Connected Society

The State of Mobile Internet Connectivity 2021

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Executive summary

The COVID-19 pandemic has accelerated digital transformation around the world. The rapid expansion of online education and health services, e-commerce and remote working has highlighted the importance of the internet. In low- and middle-income countries (LMICs), most people access the internet via mobile, and for many it is the only way to get online.It has provided people with a key means to keep in touch and access important information, services and opportunities to support their lives and livelihoods, particularly during lockdowns.

Six years ago, about a third of the world's population were using mobile internet. Today, it is more than half. Despite this progress, the pandemic has highlighted how big gaps in connectivity persist, even in high-income markets. 3.8 billion people still do not have access to the internet – due to a lack of mobile broadband coverage or because of other barriers, including a lack of awareness of the internet and its benefits, lack of literacy and the required skills, affordability, lack of perceived relevance, and safety and security concerns.

The State of Mobile Internet Connectivity 2021 highlights trends in the coverage and usage of mobile internet over the last six years and the key barriers to mobile internet adoption. It also looks at the early impacts of the COVID-19 pandemic, the biggest regional changes and the key challenges to address to ensure everyone can connect to the internet.

The findings draw on a variety of data sources, including the GSMA Consumer Survey, GSMA Intelligence databases, analysis of other industry data, and interviews with stakeholders. This year, the GSMA Consumer Survey involved more than 9,000 respondents from eight LMICs and was conducted in-person between October 2020 and January 2021, providing unique insight into consumers' mobile internet awareness, access and use during the first year of the pandemic.[1]

1. Further details on the GSMA Consumer Survey can be found in Appendix 1.

Key findings

For the first time, more than half the world's population are using mobile internet
By the end of 2020, 51% of the world's population – just over 4 billion people – were using mobile internet, an increase of 225 million since the end of 2019. Mobile internet use has been growing steadily year on year in LMICs, which now account for just over three quarters of the connected population. However, a digital divide persists, with 93% of the unconnected around the world living in LMICs.

Global coverage continues to grow, with 94% of the world's population covered by mobile broadband networks, but progress has slowed
The coverage gap – those living in areas without mobile broadband coverage – stands at 450 million people, or 6% of the world's population. The biggest increases in coverage have occurred in Sub-Saharan Africa and the Pacific Islands. However, there has been a slowdown in covering the remaining population, with the coverage gap only reducing by one percentage point in 2020. Sub-Saharan Africa is still the region with the largest coverage gap, at 19%.

3.4 billion people are not using mobile internet, despite living in areas with mobile broadband coverage
The usage gap – those living in areas with a mobile broadband network but not using mobile internet – has reduced for the second year in a row but continues to be substantial; it is now seven times larger than the coverage gap. Although the usage gap has narrowed, it still represents 43% of the world's population. Between 2019 and 2020, the reduction in the usage gap has been driven primarily by increased mobile internet adoption in East Asia. The usage gap is largest in South Asia, at 61%.

The unconnected are more likely to be poorer, less educated, older, rural and women
While the gender gap in mobile internet has continued to narrow, women in LMICs are still 15% less likely to use mobile internet than men, with 234 million fewer women than men using mobile internet. People living in rural areas are also increasingly using mobile internet, but a significant rural-urban gap persists across the surveyed countries.

Nearly a quarter of adults are still not aware of mobile internet and its benefits across the LMICs surveyed
Awareness of mobile internet has increased since 2017, especially for women and those living in rural areas. However, over the last year, awareness has not increased significantly across our surveyed countries. Women and those in rural areas are still less likely to be aware of mobile internet than their male and urban counterparts.

A lack of literacy and digital skills, as well as affordability, continue to be key barriers to mobile internet adoption
Across the surveyed countries, mobile users who are aware of the internet report a lack of literacy and digital skills, as well as affordability (particularly the cost of internet-enabled handsets), as the main barriers to using mobile internet.

Internet-enabled handsets and data became less affordable in many LMICs in 2020 due to the economic impact of the COVID-19 pandemic
Despite a fall in the cost of entry-level handsets and data in many LMICs, affordability has worsened in many countries because of the decline in per-capita income due to the pandemic. However, there are exceptions, with handset affordability improving somewhat in Sub-Saharan Africa and data becoming more affordable in South Asia.

Across the LMICs surveyed, the diversity and frequency of online activities has increased
Mobile internet users have been using their mobile phones for a wider range of online activities and, in many cases, more frequently. There has also been growth in more data-intensive activities, such as video calling, music streaming and watching videos online.

Despite the increase in data usage resulting from the pandemic, mobile networks were resilient and network capacity improved
Mobile data traffic reached record highs in 2020, with global data per user reaching more than 6 GB per month – double the data usage for 2018. Both the private and public sectors responded to the surge in traffic, increasing network capacity and delivering better quality networks for consumers. At the end of 2020, download speeds were on average higher than the year before.

4G network coverage continues to expand, while a number of countries have also seen significant increases in 5G coverage
Across LMICs, 4G coverage increased to 84% by the end of 2020 – only eight percentage points less than that for 3G. 5G networks have also been expanding, particularly in high-income countries. Global 5G coverage increased from 5% in 2019 to 17% in 2020. By the end of the year, 5G networks had been launched in 10 LMICs, with China leading the way.

The continued expansion of connectivity provides ground for optimism

The findings in this 2021 edition of The State of Mobile Internet Connectivity show that the continued expansion of connectivity provides grounds for optimism. More people than ever before are able to access information, content and services through mobile internet, with the potential to transform lives and accelerate sustainable development. Those who are already online tend to use the mobile internet more and enjoy a richer experience by engaging in a wider range of activities. These increased levels of mobile broadband connectivity have a particularly strong socioeconomic impact in LMICs,[2] including the reduction of poverty.[3]

However, if not well managed, increased levels of digitisation can exacerbate existing inequalities. While increasing coverage of mobile broadband remains an important issue in emerging markets, it is the usage gap that is key to closing the digital divide. Policymakers and regulators should shift from the traditional infrastructure-focused approach to a more people-centric one, doubling down on efforts to tackle barriers preventing the adoption and use of mobile internet services. Only by taking a holistic, collaborative approach and recognising and acting on our shared responsibility to advance the use of mobile internet can we ensure everyone has an equal opportunity to participate in an increasingly connected world.

A list of definitions can be found in Appendix 4.

2. ITU (2021). The economic impact of broadband and digitization through the COVID-19 pandemic.
3. GSMA, World Bank (2020). The poverty reduction effects of mobile broadband in Africa: Evidence from Nigeria.

KEY FINDINGS

Connected:

51% of the world's population are now **using mobile internet**

93% of the world's **unconnected** population live in **low- and middle-income countries**

Coverage gap:

6% of the world's population are not covered by mobile broadband

with progress slowing to cover the remaining **450m** people

Usage gap:

43% of the world's population are not using mobile internet

despite living in areas with mobile broadband coverage – **3.4bn** people

Global 5G coverage increased to 17% in 2020

Despite the increase in data usage resulting from the pandemic,

mobile networks were resilient

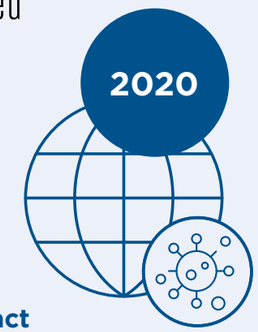
and **network capacity** improved

IN LOW- AND MIDDLE-INCOME COUNTRIES

4G coverage increased to 84% by the end of 2020

– only **8pp** less than that for **3G**

Internet-enabled handsets and data became **less affordable** in many LMICs in 2020 **due to the economic impact of the pandemic**



The **unconnected** are more likely to be

poorer

rural

less educated

older

women

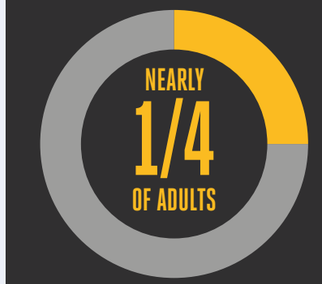
A lack of **literacy** and **digital skills**, as well as **affordability**,

continue to be key barriers to mobile internet adoption

ACROSS THE LMICS SURVEYED

The **diversity** and **frequency** of **online activities** has increased including more data-intensive activities:

