country.
- Level of education, type of disability and gender are all determinants of ownership and access to mobile phones, including the type of handset.
- The relationship between gender and disability as determinants of digital inclusion is context-dependent and non-linear. In Bangladesh, for instance, gender is a greater barrier to digital inclusion while in Kenya disability is.
- For those who own a mobile phone, ownership is frequently the result of a mobile phone being gifted or donated to them. Many of those who do not own a mobile phone often access one by borrowing.
- The reported barriers to access include: limitations to using a mobile phone due to their disability; the cost of a handset and mobile services; and lack of knowledge on how to use a mobile phone.

3.1 Trends in mobile phone ownership

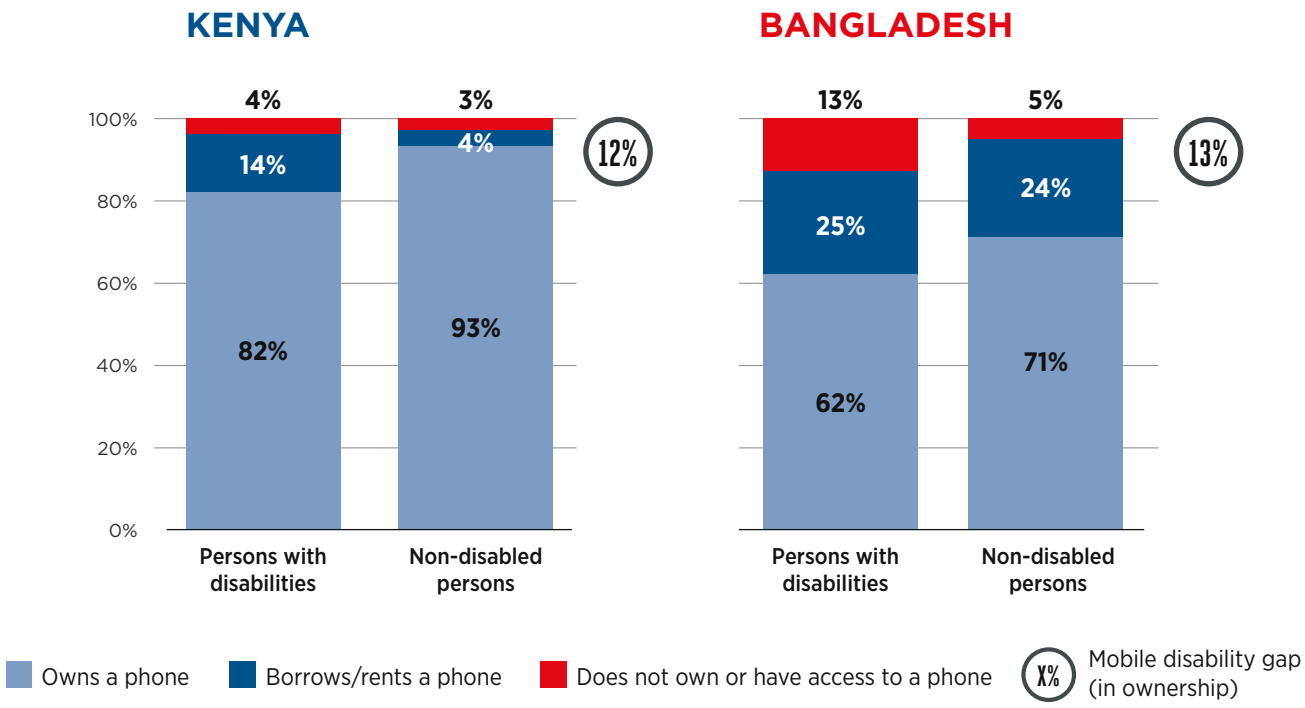
While mobile phone ownership among persons with disabilities is high, they are less likely to own a handset than non-disabled persons

In both Kenya and Bangladesh, ownership of mobile phones is high; however, 18 per cent of persons with disabilities in Kenya and 37 per cent in Bangladesh still do not own a mobile phone, compared to seven per cent and 29 per cent of non-disabled persons respectively in these countries (see Figure 1). Persons with disabilities in both countries are less likely to own a mobile phone than non-disabled persons. The gap in mobile phone ownership due to disability is clear, with a mobile disability gap[56] equivalent to 12 per cent in Kenya and 13 per cent in Bangladesh.

Figure 1

Mobile ownership and access by persons with disabilities and non-disabled persons

% of total population, by country and disability reported



Base: mobile owners and non-owners aged 18+.
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Mobile ownership is defined as having sole or main use of a mobile phone, and uses it at least once a month, whenever needed and without additional cost other than use of mobile services. The mobile disability gap in ownership refers to how much less likely a person with disabilities is to own a mobile phone than a non-disabled person.
Mobile access is defined as having potential use of a mobile phone, regardless of ownership, through borrowing or renting.
n = 816 for persons with disabilities and n = 189 for non-disabled persons in Kenya, n = 800 for persons with disabilities and n = 255 for non-disabled persons in Bangladesh

Level of education, type of disability and gender are key determinants of ownership of mobile phones. In terms of education, persons with disabilities who did not attend any form of institutional education are less likely to own a mobile phone, particularly in Bangladesh where 51 per cent of those without any formal education do not own a mobile phone, compared to 23 per cent in Kenya. Conversely, most persons with disabilities who attended higher education own a mobile phone (99 per cent in Kenya and 95 per cent in Bangladesh).

Due to the diverse needs of persons with disabilities, the **type of disability also plays a role in the likelihood of owning a mobile phone** (see Figure 2). In Kenya, hard of hearing or deaf people are almost as likely to own a mobile phone as non-disabled persons (88 per cent and 93 per cent ownership, respectively). People with visual and speech impairment also have high levels of mobile phone ownership (82 per cent). The situation is different in Bangladesh, where **those who reported visual impairment are almost equally likely to own a mobile phone as a non-disabled person** (70 per cent and 71 per cent, respectively). However, those who have difficulties with self-care or who have a hearing or speech impairment are the least likely to own a mobile phone (48 per cent,

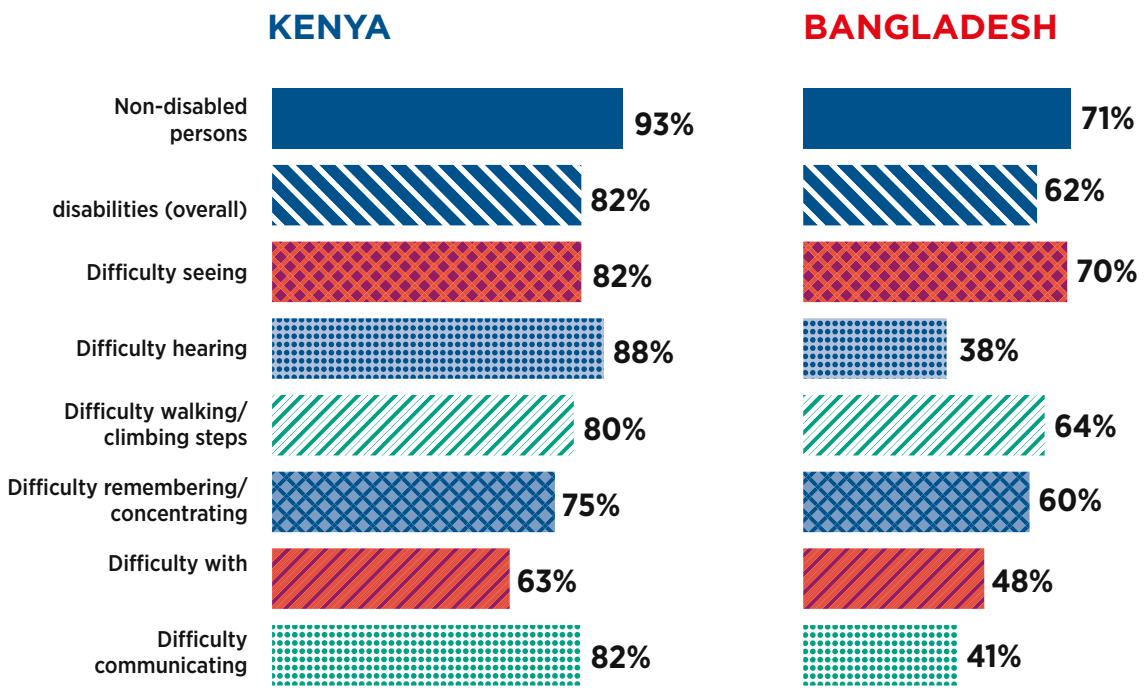
38 per cent and 31 per cent, respectively). In both countries, however, people who have **mild cognitive difficulties or challenges with self-care are less likely to own mobile phones**.

"She's saying that her parents won't buy her a phone because she can't speak. Her father won't allow her to use a phone. He says: "My daughter can't speak. She's mute. What would she do with a phone?" They want her to do household chores." Caregiver of a woman, hard of hearing, 30 y.o., rural, Bangladesh

Figure 2

Mobile ownership by persons with disabilities

% total population, by country and disability reported



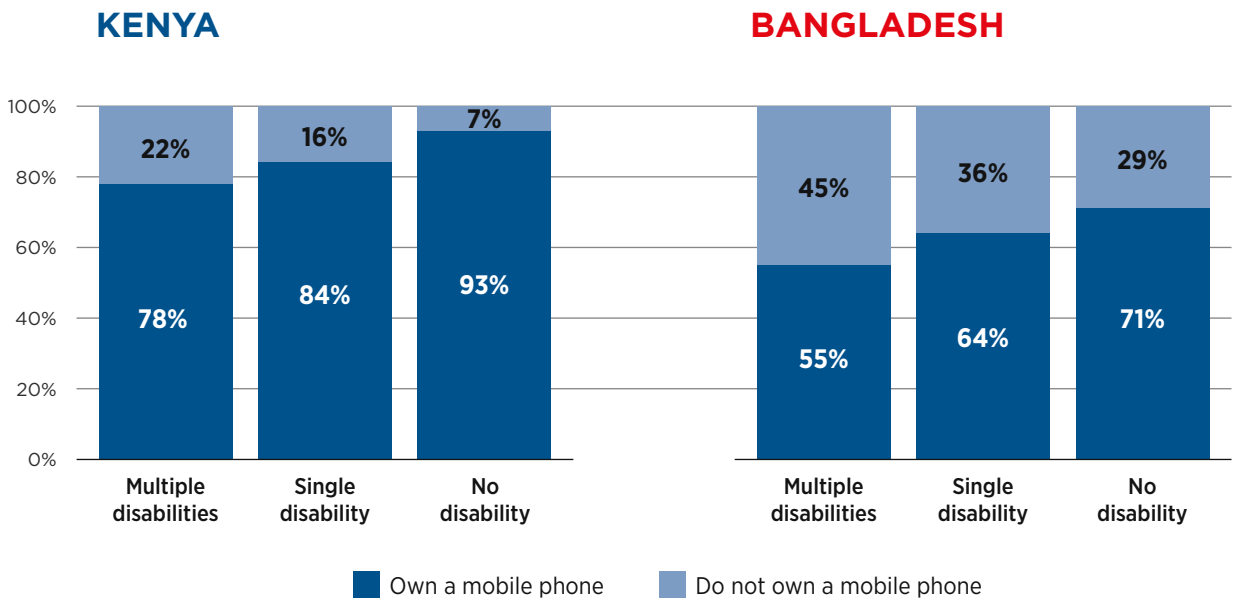
Base: mobile owners aged 18+.
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Mobile ownership is defined as having sole or main use of a mobile phone, and uses it at least once a month, whenever needed and without additional cost other than use of mobile services.
n = 43 to 816 for Kenya and n = 32 to 800 in Bangladesh

In addition to the variation in ownership between different types of disability, **those who reported having more than one disability are significantly less likely to own a mobile phone** in both countries (see Figure 3). Only 55 per cent of persons with multiple disabilities in Bangladesh and 78 per cent in Kenya own a mobile phone compared to those with a single disability (64 per cent and 84 per cent, respectively). One potential explanation for this is that accessibility features often target one type of impairment but may not have the supporting capabilities required for a combination of impairments. Another potential explanation is that individuals with multiple disabilities are less likely than those with a single disability to access education and paid employment, reducing the likelihood of owning a mobile phone.

Figure 3

Mobile ownership by number of disabilities

% total population, by country and disability reported



Base: mobile owners aged and non-owners aged 18+.
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions. A person with multiple disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least two functional domains.
Mobile ownership is defined as having sole or main use of a mobile phone, and uses it at least once a month, whenever needed and without additional cost other than use of mobile services.
n = 189 to 581 in Kenya and n = 124 to 676 in Bangladesh

Ownership of smartphones by persons with disabilities is limited, with over 70 per cent in Kenya and Bangladesh owning either a basic or feature phone

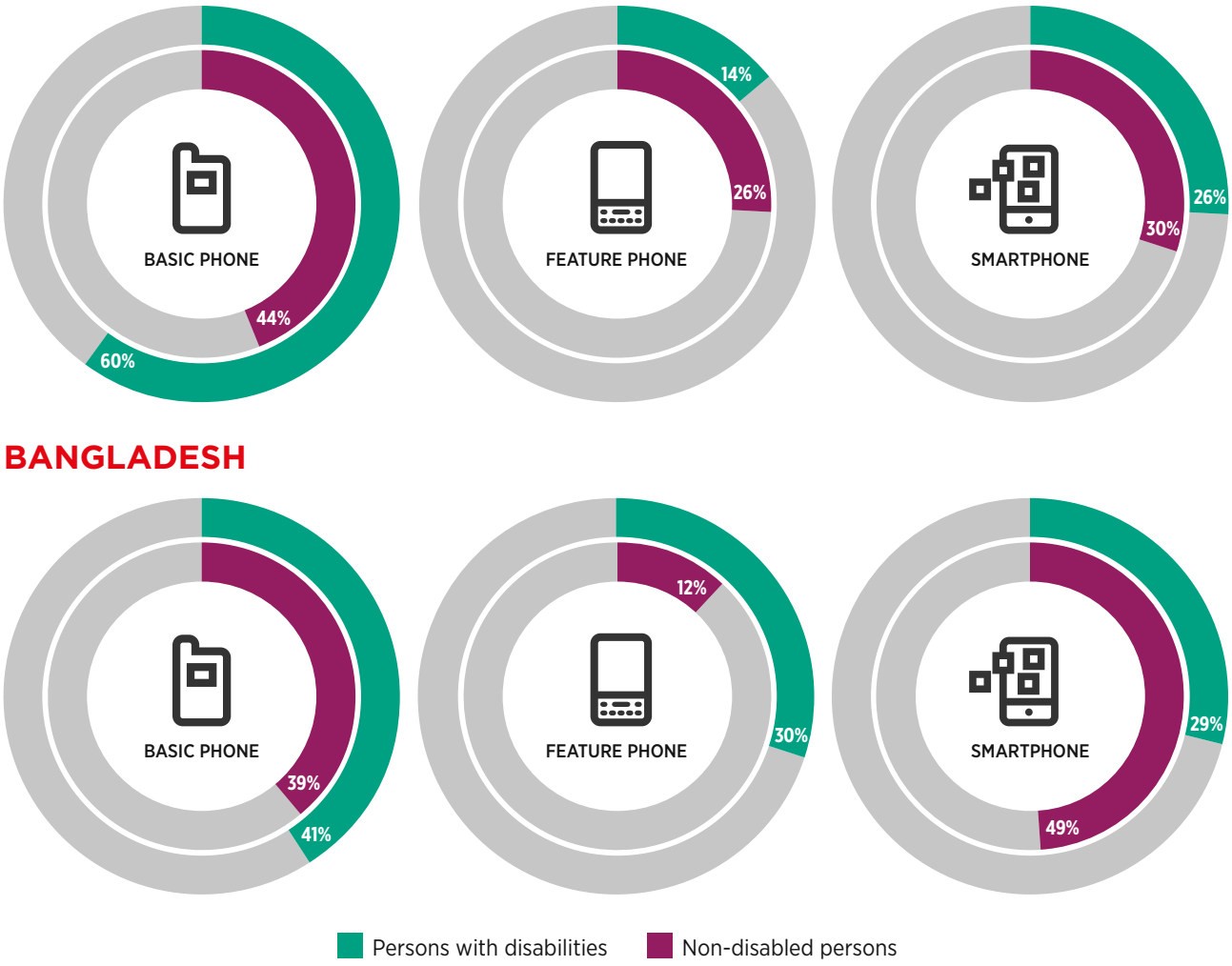
More than 70 per cent of persons with disabilities own a basic or feature phone[57] in Kenya and Bangladesh (see Figure 4). In Kenya, basic phones are more common, with 60 per cent of persons with disabilities reporting to own one while 14 per cent own a feature phone. In comparison, in Bangladesh, ownership of basic and feature phones is more evenly spread, with 41 per cent of persons with disabilities owning a basic handset and 30 per cent owning a feature handset. In both countries, smartphone ownership is still low in comparison, with just over a quarter of persons with disabilities reporting to own one. Smartphone ownership among non-disabled persons is similar to persons with disabilities in Kenya, while in Bangladesh smartphone ownership is 20 percentage points higher in non-disabled users compared with persons with disabilities.

While feature phones are increasingly popular in emerging markets,[58] they do not have the same enabling potential as smartphones do for persons with disabilities. Henceforth, this report will highlight these differences.

Figure 4

Type of mobile phones owned by owners with and without disabilities

% of mobile owners, by country and disability reported



Base: mobile owners with and without disabilities aged 18+ (excludes those who do not know).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Basic phone: no internet access, small screen, basic keypad with several letters per button. Feature phone: internet access, tends to have small screen and basic keypad with several letters per button, can come with some apps already on phone, unable to download apps from online app stores. Smartphone: internet access, large touchscreen display, comes with some apps already on phone, able to download additional apps from online app stores, advanced operating systems such as Android or Apple iOS.
n = 737 for persons with disabilities and n = 177 for non-disabled persons in Kenya, n = 529 for persons with disabilities and n = 217 for non-disabled persons in Bangladesh

Smartphone ownership follows a similar pattern across different demographics in both countries (see Figure 5). In Kenya and Bangladesh, **women with disabilities are less likely to own a smartphone than men with disabilities**. Meanwhile, persons with hearing impairment are the most likely to own a smartphone in both countries (59 per cent in Kenya and 49 per cent in Bangladesh). Interestingly, in Bangladesh, hard of hearing individuals are the least likely to own a mobile phone, yet almost half of those who own a handset have smartphones. The reason could be linked to specific mobile usage patterns of hard of hearing and deaf users, such as not being able to make calls, and the need for SMS or video calls for communicating (i.e. to use sign language), all

of which are possible using a feature phone or smartphone.

> ***"I looked for a smartphone because the deaf sometimes have communication issues. With the smartphone I can decide to do a video call through WhatsApp – that helps me communicate."*** Man, deaf, 26 y.o., rural, Kenya

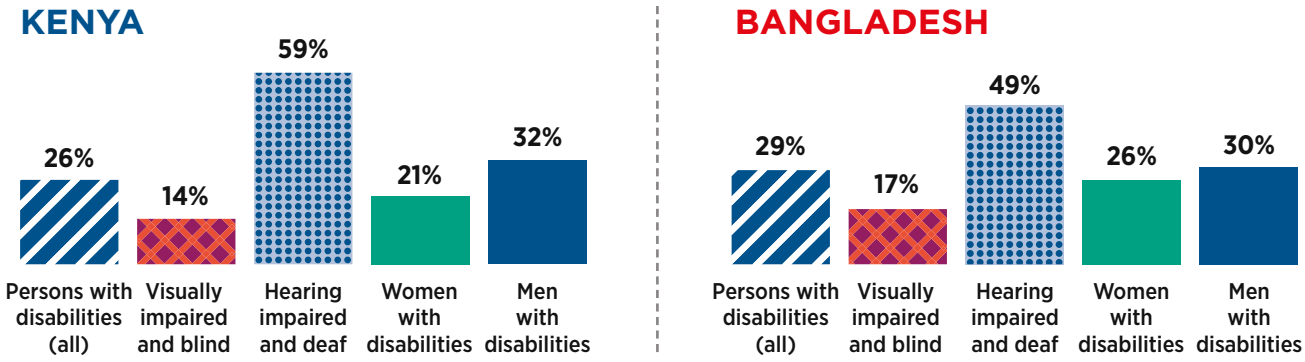
Although **visually impaired** persons are not less likely to own a mobile phone in comparison to the average ownership by persons with disabilities, they **are the least likely to own a smartphone when segmenting the population by gender and disability** (see Figure 5). Only 14 per cent of persons with visual impairment or blind in Kenya and 17 per cent in Bangladesh own a smartphone. To use a mobile phone independently, the visually impaired or blind need mobile phones to be accessible and allow the use of screen-readers. These types of features are often only available in the most expensive mobile phones, presenting a cost barrier for persons with disabilities. In addition, using a smartphone with a screen-reader requires training. As a result, although owning a smartphone is particularly useful for the visually impaired and blind, it is also the most costly and difficult to acquire, which explains low smartphone ownership levels.

> ***"When I first touched this phone [a smartphone with a screen-reader], I never thought I would be able to use it. I even wanted to sell it. But with time, I learnt [how to use] it bit by bit and now I can easily use it."*** Woman, blind, 21 y.o., urban, Bangladesh

Figure 5

Smartphone ownership by people with disabilities

% of mobile owners, by gender and disability reported



Base: mobile owners with disabilities aged 18+ (excludes those who do not know).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Smartphone: internet access, large touchscreen display, comes with some apps already on phone, able to download additional apps from online app stores, advanced operating systems such as Android or Apple iOS.
n = 161 to 737 in Kenya, n = 102 to 529 in Bangladesh

Most persons with disabilities who own mobile phones are given them by family and friends

Despite the mobile disability gap, persons with disabilities experience relatively high levels of mobile phone ownership. **However, many persons with disabilities have never bought a handset but are gifted one**. For instance, family members give mobile phones to persons with disabilities to easily communicate with and check on them. This is particularly the case for women with disabilities. In other cases, the mobile phone is given by a friend or relative to support the person with disabilities. Finally, a few persons with disabilities receive a mobile phone

and training on how to use it from local DPOs.

Some persons with disabilities pay for their mobile phone themselves. As many have limited earnings and rely to some degree on family support, they have to save money to acquire their mobile. This highlights the importance of mobile phones for persons with disabilities, who, despite the cost and their limited earnings, are determined to buy a mobile phone.

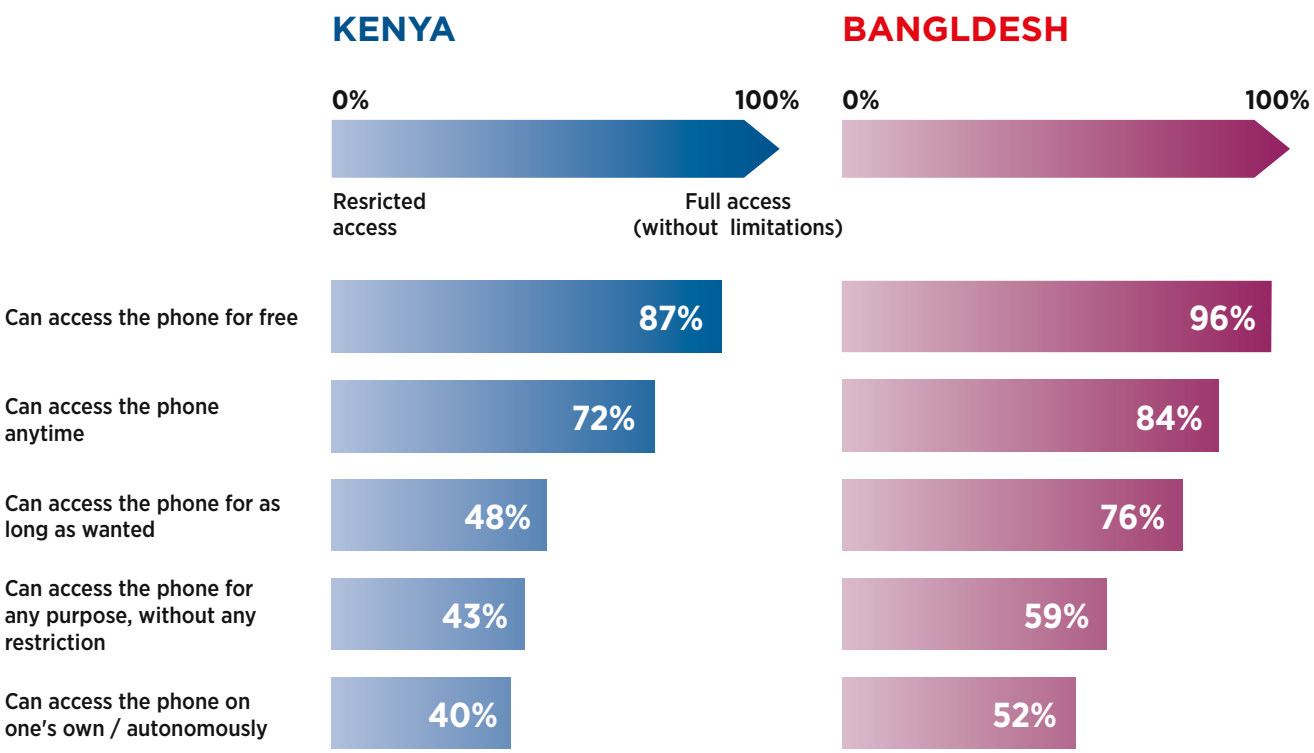
3.2
Trends in mobile phone access

Although one fifth of Kenyans with disabilities and two fifths of Bangladeshis with disabilities do not own a mobile phone, 14 per cent in Kenya and 25 per cent in Bangladesh borrow a phone. These users typically borrow a from a friend (35 per cent of those who borrow), other family members (33 per cent), their spouse (14 per cent) or their child (15 per cent). The rest borrow a mobile phone either from a colleague or neighbour. However, persons with disabilities in both countries **report restrictions** including timing of mobile phone usage, duration of use, purpose of use, and autonomous use of the borrowed mobile phone.

Figure 6

Characteristics of mobile phone access by non-owners with disabilities

% non-owner mobile users, by country



Base: non-owner mobile users with disabilities aged 18+ (excludes those who do not want to answer).
Percentages indicate the proportion of respondents who answered 'How would you characterise your access to a mobile phone? A) Do you have to pay a fee to acess a mobile phone?; B) Can you use the mobile phone anytime/ whenever you want?; C) Can you use the mobile phone you borrow for as long as you want? (or is it limited time?); D) Can you do whatever you want on the mobile phone you access? (Can you access any service you want); or E) Can you use the mobile phone you access on your own/ autonomously? (or is someone else using the mobile phone with you?)'. Respondents answered 'Yes.'
n = 56 in Kenya and n = 184 in Bangladesh

Relatives who lend their mobile phones to persons with disabilities tend to **control what they are doing** with the mobile phone and who they are communicating with. As a result, borrowers tend to use mobile phones exclusively for specific purposes (such as communicating with a family member) rather than for entertainment. **Borrowers cannot access the mobile phone whenever they want** and must wait for lender availability to borrow the phone. As a result, **borrowers tend to limit their time spent with the mobile phone** and limit conversations to the strict minimum.

Finally, while in Bangladesh only four per cent of persons with disabilities reported not having free access to use a mobile phone, in Kenya this proportion was as high as 13 per cent. Most of **those who borrow a mobile phone must still pay for the airtime** as many lenders do not trust them and are concerned that they will use all their credit. Some respondents mentioned the inconvenience of such a system as they sometimes recharge a certain amount on the lender's phone, use only part thereof, but still have to return the phone with the remaining airtime they have bought.

> ***"I usually borrow [a phone] from my family and friends, but they refuse to give it to me for free, claiming that I should give them 200 KES. They claim I will use all their credit."*** Woman, deaf, 35 y.o., urban, Kenya

3.3 Barriers to mobile phone ownership and access

Affordability, disability, digital literacy, and family circumstances are the main barriers to mobile phone ownership and access

Affordability of handsets is one of the main barriers for ownership. In Kenya, 55 per cent of persons with disabilities who do not own a mobile phone reported that they could not afford to buy one, while in Bangladesh, 37 per cent cited handset cost as a barrier. A further nine per cent of persons with disabilities in Kenya cited airtime costs as a reason for not owning a mobile phone. For persons with disabilities who self-finance their own mobile phone, most have to save over time and many still rely on supplementary contributions from family.