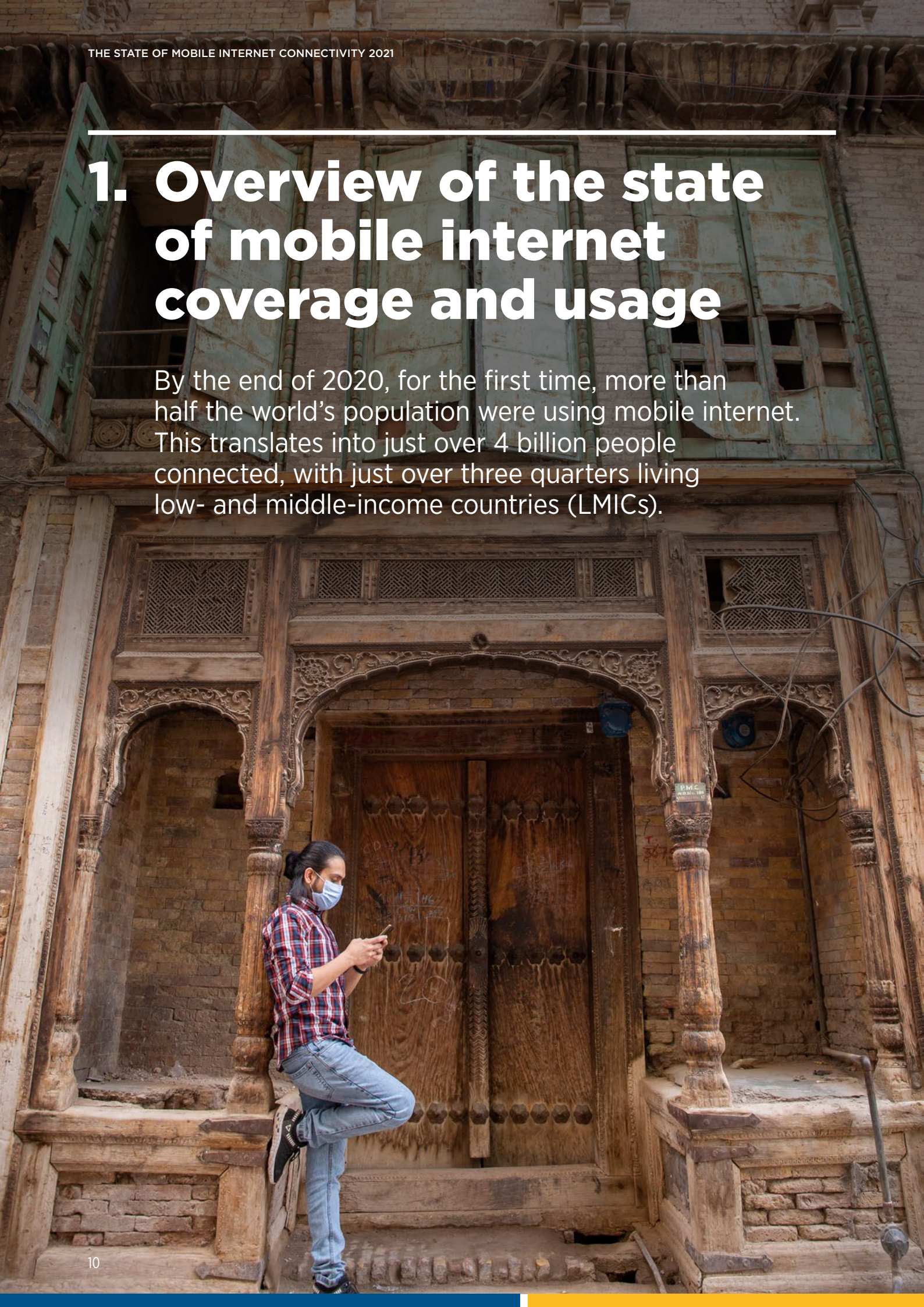
video calling **music streaming** **watching videos online**



are still not aware of mobile internet and its benefits

1. Overview of the state of mobile internet coverage and usage

By the end of 2020, for the first time, more than half the world's population were using mobile internet. This translates into just over 4 billion people connected, with just over three quarters living low- and middle-income countries (LMICs).

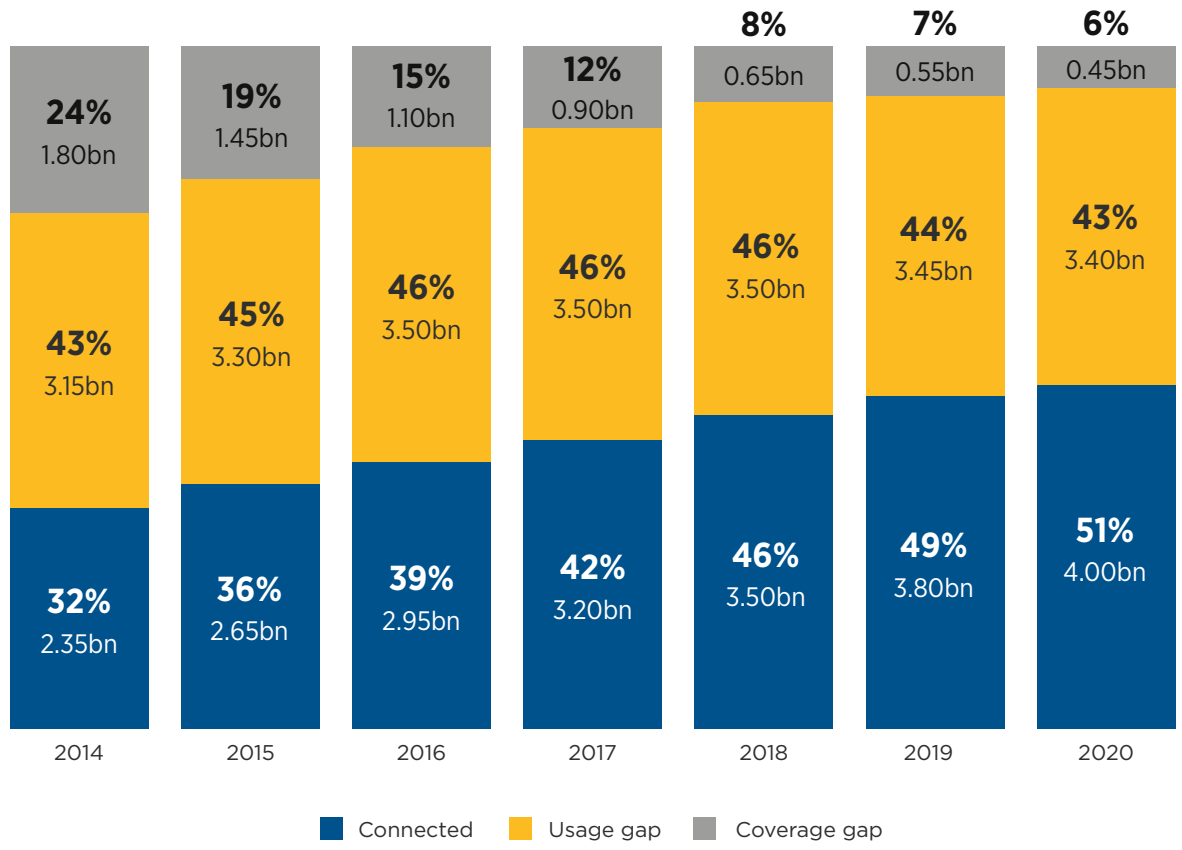


During the COVID-19 pandemic and consequent economic turmoil, mobile internet connectivity continued to grow, with a steady increase in both coverage and usage (see Figure 1). Since the end of 2019, 225 million more people have been connected. The importance of mobile internet should not be underestimated. Mobile continues to be the primary – and in some cases only – way most people access the internet, particularly in LMICs.

Across the eight countries surveyed in the GSMA Consumer Survey in 2020, the median proportion of mobile-only internet users was 69%, ranging from 52% in Mozambique to 85% in Bangladesh. Women are also more likely than men to access the internet exclusively on a mobile handset in most of the countries surveyed.[4] The same is true for people living in rural areas compared to those living in urban areas. As such, mobile internet is a critical pathway to digital inclusion for the underserved.

Figure 1

Evolution of global mobile internet connectivity, 2014–2020



Base: Total population, 198 countries.

Note: Totals may not add up due to rounding.

Unique subscriber data is sourced from GSMA Intelligence, combining data reported by mobile operators with the annual GSMA Consumer Survey. Coverage data is sourced from GSMA Intelligence, combining data reported by mobile operators and national regulatory authorities. Population data is sourced from the World Bank.

Source: GSMA Intelligence

4. GSMA (2021). The Mobile Gender Gap Report 2021.

The coverage gap continues to reduce

In 2014, almost a quarter of the world's population did not have mobile broadband coverage. Six years later, only 6% remains uncovered. This means that 94% of the world's population now have access to a broadband network. Most of the gains in coverage occurred between 2014 and 2018. Since then, there has been a slowdown in covering the remaining population. In 2020, the global coverage gap fell by one percentage point, reducing the number of people living in areas without a mobile broadband network to 450 million. Providing universal broadband poses a significant challenge, as those remaining uncovered tend to live in sparsely populated rural areas with difficult terrain.

The usage gap has reduced for the second year in a row, yet remains large and accounts for the majority of the unconnected

In 2020, 3.4 billion people (43% of the world's population) lived within the footprint of a mobile broadband network but were not accessing mobile internet services. This highlights the increasing importance of addressing the usage gap vis à vis the coverage gap. Although the usage gap is narrowing, it is now seven times larger than the coverage gap. In 2014, the usage gap accounted for 64% of the total unconnected population; in 2020, it represented 88%.

It is important to note that LMICs now account for almost 93% of the world's unconnected population and more than 98% of the uncovered population.