> ***"I did not have enough money to get [the phone I wanted]. I had to raise money for a while to be able to buy one."*** Woman, visually impaired, 28 y.o., urban, Kenya

> ***"To purchase my phone Samsung J4, I saved some money while I was in high school and my mother gave me some additional money. Then my brother too contributed."*** Man, blind, 19 y.o., urban, Kenya

Advanced smartphones are better equipped with built-in accessibility features than other handsets. These smartphones are expensive and therefore unattainable for most persons with disabilities for whom these features would enable full use of the mobile phone. While some own low-cost smartphones, these often do not have fully operational accessibility features and acquiring accessibility apps can come at an extra cost.

> ***"I don't have a phone which has TalkBack because I don't have [enough] money, it costs starting from 10,000 KES. If I had [enough] money that's what I would have bought because it's a very nice phone and it helps a lot."*** Man, blind, 32 y.o., rural, Kenya)

The disability itself, which is perceived as potentially limiting their ability to use a mobile phone, is another barrier for mobile phone ownership, and is the primary reason cited by 38 per cent of Bangladeshi persons with disabilities, compared to 23 per cent of Kenyans with disabilities.

> ***"When I want to talk to someone, my mum has to dial-in the phone number and even hold the phone for me and place it to my ear. I may drop it since I am not very stable."*** Man, speaking impairment and epilepsy, 35 y.o., rural, Kenya

Digital literacy is another barrier for both ownership and access to mobile phones. In Bangladesh, 36 per cent of persons with disabilities who do not own a mobile phone reported not knowing how to use one. Likewise, 44 per cent of persons with disabilities who do not have access to a mobile phone report that the reason is not knowing how to use one. Respondents experiences highlight the need for digital skills training for persons with disabilities.

> ***"If I understood mobile and how it works then I would have been using it. My brother and my nephews are in Dhaka, if I understood it then I could call them. But I don't understand it so I don't use it."*** Woman, hard of hearing, 55 y.o., urban, Bangladesh

Relatives and friends can act as barriers to mobile phone ownership and access. The prioritisation of savings for purchasing a mobile phone reveals their perceived value for persons with disabilities. Many family members, however, do not believe mobile phones deliver enough value to persons with disabilities to warrant buying them one.

> ***"When I first bought the phone, my father was against it because, as I was a disabled person, he thought why would I need a phone?"*** Woman, physically impaired, 24 y.o., urban, Bangladesh

Many persons with disabilities do not earn a livelihood and as such will rely on their families to finance a mobile phone on their behalf. Since most persons with disabilities who own mobile phones were gifted phones by their families or friends, the perceived value-added of a mobile phone by these enabling individuals is of utmost importance.

> ***"I told my family that I needed a phone for my education. And that's why he bought me this one."*** Man, blind, 24 y.o., urban Bangladesh

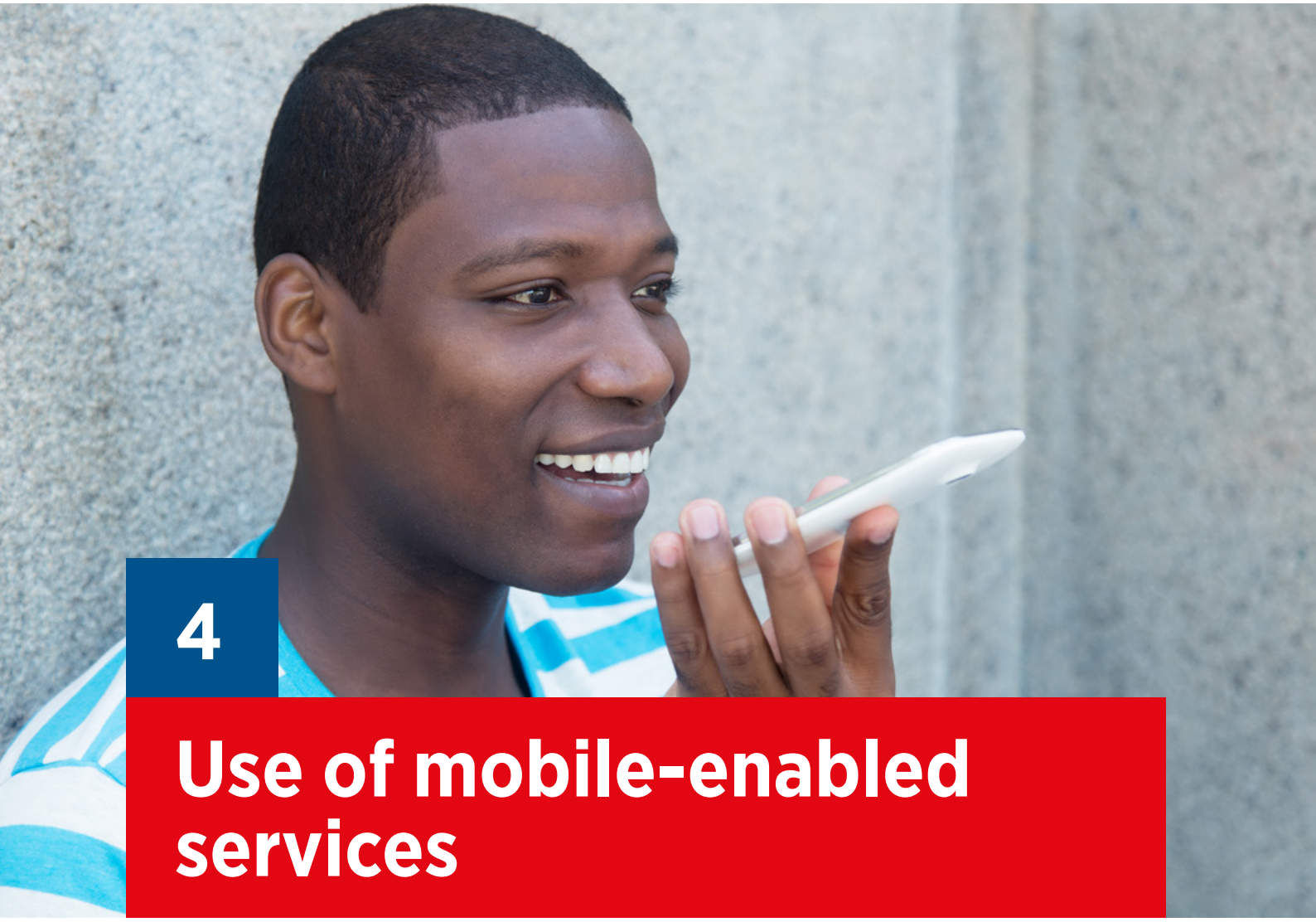
For persons with disabilities accessing a mobile phone through a relative or friend, the mobile phone owners can restrict the duration of use, purpose of use, and autonomous use of the phone. **In some cases, family members do not permit persons with disabilities to use mobile phones at all, as reported by 19 per cent of Bangladeshi with disabilities who report having no access to a mobile phone.**

> ***"She's saying that her father will get furious if she tells him to buy her a phone. And just because she doesn't earn, her father is even more reluctant about this."*** Caregiver of a woman, hard of hearing, 30 y.o., rural, Bangladesh

The different situation of deaf people in Kenya and Bangladesh and impact on mobile phone ownership

In Kenya, deaf persons experience high mobile phone ownership levels (almost on par with non-disabled persons), while Bangladeshi deaf are the least likely of all types of persons with disabilities to own a mobile phone. This can be explained by the very different situations of deaf people in their countries. In Kenya, there is a common and standardised sign language (Kenya Sign Language or KSL), taught at school, in addition to reading and writing English,[1] and 57 per cent of deaf Kenyans have attended school.[2] In Bangladesh however, there is no common and standardised Bengali Sign Language (see further details in the textbox on pg 25). Only a small minority of Bangladeshi deaf (37 per cent[3]) have attended school and are, to some extent, literate. Deaf people in Bangladesh are therefore less educated and the barriers to mobile phone ownership are amplified: i) they are not able to make full use of a mobile phone (cannot make/receive calls or send/receive SMS as they do not necessarily know how to write, and usage of video calls in sign language is limited to community members who use similar signs), ii) family may not perceive value in giving them a mobile phone (as they are unable to make full use of the phone); and iii) they have less money to spend on a mobile phone (as they are less educated, they may have lower incomes).

1. Kenyan deaf learn English rather Kiswahili at school and are only literate in English (see text box: Kenyan deaf do not understand Kiswahili on this topic for more information).
2. According to survey results.
3. According to survey results.



4 Use of mobile-enabled services

This section summarises the key trends in **mobile phone usage by persons with disabilities**, focusing on four main mobile-enabled services: voice, SMS, mobile internet and mobile money. It highlights usage differences by country, but most importantly by type of disability, and identifies specific reported usage patterns that highlight disability groups as power-users of certain mobile-enabled services. This section also explores barriers to mobile phone usage faced by persons with disabilities.

Key findings

- There is no clear gap in mobile phone usage between persons with disabilities and non-disabled persons. Persons with certain types of disability are power-users of some mobile-enabled services.
- In Kenya, persons with disabilities have a mobile internet usage almost on par with non-disabled persons. Those persons with disabilities who own a smartphone have a higher usage than non-disabled smartphone owners.
- In both countries, deaf and blind people show particularly high usage of mobile internet, which is often their main gateway to communicate with others.
- Eighty-seven per cent of persons with disabilities have a registered mobile money account in Kenya, just slightly below non-disabled persons (94 per cent). In Bangladesh, persons with disabilities are more likely to have an account than non-disabled persons (25 per cent vs. 14 per cent).
- Persons with disabilities value mobile money due its convenience and security (reduced risk of theft). To some, it is an alternative to banks, which often have inaccessible facilities and services.
- The specific 'disability context' of each country determines drivers of usage of different mobile-enabled services by persons with different types of disability. Access to accessibility features also seems to drive higher mobile usage by persons with disabilities.
- The main barriers to mobile phone usage are cost (which is amplified as persons with disabilities are more likely to be poorer and face extra costs to use a mobile phone), lack of education resulting in digital illiteracy, and the perception that their disability inhibits autonomous and confidential use of mobile-enabled services.

4.1 Trends in mobile-enabled services usage

There is no clear disability gap in mobile phone usage, but persons with disabilities are power-users of specific services

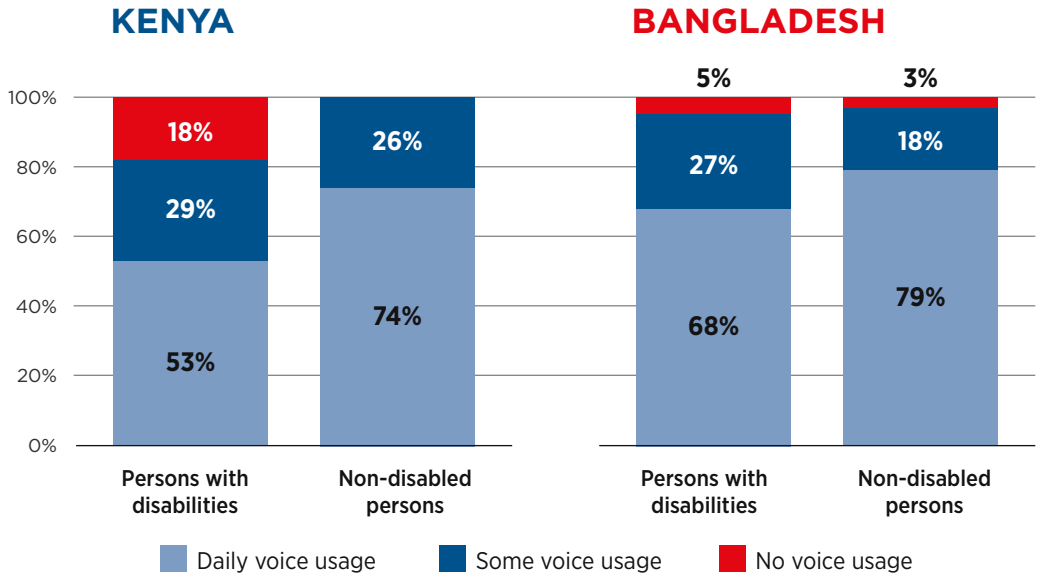
In general, persons with disabilities use mobile-enabled services almost on par with non-disabled persons. Yet clear differences in usage of services emerge when segmenting persons with disabilities by type of impairment. For some services, persons with a specific type of impairment have the highest usage of all, making them **power-users** of these services.

In terms of voice services, **persons with disabilities in both countries are less likely to make or receive calls daily compared to non-disabled persons** (see Figure 7). Still, more than half of persons with disabilities in Kenya (53 per cent) and nearly two thirds in Bangladesh make calls every day.

Figure 7

Usage of voice services by mobile users with and without disabilities

% mobile users, by country and disability reported



Base: mobile users with and without disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'How often do you ... ? A) Received calls on a mobile phone; B) Make calls on a mobile phone.'
Daily usage indicates calls are made or received every day.
n =793 for persons with disabilities and n = 185 for non-disabled persons in Kenya, n =708 for persons with disabilities and n = 248 for non-disabled persons in Bangladesh

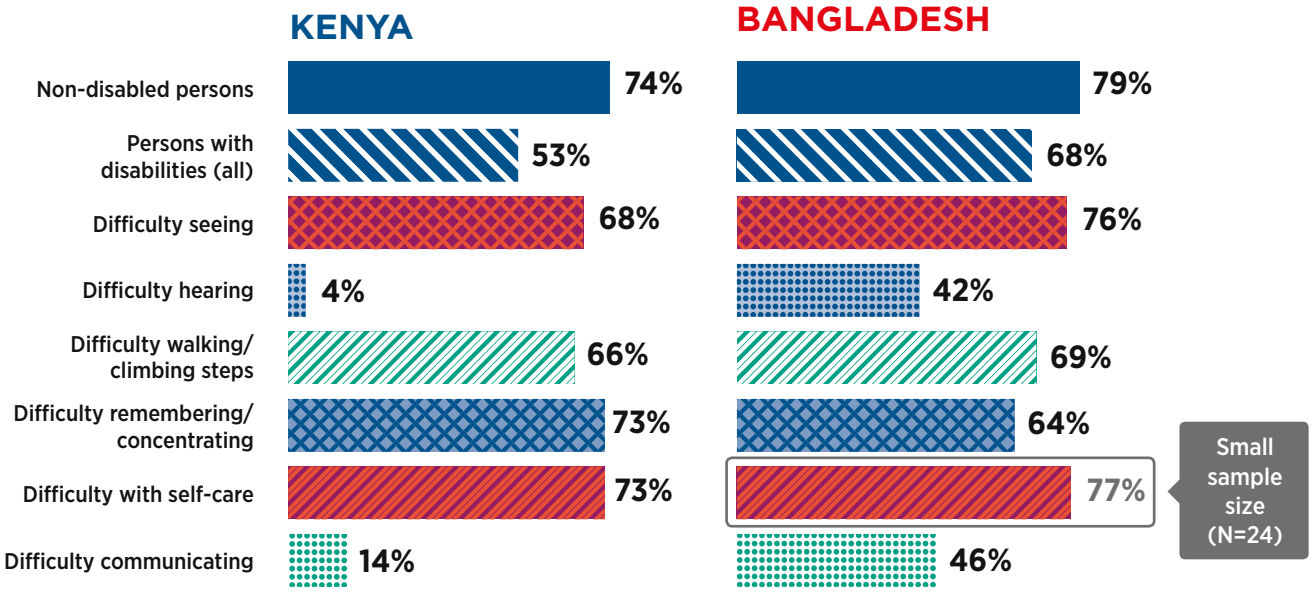
When disaggregating respondents by type of disability, there are large differences in usage of voice calls among the different groups (see Figure 8). While the hard of hearing and deaf have limited voice usage due to their disability,[59] other types of disability have daily usage of voice services just slightly below non-disabled persons, such as those with difficulties seeing, difficulties walking or those with difficulties remembering.

> ***"The problem for us deaf people is the voice call."*** Woman, deaf, 33 y.o., urban, Bangladesh

Figure 8

Daily usage of voice services by mobile users with and without disabilities

% mobile users, by country and disability reported



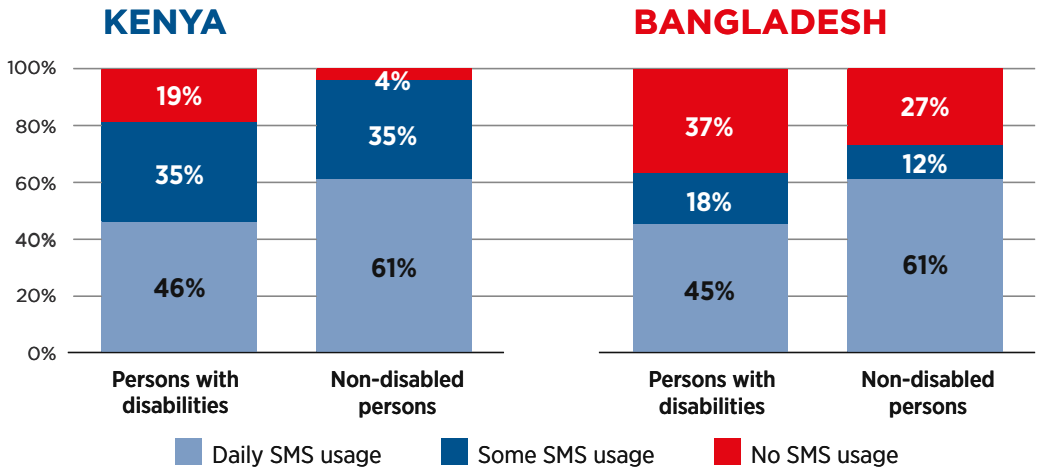
Base: mobile users with and without disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'How often do you … ? A) Receive calls on a mobile phone; B) Make calls on a mobile phone.' Respondents answered 'Daily.' Daily usage indicates calls are made or received every day.
n = 34 to 793 for Kenya, n = 24 to 708 for Bangladesh

Persons with disabilities use SMS less than non-disabled persons, as only 45 per cent of persons with disabilities in Kenya and 46 per cent in Bangladesh send or receive SMS daily, compared to 61 per cent of non-disabled persons in each country.

Figure 9

Usage of SMS by mobile users with and without disabilities

% mobile users, by country and disability reported



Base: mobile users with and without disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'How often do you … ? A) Receive a SMS on a mobile phone; B) Send a SMS on a mobile phone.' Daily usage indicates SMS are sent or received every day.
n = 792 for persons with disabilities and n = 183 for non-disabled persons in Kenya, n = 632 for persons with disabilities and n = 241 for non-disabled persons in Bangladesh

There are **large differences in usage of SMS when looking at different types of disabilities**. For instance, **deaf persons in Kenya** are more likely to have higher levels of literacy than in Bangladesh and **are power-users of SMS** compared to non-disabled persons. Due to their reliance on textual communication, close to three-quarters of hard of hearing and deaf people in Kenya use SMS daily.

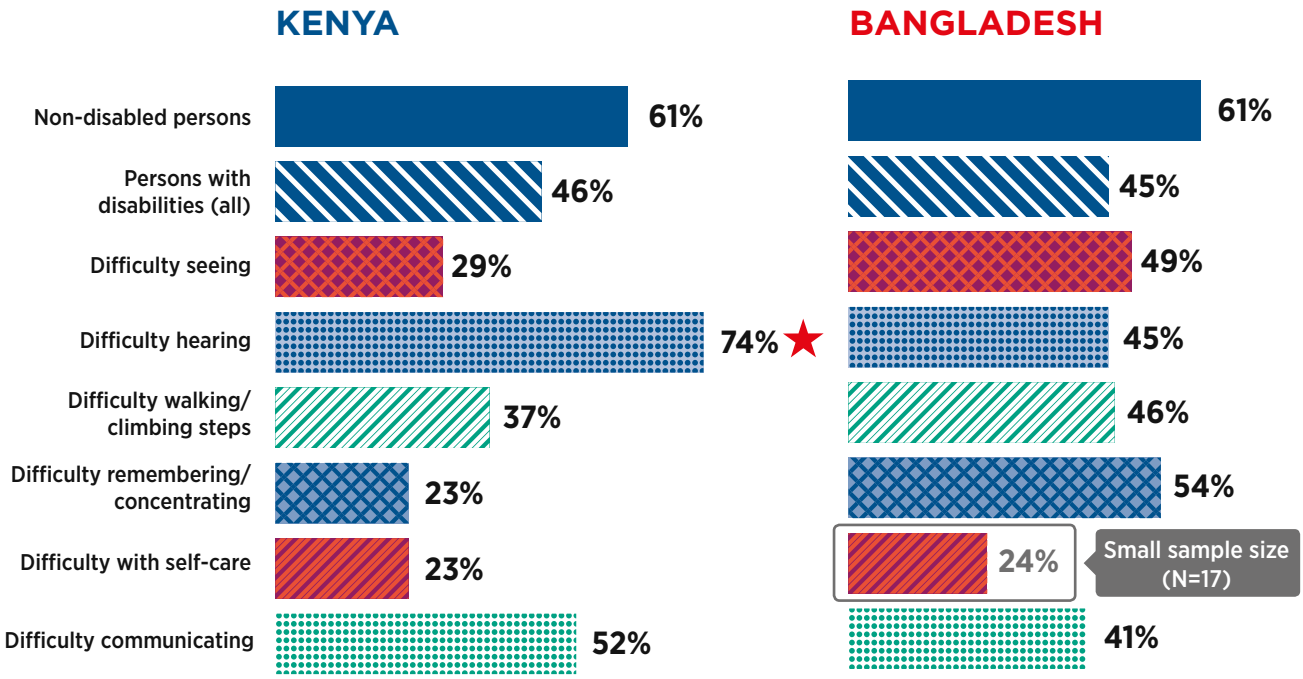
"I love texting. It helps me communicate with my friends." Woman, deaf, 35 y.o., urban, Kenya

"I use this service [SMS] most of the time because I cannot make or receive calls due to my impairment." Man, deaf, 56 y.o., urban, Kenya

Figure 10

Daily usage of SMS by mobile users with and without disabilities

% mobile users, by country and disability reported



★ Power-user

Base: mobile users with and without disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'How often do you … ? A) Receive a SMS on a mobile phone; B) Send a SMS on a mobile phone'. Respondents answered 'Daily.' Daily usage indicates SMS are sent or received every day.
n = 34 to 792 for Kenya, n = 17 to 632 for Bangladesh

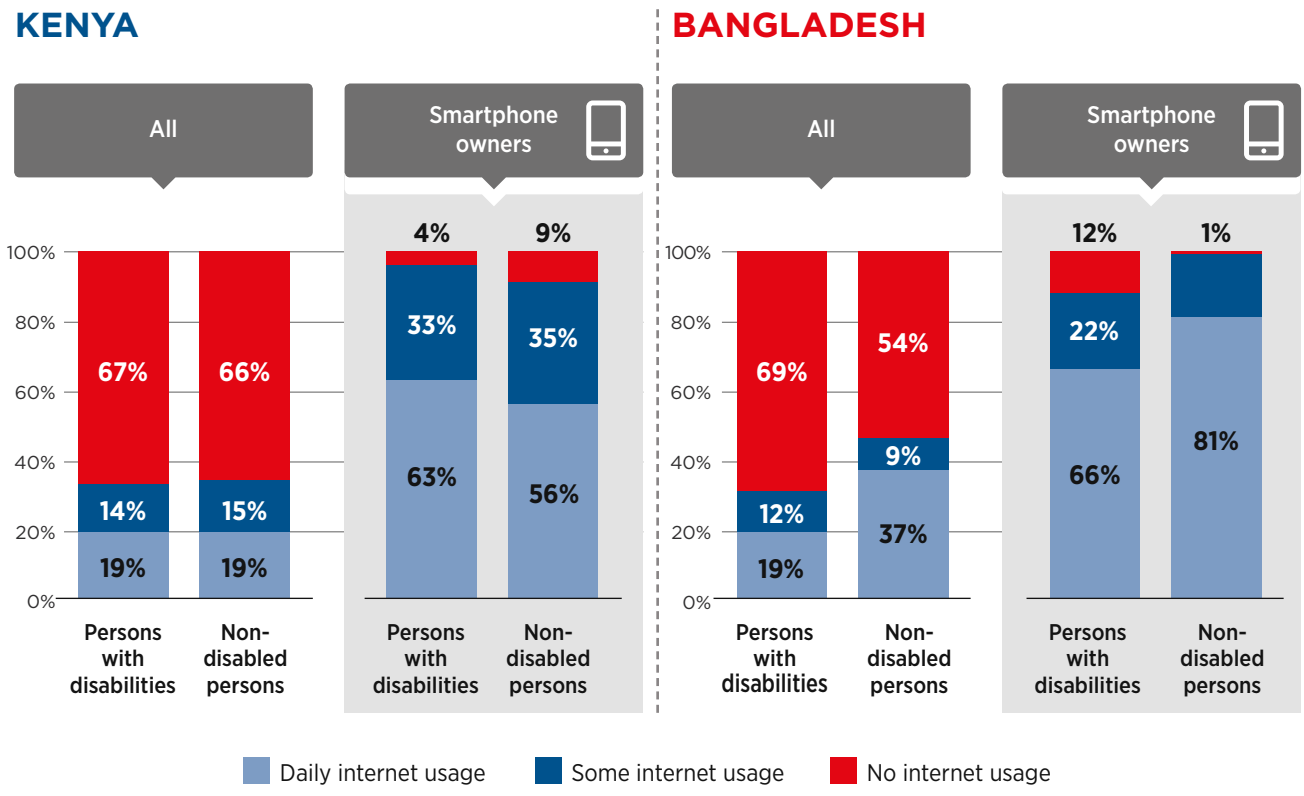
Mobile internet usage results vary by country, particularly when persons with disabilities own a smartphone (see Figure 11). Although some feature phone users may access mobile internet, they are most often unaware that their mobile phones have internet capability and may find the use of mobile internet more complicated than with a smartphone. Hence, owners of feature phones have lower usage of mobile internet compared to smartphone users. For this reason, this section describes usage of mobile internet-enabled services and highlights some specific characteristics of smartphone users.