East Asia sees the largest increase in usage; Sub-Saharan Africa and the Pacific Islands see greatest boosts to coverage

Global coverage and usage gaps mask wide variations at the regional level. Figure 2 highlights that Sub-Saharan Africa is the region with the largest coverage gap (19%), while South Asia is the region with the largest usage gap (61%). Some key regional trends in connectivity are further explored in the following paragraphs.

There are two ways people can be **'unconnected'**; either they live in an area not covered by mobile broadband, or they live in an area that is covered but do not use mobile internet.

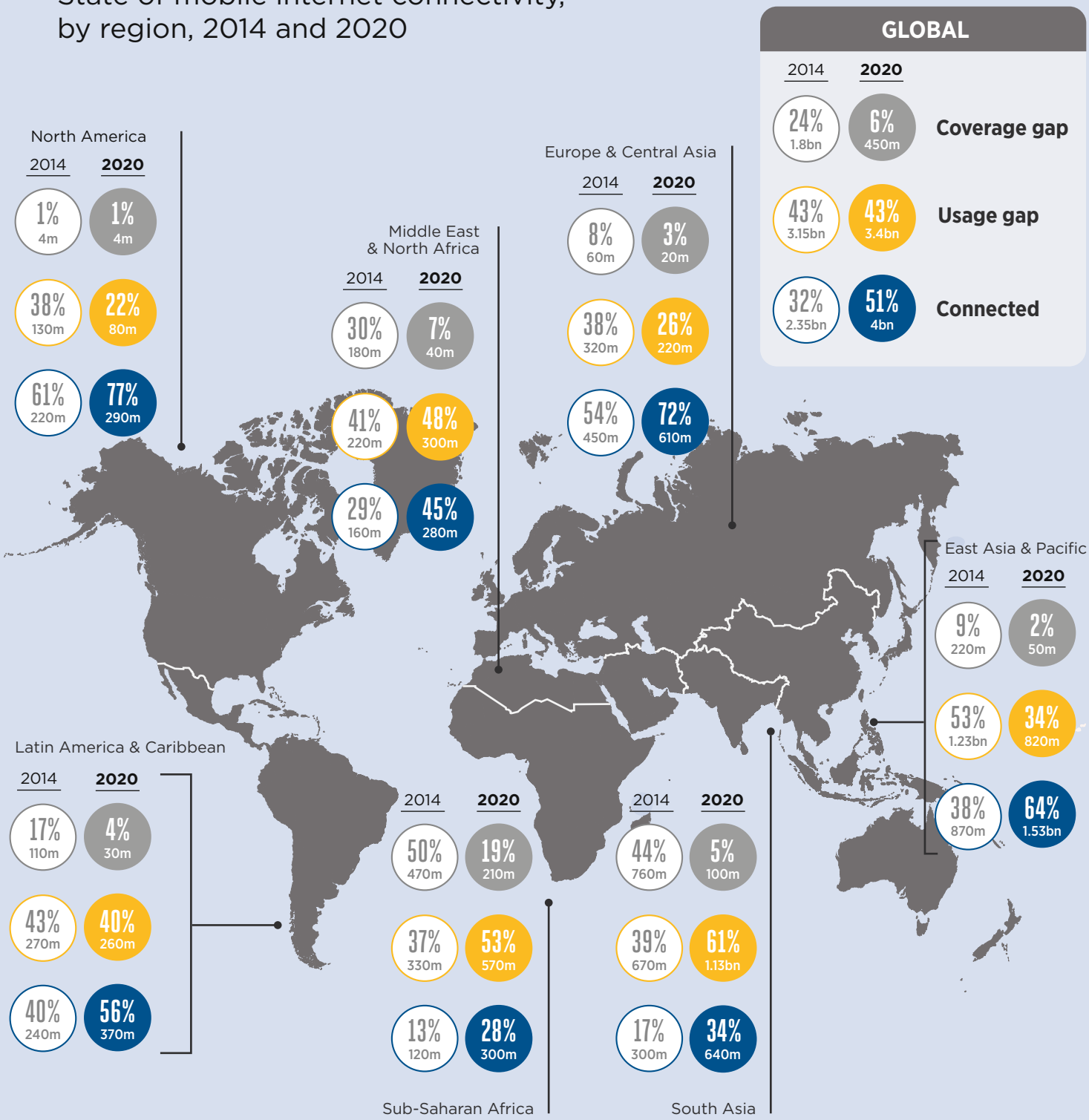
Coverage gap:
refers to those who live in an area not covered by a mobile broadband network.

Usage gap:
refers to those who live within the footprint of a mobile broadband network but are not using mobile internet services.

Connected:
refers to people who use mobile internet.

Figure 2

State of mobile internet connectivity, by region, 2014 and 2020



Base: Total population

Note: Totals may not add up to 100% due to rounding

Source: GSMA Intelligence

Between 2019 and 2020, the biggest increase in mobile internet usage was seen in East Asia, which grew by four percentage points. Other regions saw growth of two percentage points at most.

Sub-Saharan Africa is home to 47% of the world's uncovered population – an estimated 210 million people in 2020. The region's coverage gap is more than three times the global average. However, the region has continued to increase coverage, with major 3G and 4G rollouts in West and East Africa, including Nigeria, Mali and Tanzania. This has resulted in a five percentage-point reduction in the coverage gap between 2019 and 2020. More than a quarter (28%) of the population in the region are now using mobile internet – more than twice the usage level in 2014. Given that the coverage gap continues to decline and that almost three quarters of the unconnected in the region are covered by mobile broadband, addressing the usage gap is the primary challenge. Accelerating adoption will increase the economic case for further expanding coverage, which will in turn help reduce the coverage gap (see Spotlight in Chapter 4).

Although the coverage gap in South Asia remained relatively unchanged from 2019 to 2020 (6% and 5% respectively), significant gains have been made since 2014, when the coverage gap stood at 44%. Following the leap in 4G coverage in India, other countries in the region have also expanded 4G coverage, notably Bangladesh and Nepal. However, while internet usage has grown, it has not done so at the same rate as coverage deployment. The usage gap therefore persists, with little change since 2018.

In the East Asia and Pacific region, the Pacific Islands have been at the forefront of 3G and 4G coverage improvements: 4G coverage has increased from 35% of the population in 2019 to more than 50% in 2020. This continues the longer-term positive trends in coverage seen since 2014,[5] yet mobile internet adoption remains low at 21%. East Asia, driven by China, is also leading 5G network deployments, which now cover 25% of the population of LMICs in the region.

It is also important to note that there can be a delay between providing coverage and seeing a significant increase in mobile internet adoption. In many countries, increases in mobile internet adoption lag behind mobile internet coverage.[6] For example, it took six years (2014–2020) to double the volume of the connected population in Sub-Saharan Africa and South Asia, while over the same period coverage expanded at a much faster pace; in Sub-Saharan Africa, the coverage gap reduced from 51% to 19%, while in South Asia it fell from 44% to 5%.

Smartphone adoption continues to increase

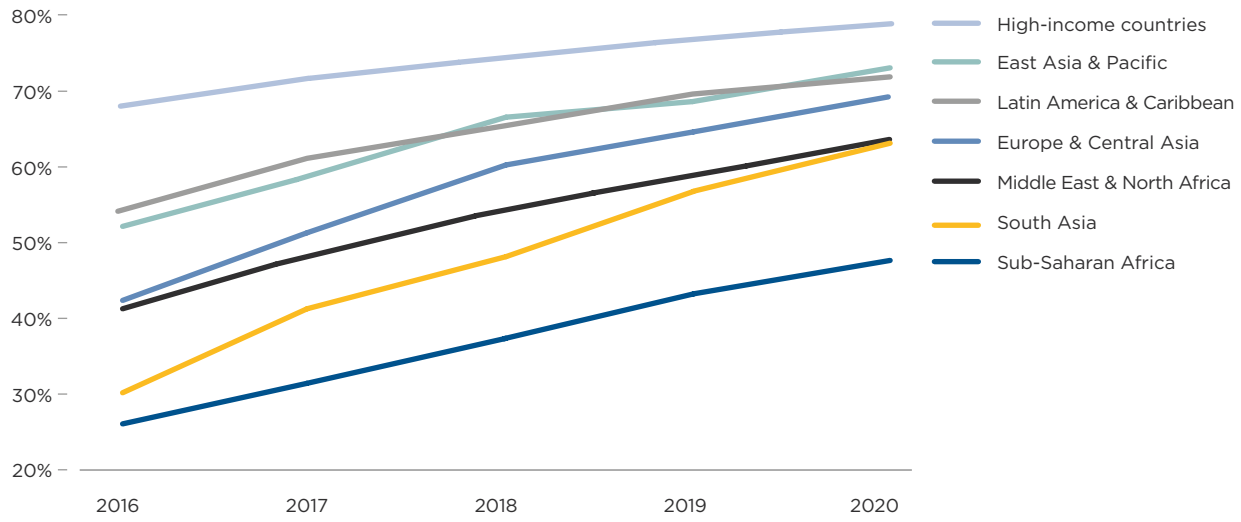
Owning a smartphone is important for adopting and using mobile internet and benefiting from the life-enhancing services the internet can offer. Recent research has found that smartphone owners are much more likely than owners of feature phones or basic phones to progress to regular mobile internet use.[7]

Smartphone adoption continues to increase. Globally, smartphones accounted for 68% of total mobile connections in 2020,[8] compared to 64% in 2019 and 47% in 2016 (see Figure 3). South Asia has seen the strongest growth in smartphone adoption in recent years, increasing from 30% of connections in 2016 to 63% in 2020. India has been at the forefront of this growth, with smartphone adoption among adults increasing from 22% in 2017 to 51% in 2020. India's smartphone users are also among the largest users of data worldwide, due in part to near-universal 4G coverage and affordable data and smartphones, as well as the introduction of the JioPhone (an LTE-enabled handset launched by Jio).