In Kenya, persons with disabilities use mobile internet with similar frequency to non-disabled persons. However, when considering smartphone owners only, persons with disabilities have a higher daily usage of mobile internet (63 per cent) than non-disabled persons (56 per cent). **In Bangladesh, conversely, persons with disabilities do not use mobile internet as frequently as non-disabled persons**. Only 19 per cent of persons with disabilities use mobile internet daily compared to 37 per cent of non-disabled persons, resulting in a mobile internet usage gap of 49 per cent. **This gap in usage reduces to 18 per cent when considering smartphone users only, highlighting the impact of the smartphone ownership gap in the overall mobile internet usage gap.**

Figure 11

Mobile internet usage by mobile users with and without disabilities

% mobile users, by country and disability reported



Base: mobile users with and without disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'How often do you ...? A) Search the internet on a mobile phone (visit websites/pages using Safari, Google Chrome, etc. – not using an application); B) Use applications such as instant messaging apps to communicate (WhatsApp, Facebook Messenger, Telegram, etc.); C) Use social media applications (Facebook, Twitter, Linkedin, Instagram, etc.); D) Use applications to access information or for entertainment, for instance to read the news, play games, watch videos etc. (YouTube, newspaper apps, gaming apps, etc.); E) Use service applications which allow you to book transport, access maps, timetables, traffic information, etc. (Uber, Google Maps, etc.).'
n = 93 to 771 for Kenya, n = 118 to 577 for Bangladesh

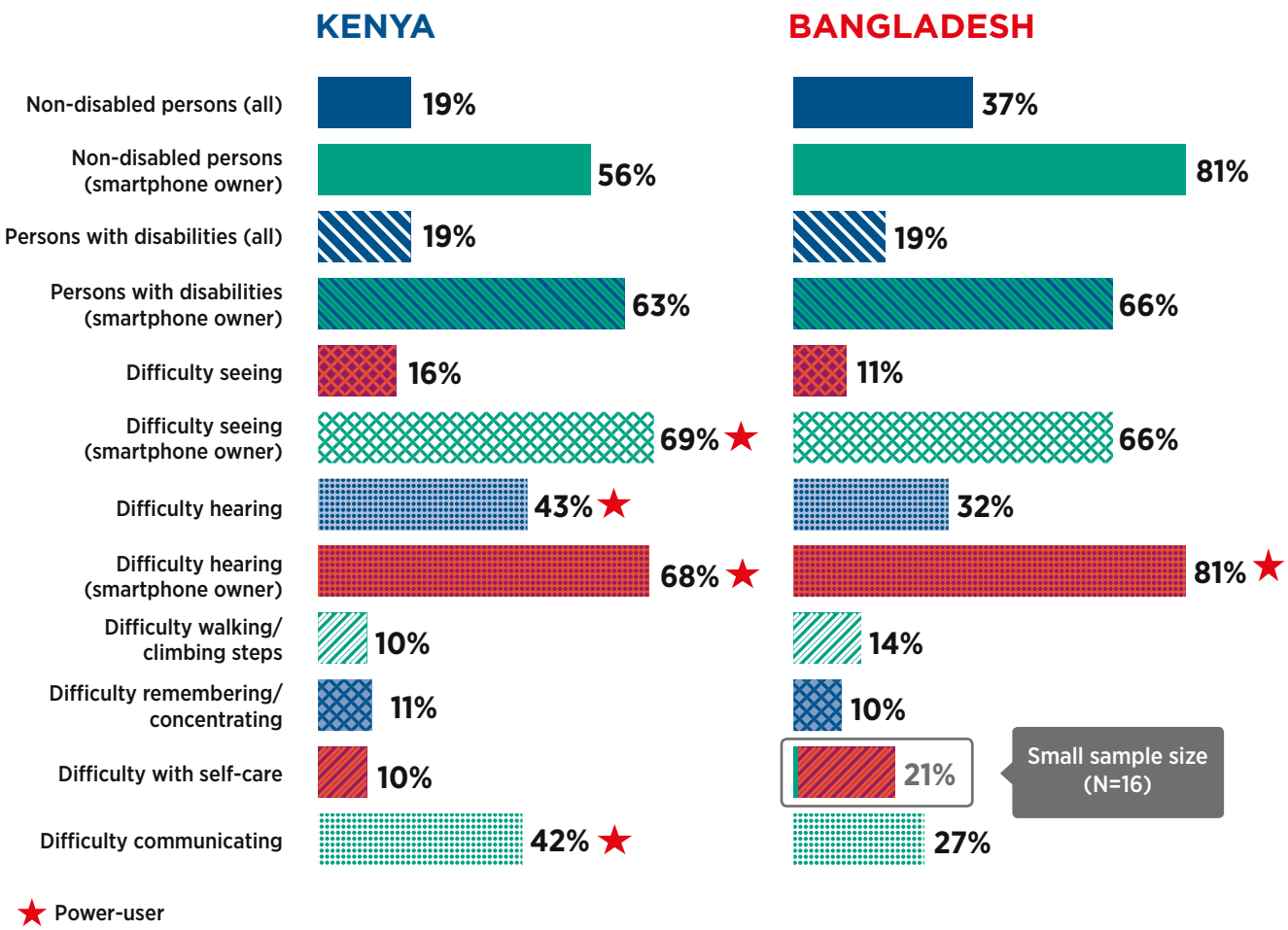
Differences in mobile internet usage also exist by type of disability (see Figure 12). **In both countries, deaf and blind smartphone owners have very high levels of mobile internet usage**. Smartphone accessibility features, such as screen-readers, facilitate use and access to internet content and applications. In Kenya, where usage of accessibility features is greater than in Bangladesh, the visually impaired and blind show even higher mobile internet usage than non-disabled persons (and people with other types of disabilities). This suggests a link between higher mobile internet usage and access to accessibility features, as higher usage is observed among countries and for groups who have the best access to such features.

> ***"I have realised that I need a phone with TalkBack[60] to enable me to maximise [my usage of mobile-enabled] services."***
> Woman, visually impaired, 58 y.o., rural, Kenya

Figure 12

Daily usage of mobile internet by type of disability according to the Washington Group Questions

% mobile users, by country and disability reported



Base: mobile users with and without disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'How often do you ...? A) Search the internet on a mobile phone (visit websites/pages using Safari, Google Chrome, etc. – not using an application); B) Use applications such as instant messaging apps to communicate (WhatsApp, Facebook Messenger, Telegram, etc.); C) Use social media applications (Facebook, Twitter, Linkedin, Instagram, etc.); D) Use applications to access information or for entertainment, for instance to read the news, play games, watch videos etc. (YouTube, newspaper apps, gaming apps, etc.); E) Use service applications which allow you to book transport, access maps, timetables, traffic information, etc. (Uber, Google Maps, etc.).' Respondents answered 'Daily.'
n = 33 to 771 for Kenya, n = 16 to 577 for Bangladesh

In Kenya, regardless of type of handset, the **hard of hearing and deaf** use mobile internet more frequently than non-disabled persons. **They are power-users of instant messaging apps**, often used for personal conversations, participation in support or religious groups, or making video calls to communicate using sign language.

> ***"I use WhatsApp every day. I use it with the deaf because we communicate face-to-face. We use sign language, so it is easier to communicate using WhatsApp's video calling option."*** Man, deaf, 26 y.o., rural, Kenya

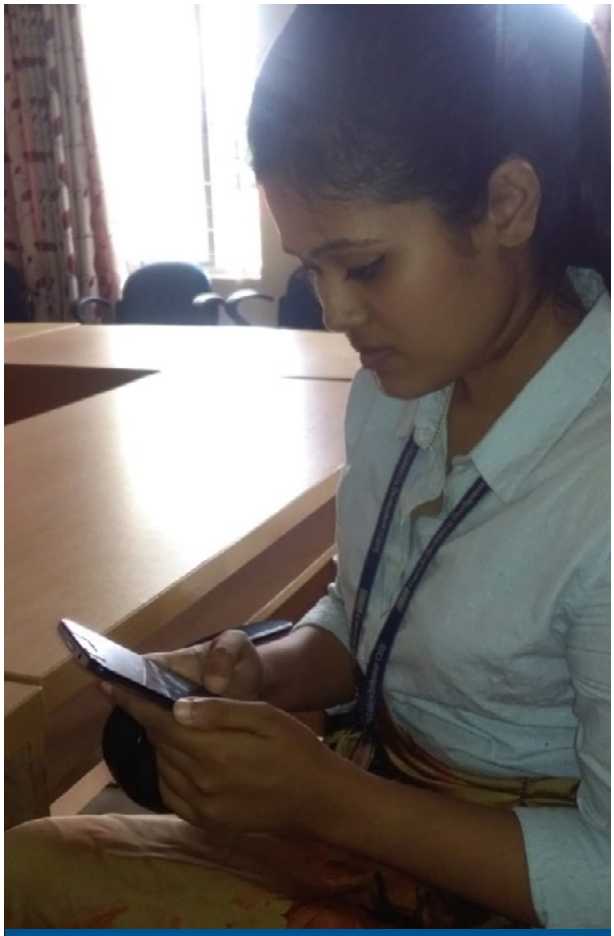
In Bangladesh, hard of hearing and deaf smartphone users show the highest mobile internet usage among all types of impairment segments. While they may not often use messaging services, mobile internet enables them to use video calls as one of their main means of communication.

> ***"I can only communicate with others by video calling them."*** Man, deaf, 24 y.o., urban, Bangladesh

This **high mobile internet usage among the hard of hearing, deaf, visually impaired and blind** who own a smartphone with accessibility features can be explained by their higher dependency on mobile phones to **connect to the world and be autonomous**, as reported by interviewees.

> ***"This device helps us to remain connected to the world. I can hear daily news from home and abroad, I can contact my family members whenever necessary, I can record class lectures and thus continue my studies."*** Woman, blind, 21 y.o., urban, Bangladesh

Mobile money is another service which is widely used by persons with disabilities (see Figure 13). While the mobile money ecosystem is very different in both countries, 87 per cent of persons with disabilities in Kenya and 25 per cent in Bangladesh own a mobile money account, compared to 94 per cent and 14 per cent of non-disabled persons, respectively. This means that **ownership of a mobile money registered account by persons with disabilities is slightly below non-disabled persons in Kenya and higher than non-disabled persons in Bangladesh**. In Kenya, those with hearing impairments and difficulties communicating have the highest levels of ownership of mobile money registered accounts.

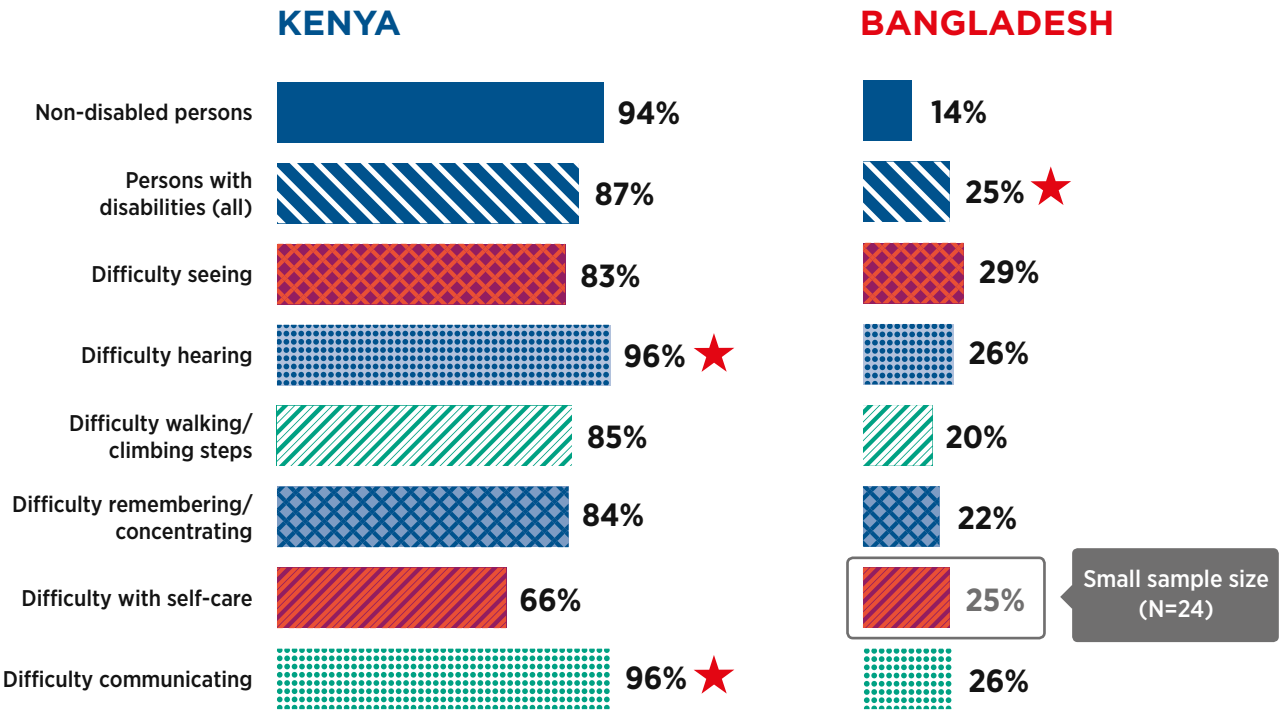


Young deaf woman, Bangladesh

Figure 13

Mobile money account ownership by mobile users with and without disabilities

% mobile users, by country and disability reported



Base: mobile users with and without disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'Do you personally have a mobile money account?.' Respondents answered 'Yes.'
n = 34 to 794 for Kenya, n = 24 to 715 for Bangladesh

Persons with disabilities report a similar level of use of mobile money related services than non-disabled persons (see Figure 14). The most commonly used services are airtime top-ups and checking an account balance, followed by person-to-person (P2P) transfers and cash-outs. For the visually impaired and blind, mobile money offers a convenient alternative to other top-up methods such as scratch cards, which are difficult to read and key in. Mobile money also reduces the need for mobility and transportation, which is often challenging for some people with disabilities, and allows them to recharge independently—which is perceived as highly valuable.

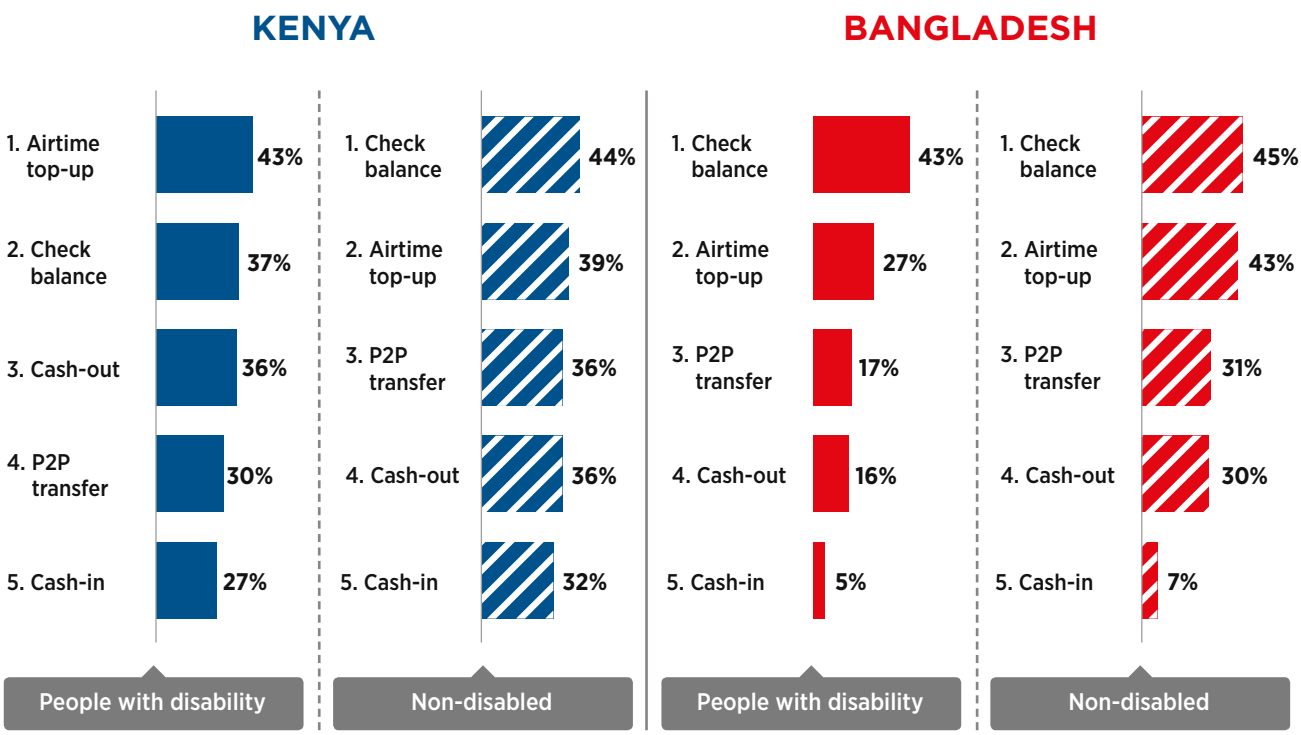
"Recharging with scratch cards is a bit hard for me because someone must read for me the digits and I can't enter them [on my mobile phone] on my own. I prefer buying from my M-Pesa[61] account since I can do it on my own with the help of TalkBack." Man, blind and has diabetes, 57 y.o., rural, Kenya

"It is easier and faster [to recharge via mobile money] considering my feet condition. Mobile money has made life easier. It only takes five minutes to get to the shop but I cannot because there are potholes everywhere and you have to keep jumping." Woman, physical impairment (severe kyphosis), 43 y.o., urban, Kenya

Figure 14

Proportion of persons with disabilities and non-disabled persons that use mobile money

% mobile money users, by country and disability reported



Base: persons with and without disabilities age 18+ that own a mobile money account.
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'How often do you... ? A) Receive or send money from/ to relatives using mobile money; B) Receive NGO/ government support (cash transfer programme) using mobile money; C) Cash-in at a mobile money agent; D) Cash-out at a mobile money agent; E) Top-up using mobile money; F) Pay bills using mobile money; G) Buy goods using mobile money (merchant payments) – excl. healthcare products or services/medicines; H) Buy healthcare products or services/ medicines using mobile money; I) Keep savings using mobile money; J) Check your account balance.' Respondents answered 'Weekly.'
n = 177 to 735 for Kenya, n = 75 to 223 for Bangladesh

Another popular use of mobile money is P2P transfers. Persons with disabilities are often economically dependent on their relatives and find it convenient to receive money through P2P transfers. Some persons with disabilities receive their salaries via mobile money, while those who own small businesses or are self-employed receive payments from customers via mobile money. Mobile money provides persons with disabilities with a more secure platform than cash, as they are frequently victims of theft.

> ***"The money I get from organising sewing training, I receive it with my mobile. If I'm supposed to get money from someone, then I tell them to send the money to my bKash account."*** Woman, physically impaired (side paralysis), 35 y.o., rural, Bangladesh[62]

"If I make a good sale, I deposit the money in my M-Pesa account instead of going with it to the house. I cannot run in case I am ambushed by thieves." Man, physically impaired, 35 y.o., urban, Kenya

Finally, **for persons with disabilities, mobile money is an alternative to banks as their facilities and services are not always inclusive and accessible**, particularly for the visually impaired, blind, hard of hearing, deaf, physically impaired and persons with short stature. Persons with short stature find the use of mobile money more convenient than ATMs, which are positioned too high for easy use. For those with hearing impairments, communicating with banking agents can be challenging. Mobile money offers an alternative that allows them to keep their bank account and cash-out using their mobile money registered account. Finally, mobile money is an alternative for persons with disabilities who would otherwise not be be able to open a bank account.

"I would not be able to withdraw money from an ATM because of my height but with mobile banking I can withdraw money straight from my bank account using my M-Pesa account as an intermediary." Man, short stature, 28 y.o., urban, Kenya

"Going to the bank to withdraw money was hard, because we needed to have a discussion with the teller. But now it's easier for me, because I use mobile money." Woman, deaf, 59 y.o., urban, Kenya

Physically impaired man, Kenya

These findings reveal the differences in usage of mobile services and also highlight the **different circumstances for persons with disabilities in their respective countries**, and the importance for mobile operators to understand the context of disability and support systems available for persons with disabilities as factors that influence mobile phone ownership and usage levels.

4.2
Barriers in usage

The main barriers to mobile phone usage by persons with disabilities are cost, digital illiteracy and the disability itself

Persons with disabilities face several barriers when using mobile phones. Some are common to all users, such cost and digital literacy, **but these barriers are amplified for persons with disabilities**.

Cost is one of the main barriers to mobile phone usage for all users. However, cost is particularly problematic for persons with disabilities who tend to be poorer than non-disabled persons and incur additional expenses to be able to use a mobile phone. For instance, sometimes persons with disabilities have to pay someone to help them use a mobile phone or to access mobile services (i.e. to top-up airtime); they can be victims of fraud by agents or those helping them use a mobile phone; they are often victims of theft; they are more likely to accidentally break their phones; and even incur higher airtime or data costs due to the longer time needed to communicate or for higher usage of video calls

"Sometimes I ask someone to write the message for me and I pay him 20 KES. When I receive a message, I ask someone to read and I still have to pay for it." Man, blind, 32 y.o., rural, Kenya

"When I send someone to buy airtime for me, I would usually tell them to buy credit for themselves too. Like if I send him to buy airtime worth 20 KES, I tell him to buy for the same amount for him." Man, speaking impairment and side paralysis, 30 y.o., rural, Kenya

"We usually leave the bigger phone [smartphone] in our rooms and take the smaller one out. Phones are stolen from people with no disability. It's easier to steal from us." Man, blind, 24 y.o., urban, Bangladesh

"I always need a lot of airtime because I take time to process my thoughts and answer people calling me." Man, speaking impairment and epilepsy, 35 y.o., rural, Kenya

Disability and socio-demographics

- Research on disability shows a **strong correlation between disability, education, employment, and income level**.[1]

- **Disability is both a cause and an outcome of poverty**. Children with disabilities are less likely to attend school and have fewer opportunities for employment or to earn an income in adulthood. Poverty itself can also be the cause of disability as those most marginalised may suffer conditions that result in disability which could have been avoided with adequate access to care.

- Our research also found a correlation between disability, education, and employment. **Persons with disabilities are not only less likely than non-disabled persons to have attended school but they are also less likely to be employed.**

	Kenya		Bangladesh	
	Persons with disabilities	Non-disabled persons	Persons with disabilities	Non-disabled persons
Never attended school	36%	12%	46%	37%
Unemployed	29%	19%	33%	1%

1. Sources on the link between disability and poverty: World Report on Disability, World Health Organization (WHO) and World Bank, 2011; Disability and poverty in developing countries: a multidimensional study, World Development, Mitra, Posarac & Vick, 2013; Kenya 2009 Population & Housing Census, Analytical Report on Disability, Volume XIII, March 2012, Kenya Bureau of Statistics; Disability in Bangladesh: Prevalence and Patterns, Population Monograph: Volume-5, November 2015, Bangladesh Bureau of Statistics

Digital illiteracy is another barrier as many persons with disabilities report a lack of knowledge of how to use some mobile-enabled services. It is likely that the lower levels of **education** faced by persons with disabilities **results in lower digital literacy**.

> ***"Most disabled people haven't gone to school so the phones should have a language that they can understand. The phone features also, they should be understandable to us."*** Woman, asthmatic, high blood pressure and physically impaired, 70 y.o., urban, Kenya

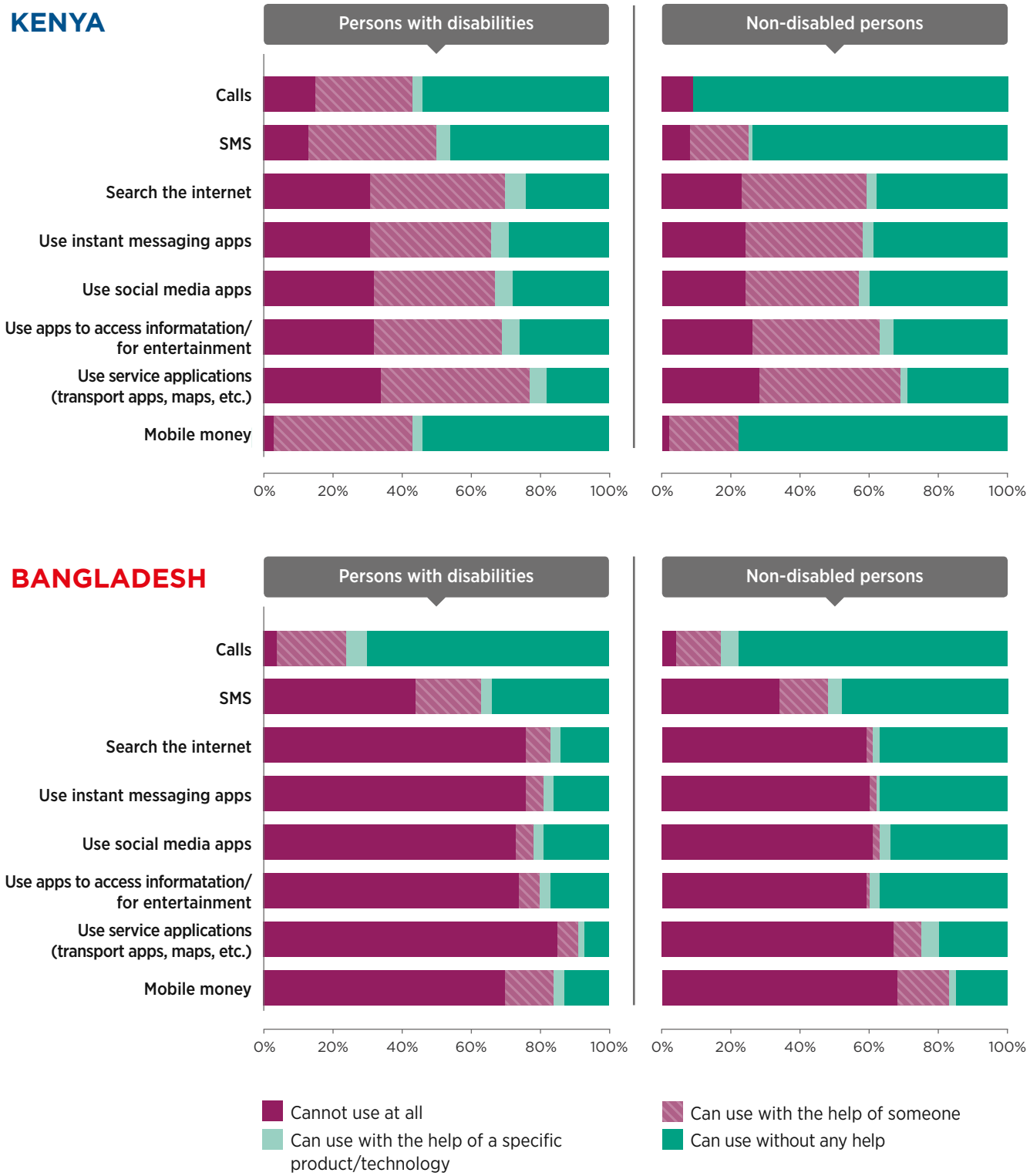
> ***"One of my daughters sends me money [via bKash] but as I don't have any education and I don't understand these things, my son is the one who collects the money from the agent for me."*** Man, hard of hearing, 55 y.o., rural, Bangladesh

When using mobile phones, persons with disabilities also face barriers directly linked to the functional limitations of their disability which, combined with the lack of adequate accessibility features, limit their autonomy and frequency of mobile usage. Calls, for instance, can only be used autonomously by 54 per cent of persons with disabilities in Kenya and 70 per cent in Bangladesh compared to, respectively, 91 per cent and 78 per cent of non-disabled persons.

Figure 15

Autonomy of usage of different mobile-enabled services

% mobile phone users, by country and disability reported



Base: mobile users with and without disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'For each of the services listed below, can you please tell me how autonomously you can use them?
n = 789 persons with disabilities and n = 186 non-disabled persons for Kenya, n = 692 persons with disabilities and n = 245 non-disabled persons for Bangladesh.

Woman showing the magnifying glass she uses to read SMS, Kenya

Persons with short stature face challenges manipulating phones with large screens, Kenya

This limited autonomy of usage differs by type of disability and type of mobile service used. The visually impaired and blind are the least autonomous of all persons with disabilities when using a mobile phone. Only 34 per cent and 58 per cent of visually impaired and blind people in Kenya and Bangladesh respectively can make or receive calls autonomously, and only five per cent in Kenya and six per cent in Bangladesh can search the internet on their own. For the hard of hearing and deaf, the main challenge is making or receiving calls. People with physical impairments or mobility challenges face issues when seeking physical services, such as going to agents to recharge. People with mobility limitations in the upper limbs, muscular weakness or short stature can face difficulties manipulating the handset, such as pressing the buttons correctly, or touching the screen in the right place when accessing services, or even handling the phone correctly, risking falls and breakages.

"Making calls is hard on my side. Because of the design, I am not able to locate people's number on my phone book. That's why I rarely make calls." Woman, blind, 58 y.o., rural, Kenya

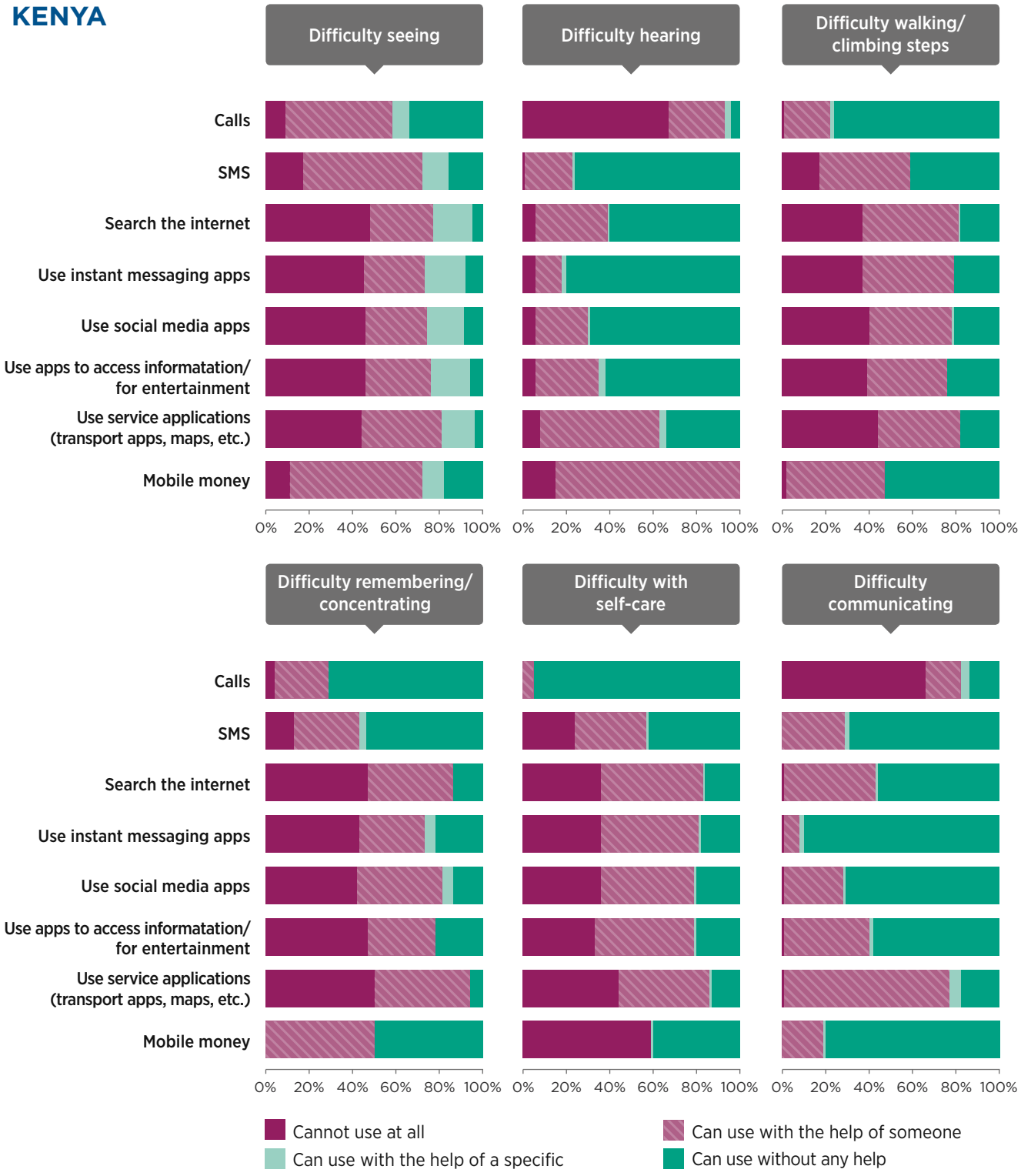
"The shop is half a kilometre away from my house, but still, on rainy days, it becomes really hard for me to go there." Man, cerebral palsy, 24 y.o., urban, Bangladesh

"The screen of a smartphone is relatively bigger and harder to hold in one hand." Man, physically impaired (paralysed hand), 40 y.o., rural, Bangladesh

Figure 16

Autonomy of use of mobile-enabled services by persons with disabilities

% mobile users, by type of disability



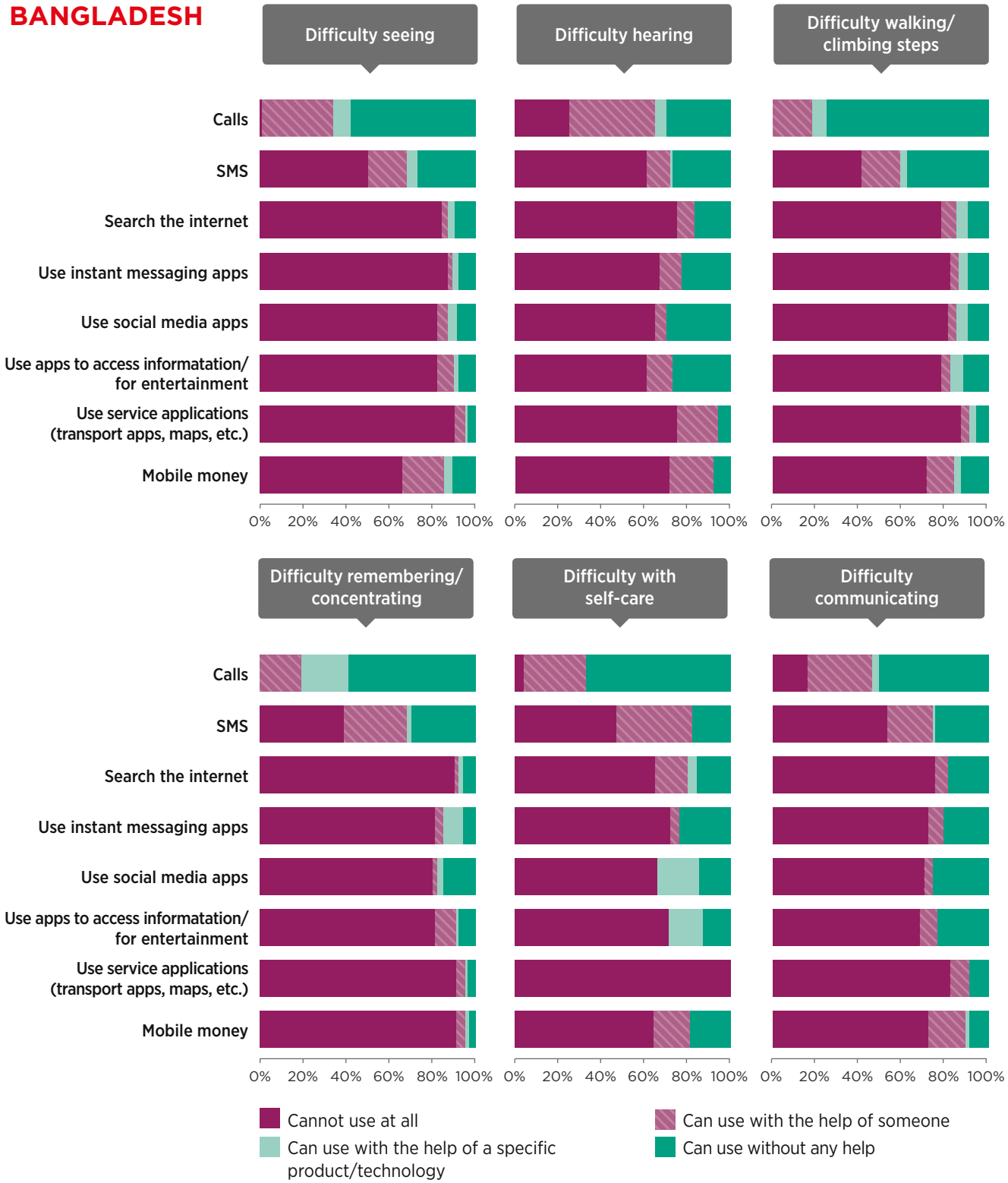
Base: mobile users with disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'For each of the services listed below, can you please tell me how autonomously you can use them?'
n = 195 for blind or visually impaired, n = 167 for deaf or hard of hearing, n = 188 for mobility impaired, n = 33 for those with difficulties remembering or concentrating, n = 40 for those with difficulties with self-care and n = 76 for those with communication difficulties

Figure 17

Autonomy of use of mobile-enabled services by persons with disabilities

% mobile users, by disability reported

BANGLADESH



Base: mobile users with disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Users have access to a mobile by owning or borrowing.
Percentages indicate the proportion of respondents who answered 'For each of the services listed below, can you please tell me how autonomously you can use them?'
n = 194 for blind or visually impaired, n = 153 for deaf or hard of hearing, n = 213 for mobility impaired, n = 38 for those with difficulties remembering or concentrating, n = 23 for those with difficulties with self-care and n = 164 for those with communication difficulties

This lack of autonomy triggers confidentiality issues, as they rely on someone else to operate the mobile phone, **which is an additional barrier to usage.** The hard of hearing, deaf, visually impaired or blind, for instance, must surrender privacy when they ask someone to make or receive a call for them or read their SMS. For the visually impaired and blind, screen-readers are an alternative to help them use their phone, but, if used without earphones, anyone can hear what they are reading or typing. Confidentiality is particularly acute when it comes to using mobile money, as persons with disabilities often disclose their PIN to the helper.

> ***"When I go for shopping, I go with cash since I find it easier to handle than mobile money. I use TalkBack when using mobile money services, but I don't want people to hear what I am transacting when I go shopping."*** Woman, visually impaired and mild cerebral palsy, 30 y.o., urban, Kenya

> ***"The only challenge is that when I go to deposit or withdraw money, the agents might ask for my PIN. If you tell them, they will withdraw all your money from your account. This has never happened to me."*** Man, blind, 32 y.o., rural, Kenya

In addition to confidentiality issues, the lack of autonomy of usage means that **persons with disabilities cannot use the phone whenever they want, limiting their usage as they need to wait for a helper to be available**. Persons with disabilities often feel uncomfortable asking for support and being dependent on others.

> ***"I try not to take any help. I am trying to give up on this dependency also, because if I ask my office secretary to go to recharge my SIM for instance, he might answer he is busy at that moment, he will do later, and then I feel bad."*** Woman, physically impaired, 24 y.o., urban, Bangladesh

> ***"I don't like being dependent on other people because it feels like ordering people around to come and help you, whereas he/she is not my personal assistant or secretary."*** Man, blind, 19 y.o., urban, Kenya

The last barrier is network connectivity, which exists for all users. Hard of hearing and deaf respondents report this challenge as they need a reliable signal to make video calls to communicate.

> ***"I think the video call service should be a lot faster and uninterrupted."*** Man, deaf, 62 y.o., urban, Bangladesh

The importance of Interactive Voice Response (IVR) in mobile money services to prevent fraud against the visually impaired and blind – the example of Safaricom

Safaricom, a mobile operator in Kenya, conducted a "disability audit" of its mobile services in 2017. As part of this project, Safaricom decided to partner with Kenya Union for the Blind (KUB) to register blind customers and thereby enable Safaricom to collect more data to improve their services for the visually impaired and blind. **They tracked mobile money usage data of 6,500 visually impaired and blind persons and realised they had higher mobile money ARPU than non-disabled persons.**

Through focus group discussions with visually impaired and blind persons, Safaricom realised that many were victims of fraud when cashing-in or -out with mobile money. Typically, the agent or person helping them to complete the transaction would not deposit the full amount as requested by the person with disability. In the absence of voice notification to check their mobile money registered account balance, **the visually impaired and blind persons would only realise later that they had been cheated by the agent/helper.**

Safaricom was already employing it to help users check their airtime balance. Following the focus group discussions, they decided to **integrate IVR to their mobile money services.** Within just three months, they were able to launch a new version of the service, thereby drastically **reducing fraud against visually impaired and blind customers.**

Such initiatives are crucial to better understand the specific usage of persons with disabilities. **Tracking consumers with disabilities is indeed the first step towards detailed usage data analytics,** which would be complementary to the survey approach used for this research and would help better understand and serve this very specific customer segment.

5 Access to basic services

This section summarises the key trends in **access to basic services** (health, education, employment, transportation, financial services, etc.) by persons with disabilities. It highlights the role of mobile technology as an enabler of access to basic services for persons with disabilities. Finally, it explores barriers to access to basic services for persons with disabilities.

Key findings

- Access to basic services by persons with disabilities is limited, with only 13 per cent to 40 per cent of persons with disabilities in Kenya claiming to have full access to basic services and less than 10 per cent of persons with disabilities in Bangladesh, depending on the service.
- Mobile phones are perceived enablers by persons with disabilities, who claim that mobile technology is a great help to access some basic services.
- Perception of the impact of mobile phones to access basic services is greater in Kenya where the mobile ecosystem is more developed than in Bangladesh and amplified by smartphone ownership.
- Mobile phones act as enablers to offer alternatives to the existing ecosystem of services, often inaccessible to persons with disabilities.
- The main barriers for persons with disabilities to access basic services are additional costs incurred to access services, and their disability, as they face stigma/discrimination from family members, service providers or other basic service users. In addition, most services are not accessible to persons with disabilities as infrastructure and services are not designed inclusively.

5.1 Trends in access to basic services

Access to basic services is limited for everyone, but slightly more limited for persons with disabilities

Access to basic services such as health, education, employment, transportation or financial services is limited for all in both countries and, across both markets, **higher proportions of persons with disabilities reported to have no access to basic services than non-disabled persons**. Only 30 per cent of Kenyans with disabilities claim to have full access to transportation, 25 per cent to health services and 13 per cent to education. In Bangladesh, regardless of the service considered, less than 10 per cent of persons with disabilities claim to have full access. It is important to highlight that asking a participant's perception on access influences reporting. While non-disabled individuals mention negative aspects affecting their access to services, persons with disabilities report current access to services positively, as

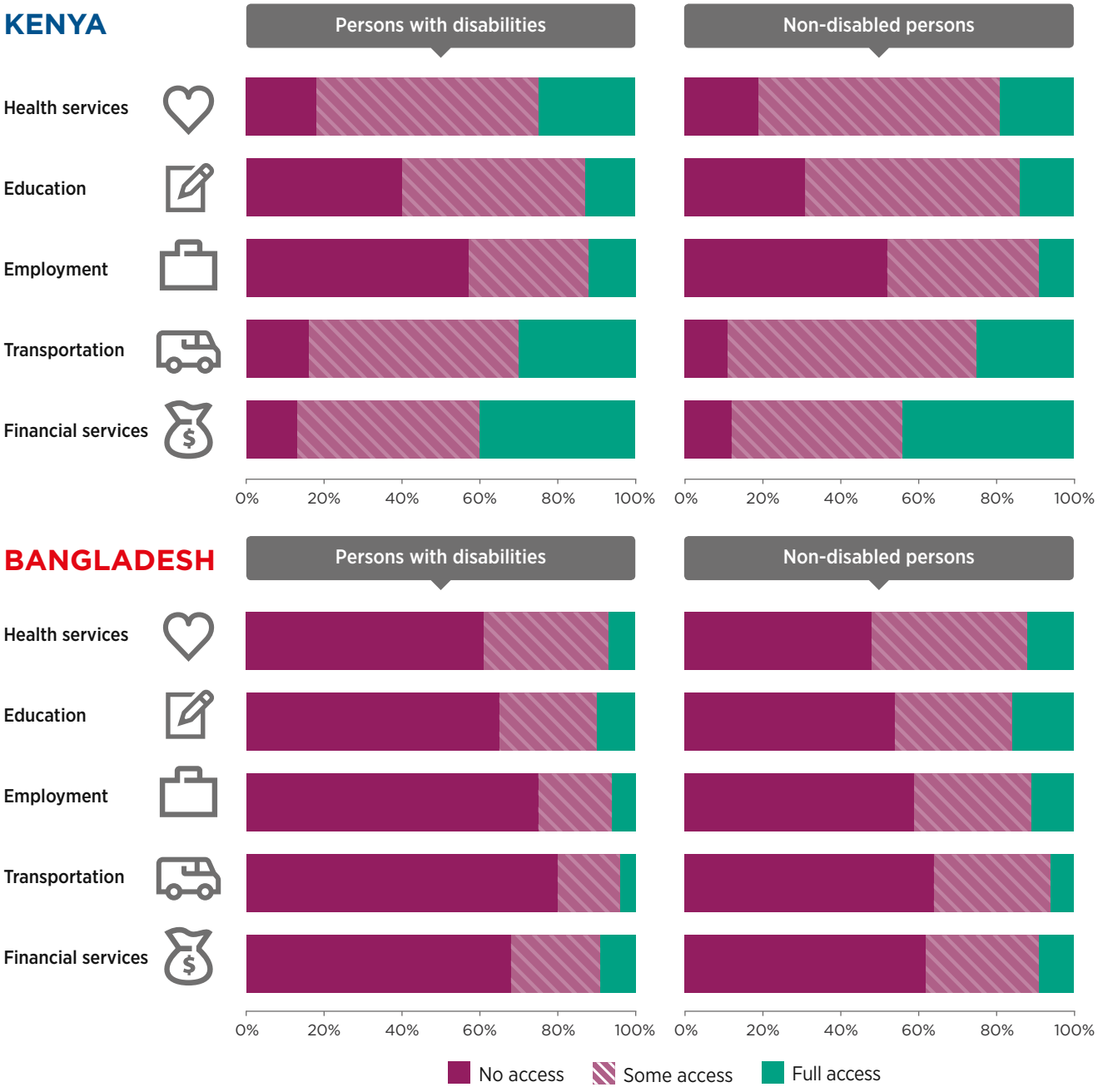
they compared to previously poor access.[63] However, when exploring access to services through the interviews, it was clear that the situation was worse than reported.

"Regarding the health services, I have access but there are no interpreters so it's a bit challenging. Maybe I feel pain in the kidney, but the doctor thinks that it's my stomach, so they give me medicine for the stomach and of course that does not help."
Woman, deaf, 26 y.o., urban, Kenya

Figure 18

Perception of access to basic services by persons with disabilities and non-disabled persons

% total population, by country and disability reported



Base: mobile owners and non-owners aged 18+ (excluding those who did not want to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Percentages indicate the proportion of respondents who answered 'On a scale from 1 (no access) to 3 (full access), to what extent do you consider you have access to the following basic services, according to your needs?'.
n = 815 for persons with disabilities and n = 187 for non-disabled persons in Kenya, n = 791 for persons with disabilities and n = 253 for non disabled persons in Bangladesh

Persons with disabilities experience mobile phones as enablers of access to basic services

In both countries, **persons with disabilities claim that mobile phones helps them to access basic services.** Access to financial services is regarded to be the most enabled by mobile phones in both countries. **The impact of mobile technology seems greater in Kenya than in Bangladesh,** which could be linked **to the more developed mobile ecosystem** (i.e. higher mobile ownership rate, higher smartphone penetration, more developed mobile money ecosystem, etc.) **and better access to accessibility features** (see Section 6: Accessibility of products and services for more details). In both countries, those who have access to the most sophisticated technologies, i.e. smartphone owners, experience a greater positive impact of mobile technology as an enabler of access to basic services.

Regardless of the service considered, at least a third of persons with disabilities in Kenya claim that mobile technology is helping them to access basic services (see Figure 19). A third of persons with disabilities report that mobile phones help them access education, healthcare, and employment, while more than 40 per cent reported help with access to transportation and 62 per cent reported help with access to financial services. **In Kenya, 87 per cent of persons with disabilities claim to have full or some access to financial services**—a number which is likely to be driven by high mobile money usage. For certain basic services, those with specific disabilities rated mobile as a greater enabler of access in comparison to the average rating given by persons with disabilities as a group. For instance, 56 per cent of those who have difficulty communicating claimed that their mobile phone helps them to access employment, and around two thirds of those who have difficulty remembering/concentrating and two thirds of those with difficulties with self-care claim that mobile helps them to access health services. Seventy-one per cent of those who have visual difficulties and have access to a smartphone reported that mobile helped them to access education. A similar proportion of those with hearing difficulties reported help with access to financial services.

In Bangladesh, the power of mobile phones to access basic services is acknowledged by persons with disabilities, although to a lesser extent. Between eight per cent and 15 per cent of persons with disabilities claim that mobile technology helps them to access basic services. Interestingly, smartphone owners in Bangladesh systematically claimed a higher impact of mobile technology as an enabler of access to basic services—10 to 25 per cent of respondents who own a smartphone claim that mobile technology supports access to basic services. **With increased accessibility, the potential of mobile phones as ATs increases**, as well as their enabling capabilities to improve access to services by persons with disabilities.

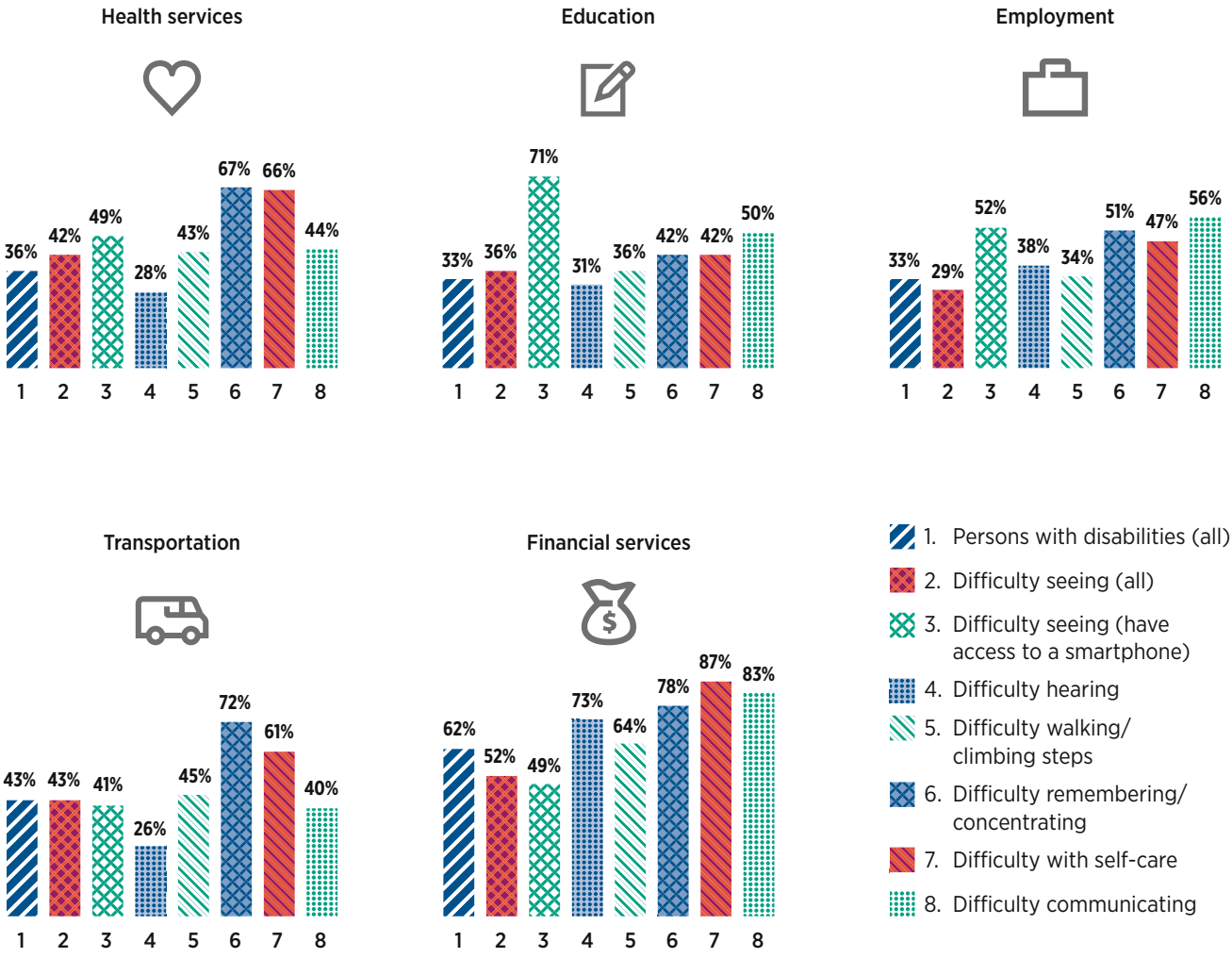
Mobile phones enable persons with disabilities to accomplish different tasks and daily activities which they would not be able to do otherwise, thereby helping them to improve their access to basic services. **Mobile technology offers alternatives to the existing ecosystem of services, which are often inaccessible to them.** Annex 3 summarises some of the benefits reported. These findings show that mobile phones are enablers of access to basic services and the more accessible handsets are, the greater the impact of mobile technology to assist persons with disabilities is. This highlights the potential of the mobile industry to drive inclusion of persons with disabilities.

Figure 19

Proportion of persons with disabilities that report to be "helped very much" to access basic services by mobile phones

% mobile users, by disability reported

KENYA



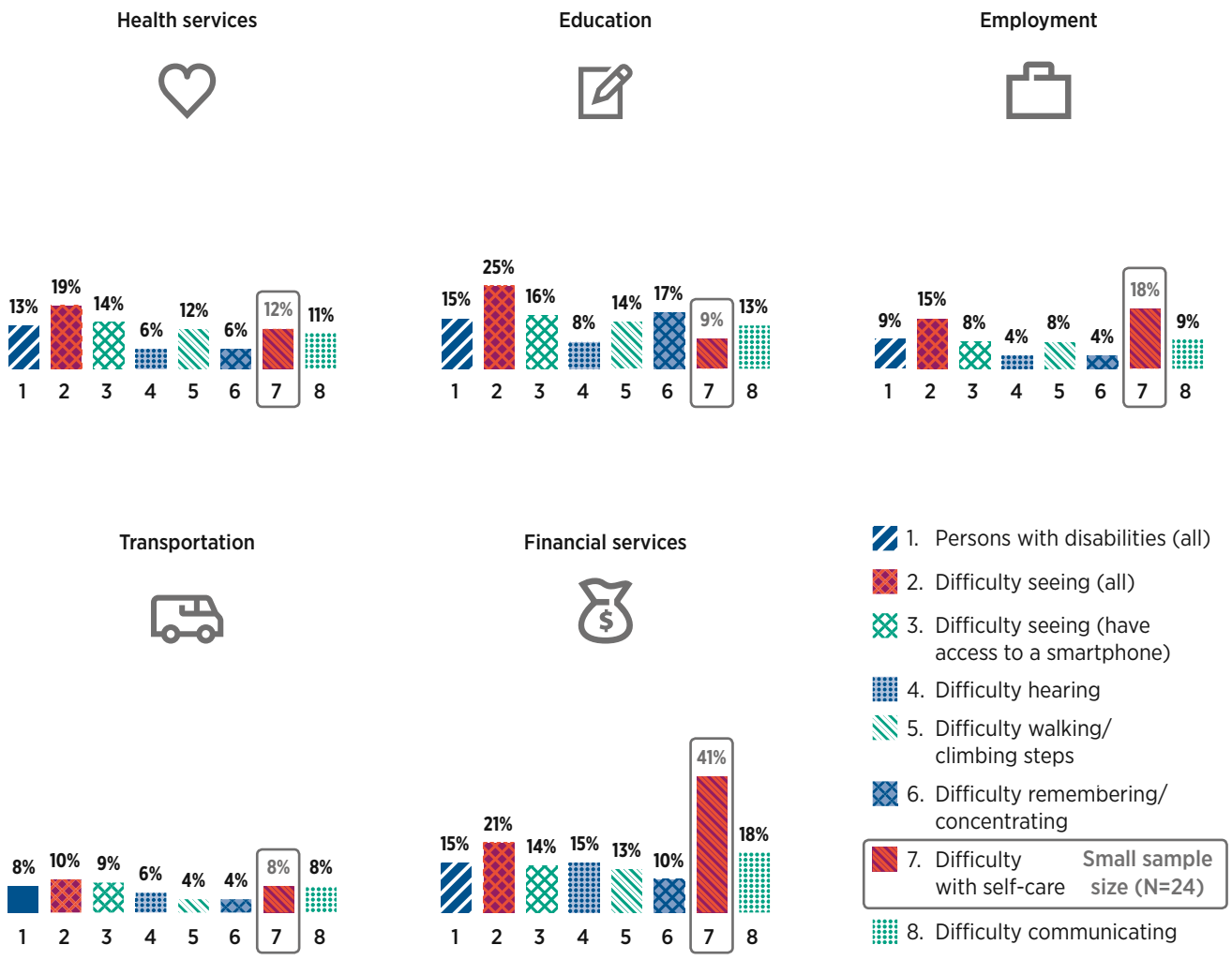
Base: mobile owners and non-owners aged 18+ (excluding those who do not know or do not want to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Percentages indicate the proportion of respondents who answered 'On a scale from 1 (not helping at all) to 3 (helping very much), to what extent do you consider that having access to a mobile phone is helping you (could help you) to access the following basic services, according to your needs?'. Respondents answered '3.'
n = 37 to 813

Figure 19

Proportion of persons with disabilities that report to be “helped very much” to access basic services by mobile phones

% mobile users, by disability reported

BANGLADESH



Base: mobile owners and non-owners aged 18+ (excluding those who do not know or do not want to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty (“a lot of difficulty”) or a complete inability (“cannot do at all”) to perform at least one or more of the functional domains of the Washington Group Questions.
Percentages indicate the proportion of respondents who answered ‘On a scale from 1 (not helping at all) to 3 (helping very much), to what extent do you consider that having access to a mobile phone is helping you (could help you) to access the following basic services, according to your needs?’. Respondents answered ‘3.’
n = 28 to 759


SAMSUNG

5.2
Barriers to access basic services

The main barriers to access basic services are cost and disability

In both countries and for all types of basic services, **cost of service and disability are among the top barriers preventing access to basic services for persons with disabilities**. Cost is a major barrier for both non-disabled persons and persons with disabilities, but it is more acute for the latter due to the additional costs required to access the services.

Disability is indeed "an expensive lifestyle"[64] **and persons with disabilities must bear extra costs to access basic services**. For instance, many persons with disabilities have limited autonomy and require assistance to access basic services (e.g. a guide to get to the service facility for the visually impaired and blind, a sign language interpreter for the hard of hearing and deaf, a caregiver to operate a wheelchair for the physically impaired, etc.). The cost barrier is particularly acute for visually impaired and blind people who require very specific assistive products to do most activities (i.e. books in Braille, Braille machines to type notes, screen-readers to use mobile phones or computers, etc.). When family members are not available, persons with disabilities pay for a helper's time and their expenses (i.e. transport, food, etc.).