5. For more details, see p.43 "Achieving greater coverage in the Pacific Islands" in GSMA (2020). The State of Mobile Internet Connectivity 2020.
6. GSMA (2018). State of Mobile Internet Connectivity 2018, Analysis by GSMA Intelligence also shows that annual changes in mobile broadband coverage have a weak positive correlation with changes in mobile internet adoption, but the correlation becomes stronger (positive and statistically significant) when looking at lags in coverage increases, especially after two years.
7. GSMA (2020). The Mobile Gender Gap Report 2020. GSMA (2021). The Mobile Gender Gap Report 2021.
8. Note that the definition of smartphone differs slightly between the GSMA Consumer Survey and GSMA Intelligence. GSMA Intelligence smartphone connections include smart feature phone connections, whereas the Consumer Survey data does not.

Figure 3

Smartphones as a proportion of total mobile connections for high-income countries and LMICs (by region),[9] 2016–2020

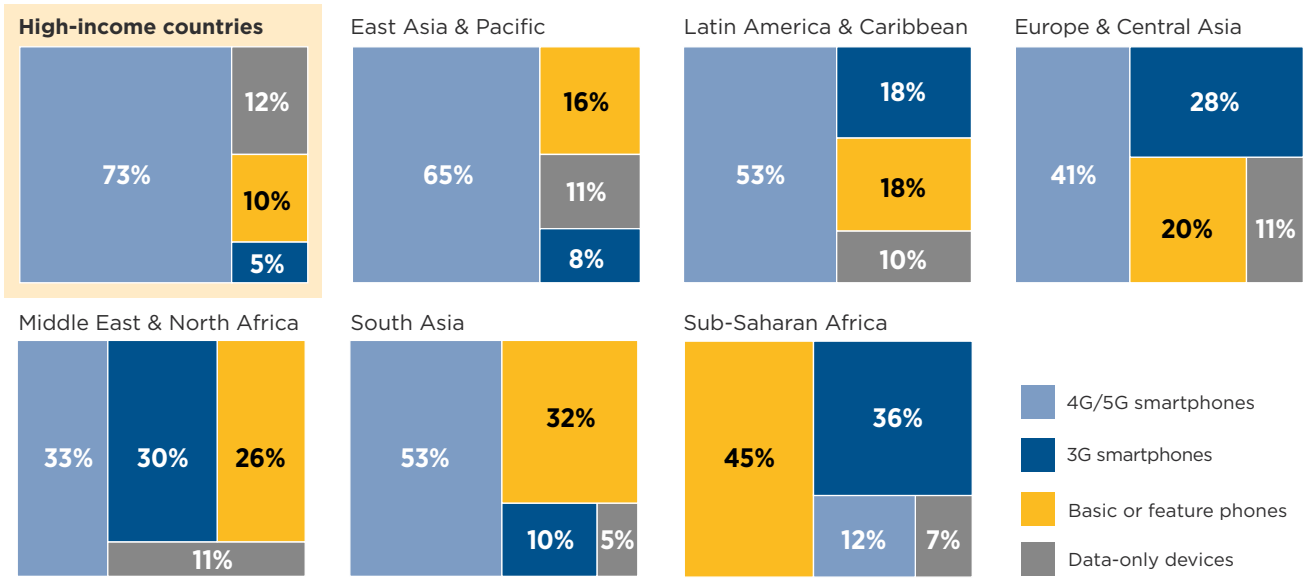


Source: GSMA Intelligence

Growth continues in Sub-Saharan Africa but it is still lagging other regions, with smartphones accounting for less than half of total connections. Sub-Saharan Africa has the highest percentage of basic or feature phone connections, accounting for 45% of all connections. In addition, a significant share of smartphones in Sub-Saharan Africa support 3G only, whereas in other regions the majority of smartphones are 4G or 5G capable (see Figure 4).

Figure 4

Mobile connections by device type for high-income countries and LMICs (by region), 2020



Source: GSMA Intelligence

9. Note: the smart feature phone category of handsets is included in the definition of smartphones.

People in rural areas are increasingly using mobile internet, but there remains a significant rural-urban gap

In 2019, people living in rural areas of LMICs were 37% less likely to use mobile internet than those living in urban areas, with the largest rural-urban gap in Sub-Saharan Africa, where rural populations were 60% less likely to use mobile internet. While this is a significant gap, the number of people using mobile internet across LMICs grew rapidly between 2017 and 2019, with the rural-urban gap steadily decreasing over the period. This reduction has been driven by LMICs in South Asia and Latin America.[10]

Across the eight LMICs surveyed in 2020, the rural-urban gap reduced in some countries (notably Kenya, Nigeria and Guatemala), while in the other markets it remained relatively unchanged or has increased in the case of Algeria (see Figure 5). Smartphone ownership in rural areas has also increased significantly in India, Kenya and Nigeria over the last two years.

A combination of increased rural coverage, awareness of mobile internet, decreases in the cost of entry-level smartphones and smart feature phones, as well as innovative financing schemes and payment models available to low-income segments, are likely to have contributed to the changes observed in these countries.

Figures 5 and 6 highlight that, while some progress is being made, a significant rural-urban gap persists in both smartphone ownership and mobile internet use.

The '**rural-urban gap**' refers to how much less likely a person living in a rural area is to use mobile internet than a person living in an urban area.

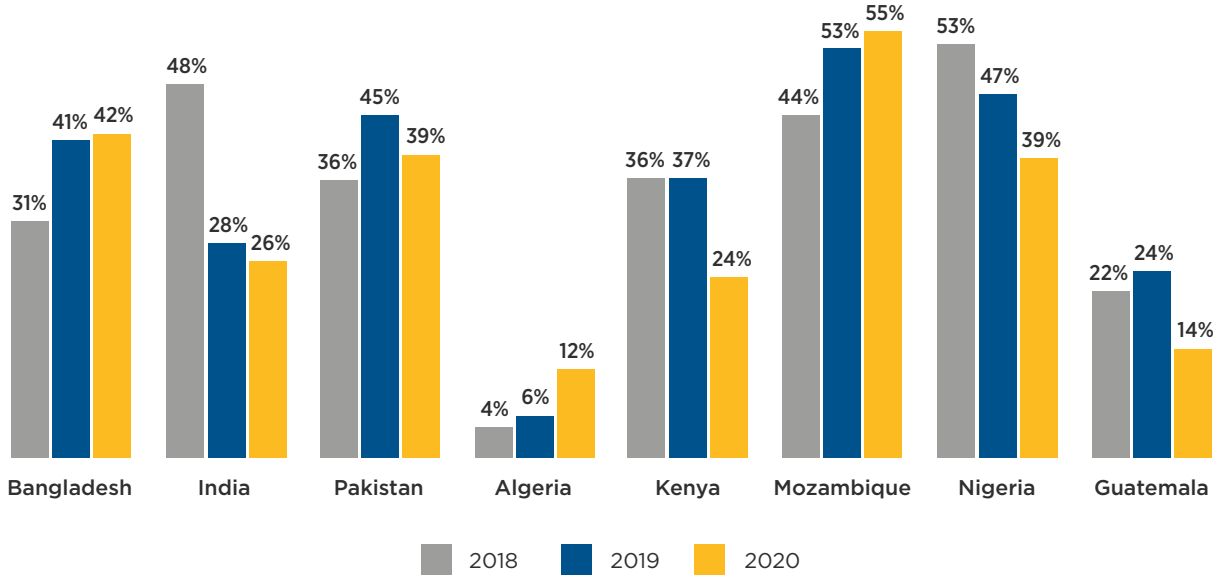
It is calculated as:

$$\textbf{Rural-urban gap} = \frac{\%\ \text{of urban users} - \%\ \text{of rural users}}{\%\ \text{of urban users}}$$

10. For more details on the rural-urban gap by region for 2017–2019, see GSMA (2020). The State of Mobile Internet Connectivity 2020.

Figure 5

Country-level rural-urban gaps in mobile internet use, 2018–2020



Base: Adults aged 18+.