> ***"For me to access healthcare services and public transport, I need to be guided by a helper whom I have to pay for his/her transport. In addition, they also need to be paid for their lost time. This can cost me like 200 KES per trip depending on time taken for the trip. My health condition and visual impairment has really limited my mobility. In cases where I don't have a reliable helper, I don't access these services."***
> Woman, blind, 58 y.o., rural, Kenya

> ***"We use the Braille machine which costs 45,000 KES and it's not manufactured here in Kenya, for instance some are imported from Germany. In terms of books, you can get a book like a mathematics book [in Braille] for 2,500 KES. Our learning materials are very expensive."*** Man, blind, 19 y.o., urban, Kenya

Those with physical impairments also bear extra costs to travel to the service facility. They have difficulty walking, incur transportation costs, and are also often required to pay extra for public transport when they need additional space to stretch their limbs or for their wheelchair.

> ***"To fetch water is a bit hard for me because the rivers are so far away and I also have to carry the water through a motorbike or I ask someone to carry it for me against a fee."***
> Man, physically impaired, 21 y.o., rural, Kenya

> ***"Bus drivers say that my wheelchair takes the space where one person can sit and that I have to pay extra. If I say I don't want to pay for my wheelchair they tell me to get down from the bus because why would they face losses for me?"*** Woman, physically impaired, 31 y.o., urban, Bangladesh

Finally, health services are more expensive for persons with disabilities as they generally require special rehabilitation services and treatments due to their condition.

> ***"If I try to take any diagnosis of my condition, the fees for the doctor's might be 500-1,000 BDT. If I spend that amount of money on medical expenses, my family cannot run. I cannot afford going to the doctor."***
> Man, hard of hearing, 29 y.o., rural, Bangladesh

The disability itself is also a major barrier to access basic services, notably due to stigma and discrimination from family (who refuse access to basic services to their children with disabilities), but also from service providers or other service users. This is the case for all types of services (education, health, transportation, employment, religious services, etc.), whether they are provided by the government or private companies.

> ***"Sometimes the bus drivers don't let me get on the buses. Even the rickshaw drivers don't want to take me as a passenger."***
> Man, cerebral palsy, 24 y.o., urban, Bangladesh

> ***"Sometimes the doctor will not address me directly. I don't really know the reason. He will just start asking the guide about my health condition, instead of asking me. This does not make me happy with hospitals."***
> Man, blind, 40 y.o., urban, Kenya

Societal attitudes towards persons with disabilities are often negative and they are perceived as unable to contribute to society, and therefore not worthy of access to basic services. Most of them feel very isolated socially. In both countries, stigma and discrimination are particularly acute in rural areas.

> ***"The admin didn't at first want to admit me in their school. They said to me that if I am admitted here, then the other kids will tease me, they won't like to meet me, won't greet me, they wouldn't come to school if I am admitted."*** Woman, physically impaired, 24 y.o., urban, Bangladesh

> ***"Most employers, if you speak with them on the phone, they agree to give you a job, but when you go there physically and they see that you have a disability they don't employ you."*** Woman, visually impaired and mild cerebral palsy, 30 y.o., urban, Kenya

> ***"I face a lot of discrimination in the church, as no one wants to sit around me, so I find myself sitting alone. This affects me psychologically."*** Man, blind, 40 y.o., urban, Kenya

Man with speaking impairment and side paralysis, Kenya

Physically impaired man, Bangladesh

Physically impaired man in a wheelchair, Bangladesh

Finally, **many services are not accessible for persons with disabilities as the physical infrastructure and services are not inclusively designed**. Many buildings where services are offered are not accessible. For example, they have stairs and no elevator, doors are too small for wheelchair access or tiled flooring renders the surface too slippery for those with walking aids, etc. Public transportation often has a very high step to embark, making it challenging for some persons with physical impairment.

> ***"I went to Nazareth hospital at a branch in Limuru. I was to be admitted and my sister went to check the room only to find out my wheelchair could not get in the room."*** Woman, asthmatic, high blood pressure and physically impaired, 70 y.o., urban, Kenya

Many service facilities are ill-equipped and lack furniture or equipment for the special needs of persons with disabilities (no screen-readers, oral instructions on ATMs for the blind, no large font or Braille books at school or in worship places, etc.).

> ***"It is big challenge to transact money even at the ATM. I have to request someone to carry me and tell them to look aside so that they do not see my PIN."*** Man, short stature, 28 y.o., urban, Kenya

> ***"It's hard to use an ATM machine since I cannot see the numbers and I cannot call a stranger to help key in my PIN."*** Woman, visually impaired, 28 y.o., urban, Kenya

Finally, employees and civil servants in service facilities are not properly trained or incentivised to serve persons with disabilities, which consequently results in persons with disabilities not receiving an adequate service.

> ***"There are no translators in the hospital, so I have to write everything down and some are just hard to explain."*** Woman, deaf, 35 y.o., urban, Kenya

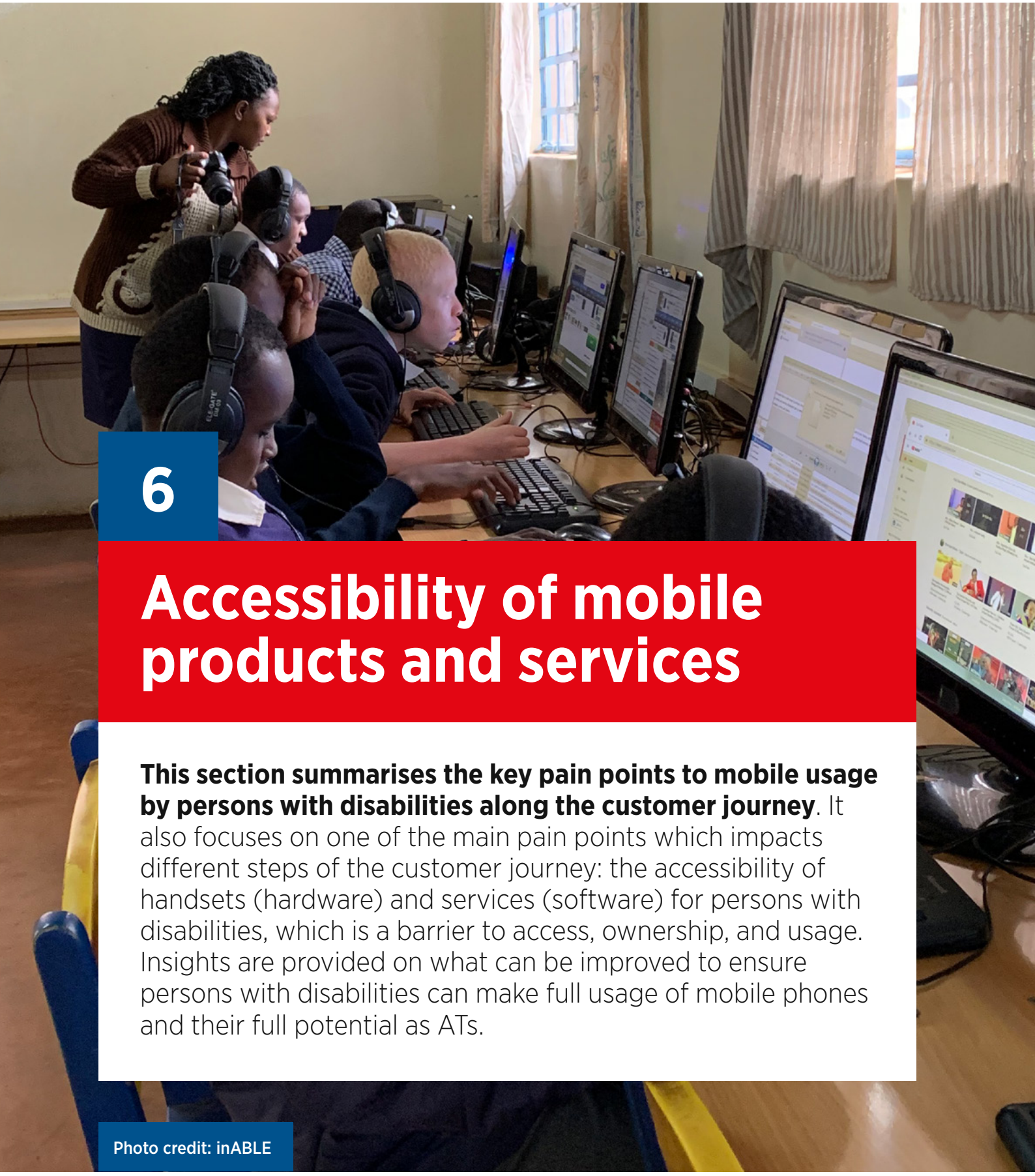
> ***"In bank, we disabled people face difficulties. When I go to get my salary from the bank, I face problems as I can't sign properly, I still can't write my signature properly, so I use my finger [digital print] for that, but the officers there don't want to allow. I often get into arguments with the manager of the bank because of it."*** Man, blind, 52 y.o., urban, Bangladesh

> ***"People don't want to help you out, especially the conductors. They take is as though you're wasting their time or slowing them down."*** Man, short stature, 28 y.o., urban, Kenya

Superstition and disability

In both Kenya and Bangladesh, particularly in rural areas, there are traditional beliefs and superstitions around disability and its causes. Some people believe that persons with disabilities (or their parents) have sinned, and the disability is the consequence and the punishment for this sin. These beliefs highlight the lack of disability awareness by the vast majority of the population.

> ***"There are many superstitions. For instance, some people say that an individual becomes disabled when the parents commit any kind of mischief. They even call the disabled individual 'cursed child'."*** Man, physically impaired (paralysed hand), 40 y.o., rural, Bangladesh



6

Accessibility of mobile products and services

This section summarises the key pain points to mobile usage by persons with disabilities along the customer journey. It also focuses on one of the main pain points which impacts different steps of the customer journey: the accessibility of handsets (hardware) and services (software) for persons with disabilities, which is a barrier to access, ownership, and usage. Insights are provided on what can be improved to ensure persons with disabilities can make full usage of mobile phones and their full potential as ATs.

Photo credit: inABLE

Key findings

- The value of mobile phone for persons with disabilities is often not perceived by the individuals themselves or their relatives, creating a barrier to access and usage.
- Many persons with disabilities do not know that accessibility features exist and could help them use a mobile phone autonomously. Only 13 per cent of persons with disabilities in Kenya and 10 per cent of persons with disabilities in Bangladesh report using accessibility features.
- Most accessibility features (screen-readers, magnifiers, voice command, etc.) are only available on smartphones, which are often unaffordable to them.
- Poor digital literacy and technology awareness limits persons with disabilities' usage of mobile phones to access the most basic services, preventing them from using the full potential of mobile phones to support them in their daily tasks.
- Also, while most solutions and technologies exist to make services more inclusive and accessible for persons with disabilities, these are not always implemented, as MNOs and service providers lack the required knowledge of disability and the challenges encountered by their customers with disabilities

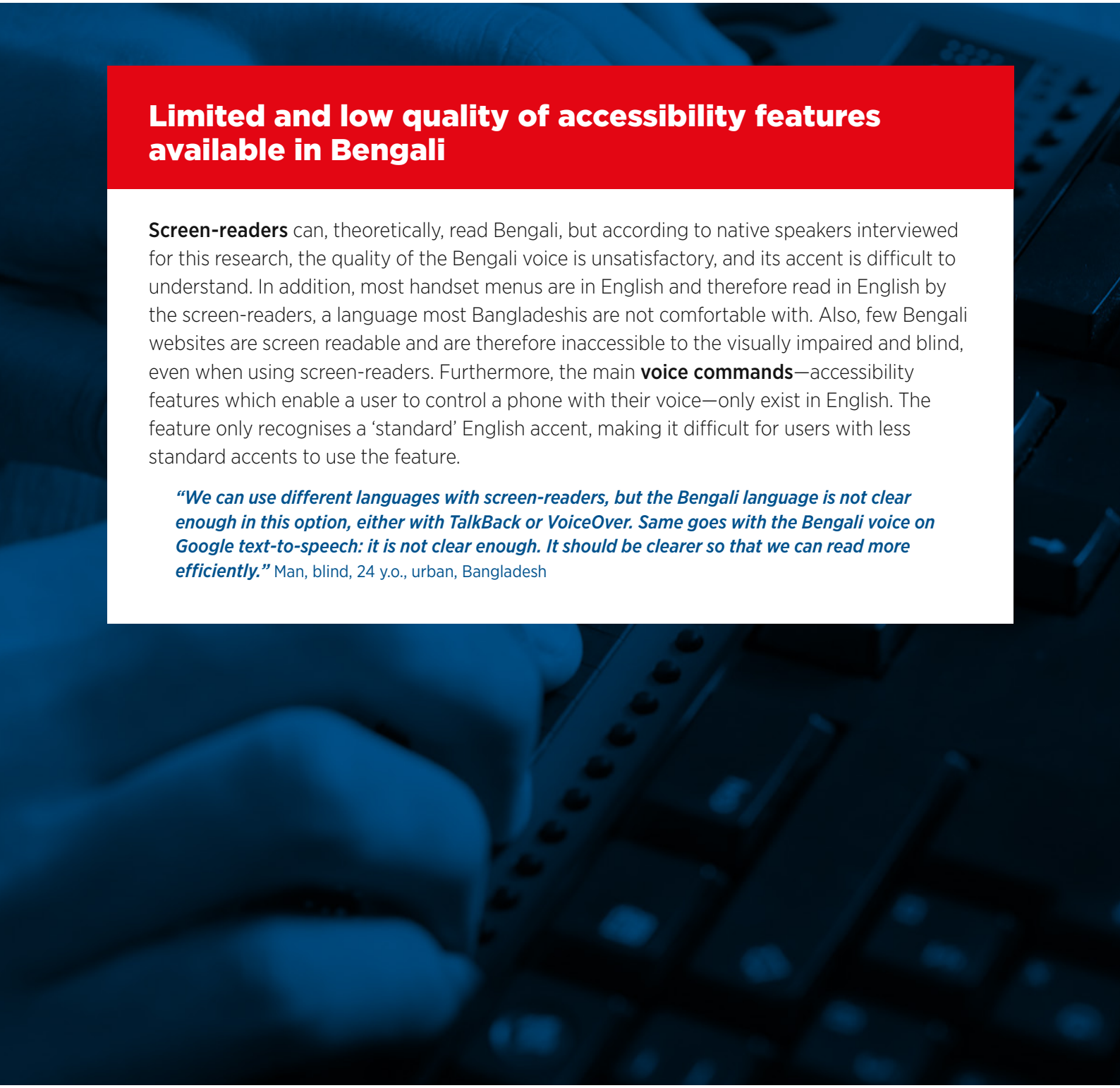
6.1 Accessibility of handsets and services

Few persons with disabilities have access to accessibility features

Most persons with disabilities in Kenya and Bangladesh do not have access to many accessibility features to help them use their mobile phone due to the type of handsets they own, the cost of additional applications and even the lack of awareness of these features. The accessibility barrier impacts the entire customer journey, limiting the perceived value of mobile phones and the capacity of persons with disabilities to autonomously and confidentially use a mobile phone.

The use of accessibility features depends on the type of disability of the user. In both countries, visually impaired and blind smartphone owners are by far the biggest users of accessibility features, possibly due to their dependency on these features to be able to use mobile phones. Only 13 per cent of persons with disabilities in Kenya and 10 per cent of persons with disabilities in Bangladesh report using accessibility features. When segmenting by type of disability, only 41 per cent of visually impaired smartphone

owners use accessibility features in Bangladesh, as opposed to 64 per cent in Kenya. This could be explained by the fact that most operating systems work in English, a language more widely spoken in Kenya than in Bangladesh, and accessibility features are either not available in Bengali, or they operate poorly. This creates an additional barrier to mobile phone usage by Bangladeshis with disabilities.



Limited and low quality of accessibility features available in Bengali

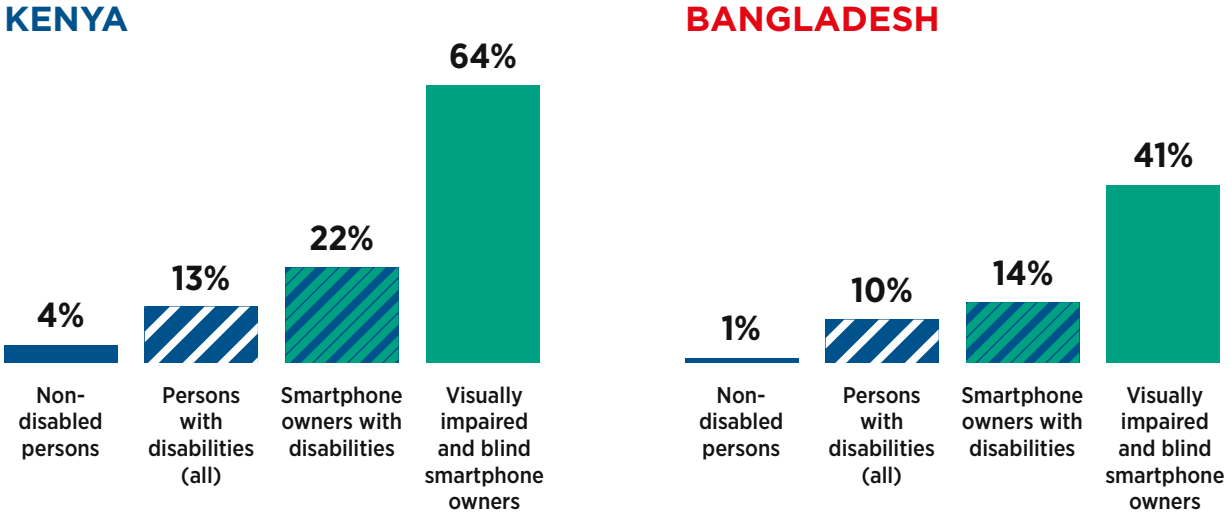
Screen-readers can, theoretically, read Bengali, but according to native speakers interviewed for this research, the quality of the Bengali voice is unsatisfactory, and its accent is difficult to understand. In addition, most handset menus are in English and therefore read in English by the screen-readers, a language most Bangladeshis are not comfortable with. Also, few Bengali websites are screen readable and are therefore inaccessible to the visually impaired and blind, even when using screen-readers. Furthermore, the main **voice commands**—accessibility features which enable a user to control a phone with their voice—only exist in English. The feature only recognises a 'standard' English accent, making it difficult for users with less standard accents to use the feature.

> ***"We can use different languages with screen-readers, but the Bengali language is not clear enough in this option, either with TalkBack or VoiceOver. Same goes with the Bengali voice on Google text-to-speech: it is not clear enough. It should be clearer so that we can read more efficiently."*** Man, blind, 24 y.o., urban, Bangladesh

Figure 20

Proportion of respondents who report that accessibility features help them to use mobile phones

% mobile users, by country and disability reported



Base: mobile users aged 18+ (excluding those who do not know).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Percentages indicate the proportion of respondents who answered 'Which specific product/ technology help you use mobile phones, if any?'.
n = 86 to 794 for Kenya and n = 34 to 715 for Bangladesh

Despite their limited use, many accessibility features exist and are available for handsets. The Mobile & Wireless Forum launched the Global Accessibility Reporting Initiative (GARI)[65] to develop a database of accessibility features for different devices, including mobile phones, tablets, apps, wearables and smart TVs. This database can be used by persons with disabilities when choosing a handset but also to inform manufacturers, developers, and governments on best practice regarding mobile accessibility. **Many of these features—and notably the most effective ones—are only available on the most expensive smartphones,** making them inaccessible for most persons with disabilities. In Kenya and Bangladesh, the most commonly used handset accessibility features available on smartphones are screen-readers, speech-to-text, magnifiers, voice command and video calls.

Screen-readers or text-to-speech technologies read out textual information on the phone, enabling people with visual impairment to navigate their phone menu or icons, and to read text in SMS, emails, books, or articles. The most common are TalkBack (Apple) and VoiceOver (Android). They come built-in with the most sophisticated smartphones, but some can be downloaded at a cost on other devices. These are often available in a limited number of languages and with variable quality. **Speech-to-text** enables users to write messages (SMS, emails, etc.) by dictation.

> ***"By using TalkBack I have been able to overcome the problem of being dependent on others to help me. Since I have it, I have never asked anyone to help me operate the phone."***
> Man, blind, 19 y.o., urban, Kenya

Voice command enables operation of the phone by voice. This feature is particularly useful for the visually impaired and blind or those who have difficulties manipulating the handset when pressing buttons or using the screen. The most well-known voice command feature is SIRI, which is available on Apple devices.

Magnifier/font size enlargers enable the visually impaired to zoom in and enlarge fonts to read text on a screen, while **video calls** help the hard of hearing and deaf to communicate using sign language.

In addition to accessibility features, **handset design and characteristics are important to make the mobile phone user-friendly for persons with disabilities**. Design requirements that should be considered for all handset types are:

- **Size and weight:** Depending on the type of impairment, size and weight are important considerations. Physically impaired or persons with short stature, for instance, tend to prefer smaller and lighter mobile phones that are easy to manipulate and carry around. Conversely, the visually impaired and blind tend to prefer larger handsets as they can enlarge the fonts and use the screen-reader feature easily.

- **Robustness:** Persons with disabilities, and specifically those with physical or visual impairment, look for robust mobile phones that can withstand falls.

- **Earphones:** Earphones are useful to help persons with certain disabilities answer calls, without having to pull their phone out of their pocket. This is particularly convenient for those who find operating their phones difficult, and is also more secure, reducing the potential risk of theft. Earphones are also useful for the visually impaired and blind using screen-readers as it helps protect their confidentiality.

- **Loudspeaker volume:** The hard of hearing would be able to make calls more easily if some mobile phones with higher loudspeaker volumes were available.

- **Vibrating alerts:** For the hard of hearing and deaf, alternatives to sound information are crucial. Vibrate options, for instance, can alert them to calls or messages.

- **Keypad:** For visually impaired and blind persons who use basic or feature phones, the keypad design is crucial, as well to ensure that buttons are distinct and identifiable.

Table 5

Accessibility features and their type of beneficiaries

Accessibility feature	Type of phone required	Beneficiaries (type of disability)
Screen-reader (also known as text-to-speech, TalkBack, VoiceOver, etc.)	Smartphone	Visually impaired, blind
Speech-to-text	Smartphone	Visually impaired, blind, physically impaired
Text/font-size magnifier	Smartphone	Visually impaired
Voice command	Smartphone	Visually impaired, blind, physically impaired
Video calls	Smartphone	Hard of hearing, deaf
Phone size/weight	All	Physically impaired, persons with short stature
Phone solidity	All	Visually impaired, blind, physically impaired
Loudspeakers	All	Hard of hearing
Vibrating alerts	All	Hard of hearing, deaf
Earphones	All	Visually impaired, blind, physically impaired, persons with short stature
Keypad	Basic and feature phone	Visually impaired

Mobile operators' services are not "designed for all", making them difficult to use for persons with disabilities

In addition to challenges with handsets, **most persons with disabilities also face challenges accessing services offered by mobile operators**. Few have been designed following an inclusive approach, making them hard to access for persons with disabilities.

Visually impaired and blind persons, for instance, often struggle as some notifications and information shared by mobile operators with their users are only available in text. This can be the case for airtime balance information, which often comes as an SMS at the end of a call or in the USSD menu. As the vast majority of visually impaired and blind persons do not own a smartphone with a screen-reader, they are often unable to check their mobile phone balance on their own. **Voice notifications enabled by IVR or outbound callsare highly valued by the visually impaired and blind, and can even become one of the main purchasing criteria when it comes to choosing a mobile operator.**

> ***"One of the challenges I face is checking airtime balance because I cannot see the notifications. Even when I am out of airtime, I am not able to know. I always have to ask someone to check the credit balance for me because my phone doesn't have TalkBack."***
> Man, blind, 32 y.o., rural, Kenya

The language used by mobile operators to communicate with users is not always appropriate. Some persons with disabilities only communicate in local dialects and have trouble understanding messages in English. Some language issues faced by persons with disabilities are also very specific to the disability. Deaf people in Kenya, for instance, do not typically speak Kiswahili and most of them can only understand basic English levels. As a result, they face issues when receiving textual information from mobile operators in Kiswahili. **Deaf people also face difficulties when it comes to contacting customer care services as it is often available via voice calls only**. Chat customer service or—even better—customer care via video calls with fluent sign language agents would be much more appropriate. While some operators have started to implement customer care in sign language, such as Safaricom in Kenya, this is not yet available in Bangladesh.

Kenyan deaf do not understand Kiswahili

In **Kenya**, the **deaf community does not speak or read Kiswahili**. At school, Kenyan deaf are taught **Kenya Sign Language** (which is based on British Sign Language and its grammar) and **English** only. Since they cannot hear, they are never exposed to the Kiswahili language and grammar and therefore do not understand it. Kenyan deaf only master a rather **"simple" English**, with simplified grammar and sentence structure. **Sign language tends to omit unneeded words and uses a simplified grammar**, hence the difficulty for Kenyan deaf to understand more complex English structures.

> ***"If you send messages in Kiswahili I cannot answer because I don't understand Kiswahili. The deaf language is only English."*** Man, deaf, 26 y.o., rural, Kenya

The methods offered to top-up airtime, such as scratch cards, are not always user-friendly for some persons with disabilities. Those with hand impairments or muscular weaknesses in the upper limbs, for instance, have difficulty physically scratching the cards. Persons with short stature also face challenges recharging their phone outside of the home as it is difficult to hold their phone and scratch the card at the same time. For individuals with visual impairment, the main challenge is reading the numbers on the scratch cards, which generally use very small fonts. This situation creates confidentiality and security issues for persons with disabilities, as those helping them to top-up their credit are sometimes tempted to cheat them. Mobile money is a more convenient alternative for those who know how to use it. Others tend to use specific apps to recharge: the user takes a photograph of the scratch card with their mobile phone and it automatically reads the numbers and tops-up (thereby preventing the user from entering all the numbers manually). These apps seem popular among persons with disabilities in Kenya, but they are less known in Bangladesh and are restricted for use on smartphones.

> ***"It is hard to see the numbers written on scratch cards due to their small font size. I once asked my friend to help top up a 50 KES scratch card and she transferred 20 KES worth of airtime to her phone without my knowledge. I noticed after checking my balance and found I had 30 KES worth of airtime left."*** Woman, albinism, 23 y.o., urban, Kenya

> ***"I used to have an app that would only require me to take a picture of the scratch card and it would top up for me directly."*** Man, short stature, 28 y.o., urban, Kenya

Store design is also important to enable persons with disabilities to visit mobile operators. Many stores have stairs and no elevator, making it difficult for physically impaired individuals to visit them. The floor material is also important: most floors use tiles which can be slippery and dangerous for those using walking aids. Finally, many persons with disabilities cannot wait for long periods of time and are easily tired. A priority line/counter for persons with disabilities would be helpful.

Finally, **mobile operators' websites are not always screen readable** (i.e. screen-readers used by the visually impaired and blind cannot read the website). While some efforts have been made in Kenya, very few websites are screen readable in Bangladesh, preventing persons with disabilities from using screen-readers to access information and offers advertised on operators' websites.

Tiled floors are very slippery for persons with disabilities using sticks to walk, Bangladesh

7

The role of gender in the mobile disability gap

Gender and disability are determinants of inclusion and participation in society. However, context determines whether one or the other have a greater negative correlation. This is also the case when looking at digital inclusion. This section presents a brief analysis of the intersections of gender, disability, and the mobile disability gap.

Key findings

- The intersection of gender and disability on digital inclusion differs by country. In Bangladesh, where the gender gap is large, being a woman is a greater determining factor of mobile phone ownership and access, while in Kenya, disability is the greater determinant.
- For usage of mobile services, there is a very limited gender gap among persons with disabilities. Disability is much more determining than gender in both countries.

7.1 Gender, disability and inclusion

In Bangladesh, gender is a greater determining factor than disability when it comes to inclusion and participation in society, while in Kenya, disability is the greater determinant

In Bangladesh, the most determining factor when it comes to attending school or having a job is gender. Regardless of disability, women are much less likely to attend school and have employment than men and, in our analysis, no major differences can be observed between non-disabled women and women with disabilities. **Women in Bangladesh also tend to be less empowered than their Kenyan counterparts** (see Table 6). Whether they have a disability or not, they are more likely to stay at home and not access employment. They are therefore financially dependent on a relative or spouse.

Deaf woman during her research interview, Kenya

Table 6

Comparison of access to education and employment, and marital status of men and women with disabilities and without disabilities in Kenya and Bangladesh

% respondents, by country, gender and disability reported

	Kenya				Bangladesh			
	Non-disabled persons		Persons with disabilities		Non-disabled persons		Persons with disabilities	
	Men	Women	Men	Women	Men	Women	Men	Women
% NO EDUCATION	11	13	31	41	24	48	46	45
% HAS A JOB *(any type of job, incl. farming, self employed, casual labour, etc.)*	65	78	53	48	81	11	41	12
% MARRIED	70	71	55	39	70	72	54	52

Base on survey data for adults aged 18+.

In Kenya, the situation for women is very different to Bangladesh. Gaps in access to education and employment are much bigger between persons with disabilities and non-disabled persons than between men and women. Gender, however, exacerbates differences. If there is no access gap among non-disabled men and women, a gender gap in access to education and employment exists when looking at persons with disabilities only. In this sense, women with disabilities often do not marry, are often single mothers and are the main source of income of their household. Almost half (48 per cent) are employed, almost equal to the proportion of men with disabilities (53 per cent), through self-employment, craft-making, selling clothes or owning a small kiosk, etc. As a result, they tend to be much more empowered than their Bangladeshi counterparts.

"I am a single mother with two daughters and two grandchildren. I am also a businesswoman. I have to work despite my disability to be able to support my family for I have no one else to depend on." Woman, physically impaired, 45 y.o., urban, Kenya

In both countries, persons with disabilities are less likely to be married than non-disabled persons. However, the situation for each gender differs by country. In Bangladesh, women with disabilities are as likely to be married as men with disabilities, while they are less likely to be married in Kenya (39 per cent of women with disabilities are married compared to 55 per cent of men with disabilities).

7.2
Gender and the mobile disability gap

In Bangladesh, gender is greater determining than disability when it comes to owning a mobile phone, while the reverse is true in Kenya. Gender combined with disability has an impact on the type of handset owned in Kenya

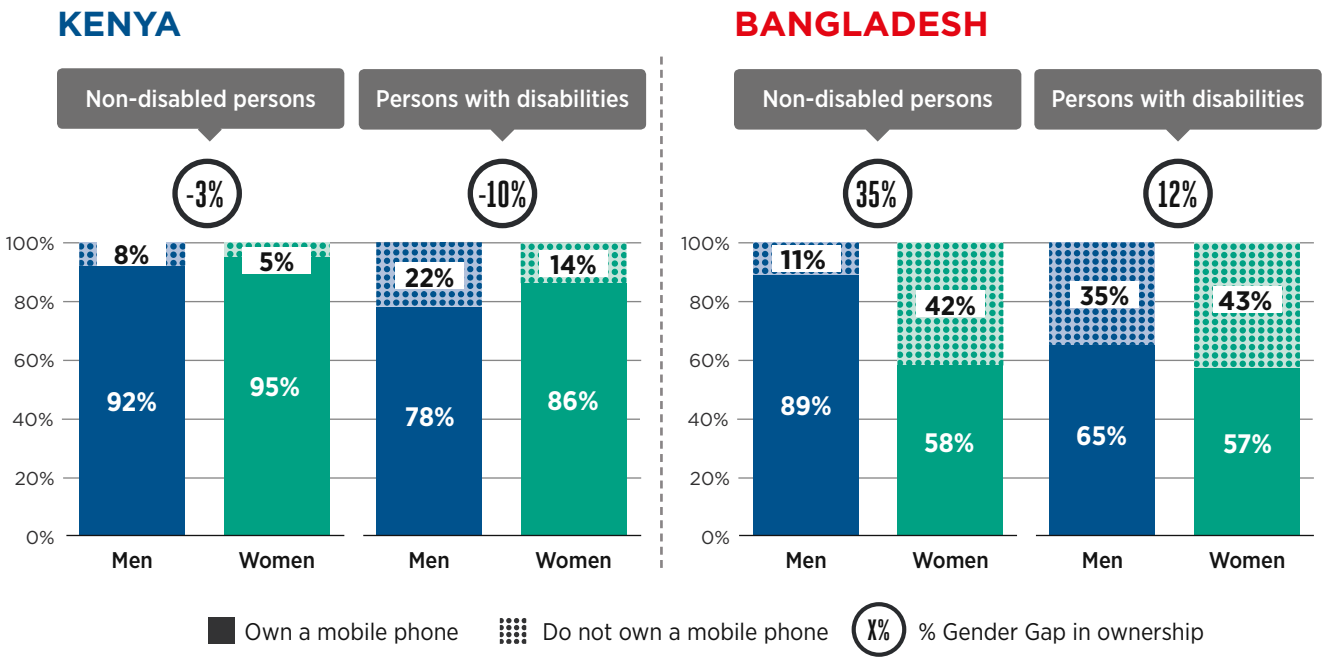
In **Bangladesh**, similarly to inclusion and participation in society, the **most determining factor to owning a mobile phone is gender**. Non-disabled women and women with disabilities have similar mobile phone ownership levels, which are much lower than their male counterparts who own mobile phones.

In **Kenya**, conversely, where there is very limited gender gap among non-disabled persons,[66] the **most discriminating factor** when it comes to owning a mobile phone is **disability**. The positive gender gap in mobile phone ownership among persons with disabilities can be explained by the relative empowerment and independence of Kenyan women with disabilities. As most of them are single, divorced, separated, or widowed, they often have decision-making power and financial independence, two factors which positively impact mobile phone ownership.

Figure 21

Characteristics of mobile phone ownership by men and women with and without disabilities

% total population, by country, gender and disability reported



Base: mobile owners and non-owners aged 18+
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Mobile ownership is defined as having sole or main use of a mobile phone, and uses it at least once a month, whenever needed and without additional cost other than use of mobile services.
The gender gap refers to how much women are less likely to own a mobile phone than men.
n = 369 to 447 for persons with disabilities and n = 93 to 96 for non-disabled persons in Kenya, n = 455 to 545 for persons with disabilities and n = 125 to 135 for non-disabled persons in Bangladesh

These findings are apparent when comparing the disability gap to the gender gap in mobile phone ownership (see Table 7).[67] In Kenya, the gender gap in mobile phone ownership stands at six per cent, whereas the disability gap is twice as big (12 per cent). In Bangladesh, however, the results are reversed as the gender gap is more than double (33 per cent[68]) the disability gap (13 per cent).

Table 7

Comparison of the mobile disability gap and the mobile gender gap in Kenya and Bangladesh

	Kenya	Bangladesh
DISABILITY GAP	12%	13%
GENDER GAP[1]	6%	33%

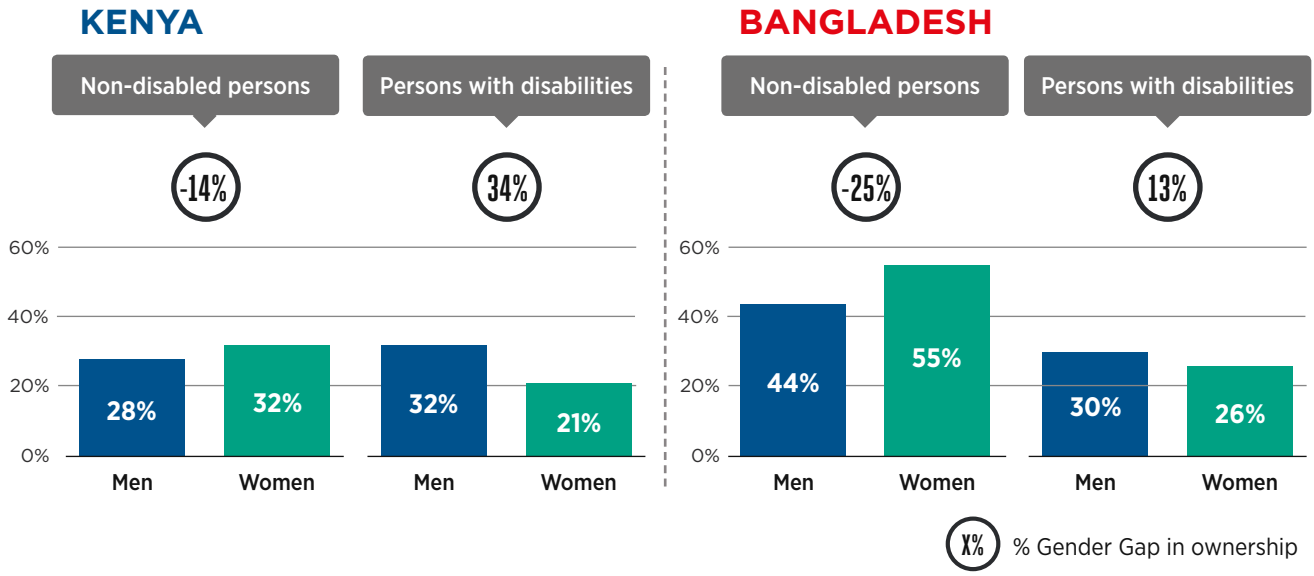
1. GSMA, The Mobile Gender Gap Report 2019 – https://www.gsma.com/mobilefordevelopment/wpcontent/uploads/2019/02/GSMA-The-Mobile-Gender-Gap-Report-2019.pdf

In Kenya, there is a gender gap when it comes to the type of mobile phone owned (see Figure 22). Twenty-one per cent of women with disabilities in Kenya own a smartphone versus 32 per cent of men with disabilities. This gap is not present among non-disabled persons, which could highlight the financial limitations of women with disabilities, even if they manage to buy a mobile phone. In Bangladesh, there is no such gap in smartphone ownership amongst non-disabled persons and the gender gap among persons with disabilities is smaller than in Kenya. The gender gap in mobile phone ownership is large in Bangladesh, and it is likely that the women who can own a phone are the most empowered or well-off, hence the relatively high levels of smartphone ownership among them.

Figure 22

Characteristics of smartphone ownership by men and women with and without disabilities

% mobile phone owners, by country, gender and disability reported



Base: mobile owners aged 18+ (excluding those who do not know).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Smartphone: internet access, large touchscreen display, comes with some apps already on phone, able to download additional apps from online app stores, advanced operating systems such as Android or Apple iOS.
Percentages indicate the proportion of respondents who answered 'What type of mobile phone do you own/ having access to in general? (only those who own a mobile phone)'. Respondents answered 'Smartphone'.
The gender gap refers to how much women are less likely to own a mobile phone than men.
n = 336 to 401 for persons with disabilities and n = 87 to 90 for non-disabled persons in Kenya, n = 193 to 336 for persons with disabilities and n = 98 to 119 for non-disabled persons in Bangladesh

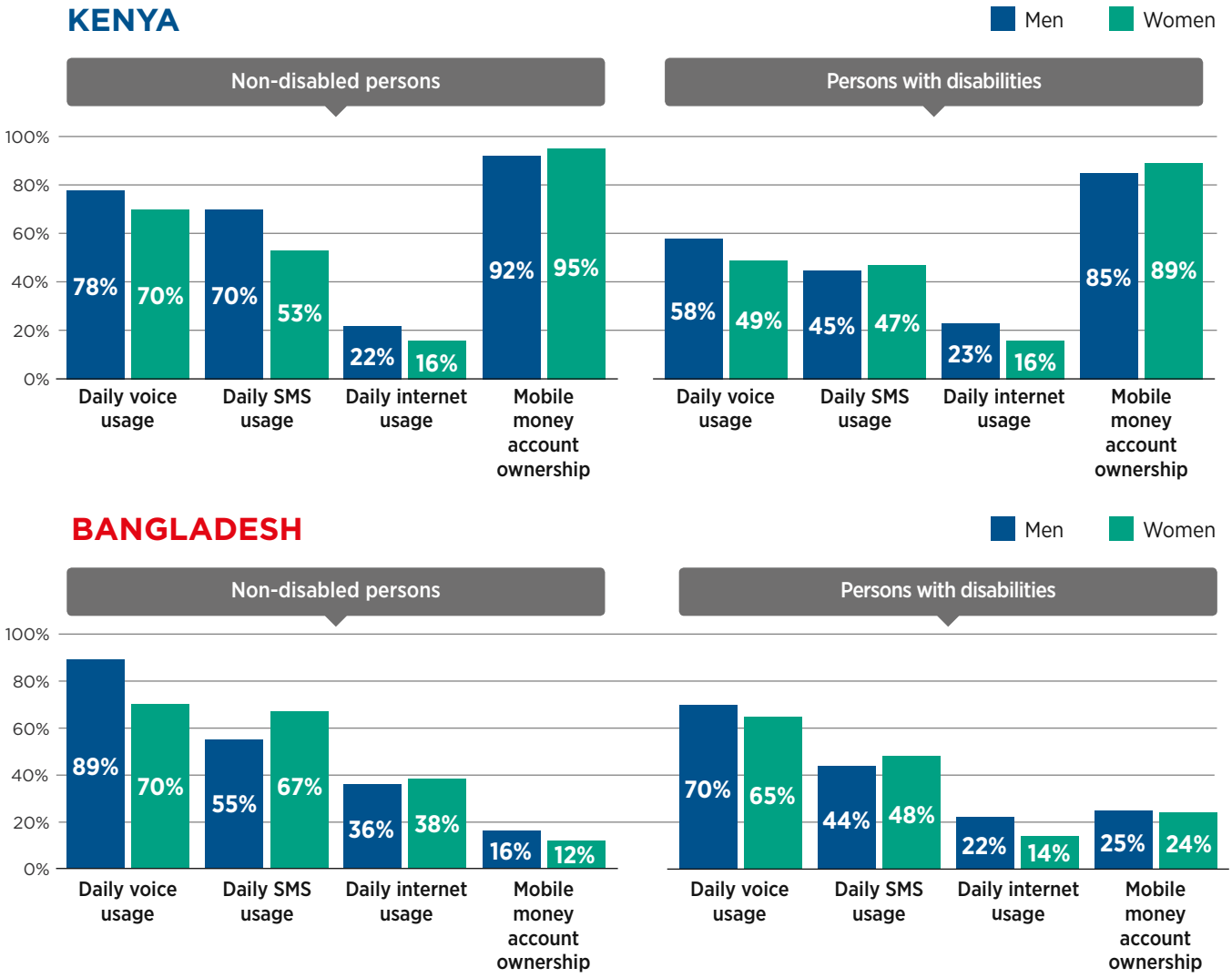
Women with disabilities who own a mobile phone have usage levels on par with men with disabilities. In both countries, the usage gap is more linked to disability than to gender

There is a very limited gender gap in mobile phone usage among persons with disabilities. In both countries, proportions are very similar for men with disabilities and women with disabilities who use voice, SMS, or mobile internet daily, and own a registered mobile money account. For usage, disability is much more determining than gender in both countries.

Figure 23

Usage of mobile services by men and women with and without disabilities

% mobile users, by country, gender and disability reported



Base: mobile users aged 18+ (excluding those who do not know).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Percentages indicate the proportion of respondents who answered 'How often do you ... ? For voice, SMS and mobile Internet usage; Do you personally have a mobile money account?'.
n = 356 to 437 for persons with disabilities and n = 92 to 93 for non-disabled persons in Kenya, n = 311 to 404 for persons with disabilities and n = 123 to 125 for non-disabled persons in Bangladesh

The intersection of gender and disability is complex but widely acknowledged. Women with disabilities face double discrimination due to their gender and their disability.[69] In terms of the mobile disability gap, the determinant role of gender and the role of disability differs from country to country. In Bangladesh, where there is a large mobile gender gap, gender plays a greater role as a determinant of mobile phone ownership, contrary to Kenya where the gender gap is almost inexistent and disability plays a greater role in the mobile disability gap. However, disability is a greater determinant of mobile phone usage in both countries. This means that strategies to close the mobile disability gap should also target gender, but the gap for mobile phone usage could be narrowed by designing disability conscious products and services.

8 Mobile technology as an enabler of participation: Stories from users

Insights from this research demonstrate that owning or having access to a mobile phone and being able to make full use of mobile products and services greatly enhances the lives of persons with disabilities. **This section aims to provide additional insights on how mobile phones are bridging the gap and increasing accessibility in all aspects of the lives of persons with disabilities.** It also profiles some of the persons with disabilities who share their experiences using mobile phones.

Key findings

- Persons with disabilities value their mobile "very much" as it enables them to perform activities/tasks that they otherwise wouldn't be able to do. Between 23 per cent and 66 per cent of persons with disabilities—depending on the country and the type of activity—claim that they would not be able to do certain activities without their mobile phone.

- Persons with disabilities who have the most sophisticated devices get the most value out of their mobile. All, however, report that mobile has enhanced their life and brought value to them.

8.1 "Without mobile phones, we would be in darkness"

For persons with disabilities, mobile phones have great value as a communication tool and many claim that they could not live a day without it. **Mobile phones are their gateway to the world**, whereby they feel connected, their **barriers of communications are removed** (including for those with hearing or speaking impairments), and they participate in everyday activities that were not previously possible.

> ***"I really congratulate people who are innovative, who produce these mobile phones, since without these mobile phones I think we would have been in darkness."***
> Man, deaf, 66 y.o., rural, Kenya

> ***"I think mobile phones are very essential for people like us. It connects us to the whole world and helps us communicate easily."***
> Man, blind, 24 y.o., urban (but grew up in a rural area), Bangladesh

> ***"Mobile phone is like everything for me, it has helped me in every sphere of my life. When I don't have this mobile set in my hands I feel empty."*** Woman, deaf, 33 y.o., urban, Bangladesh

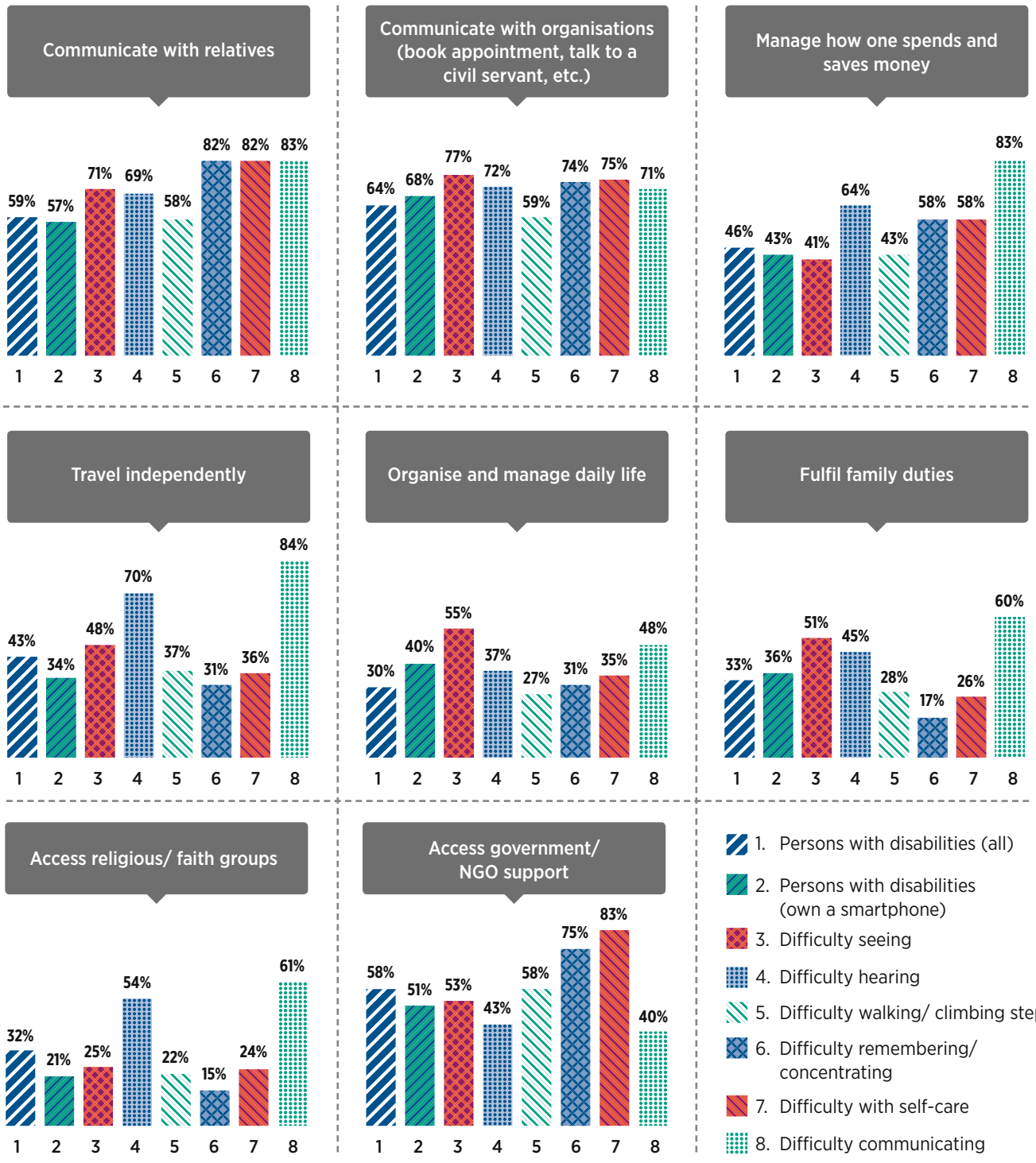
Being able to communicate with relatives and organisations that provide services were reported by many persons with disabilities as "could not do without a mobile phone" in both countries (59 per cent and 64 per cent respectively for Kenya and 66 per cent and 57 per cent respectively for Bangladesh). In Kenya, many also reported that lack of access to mobile phones would affect their access to support from the government or non-for-profit organisations (58 per cent), while in Bangladesh, many reported that without a mobile phone, their capacity to fulfil their family duties would be affected (50 per cent).

Figure 24

Activities reported by persons with disabilities in Kenya where mobile phones play an enabling role

% mobile users with disabilities, by disability reported

KENYA



Base: mobile users with disabilities age 18+ (excludes those who do not know and do not wish to answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Percentages indicate the proportion of respondents who answered 'I would now like to understand how dependent you are in your daily life. For the activites listed below, can you please tell me if you could do them or not if you did not have access to a mobile phone?'
n = 33 to 813

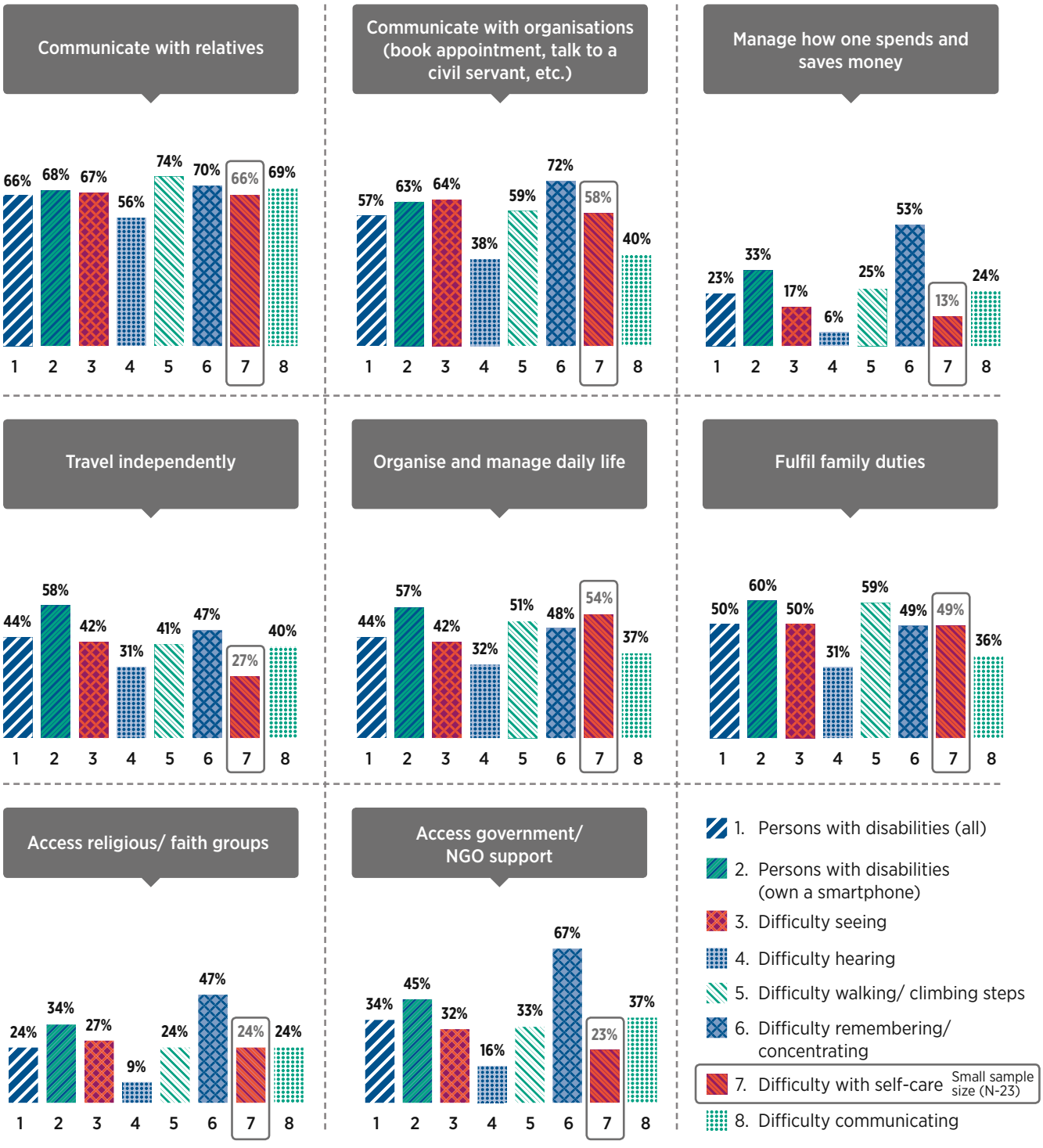
As show in Figure 25, in Kenya, of those who report that without access to a mobile phone they would not be able to manage their finances (46 per cent of all persons with disabilities), many of those with communication difficulties (64 per cent) and hearing difficulties (83 per cent) agree. From the 43 per cent of persons with disabilities who report being unable to travel independently without a mobile phone, 70 per cent of persons with difficulties communicating and 84 per cent of those with hearing difficulties agree. For some (32 per cent of all persons with disabilities), mobile phones also help them to access their faith groups, and 54 per cent of persons with difficulties communicating and 61 per cent of those with hearing difficulties report this to be the case.

Figure 25

Activities reported by persons with disabilities in Bangladesh where mobile phones play an enabling role

% of mobile users with disabilities, by disability reported

BANGLADESH



Base: mobile owners with disabilities age 18+ (excludes those who do not know or did not answer).
A person with disabilities is someone who reports or is identified as having acute difficulty ("a lot of difficulty") or a complete inability ("cannot do at all") to perform at least one or more of the functional domains of the Washington Group Questions.
Percentages indicate the proportion of respondents who answered 'I would now like to understand how dependent you are in your daily life. For the activites listed below, can you please tell me if you could do them or not if you did not have access to a mobile phone?'
n = 23 to 687

In Bangladesh, some people with disabilities report that without a mobile phone, they would not be able to manage their finances (23 per cent), access faith groups (24 per cent) or access support from government or non-for-profit organisations (34 per cent). From these respondents, those with difficulties remembering or concentrating report not being able to do these activities without a mobile phone (finances: 53 per cent, faith groups: 47 per cent and support from government and non-for profit organisations: 67 per cent).

These findings highlight the potential of mobile phone as ATs, as they play a tremendous role in helping persons with disabilities in their daily activities and to participate more in society. Depending on their profile, users experience mobile technology differently. Those who own the most sophisticated devices get the most value out of their mobile phone, but all report that these technologies have enhanced their life and brought value to them. The rest of this section highlights some of the stories shared by users and the role of mobile phones in their lives. While their stories are accurate, their names have been changed to protect their anonymity.

User stories: Salma*

Salma is 18 years old, lives with her husband in a rural slum area some hours' drive away from Dhaka, Bangladesh and has a speech impairment. She is financially dependent on her husband, who is a farmer, and her brother is her caregiver. She has problems communicating, as people do not understand her speech, so she relies on her brother to communicate with others. She went to primary school and knows how to read and write, but she does not know sign language.

Salma does not own a mobile phone but has use of her husband's and brother's mobile phones. She calls her brother and parents when needed, but she does not know how to use SMS. She knows how to top-up airtime but does not know how to use mobile money. Most of the time, she uses a mobile phone to listen to music or play games with her nephew.