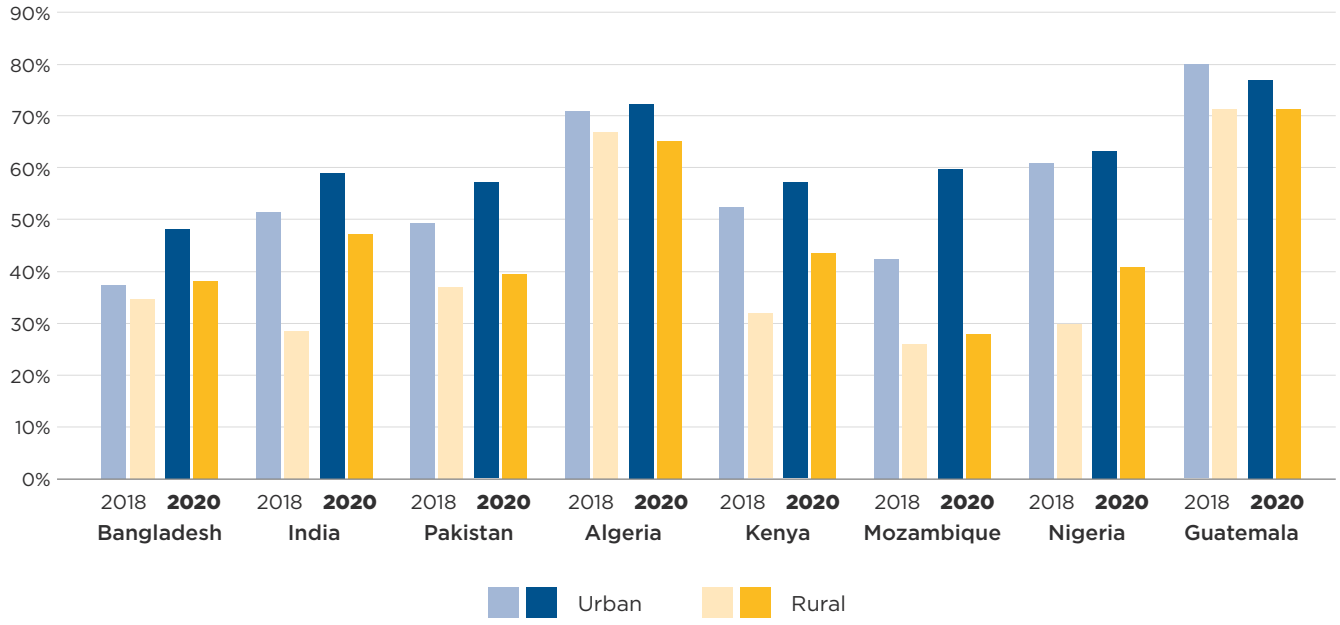
N = from 290 to 1,400.

For further details on the questions asked, see Appendix 1.

Source: GSMA Consumer Survey.

Figure 6

Smartphone ownership, 2018 versus 2020



Base: Adults aged 18+.

N = from 290 to 1,400.

For further details on the questions asked, see Appendix 1.

Source: GSMA Consumer Survey.

The mobile internet gender gap is reducing but remains significant

In LMICs, the gender gap in mobile internet use continues to narrow but remains substantial. In 2020, women were 15% less likely than men to use mobile internet, with South Asia and Sub-Saharan Africa showing the largest gender gaps in mobile internet (see Figure 7). The reduction has been driven primarily by South Asia, where the gender gap has consistently been the widest but where it decreased significantly from 50% in 2019 to 36% in 2020. Improved affordability and changing market dynamics in South Asia are likely to have contributed to this (See Chapters 2 and 4). The gender gap in mobile internet use in South Asia is now on a par with Sub-Saharan Africa where – along with the other regions – the gender gap in mobile internet remains largely unchanged. Across LMICs, there are still 234 million fewer women than men accessing mobile internet.

The gender gap in smartphone ownership in low- and middle-income countries has also reduced – for the first time since 2017, again driven by South Asia. Women are 15% less likely to own a smartphone than men, down from 20% in 2019. This is important as, across the countries surveyed, when women own a smartphone, they are almost on a par with men who own a smartphone in terms of mobile internet adoption and the range of mobile services they use.[11]

The gender gap varies significantly between population segments in each country. In particular, the gender gap tends to be greatest in rural areas and among certain groups, including those with lower literacy levels, those out of the workforce or those living with a disability.

The **gender gap in mobile internet use** refers to how much less likely a woman is to use mobile internet than a man.

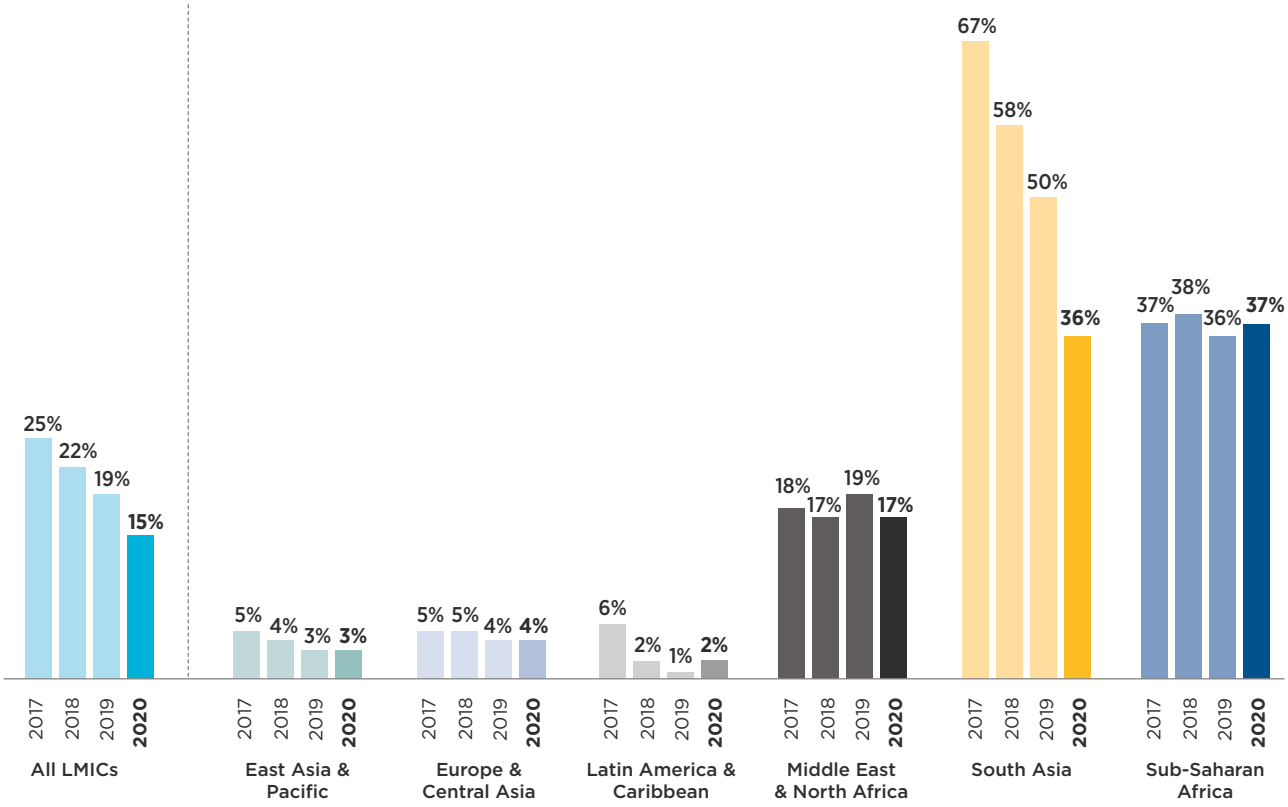
It is calculated as:

$$\text{Gender gap} = \frac{\%\text{ of male users} - \%\text{ of female users}}{\%\text{ of male users}}$$

11. GSMA (2021). The Mobile Gender Gap Report 2021.

Figure 7

Gender gap in mobile internet use in LMICs, by region, 2017–2020



Source: GSMA Intelligence

Overall, despite the most vulnerable groups being most affected by the COVID-19 pandemic across most socioeconomic indicators in 2020,[12] it is encouraging that it does not appear to have led to an overall decline in mobile internet use among women across LMICs or rural populations in many of the countries surveyed – at least so far. However, while pandemic restrictions and lockdowns have increased the need for connectivity, in some countries there is early evidence that the pandemic may have a disproportionately negative impact on women's handset ownership.[13] Further research will be key to assess the long-lasting effects of the pandemic, since mobile internet adoption and use has been an important tool enabling underserved populations to meet their needs.

12. United Nations (2021). The Sustainable Development Goals Report 2021.
13. GSMA (2021). The Mobile Gender Gap Report 2021.

Who are the unconnected?

If a person has not used mobile internet in the last three months, they are considered 'unconnected'. Analysis of GSMA Consumer Survey data from 2017 to 2019 explored the key socio-demographic drivers of mobile internet adoption in LMICs. People are less likely to use mobile internet if they are older, less educated or with low/no literacy, on a low income, or living in rural areas. In addition, after controlling for socio-demographic characteristics, women were still 6% less likely to use mobile internet than men, suggesting other issues are at play, such as discrimination and social norms.[14] Data from the Consumer Survey 2020 further illustrates this finding:

- **Geography** – Most of the unconnected live in rural areas. For example, in Nigeria, 63% of those living in rural areas are unconnected, compared to 40% of people living in urban areas.
- **Age** – People over 35 years old are more likely to be unconnected than those who are younger. For example, in Algeria, 58% of people over 35 years old are unconnected, while only 13% of the younger population are unconnected.
- **Education** – A significant proportion of the unconnected only completed primary school. For example, in Bangladesh, 93% of those with only primary school education or below are unconnected, while 56% of those who completed secondary education remain unconnected.
- **Literacy** – Those reporting low levels of literacy are also more likely to be unconnected. For example, in Guatemala 78% of people who are illiterate are unconnected, compared to only 31% of those who are literate.