Salma spends most of her time at home and lives an isolated life as she is not part of any disabled persons' organisation or support groups. She lacks means for communicating with others. If her family better understood the value that a mobile phone could bring to her life, she could potentially live more independently and break the isolation.

** Not their real name*

User stories: John*

John is 49 years old and lives in a small village in Kenya. John was in his early twenties when he was hit by a train while working on the rails in a tunnel without proper lighting. As a result of the accident, John lost his lower limbs and became physically impaired. He is now married and has three children.

Although it was difficult at the beginning, John decided to start his own business. He trained as a shoemaker and then became a cobbler. While working at the market, he was often a victim of robbery, finding his shop emptied overnight on a weekly basis.

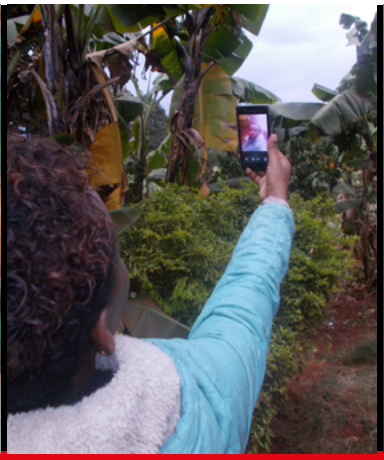
John decided to relocate to where he lives now, and is locally known as the best cobbler around. He has several customers and although some are not nice to him, he treats his customers well and provides a good service. He now also has a couple of people working with him.

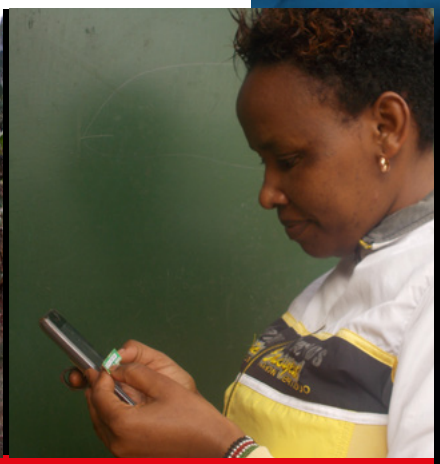
John owns his mobile phone and uses it for many purposes. John uses M-Pesa often to pay his bills, pay for his shopping and send money to others. He also uses M-Pesa to top-up his mobile phone, unless he does not have enough money in his account, in which case he uses a scratch card. He considers it a cheap and easy-to-use system. John also uses his mobile phone for entertainment, such as listening to music and taking pictures. For work, his mobile phone helps him to contact the people working with him and all his business correspondence is dependent on his mobile phone. His mobile phone also helps him contact a trusted boda driver when he needs transportation. He uses Google, Facebook, WhatsApp and is associated to different disabled persons' groups, one of which is a volleyball team for persons with physical impairment. He said: "Because of mobile, I am not isolated."

He had a very good mobile phone stolen last year and his current handset is not working properly. "Most of the time it gets hang, you cannot do much with this phone," he said, so he is now saving to buy a new mobile phone. His biggest challenge is the cost of mobile phones and data and, as he does not have electricity at home, the battery does not last long, which means he needs to travel to the market to recharge.

** Not their real name*

User stories: Anna*





Anna is 30 years old and lives in Nairobi. At the age of five, she fell ill and was sent to the hospital. Her parents could not afford her treatment and used traditional practices to cure her. She recovered but lost her hearing. Eight years ago, she married a man who also has a hearing impairment. Their hearing daughter communicates in sign language, which was the first language she learned. Anna is a tailor and lives with her family in a hilly part of the city.

Anna owns a smartphone that she bought herself, but she needs to have two SIM cards due to poor network connectivity and differences in the cost of services. Anna knows how to use different services. She tops up her phone using scratch cards, she has a registered M-Pesa account that she uses to receive and transfer money, and she also uses mobile internet for Facebook, WhatsApp and emails.

Her mobile phone helps her in many ways. As a tailor, she gets ideas and inspiration for her clients. She also communicates with most of her clients by SMS; they send her a design from a website, they agree on a price, she orders the materials and arranges a delivery date. Her mobile phone also helps her to arrange transportation, pay with M-Pesa, and arrange medical appointments.

Her major challenges are poor network connectivity and the price of mobile data. She relies on video to communicate with her family and friends using sign language but when the connectivity is poor, the video calls 'freeze' or she needs to go outside to get better signal, which limits her ability to use both hands to communicate in sign language.

** Not their real name*

The importance of user stories

Insights at the market level on mobile technology as an enabler of assistive technology are relevant for decision-making for multiple stakeholders including MNOs, service providers, DPOs and technology manufacturers. However, it is through the stories of users where the life-changing role of mobile phones for persons with disabilities emerges. These stories show how mobile phones have helped persons with disabilities to break barriers and isolation, and access empowering opportunities that they could not do before. Through future activities, the GSMA Assistive Tech programme will continue collecting user stories like the ones told by John, Salma and Anna and bring the voices and experiences of persons with disabilities using digital products to the spotlight

9 Opportunities for mobile operators

The previous sections of this report have provided insight on access and use of mobile phones by persons with disabilities. **Persons with disabilities represent an active and non-negligible segment of mobile customers**. While there are no significant differences in the usage of mobile services between persons with disabilities and non-disabled persons, some persons with disabilities have specific usage patterns and are even power-users of mobile services. **Targeting them and developing solutions that satisfy their needs represents a business opportunity for mobile operators**, not only by providing life-changing technologies for persons with disabilities, but also because by satisfying the needs of this group, they will benefit other users as well, such as the elderly who may develop an impairment with age. Furthermore, the gap in ownership also needs to be addressed not only because of the value that these technologies bring to persons with disabilities, as demonstrated in this research, but also because they can indeed be regular customers if appropriate products and services are provided. By creating business opportunities that serve persons with disabilities, it is estimated that a market worth $8 trillion could be tapped.[70] Serving this population is a **great opportunity for mobile operators to contribute to achieving Sustainable Development Goals**[71] and to **leaving no one behind** when it comes to access to mobile technology.

9.1 Market characteristics

Kenya

Although the national statistics provided by KBS indicate that 3.5 per cent of the total population in Kenya are persons with disabilities, this is considered to be underestimated due to participants underreporting their disability. Experts interviewed consider this proportion to be somewhere in the range of 10 to 15 per cent. This means that, as Kenya has a total population of 51.4 million people, the number of persons with disabilities in Kenya could vary from 1.8 million to somewhere between 5.1 and 7.7 million. Assuming that the latter is true, as it is closer to the global estimate of 15 per cent, this means that there are between 1.3 and 1.9 million people with visual impairment (0.99 to 1.44 million adults), 3.2 to 4.8 million people with speech or hearing impairment or deaf (1.63 to 2.45 million are adults), and 2.6 to 3.7 million with other types of impairment (1.87 to 2.66 million adults).[72] These estimates allow us to make some assumptions about the potential characteristics of the market in Kenya (see Figure 27).

While 82 per cent of persons with visual impairment own a mobile phone, only 14 per cent own a smartphone and 86 per cent own a feature or a basic mobile phone. **Interestingly, visually impaired and blind persons who own a smartphone are voice and mobile internet power-users.** These users represent a core market of **110,000 to 170,000 persons** in Kenya. Eighty-eight per cent of those with **hearing and speaking impairments and deaf own a mobile phone, of which 59 per cent are smartphone owners. These users are SMS and mobile internet power-users,** representing a core market of **1.43 to 2.16 million people.**

Furthermore, while the number above indicates potential active customers, **there is a proportion of persons with disabilities who are not mobile phone owners or who own a basic or a feature phone**, including persons with visual impairment or blind (18 and 71 per cent, respectively), hearing or speech impairment and deaf (12 and 36 per cent, respectively), and other types of impairment (26 and 65 per cent, respectively) **who could potentially become smartphone owners with appropriate handsets and services offered**.

Figure 26

Market size estimations for persons with disabilities in Kenya

43.7 to 46.3m non-disabled persons	5.1 to 7.7m persons with disability in Kenya			
	1.3 to 1.9m VI and blind [1]		3.2 to 4.8m HI/SI and deaf [1]	2.6 to 3.7m other
25.8 to 27.3m adults	*0.99 to 1.44m adults*		*1.63 to 2.45m adults*	*1.87 to 2.66m adults*
93% own a mobile [2]	82% own a mobile [2]		88% own a mobile [2]	74% own a mobile [2]
30% smartphone	14% smartphone	86% basic/feature phone	59% smartphone	12% smartphone
76% daily voice usage	82% daily voice usage ★	71% daily voice usage	4% daily voice usage	72% daily voice usage
63% daily SMS usage	62% daily SMS usage	26% daily SMS usage	75% daily SMS usage	35% daily SMS usage
19% daily internet usage	69% daily internet usage ★	8% daily internet usage	46% daily internet usage	12% daily internet usage
95% MM account owner	96% MM account owner	84% MM account owner	97% MM account owner	94% MM account owner
Market size: 24.0 to 25.4m	**Market size: 0.11 to 0.17m**	**Market size: 0.70 to 1.02m**	**Market size: 1.43 to 2.16m**	**Market size: 1.38 to 1.97m**

★ Power-users

Sources: Based on survey respondents that are mobile phone owners age 18+. ; number of adults with disability: estimates based Kenya Bureau of Stastitics data; number of adults non-disabled persons: based on UNICEF below 18 y.o. population data; mobile ownership and usage data: survey

Notes: 1. VI: Visually Impaired; HI: Hearing Impaired; SI: Speaking Impaired

2. Data presented here is for mobile phone owners. It slightly differs from data presented in other sections of the report which are for those who access a mobile phone.

Bangladesh

In Bangladesh, estimates of the prevalence of disability also vary (see Figure 28). While national statistics by BBS indicate a disability prevalence of 1.4 per cent, local stakeholders estimate this percentage to be between 10 and 15 per cent and in line with global estimates. If we consider the latter estimate, there are between 16.1 to 24.2 million people in Bangladesh with some form of disability. When looking at the population by type of impairment, there are between 3.2 to 4.8 million people with visual impairment (2.72 to 4.08 million adults), while there are 3.7 to 5.6 million people with a speech or hearing impairment or deaf (2.22 to 3.36 million are adults), and 9.2 to 13.8 million with other types of impairment (5.7 to 8.56 million adults).[73] Following the analysis from Kenya, assumptions could be drafted with these numbers.

From the **70 per cent of visually impaired and blind individuals who own a mobile phone, 17 per cent are smartphone owners.** These users are SMS, mobile internet and mobile money power-users and represent a core market of **320,000 to 490,000 persons** in Bangladesh. Ownership of mobile phones among the hard of hearing and deaf is low, with only 38 per cent owning a mobile phone. From this group, 49 per cent are smartphone owners and they

are **mobile internet** and **mobile money** power-users, representing a core market of **0.84 to 1.28 million people. Other segments of persons with disabilities,** such as visually impaired and blind persons who own basic or feature phones, and other types of disability, are also **mobile money power-users** and represent a core market of **5.11 million to 7.68 million users.**

The proportion of persons with disabilities who do not own a mobile phone is higher in Bangladesh than in Kenya. In this regard, there is an **untapped market to target**. Similar to Kenya, with the provision of the suitable products and services, of those who do not own a mobile phone or who own a basic or feature phone, persons with visual impairment or blind (30 per cent not owners, 58 own basic or feature phone), hearing or speech impairment and deaf (62 and 19 per cent, respectively), and other types of impairment (38 and 48 per cent, respectively) could potentially become smartphone owners.

Figure 27

Market size estimations for persons with disabilities in Bangladesh

137.2 to 145.3m non-disabled persons	16.1 to 24.2m persons with disability in Bangladesh			
	3.2 to 4.8m VI and blind[1]		3.7 to 5.6m HI/SI and deaf[1]	9.2 to 13.8m other
92.5 to 97.9m adults	*2.72 to 4.08m adults*		*2.22 to 3.36m adults*	*5.70 to 8.56m adults*
71% own a mobile[2]	70% own a mobile[2]		38% own a mobile[2]	62% own a mobile[2]
49% smartphone	17% smartphone	83% basic/ feature phone	49% smartphone	20% smartphone
94% daily voice usage	95% daily voice usage	94% daily voice usage	61% daily voice usage	86% daily voice usage
69% daily SMS usage	74% daily SMS usage ★	55% daily SMS usage	68% daily SMS usage	56% daily SMS usage
44% daily internet usage	66% daily internet usage ★	0% daily internet usage	60% daily internet usage ★	17% daily internet usage
16% MM account owner	62% MM account owner ★	32% MM account owner ★	38% MM account owner ★	25% MM account owner ★
Market size: 65.7 to 69.5m	**Market size: 0.32 to 0.49m**	**Market size: 1.58 to 2.37m**	**Market size: 0.84 to 1.28m**	**Market size: 3.53 to 5.31m**

★ Power-users

Sources: Based on survey respondents that are mobile phone owners age 18+; number of adults with disability: estimates based Kenya Bureau of Stastitics data; number of adults non-disabled persons: based on UN Population Fund population data; mobile ownership and usage data: survey

Notes: 1. VI: Visually Impaired; HI: Hearing Impaired; SI: Speaking Impaired

2. Data presented here is for mobile phone owners only. It slightly differs from data presented in other sections of the report which are for those who access a mobile phone.

9.2 Opportunities for operators

Mobile operators have introduced several initiatives to better serve customers with disabilities.[74] This is a good step towards a **more inclusive mobile industry**, while **creating new commercial opportunities** for MNOs.

Developing customised offers to meet the specific needs of persons with disabilities has proven successful in attracting new customers. Hard of hearing and deaf persons, for instance, highly value SMS, video messages and mobile internet packages (including special offers for video calling apps). For example, Grameenphone, a mobile operator in Bangladesh, launched an offer with attractive prices for video text messages. Although the offer did not specifically target the hard of hearing and deaf, it was relevant for these users and attracted many as customers.

> ***"The main problem of the deaf people is communication, so they should think about us also and give many text related offers. They could also lessen the charges for mobile data and SMS, because deaf people use mobile data and text related services more. But mostly the companies give emphasis to the call rates."*** Woman, hard of hearing, 26 y.o., urban, Bangladesh

> ***"There's an offer of sending video text messages of 20 seconds, that Grameen had given. That's why I started using a Grameen SIM. Then almost every deaf person started using Grameen[phone]. If they had given more offers like this then it would have been helpful for us."*** Woman, deaf, 33 y.o., urban, Bangladesh

> ***"There was an operator who had a special SMS offer and because of that I bought that SIM card."*** Woman, hard of hearing, 26 y.o., urban, Bangladesh

Creating specific offers for persons with disabilities is another option. In most countries, governments try to register persons with disabilities. MNOs could consider offering specific price reductions to persons with disabilities when registering their new SIM. By doing so, MNOs would improve their image among persons with disabilities and gain new customers.

> ***"I think they should offer cheaper call rates for students and disabled people."*** Man, cerebral palsy, 24 y.o., urban, Bangladesh

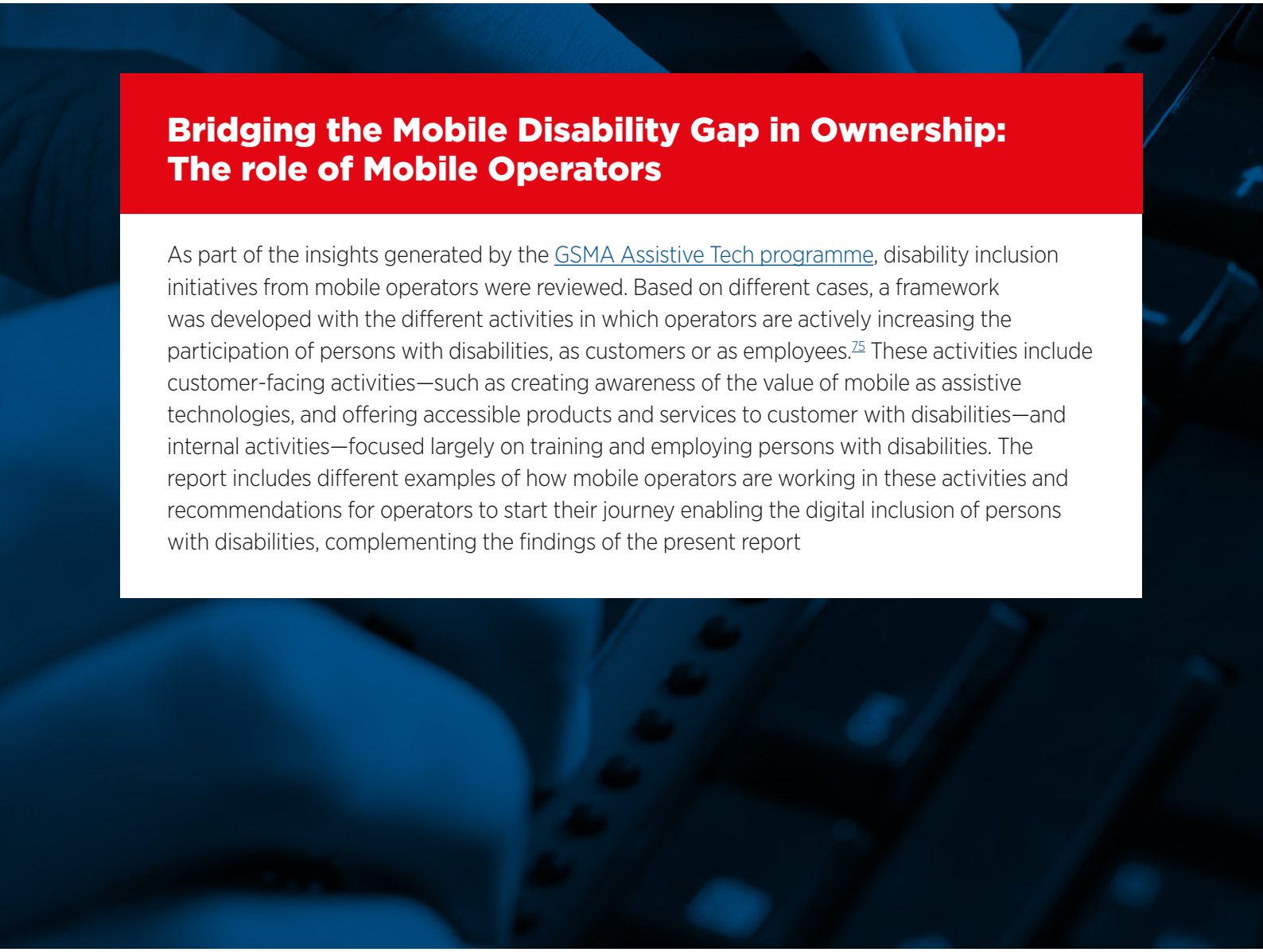
> ***"Grameenphone charges a lot of money, they should lower the call rates for people who're disabled."*** Man, difficulty communicating and physically impaired (paralysed legs), 40 y.o., urban, Bangladesh

Conducting disability audits on existing products and services as well as new product launches is also key to ensure they are accessible to all. Technologies already exist to render mobile-enabled products and services accessible to all, but MNOs often lack awareness of the specific challenges faced by persons with disabilities when using a mobile phone to design their services accordingly. This results in challenges for persons with disabilities when using such services. Voice or audible notifications, enabled by IVR, to check airtime or mobile money balance, for instance, is a technology that mobile operators already have, but is not implemented for all services. Safaricom in Kenya had audio notifications for airtime balance, but not for mobile money balance, which was problematic for the visually impaired and blind. After conducting focus group discussions with persons with disabilities, they were able to identify this issue and included IVR notifications to check mobile

money balances, thereby facilitating mobile money usage for the visually impaired and blind. Ensuring persons with disabilities are part of product/service design is a good way to ensure services are accessible to all, thereby increasing their usage.

> ***"I would advise [mobile operators] to appoint people with disabilities so that they can help them to know how the persons with disability's world works and they can create inclusive services for them."*** Woman, deaf, 26 y.o., urban, Kenya

Becoming more inclusive of persons with disabilities is therefore not only a moral duty for MNOs, but also **represents a commercial opportunity to attract new customers and increase the usage of existing customers by improving the accessibility of mobile-enabled services**.



Bridging the Mobile Disability Gap in Ownership: The role of Mobile Operators

As part of the insights generated by the GSMA Assistive Tech programme, disability inclusion initiatives from mobile operators were reviewed. Based on different cases, a framework was developed with the different activities in which operators are actively increasing the participation of persons with disabilities, as customers or as employees.[75] These activities include customer-facing activities—such as creating awareness of the value of mobile as assistive technologies, and offering accessible products and services to customer with disabilities—and internal activities—focused largely on training and employing persons with disabilities. The report includes different examples of how mobile operators are working in these activities and recommendations for operators to start their journey enabling the digital inclusion of persons with disabilities, complementing the findings of the present report

10 Conclusions and recommendations

This report has presented insights on the mobile disability gap in Kenya and in Bangladesh, the role of technology in the lives of persons with disabilities, and some of the barriers they face throughout their customer journey.

The level of mobile phone ownership among persons with disabilities is high and their use mobile-enabled services is similar to that of non-disabled persons. In fact, power-users were identified when looking at the usage of services by specific segments of disability. In Kenya, persons with disabilities who own a smartphone reported higher usage of mobile internet than non-disabled persons. The complex intersection of gender and disability remains a determinant of access, ownership and use of mobile phones by persons with disabilities.

Mobile phones play a life-changing role for many persons with disabilities, who report that mobile phones help them to **increase their independence, break some social barriers and isolation, and stimulate their participation** in many areas of education, employment and social life. Many respondents in this research report that without mobile phones, they would not be connected with their relatives, their support groups or communities, or even receive support from the government or DPOs. Regardless of these benefits, **persons with disabilities face barriers at all stages of the customer journey of mobile phone access, ownership and usage (see Figure 28).**

Figure 28

Insights and barriers to access, ownership and usage of mobile phones along the customer journey

STAGES OF THE CUSTOMER JOURNEY

1 Awareness	2 Accessing a mobile phone	3 Owning a mobile phone	4 Use of mobile phones and mobile-enabled services
KEY BARRIERS			
• Persons with disabilities perceive the value of mobile phones as a communication tool. Their caregivers and gatekeepers do not have the same perception. • Mobile phones are not perceived as ATs by either persons with disabilities or their caregivers. Their awareness of relevant products and services is also low.	• While access to mobile phones by persons with disabilities is high, they face restrictive use when borrowing from someone. • For those who borrow a mobile phone, the cost of services may be a barrier to use.	• Persons with disabilities have high levels of mobile phone ownership, but the majority own a basic or a feature phone, limiting the value that these devices can give. • Most of those who own a mobile phone have a device that was gifted to them or that required a great effort to save up for its purchase. • The most accessible devices are still unaffordable to most persons with disabilities.	• Handset use can be challenging depending on the functional limitations of persons with disabilities. • The cost of using mobile services can be prohibitive to some persons with disabilities. • Many mobile and basic services have not been designed for disability inclusion. • Accessories and software exist, that could allow persons with disabilities to make full use of mobile phones. Many persons with disabilities are unaware of these tools or, if aware, they often represent an additional cost and require digital skills that not everyone has.

Awareness of the value of mobile phones and their potential to act as an AT is a fundamental step to drive greater access and ownership by persons with disabilities. Yet while mobile phones are perceived as effective communication tools, persons with disabilities and their caregivers and gatekeepers often do not see their value as ATs. In general, persons with disabilities and their caregivers lack knowledge of existing products and solutions relevant for persons with disabilities.

Although persons with disabilities have high access levels in both countries, **they are often restricted in their use of these devices because their mobile lenders do not perceive the value of mobile phones for persons with disabilities.** Furthermore, borrowing a mobile phone can result in higher costs for persons with disabilities, as they need to pay for the services used and do not get their remaining balance back.

Lack of digital skills and device affordability are key ownership barriers among persons with disabilities. The majority of persons with disabilities own either a basic or feature phone which, most of the time, has been either gifted to them or purchased after extensive efforts to save money. The most accessible mobile phones tend to be the most expensive smartphones, which are unaffordable to most persons with disabilities.

When using mobile phones and mobile-enabled services, the lack of digital skills, affordability and poor design of services are reported barriers. The design of handsets is often not inclusive enough for persons with disabilities and, due to their functional limitations, persons with disabilities cannot make full use of their mobile phones. While accessories and software exist to make devices more accessible, many persons with disabilities receive no training on how to use their device and, even when available on their phones, these accessibility features tend to be underutilised. These accessibility features may also come at an additional cost which can be unaffordable to many.

Recommendations

Awareness, affordability, digital skills, and their own perception of the limitations of their disability are barriers to access, own and use of mobile phones by persons with disabilities. The provision of suitable products and services for persons with disabilities should be conscious of how these factors affect every stage of the customer journey. Based on the findings of this research, the GSMA proposes the following recommendations for different stakeholder groups to help address the mobile disability gap and drive the potential of mobile phones as ATs for the greater inclusion of persons with disabilities.

Recommendations for stakeholders

Table 8

Recommendations for closing the mobile disability gap, by type of stakeholder and type of barriers addressed

Barriers to address		
Awareness and availability of suitable products and services	Mobile operators	**Identify customers with disabilities to be able to better serve them**, by offering accessible handsets and tailored packages that suit their needs. **Design products and services that promote inclusivity and accessibility to all** i.e. user-centred design focused on customers with disabilities could help to make products and services inclusive. Gender should also be considered in markets with large mobile gender gaps. **Provide accessible information about handsets and services to users with disabilities and their caregivers**. Print brochures (including in Braille), use videos with sign language interpretation and captions, and share information to persons with disabilities in different formats (in shops, digital, etc.). **Make communications about mobile services, including customer support, in accessible formats** including **texts** (SMS, WhatsApp or online chat), **video calls** (for the hard of hearing and deaf) or **voice calls/IVR** (for the visually impaired and blind). Provide screen readable company websites. **Train agents and staff at the shop-level on how to provide services and support to customers with disabilities**, as they might require specific instructions depending on their disability. **Build inclusive store designs** (access ramp/lift, non-slippery floor material, etc.).
	Other technology companies (handset manufacturers, app developers, etc.)	**Design and offer digital solutions, including mobile phones, with characteristics suitable for different types of persons with disabilities** (i.e. basic mobile phones with large screens and fonts for the visually impaired, small smartphones that are easy to manipulate for persons with short stature, solid/resistant, robust smartphone screens, etc.) **Customise accessibility features to make them available in relevant local languages**.
	Governments, policymakers and regulators	**Develop and implement accessibility policies that provide access to digital products** and services by persons with disabilities to enable their full participation in society, as well as regional cooperation around harmonisation of policies, strategies, laws and programmes. **Support initiatives aiming at developing digital innovations for persons with disabilities**, such as grants or acceleration programmes for start-ups and innovators, which can be driven and provided by the local digital ecosystem. **Provide accessible information about digital solutions for persons with disabilities and their caregivers that could facilitate their participation in society, and support available for persons with disabilities to maximise the potential of these technologies**. Print brochures (including in Braille), use videos with sign language interpretation and captions, and share information to persons with disabilities in different formats. Provide screen readable websites.
	Disabled persons' organisations/ NGOs / development community	**Organise digital skills training and raise awareness on the value of mobile technology for persons with disabilities.** **Provide accessible information about existing digital products for persons with disabilities and their caregivers that could facilitate their participation in society**. Print brochures (including in Braille), use videos with sign language interpretation and captions, and share information to persons with disabilities in different formats. Provide screen readable websites.