14. See modelling details in Butler, C. (2020). Disaggregating the drivers of mobile technology adoption: the threat of unobservable gender biases.

2. Key barriers to mobile internet adoption and use

Pandemic-related restrictions, such as social distancing and stay-at-home instructions, were for some a driver of mobile internet adoption. Going online became necessary to stay connected, conduct business, gain access to information and ease the monotony of lockdown life. However, 47% of the population in LMICs are still not using mobile internet, despite being covered by a mobile broadband network. This chapter presents the latest assessment of the key barriers to mobile internet adoption and use in LMICs.

There are five overarching barriers to mobile internet adoption and use, as seen in Figure 8. Awareness of mobile internet and its benefits is a critical step in the journey to mobile internet use. Yet, not all those aware of mobile internet go on to use it, suggesting other reasons are preventing them from going online. Analysis from the 2020 GSMA Consumer Survey shows that for mobile users who are aware of mobile internet but do not use it, the main barriers are literacy and digital skills, and affordability, especially of internet-enabled handsets (see Appendix 3). These barriers are broadly unchanged since 2018 and disproportionately affect certain segments of the population more than others due to structural inequalities and underlying social norms.

Figure 8

Key barriers to mobile internet adoption and use

Knowledge and skills	Affordability	Relevance	Safety and security	Access
People lack awareness and understanding of mobile internet and its benefits or have low levels of literacy and digital skills.	People cannot afford devices, data plans or other service fees.	Relevant content, services and products that meet users' needs and capabilities are unavailable.	People are concerned about the negative aspects and risks of the internet, such as harmful content, harassment, fraud and online security.	People do not have access to networks and enablers, such as electricity and formal IDs, or devices and services are not sufficiently accessible.

Awareness of mobile internet is greater than ever before, but rural populations lag behind

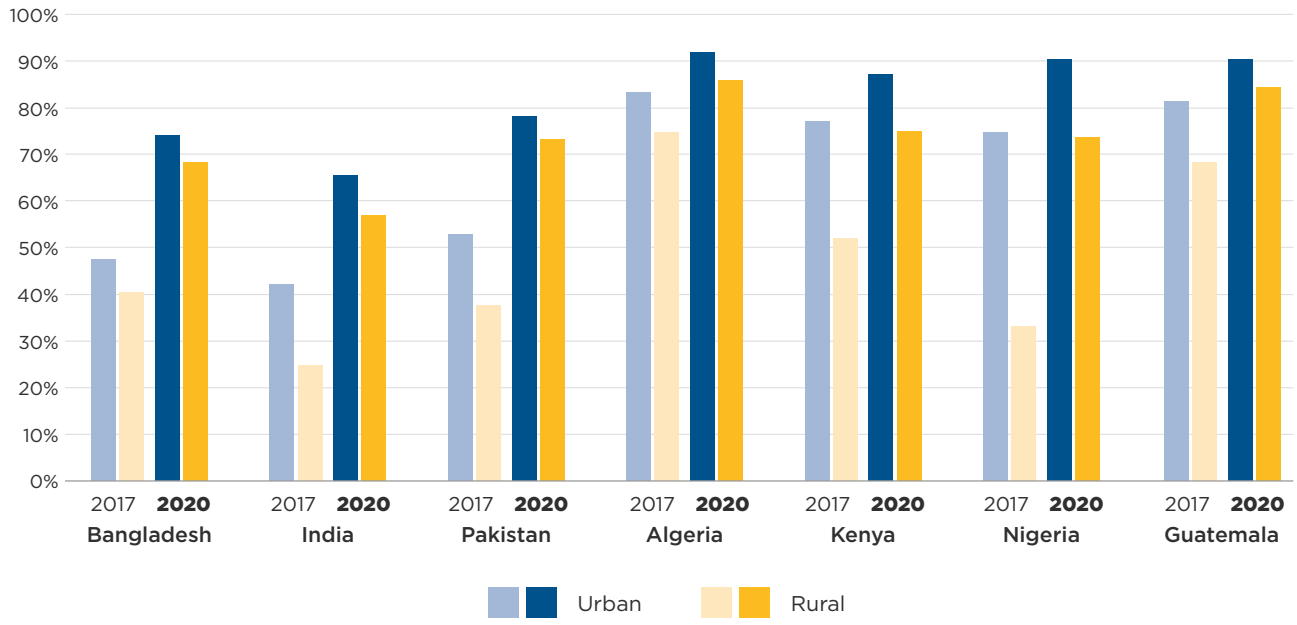
For individuals to adopt mobile internet, they first need to be aware of it, know what the benefits are and understand how to use it. Since the first publication of this report in 2018, awareness of mobile internet has increased significantly across the surveyed countries.[15] However, nearly a quarter of adults across our surveyed countries are not aware of mobile internet and its benefits.

15. For more details on the changes year-on-year, see p.30 in GSMA (2020). The State of Mobile Internet Connectivity 2020.

Awareness has increased disproportionately in rural areas compared to urban areas since 2017 in all the markets surveyed. For example, in Nigeria, rural populations are now 19% less likely to be aware of mobile internet than urban residents, compared to 56% in 2017. However, awareness remains lower among those living in rural areas compared to their urban counterparts. This is partly due to unequal access to mobile services, but also lower literacy levels and information campaigns not reaching the last mile. For example, in India, where mobile broadband covers 99% of the country and awareness levels have increased significantly, just under 60% of those living in rural areas are aware of mobile internet (see Figure 9). Awareness has also increased disproportionately among women compared to men since 2017, but women are still less likely than men to be aware of mobile internet in our surveyed countries. Increasing awareness of mobile internet services and its life-enhancing value among rural populations and women is a critical step in the journey to inclusive mobile internet adoption.

Figure 9

Mobile internet awareness by country, 2017 versus 2020



Base: Adults aged 18+.

N = from 233 to 1,406.

For further details on the questions asked, see Appendix 1.

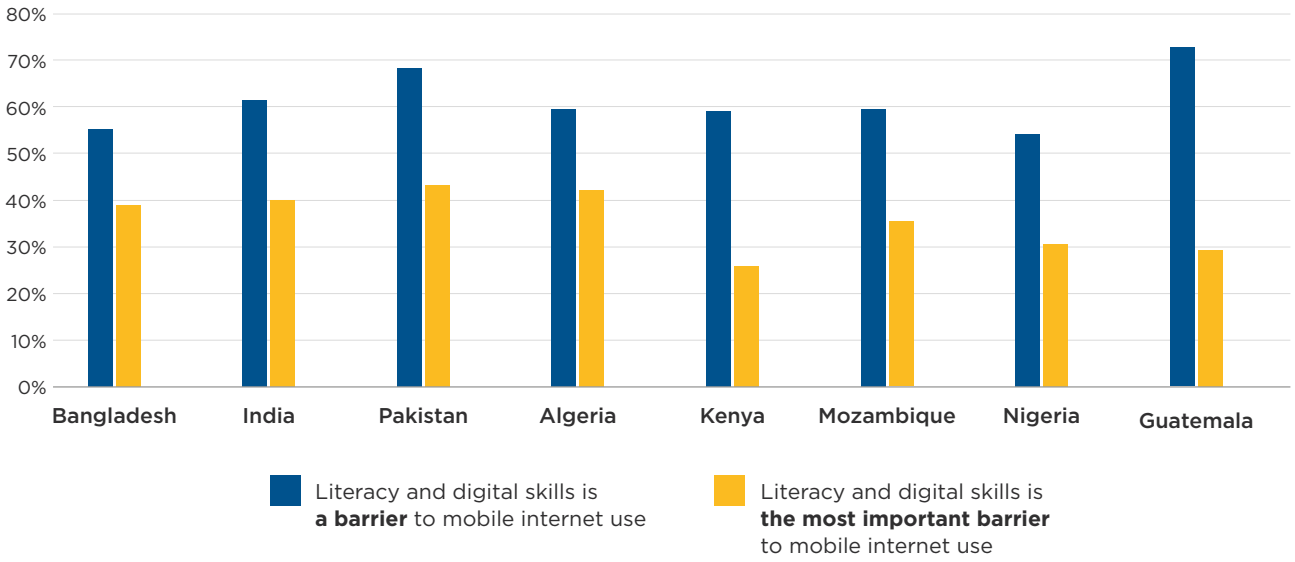
Source: GSMA Consumer Survey

Literacy and digital skills continue to be a critical barrier to mobile internet adoption

A lack of literacy and digital skills remains the biggest perceived barrier to mobile internet adoption and use among mobile users aware of mobile internet across the surveyed markets. In each country, more than 50% of mobile users who do not use mobile internet despite being aware of it reported literacy and digital skills as an important barrier, while around a third reported it as the most important barrier to mobile internet use (Figure 10). This barrier disproportionately affects people living in rural areas and women, who are also more likely to have lower literacy levels, attributable to social, economic and cultural factors.

Figure 10

Proportion of mobile users aware of mobile internet who report barriers related to literacy and digital skills in 2020



Base: Adults aged 18+ who have used a mobile phone in the last three months but not used mobile internet in the last three months, despite being aware of mobile internet.

N = from 131 to 347.

For further details on the questions asked, see Appendix 1.

Source: GSMA Consumer Survey

Spotlight

Unpacking the literacy and skills barrier in South Asia

Taken together, Bangladesh, India and Pakistan represent 95% of the population in South Asia. Over the last five years, mobile internet adoption in these countries has increased but remains low (see Chapter 1).

For most mobile users who are aware of mobile internet but do not use it, a lack of literacy and skills remains the greatest barrier preventing them from doing so across the three countries. This barrier is a composite of five sub-barriers (see Figure 11). Difficulties with reading and writing[16] were most frequently cited as a top barrier for both urban and rural mobile users.

Figure 11

The literacy and skills barrier in South Asia

	Reading/writing difficulties		Do not know how to access internet on a mobile		Do not have time to learn how to access internet on a mobile		Do not know how to use a mobile		Not sufficient support in learning how to use internet	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Bangladesh	19%	15%	10%	13%	6%	7%	0%	3%	1%	3%
India	8%	18%	4%	10%	9%	10%	6%	2%	5%	5%
Pakistan	26%	33%	1%	1%	9%	4%	3%	5%	3%	2%

Lowest sub-barrier cited in that country — Highest sub-barrier cited in that country

There are a range of factors that affect how people experience this barrier:

- **Lack of mobile ownership** – respondents who use a mobile but do not have sole or main use of it were more likely to cite literacy and skills as a top barrier than those who own a mobile.
- **Age** – lack of time to learn was reported more frequently by those over 35 years old, who likely have greater work and home responsibilities, than younger respondents.

Interestingly, reading and writing difficulties are still cited as a barrier by those who are literate. Notably, in India, 27% of people who cited reading and writing difficulties as their top barrier were literate, suggesting other real or perceived barriers exist such as language or alphabet script.

South Asia is home to almost half the global illiterate population.[17] For people with low or no literacy, it will be important to not only simplify the process of getting online but also to raise awareness of these solutions, such as the use of voice to navigate the internet. Smart feature phones, for instance, are deemed more accessible for those unable to read and write, thanks to voice command systems.[18]

16. This refers to a lack of basic literacy i.e. an inability to read and write well or at all, rather than an inability to see the characters on a mobile phone screen due to poor eyesight, for example.
17. "Literacy rates rise from one generation to next, but challenges remain in region", bangkok.unesco.org, September 2017
18. See for example James, J. (2020). The smart feature phone revolution in developing countries: Bringing the internet to the bottom of the pyramid, The Information Society, vol. 36, 2020

Affordability grows as a key barrier to mobile internet use for many, due to the economic impact of the COVID-19 pandemic

Affordable internet-enabled handsets and data are critical to increase demand for mobile internet services and enable the digital inclusion of underserved populations. The cost of entry-level internet-enabled handsets has decreased in more than half of LMICs[19] and the cost of data has continued to decline. However, they are becoming less affordable in many countries as a result of the economic impact of the pandemic (see *Spotlight: How the COVID-19 pandemic is impacting affordability of mobile internet*).

Affordability is a significant barrier for the poorest individuals. The poorest 20% in terms of income would, on average, currently expect to spend more than 65% of their monthly income on an entry-level internet-enabled handset and more than 7% of their monthly income on a data plan (see Figure 12). This increases to more than 100% and 15% respectively in Sub-Saharan Africa.

Affordability refers to the ability of consumers to pay for a handset and cover the cost of a suitable data bundle.

The affordability of mobile data and handsets has two parts:

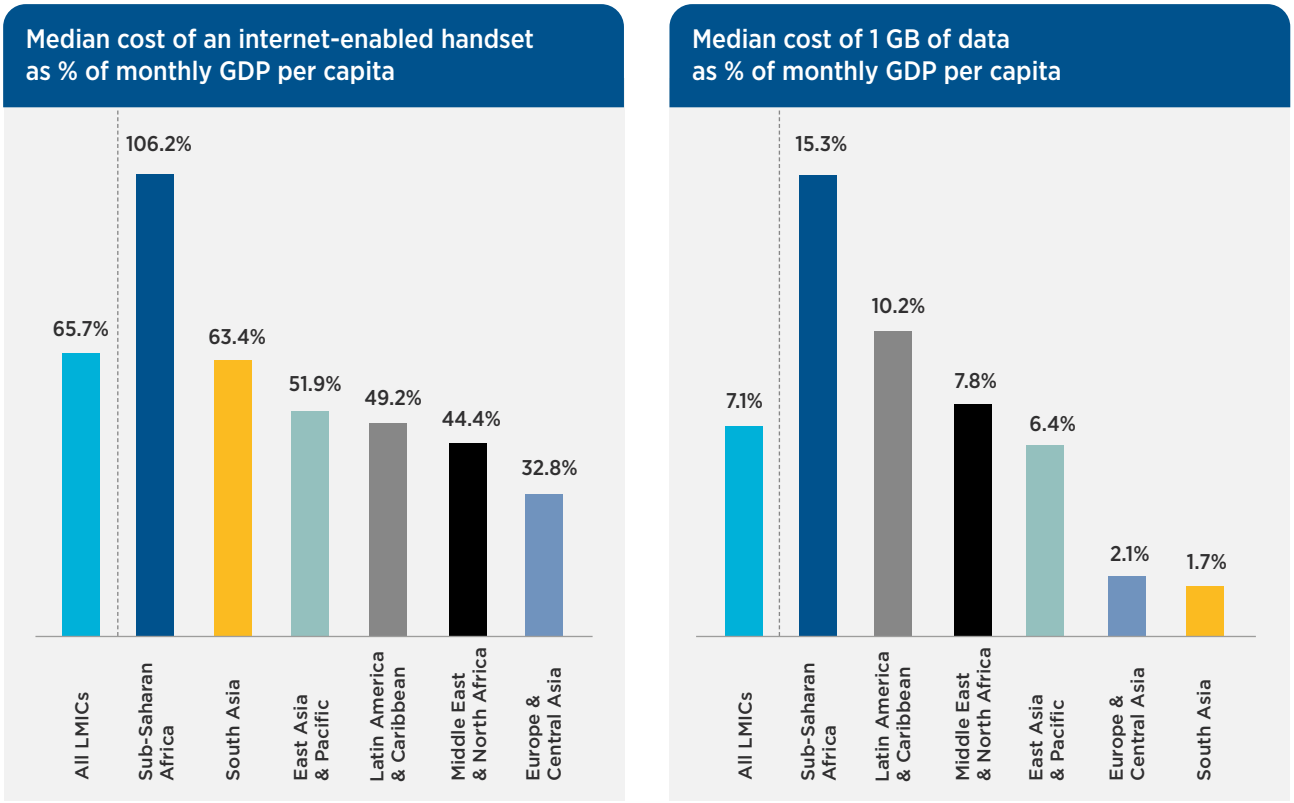
- the cost (in local currency) of purchasing mobile data and an internet-enabled handset
- a consumer's income.[20]

The lower the cost of a handset and data as a share of monthly GDP per capita, the more affordable a handset and data are.[21]

19. The analysis on handset affordability is based on 88 LMICs for which we collected data, while the analysis on data affordability is based on 128 LMICs.
20. Income is an important factor to consider. If two consumers with different levels of income face the same handset and data costs, the consumer with the lower income will be less likely to purchase and will remain unconnected.
21. Further details on the data used to estimate affordability in each country are provided in Appendix 2.

Figure 12

Affordability of an entry-level handset and 1 GB of data in 2020 for the poorest income quintile, by region



Price of device is the cheapest internet-enabled feature phone or smartphone available (at the time of collecting data) sold by mobile operators or mobile phone retailers (it does not reflect prices in second-hand or black markets.)

Price of 1 GB is the cheapest plan available (at the time of collecting data) to purchase at least 1 GB of data per month.