Table 8

Recommendations for closing the mobile disability gap, by type of stakeholder and type of barriers addressed, continued

Barriers to address		
Affordability of products and services for persons with disabilities	Mobile operators	**Introduce and market affordable products and services** that meet the specific needs of persons with different types of disability.
	Other technology companies (handset manufacturers, app developers, etc.)	Design **affordable smartphones with in-built screen-readers.** **Engage and develop partnerships with mobile operators or governments** to ensure affordable means for supplying mobile products for persons with disabilities.
	Governments, policymakers and regulators	**Provide or subsidise digital products and services suitable for persons with disabilities.** **Include accessible handsets and software in the national procurement list of assistive technologies for persons with disabilities.** **Review sector-specific taxes that may exacerbate the cost barrier to mobile ownership and use for persons with disabilities**
	Disabled persons' organisations/ NGOs / development community	**Finance programmes whereby mobile phones are donated to persons with disabilities as assistive technologies.**
Literacy and skills for maximising the potential of mobile as an assistive technology	Mobile operators	Give customers the option to **choose their preferred language and means of communication,** where possible. Organise **digital skills training for persons with disabilities** on how to use accessibility features, gadgets and software that could facilitate the use of mobile phones by persons with disabilities.
	Other technology companies (handset manufacturers, app developers, etc.)	Give customers the option to choose their preferred language. Use easy to understand **language that is comprehensible by all** and suitable for local communication needs. Design solutions for ease of use.
	Governments, policymakers and regulators	**Include training on digital skills for adults and young people with disabilities,** including on the use of mobile phones and accessibility features as assistive technologies. Ensure online government services are developed considering the needs and capabilities of persons with disabilities.
	Disabled persons' organisations/ NGOs / development community	Organise **training for persons with disabilities** and for their caregivers on the benefits of mobile technology as an AT and on how to use accessibility features, notably screen-readers, voice command, etc.
Relevance for customers with disabilities	Mobile operators	**Identify the needs of customers with disabilities**, and design specific products and services for different disability segments. For instance, for the **hard of hearing and deaf** notably, develop offers with **SMS**, short **video messages**, or mobile **internet packages** (including special offers for video calling apps). **Offer opt-in customer support that can redirect customers with disabilities to appropriate call centres** (i.e. agents trained to interact with the blind, sign language interpreters, etc.)
	Other technology companies (handset manufacturers, app developers, etc.)	For app developers, **leverage existing research to identify the gaps for persons with disabilities when accessing services** (i.e. app with reminders to take medicine for those with difficulty remembering, sign language emojis for the deaf, etc.). **Consider the needs of users with disabilities when designing solutions.**
	Governments, policymakers and regulators	**Support investment in the digital and mobile ecosystem to drive innovations for persons with disabilities** and develop specific products/services relevant to this specific customer segment.
	Disabled persons' organisations/ NGOs / development community	Engage with mobile operators and with the digital and innovation ecosystem to facilitate research and identify gaps that mobile and digital technology could solve. **Organise awareness campaigns on the value of mobile technology for persons with disabilities.**

Annex 1

Detailed methodology

Quantitative research

In each country (Kenya and Bangladesh), **quantitative data** was collected:

- **Sample size:** **1,005 interviews (Kenya)** and **1,055 interviews (Bangladesh)** including a **minimum of 800 interviews with persons with disabilities and 200 interviews with non-disabled persons** in each country as a control group.

- **Quotas:** to ensure the **representativity of the sample** and enable the team to **conduct analysis on relevant populations,** quotas were set for data collection. These quotas were set on: **type of disability** (visually impaired and blind, hard of hearing and deaf, physically impaired, other types of disability), **gender, environment** (urban/rural), **age** and **income level**.[76]

- **Target population:** Only **adults** (with and without disability), **above 18 y.o.** were interviewed for this research. Adults with **all types of disability** were eligible to participate in this research, although, for ethical reasons, they were required to be able to **give informed consent** to participate in the research. This **excluded adults with severe intellectual disability from the research**.

- **Mobilisation of the respondents:** In Kenya, the team **partnered with 14 DPOs** to organise interviews with persons with disabilities in various central locations. The research team also **visited places where persons with disabilities gather** (masses for the deaf, disability sport events, etc.). In Bangladesh, the team **partnered with an organisation working with more than 350 DPOs in the country,** which helped organise interviews with persons with disabilities thanks to its network of partner organisations. In each country, interviews with non-disabled persons were conducted in different locations to interviews with persons with disabilities.

- **Interview locations:** In Kenya, urban interviews were conducted in **Nairobi**, while rural interviews were conducted in the **rural parts of Machakos county** (70 kilometres south east of Nairobi). In Bangladesh, urban interviews were conducted in **Dhaka** and **Chittagong**, while rural interviews were conducted in **rural areas within 20 to 50 kilometres of Dhaka and Chittagong** (upazilas[77] of Savar, Anwara, etc.).

- **Interview duration and content:** Interviews lasted on average **20 minutes**. The **interview duration greatly varied from one respondent to another**.

Interviews conducted with the help of a sign language interpreter or interviews with persons with speech impairment, mild intellectual disability, etc. took significantly more time, for instance. The questionnaire had **six sections:** disability assessment based on the Washington Group short-set of questions,[78] mobile phone access and ownership, mobile phone usage (voice, SMS, mobile internet and mobile money), access to basic services and participation in society, mobile phone and usage difficulties, and socio-demographics.

- **Administration of the questionnaire:** Where possible, the **questionnaire was asked directly to the respondent**. Hard of hearing and deaf respondents were generally interviewed with the help of **a sign language interpreter**. Respondents who had difficulty communicating (speech impairment, mild intellectual disability, hard of hearing or deaf with a limited knowledge of sign language, etc.) were interviewed with the **help of a caregiver.**

- **Weighting of the databases:** To enable the research team to draw conclusions at the national level, both **databases were post-weighted**. Weighting criteria in **Kenya** included **gender, environment, education level**[79] and **type of disability** (for respondents with disabilities). The weights were computed using data from the Kenya 2009 Population & Housing Census, which included a specific section on disability.[80] In Bangladesh, weighting criteria included **gender, environment, type of house** and **type of disability** (for respondents with disabilities). The weights were computed using data from the Bangladesh 2011 Census, which included a specific section on disability.[81]

- **Assessment of disability: Disability** is a **complex concept. Different approaches** (medical, functional, participation, etc.) can be used **to define and assess** whether a person is has a disability or not.

This research used the **World Health Organization definition of disability:**

> ***"Disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations. Disability is thus not just a health problem. It is a complex phenomenon, reflecting the interaction between features of a person's body and features of the society in which he or she lives. Overcoming the difficulties faced by people with disabilities requires interventions to remove environmental and social barriers."***[82]

To **assess whether a person had a disability** and the type of disability, the research team used **two different methods:**

1. **DPO assessment:** A quick assessment of whether a person had a disability or not and of the type of disability, based on DPO staff experience. This was used to identify persons with disabilities and types of impairments **prior to the interview** to enable the research team to fulfil the quotas. Four main types of disability were used for the DPO assessment: visual impairment and blindness, hearing impairment and deafness, physical impairment (difficulty moving parts of one's body), and other types of disability (any other type of disability not included above such as

psycho-social disabilities, albinism, persons with short stature, etc.).

2. **Washington Group assessment:** The Washington Group short set of questions was designed to assess disability **based on one's perceived ability or inability doing certain activities/tasks**. Types of disability are therefore different compared to the DPO assessment and include: acute difficulty or complete inability seeing, hearing, remembering/concentrating, self-caring such as washing all over or dressing, and communicating. This assessment can only be completed **during the interview** by asking the respondent a specific set of questions. This assessment of disability is the result of a consensus between statistical offices of the different UN Member States, and National Statistical Offices are increasingly using it when collecting data on disability.

The **DPO assessment** was therefore used **prior to the interviews** to identify respondents with disability and ensure a good sample representativity, while the **Washington Group assessment** was used **during the interview** and **for the data analysis** to align with international standards on statistics on disability.

In this report:

- **All survey data presented uses the Washington Group assessment of disability.** However, for the few instances where persons with disabilities—identified as such by the DPOs—did not report any difficulty or inability (as per the Washington Group Questions), they have still been categorised as having a disability. Indeed, the Washington Group short set of questions has some limitations, notably when it comes to identifying people with psycho-social disabilities (frequently underreported by respondents who are ashamed of their disability).

- **Comparisons by type of disability**, as per the Washington Group, **oppose those able to do the activity and those not able to do it or only with acute difficulty**. For instance, data will be shown for those who have a lot of difficulty or cannot see at all (disabled with visual impairment or blindness, as per the Washington Group assessment), and those who do not have any—or only limited—difficulty seeing (this includes all non-disabled persons, but also persons with disabilities other than visual impairment).

Qualitative in-depth interviews with persons with disabilities

In each country (Kenya and Bangladesh), **qualitative in-depth interviews** were also conducted with persons with disabilities:

- **Sample size:** 40 qualitative in-depth interviews in each country.

- **Quotas:** Quotas were set by **type of disability** (visually impaired and blind, hard of hearing and deaf, physically impaired, other types of disability), **gender, environment** (urban/rural), **age** and **income level**.[83] The team selected respondents with specific and varying profiles in order to collect insights on the different profiles of mobile phone users among persons with disabilities. The team therefore interviewed a mix of mobile phone owners, non-owners and borrowers; basic, feature, and smartphone owners; tech-savvy respondents using accessibility features/ respondents using basic mobile phones with no accessibility features, etc.

- **Interview duration and content:** Interview **duration greatly varied from one respondent to another**, from **45 minutes** for some respondents who did not own a mobile phone and had difficulty speaking, understanding the questions and concentrating on the interview, to **150 minutes** for some of the most tech-savvy respondents who were very keen to show the research team the accessibility gadgets they were using. Interviews were conducted following a semi-structured approach to leave some flexibility for the research team, depending on the profile and reactions of the interviewee. Topics discussed during the interview included: everyday activities, employment, education, access to other basic services, disability (origin, resulting limitations, 'strategies' to overcome it, perception of the society, etc.), acquisition of a mobile phone, airtime top-up, usage of mobile phones (voice, SMS, mobile internet and mobile money), impact of mobile phones on their lives, etc.

Target population, mobilisation of the respondents, interview locations, administration of the questionnaire and assessment of the disability were the same as for the quantitative research.

Limitations

Conducting research on persons with disabilities is difficult and has some limitations.

Identification of persons with disabilities for such large samples is a challenge and can only be done via DPOs or by visiting places where persons with disabilities gather (masses for the deaf, sports events, etc.). In low- and middle-income countries, very few DPOs operate in **deep rural areas** and very few events for persons with disabilities happen in these areas, as awareness of disability is very limited. As a result, it is difficult to include persons with disabilities from deep rural areas in the sample. In this research, we had quotas in rural areas (50 per cent) but these areas tended to be in a 100 kilometre radius from main cities (Nairobi, Dhaka, Chittagong) rather than in deep rural areas.

Categorisation of respondents as having a disability or not and definition of their type of disability is also a challenge. In this research, two complementing methodologies were used: Washington Group Questions and DPO assessment, but both have their limitations and tend to "exclude" persons with less obvious types of disability/mild disability.

Communication was also a major challenge. In most cases, it was mitigated by relying on interpreters or taking more time to conduct the interviews. However, in Bangladesh notably, the absence of a standardised sign language made it difficult to interview the hard of hearing and deaf as many do not have any means/language to communicate with others. As a result, the Bangladesh hard of hearing/deaf sample has a higher proportion of hard of hearing than deaf compared to Kenya, as the hard of hearing could be interviewed without the use of sign language (by talking louder and taking more time to administer the questionnaire).

Severe intellectually disabled persons could not be included in this research as, for ethical reasons, each participant had to give consent to participate in the research. This excludes from the research those born with a severe intellectual disability, but also persons with disabilities who were not born intellectually disabled but who, due to discrimination/social isolation, did not develop a language, and hence became intellectually disabled growing up (while not being intellectually disabled from birth).

Annex 2

List of key expert interviewees

To complement the quantitative and qualitative data collection and to provide the research team with contextual information, key expert interviews were conducted in each country (13 in each country). Experts interviewed included DPO staff, academics, government institutions, MNOs, telecommunications regulators, etc. These were:

In Kenya:

- Communications Authority of Kenya
- CDSK (Cheshire Disability Services Kenya)
- Eartrek
- FDWEK (Federation of Deaf Empowerment Women Kenya)
- Hope & Disability Network
- iLabs
- Kenya Union for the Blind
- KISE (Kenya Institute of Special Education)
- Ministry of Education
- NCPWD (National Council for Persons with Disabilities)
- NONDO (Northern Nomadic Disabled Persons Organisation)
- Safaricom
- Tuleane Afrika Initiative

In Bangladesh:

- Access to Information (A2i) in Bangladesh
- BERDO (Blind Education and Rehabilitation Development Organisation)
- B-SCAN (Bangladesh Society for the Change and Advocacy Nexus)
- CDD (Centre for Disability in Development)
- Ministry of Social Welfare
- Anthropology Department, Dhaka University
- SARPV (Social Assistance and Rehabilitation for the Physically Vulnerable)
- SWID (Society for the Welfare of the Intellectually Disabled)
- Robi
- Banglalink
- BRAC
- CSID (Centre for services and information on Disability)
- BBDN (Bangladesh Business and Disability Network (BBDN)
- Bangladesh Institute of ICT in Development (BIID)

Annex 3

Examples of benefits of mobile to access basic services

Type of service	Problem faced	Type of disability	How mobile can help?
Education	Autonomous academic research	Visually impaired and blind	Accessing the internet to complete some research autonomously to write academic works: *"I decided to have a phone like this one, with a high-quality TalkBack service, because I will be joining the campus soon and sometimes I will need to do research, so I will be using my phone instead of disturbing other people."* **Man, blind, 19 y.o., urban, Kenya**
	Follow lessons and take notes	Visually impaired and blind	Recording classes, re-listening to them and typing notes at their convenience (at desired speed or using special machines/technologies which cannot always be carried to school): *"I used my mobile phone with permission to record class lectures. And then I can write down my notes by hearing those records."* **Woman, blind, 21 y.o., urban, Bangladesh**
	Study autonomously	Visually impaired and blind	Downloading apps and searching the internet to learn by oneself: *"I am able to learn anything from Google. I downloaded an app which helps me learn French online, it's called "Breakfast Coffee French."* **Man, blind, 19 y.o., urban, Kenya** *"I saw my vocabulary and general knowledge increasing with the use of mobile phones."* **Man, blind, 24 y.o., urban (but grew up in a rural area), Bangladesh**
Health	Finding information	All	Using the internet to research symptoms online: *"Access to the internet is particularly important, especially when I'm trying to understand something about my condition. For example, when you want to gather some information and you cannot ask anyone because you don't want to look stupid or you are ashamed, then you look it up on the internet. It saves you from a lot of trouble."* **Man, depression, 24 y.o., urban, Kenya**
	Getting medical advice/ support remotely	All	Calling doctors to get medical advice: "Thanks to my phone, I can also call the doctor and know how I should take my medicines." Woman, severe headache causing temporary deafness and severe pain in the whole body, 55 y.o., urban, Bangladesh

Type of service	Problem faced	Type of disability	How mobile can help?
Health	Contact relatives during an emergency	Physically impaired	Informing family members and relatives in case of an emergency that requires transport to a health facility: *"I use the mobile phone for health-related services. Like, if I am not well, then I use to communicate to inform my husband or my brother to tell them to come here to me, as I need them to take me to the doctors."* **Woman, physically impaired, 39 y.o., urban, Bangladesh**
Employment	Finding customers (for self-employed)	All	Advertising for work on social networks: *"I am a model and I have to show people I'm alive. For instance, last week I participated in the Miss Ruai Contest. I like taking photos daily and posting them on social media [Instagram, Facebook and WhatsApp]. I also upload my professional pictures on Instagram. My life has been better since I own this mobile as it helps me get clients for photoshoots on Instagram."* **Woman, albinism, 23 y.o., urban, Kenya – working as a model**
	Finding suitable job opportunities	All	Looking for job offers that meet requirements on the internet: *"To gain access to networking opportunities, I use a mobile phone that is within reach. I use Glass Door, it's an app from Google Play Store and there is always a filter for the jobs I may be fit for. Later I get notifications in my email for the jobs that have been highlighted and I check them using my phone and if I can apply, I apply."* **Man, depression, 24 y.o., urban, Kenya**
	Receiving training to access higher qualifying jobs	All	Using the internet to find information and improve skills: *"I use Google when I want to know something. For example, if there is a shoe that I want to know its origin, or I want to know how it was made or I want to know how I can improve the durability of the shoe. Most of my research is about my work."* **Man, physically impaired, 21 y.o., rural, Kenya – working as a shoe-maker**
Transportation	Finding transportation	Physically impaired	Ordering private transport via apps: *"I don't use local public transports anymore. Uber is more convenient as I can fold my wheelchair and get in the car, but for the local transports, it's tough."* **Woman, physically impaired, 24 y.o., urban, Bangladesh**
Financial services	Physically accessing banks or ATMs to make transactions	Physically impaired and short stature	Using mobile banking to make financial transactions: *"Thanks to mobile banking it has made things a little easier because I can use my phone to access these services [making financial transactions]. I use the Eazzy banking app."* **Woman, asthmatic, high blood pressure and physically impaired, 70 y.o., urban, Kenya**
	Lack of confidentiality/ security when doing mobile transactions	All	Using mobile money for autonomous transactions from home: *"Regarding mobile money services, before I was sending someone with the cash and it was difficult to find someone that you can trust. But now I can make the transaction via my phone. Its private and confidential."* **Woman, physically disabled, 45 y.o., urban, Kenya**

Type of service	Problem faced	Type of disability	How mobile can help?
Financial services	Frequent victims of theft	Physically impaired, visually impaired, blind and persons with short stature, etc.	Transporting money securely: *"When I go for shopping, I prefer to pay with M-Pesa because sometimes what I want to buy costs a lot and if I withdraw it someone may steal from me but if it's in my phone no one will know about it."* **Man, physically impaired, 21 y.o., rural, Kenya**
Religion	Reading holy texts	Visually impaired and blind	Accessing soft copies and using in-built phone magnifiers or screen-readers to read holy texts: *"For my case, as long as I have a soft copy [of the Quran], I can read from my phone since all I have to do is maximise the font to my preferred size."* **Woman, visually impaired, 28 y.o., urban, Kenya** *"For the Bible I can use my phone to read is since it has TalkBack."* **Man, blind and diabetic, 57 y.o., rural, Kenya**
Persons with disabilities rights	Accessing information on disability	All	Using the internet to search and learn about rights: *"I use Google to look for information. For instance, I have downloaded the disability act."* **Woman, asthmatic, high blood pressure and physically impaired, 70 y.o., urban, Kenya**

Endnotes

1. WHO (2011). 'World Report on Disability'.
2. Disability is defined by the World Health Organization (2011) as "an umbrella term covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations."
3. *Ibid.*
4. World Bank (2019). Disability Inclusion. See: https://www.worldbank.org/en/topic/disability
5. Ingstad, B. & Eide, A. H. (2011). Disability and poverty: a global challenge.
6. *Ibid.*
7. *Ibid.*
8. WHO (2018). Assistive Technology. See: https://www.who.int/news-room/fact-sheets/detail/assistive-technology
9. *Ibid.*
10. GSMA (2019). 'The Mobile Economy'.
11. Raja, D. P. (2016). Bridging the disability divide through digital technologies. Background paper for the 2016 World Development Report: *Digital Dividents*.
12. GSMA (2018) Leveraging the Potential of Mobile for Persons with Disabilities: Scoping Study
13. GSMA (2018). Taking action to make mobile technologies and services accessible to Persons with Disabilities.
14. Global Disability Innovaiton hub. See: https://www.disabilityinnovation.com/
15. In Kenya, the team partnered with 14 DPOs (Disabled Persons Organisations) to organise interviews with persons with disabilities in various central locations. The research team also visited places where persons with disabilities gather (masses for the deaf, disability sports events, etc.). In Bangladesh, the team partnered with an organisation working with more than 350 DPOs in the country, which helped organise interviews with persons with disabilities thanks to its network of partner organisations. In each country, interviews with non-disabled persons were conducted in the different locations visited for interviews with persons with disabilities.
16. In both countries, proxies were used to estimate respondent income level: main type of flooring material in Kenya and type of house in Bangladesh.
17. Total surveys collected: 1,005 interviews (Kenya) and 1,055 interviews (Bangladesh).
18. The proxy initially chosen by the research team to evaluate respondents' income level in Kenya (main type of flooring material) did not prove satisfactory and the research team decided to use another and more relevant criteria for the weighting. Highest education level attained by the respondent proved to be the most satisfactory among the ones available in national-level statistics and was therefore selected as a weighting criterion.
19. Kenya National Bureau of Statistics (2012) Kenya 2009 Population & Housing Census, Analytical Report on Disability, Volume XIII, March 2012
20. Bangladesh Bureau of Statistics (2015) Disability in Bangladesh: Prevalence and Patterns, Population Monograph: Volume-5
21. The identification and assessment of the severity of disability can be challenging. The Washington Group is a United Nations Statistics Commission City Group working on statistics on persons with disabilities that developed different tools to identify and assess disability, including the short set of questions which was used for this research. This approach has been used by development and humanitarian organisations in their data collection efforts to successfully evaluate the number of persons with disabilities reached by a programmed or a service.
22. Type of disability: Bangladesh – physical 2, visual 2, speech 2, hearing 1, muscular dystrophy 1, Kenya – physical 3, visual 2, hearing/speech 2, cerebral palsy 1. Living environment: Bangladesh – 3 rural, 3 urban, 2 slum and in Kenya – 4 rural, 3 urban, 1 slum. Gender: Bangladesh – women (5) / men (3); Kenya - women (4) / men (4). Age: Bangladesh – 18-25 (3), 26-45 (3), 46+ (2); Kenya - 18-25 (1), 26-45 (4), 46+ (3).
23. World Bank (2019). Kenya. See: https://www.worldbank.org/en/country/kenya/overview
24. *Ibid.*
25. World Bank (2019). World Bank Open Data. See: https://data.worldbank.org
26. *Ibid.*
27. Interviewed key experts indicated that their perceived prevalence of disability, as per the WHO definition, was closer to 10-15 per cent of the total population.
28. World Health Organization (2011). World Report on Disability.
29. Kenya National Bureau of Statistics (2012) Kenya 2009 Population & Housing Census, Analytical Report on Disability, Volume XIII, March 2012
30. At time of drafting this report, a new national census is taking place in Kenya using the Washington Group Questions for the identification of persons with disabilities. This is expected to generate different results on disability prevalence to those referenced and used in the present research.

Endnotes

31. National Council for Persons with Disabilities (2003). Persons with Disabilities Act. See: http://ncpwd.go.ke/index.php/downloads/persons-with-disabilities-act
32. United Nations (2008). UN Convention on the Rights of Persons with Disabilities. See: https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html
33. WIPO (2016). The Marrakesh Treaty. See https://www.wipo.int/marrakesh_treaty/en/
34. Kenya Law Reform Commission (2010) Constitution of Kenya. See: http://www.klrc.go.ke/index.php/constitution-of-kenya/108-chapter-two-the-republic/173-7-national-official-and-other-languages
35. Interview with the Ministry of Education of Kenya.
36. Interview with NCPWD.
37. GSMA Intelligence (2019). Kenya. See: https://www.gsmaintelligence.com/markets/1887/data/
38. World Bank (2019). Kenya. See: https://www.worldbank.org/en/country/kenya/overview
39. GSMA Intelligence (2019). Kenya. See: https://www.gsmaintelligence.com/markets/1887/data/
40. Financial Inclusion Insights (2017). Data Fiinder. See: http://finclusion.org/data_fiinder/
41. World Bank (2019). World Bank Open Data.
42. *Ibid.*
43. Bangladesh Bureau of Statistics (2011). Population & Housing Census 2011 (National Series). Socio economic and Demographic Report: Volume 4.
44. World Bank (2019). World Bank Open Data. See: https://data.worldbank.org
45. United Nations Children's Fund (2014). Ending Child Marriage: Progress and prospects.
46. See UNICEF's work on gender equality for more details on the link between early marriage and gender equality: https://www.unicef.org/gender-equality.
47. Key experts interviewed indicated that their perceived prevalence of disability in Bangladesh is closer to 10–15 per cent or 16.1 million to 24.2 million persons.
48. Bangladesh Bureau of Statistics (2015) Disability in Bangladesh: Prevalence and Patterns, Population Monograph: Volume-5
49. United Nations (2008) UN Convention on the Rights of Persons with Disabilities. See: https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html
50. International Labour Organization (n.d.). Persons with disabilities rights and Protection act in Bangladesh.
51. World Bank Group (2016). Program Brief. Allowances for the financially insolvent disabled.
52. Department of Social Services (2019): See: https://www.dis.gov.bd/en/
53. Interview with Center for Disability in Development (CDD)
54. Research teams estimates based on the percentage of under 15 years of age population in Bangladesh (as per the World Bank) and estimates on the number of hearing and deaf people in Bangladesh.
55. Interview with CDD.
56. Calculated as defined by the equation on page 6.
57. A basic mobile phone has a small screen and a keyboard, with one number and several letters per button. It does not allow you to browse websites or use mobile applications (apps) such as Facebook, WhatsApp or YouTube. A feature phone allows you to browse websites or use social media applications, such as Facebook. It tends to have a small screen and a keyboard, with one number and several letters per button. A smartphone allows you to go on the internet and to download and use applications (apps), such as Facebook, WhatsApp or YouTube. It has a large touchscreen display and functions with operating systems such as Android, Apple iOS, Blackberry OS or Windows Mobile. (Source: GSMA, 2018).
58. GSMA (2019). The State of Mobile Internet Connectivity 2019.
59. As mentioned in the research limitations in Appendix 1, finding and interviewing deaf respondents in Bangladesh was challenging, largely due to the lack of standardised Bengali sign language. This resulted in more respondents being hard of hearing rather than deaf and a higher proportion of those with "difficulties hearing" and "difficulties communicating" reporting daily usage of voice services in Bangladesh than in Kenya.
60. Screen-reader technology developed by Google included in Android devices.
61. Mobile money service from Safaricom, a mobile operator in Kenya.
62. Mobile financial service in Bangladesh.

Endnotes

63. "Access" can be a subjective concept and each respondent uses a different frame of reference. Non-disabled persons, for instance, when asked to report their access to basic services, mentioned many challenges such as the cost of healthcare, the quality of education in schools, low salaries, traffic, etc. and had a tendency to consider that, for these reasons, they did not have full access to these services. Conversely, persons with disabilities were more likely to mention that they had good access to healthcare, while still mentioning being unable to talk with the doctors for instance, which is in fact a major barrier. The comparatively optimistic perception of access to basic services by persons with disabilities can be explained by improvements in the general attitude towards persons with disabilities in both countries (and despite many challenges remaining). When comparing to what it was before; they therefore tend to claim to have better access.

64. Interviews with DPOs.

65. Global Accessibility Reporting Initiative. See: https://www.gari.info/

66. No gender gap in mobile phone ownership among non-disabled persons according to this research (but within the margin of error) and six per cent gender gap according to the GSMA 2019 Gender Gap Report - https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/02/GSMA-The-Mobile-Gender-Gap-Report-2019.pdf

67. The gender gap is an indicator which reveals by how much a woman is less likely to own a mobile phone than a man.

68. GSMA (2019) Connected Women: The Mobile Gender Gap Report 2019

69. UN. Gender perspectives on disability and the disability perspective on the situation of women and girls with disabilities. See: https://www.un.org/development/desa/disabilities/issues/women-and-girls-with-disabilities.html

70. Accenture (2018). The accessibility advantage: why should we care about inclusive design.

71. Sustainable Development Goals from the United Nations. See: https://sustainabledevelopment.un.org/?menu=1300

72. Calculation done with the proportion of persons with disabilities by type of impairment as defined by KBS.

73. Calculation done with the proportion of persons with disabilities by type of impairment as defined by the BBS.

74. GSMA (2019) How mobile operators are driving inclusion of persons with disabilities.

75. GSMA (2019). How mobile operators are driving inclusion of persons with disabilities

76. In both countries, proxies were used to estimate respondent's income level: main type of flooring material in Kenya and type of house in Bangladesh.

77. "Upazilas" are administrative units of Bangladesh, corresponding to subdistricts.

78. The Washington Group is a United Nations Statistics Commission City Group working on statistics on persons with disabilities. They have developed different tools to identify and assess disability, including the short set of questions, which was used for this research. See: http://www.washingtongroup-disability.com/washington-group-question-sets/short-set-of-disability-questions/

79. The proxy initially chosen by the research team to evaluate respondent's income level in Kenya (main type of flooring material) did not prove satisfactory and the research team decided to use another and more relevant criteria for the weighting. Highest education level attained by the respondent prove to be the most satisfactory among the ones available in national-level statistics and was therefore selected as a weighting criterion.

80. Kenya National Bureau of Statistics (2012) Kenya 2009 Population & Housing Census, Analytical Report on Disability, Volume XIII, March 2012

81. Bangladesh Bureau of Statistics (2015) Disability in Bangladesh: Prevalence and Patterns, Population Monograph: Volume-5

82. World Health Organization. See: https://www.who.int/topics/disabilities/en/

83. In both countries, proxies were used to estimate respondent's income level: main type of flooring material in Kenya and type of house in Bangladesh.

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