Source: GSMA Intelligence calculations based on pricing data from Tarifica

Spotlight

How the COVID-19 pandemic is impacting the affordability of mobile internet

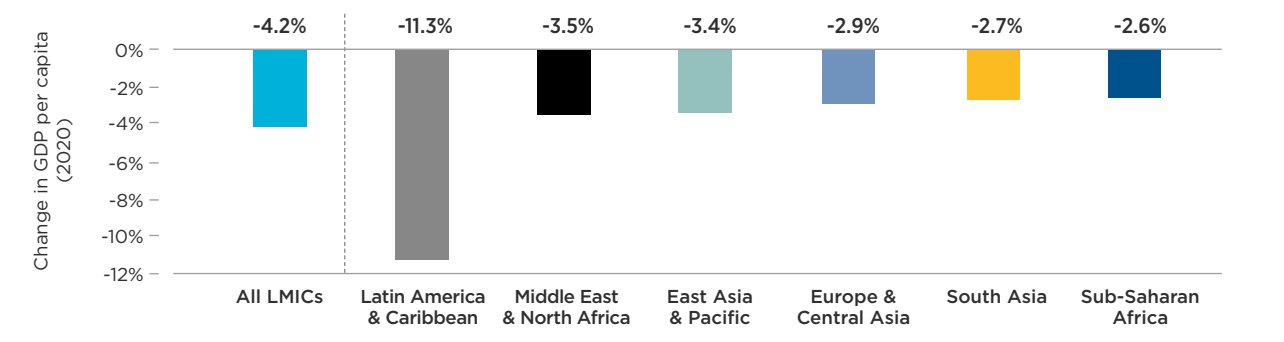
The affordability of mobile services has been impacted by the economic fall-out of COVID-19. While the full extent of the impact is not yet known, the most recent data shows that the global economy contracted by 3.2% in 2020,[22] with the equivalent of 255 million full-time jobs lost. This has translated into a sharp drop in labour income.[23] It has also disproportionately impacted those on the lowest incomes, with more than 100 million people pushed into extreme poverty – the first increase in over 20 years.[24]

In low- and middle-income countries, the median contraction in GDP per capita was more than 4% in 2020, with the largest losses in Latin America and the Caribbean (see Figure 13).

Conversely, the median cost of entry-level handsets and 1 GB of data continued to decline in 2020 (see Figure 14). In many countries, the economic impact of the pandemic on jobs and income has therefore had a larger negative impact on affordability than the positive trend seen in prices.

Figure 13

Median contraction in GDP per capita in LMICs, 2020

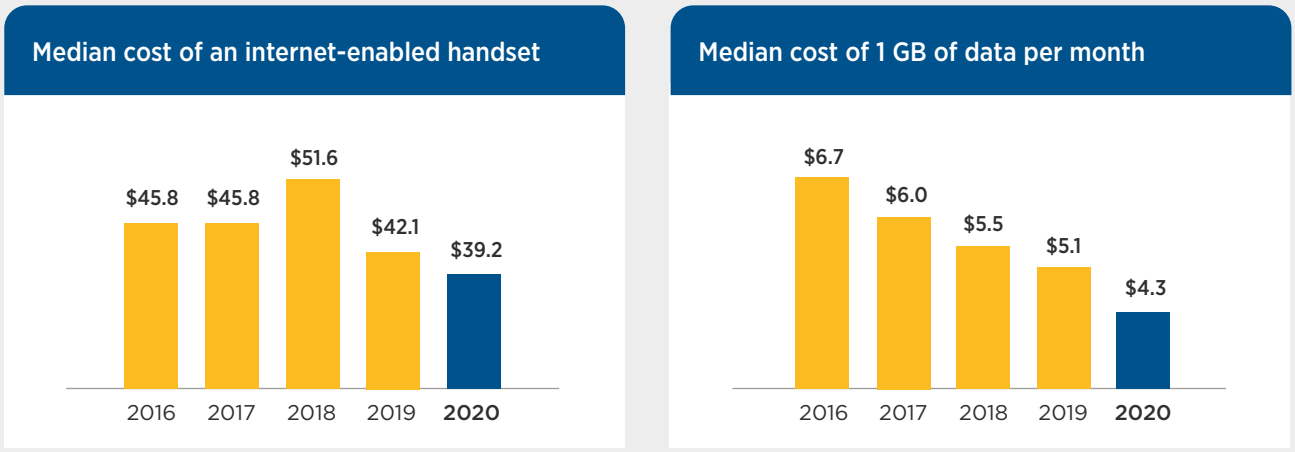


Source: GSMA Intelligence analysis of IMF World Economic Outlook (April 2021)

22. Source: IMF World Economic Outlook (July 2021)
23. The ILO's World Employment and Social Outlook: Trends 2021 reports that global labour income was $3.7 trillion lower in 2020 than it would have been in the absence of the pandemic.
24. United Nations (2021). The Sustainable Development Goals Report 2021.

Figure 14

Price of an internet-enabled handset and 1 GB in LMICs



Price of handset is the cheapest internet-enabled feature phone or smartphone available (at the time of collecting data) sold by mobile operators or mobile phone retailers (it does not not reflect prices in second-hand or black markets handsets).

Price of 1 GB is the cheapest plan available (at the time of collecting data) to purchase at least 1 GB of data per month.

Source: GSMA Intelligence calculations based on pricing data from Tarifica

Although the latest economic growth projections suggest global GDP will rebound and increase by 6% in 2021 (ranging from 3.4% in Sub-Saharan Africa to 7.5% in Asia[25]), prospects remain highly uncertain and subject to ongoing waves of COVID-19 infection. For many low- and middle-income countries, GDP per capita is likely to remain below pre-pandemic levels for an extended period.[26] Therefore, affordability of handsets and data will likely remain a barrier for much of the unconnected population.

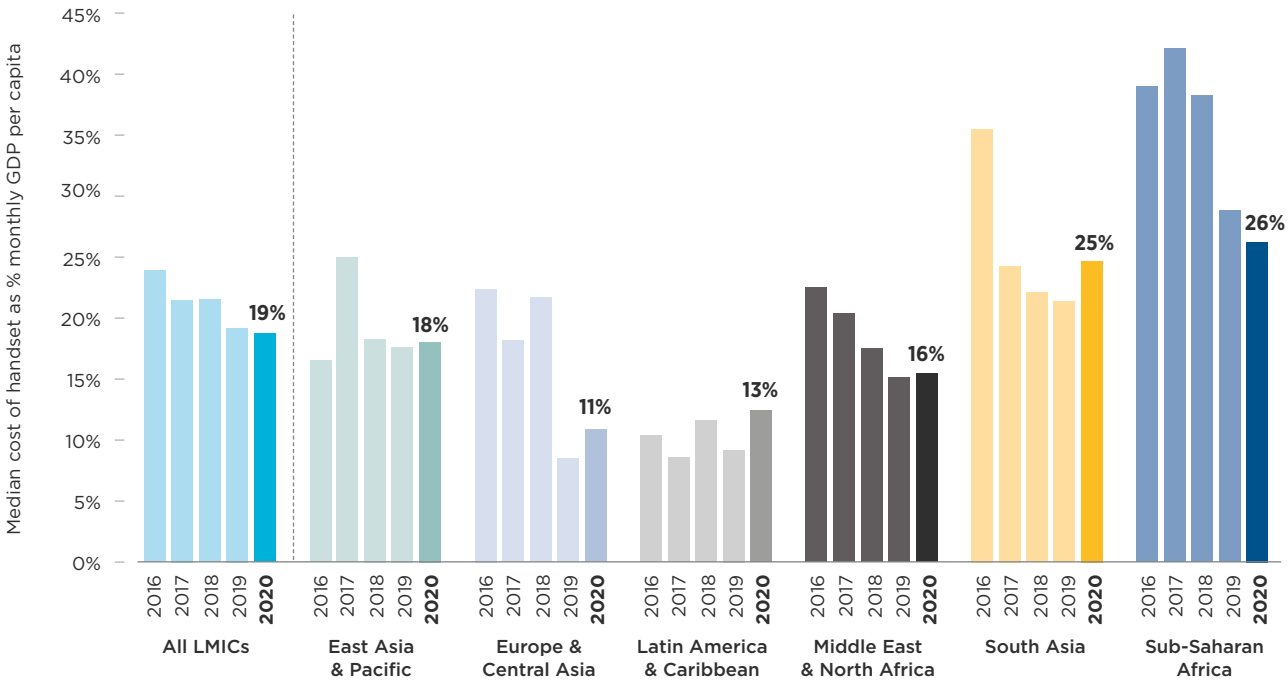
25. Source: IMF World Economic Outlook (July 2021)
26. The World Bank (2021). The Global Economy: on Track for Strong but Uneven Growth as COVID-19 Still Weighs.

Affordability of internet-enabled handsets is worsening in all regions, except Sub-Saharan Africa

Affordability has worsened nearly everywhere in the last year, with the median cost of an entry-level internet-enabled handset as a share of monthly GDP per capita increasing in all regions, except Sub-Saharan Africa (see Figure 15). While handsets remain on average the least affordable to consumers in Sub-Saharan Africa, the median cost of a handset as a share of monthly GDP per capita fell from 29% to 26%, continuing the downward trend seen since 2017. As a result, affordability of an entry-level internet handset improved slightly across all LMICs overall, reaching a median cost of 19% of monthly GDP per capita, despite decreasing in affordability in most regions.

Figure 15

Affordability of an entry-level internet enabled handset in LMICs, 2016-2020



Price of device is the cheapest internet-enabled feature phone or smartphone available (at the time of collecting data) sold by mobile operators or mobile phone retailers. To determine affordability, we divide the price by monthly GDP per capita (sourced from IMF World Economic Outlook).

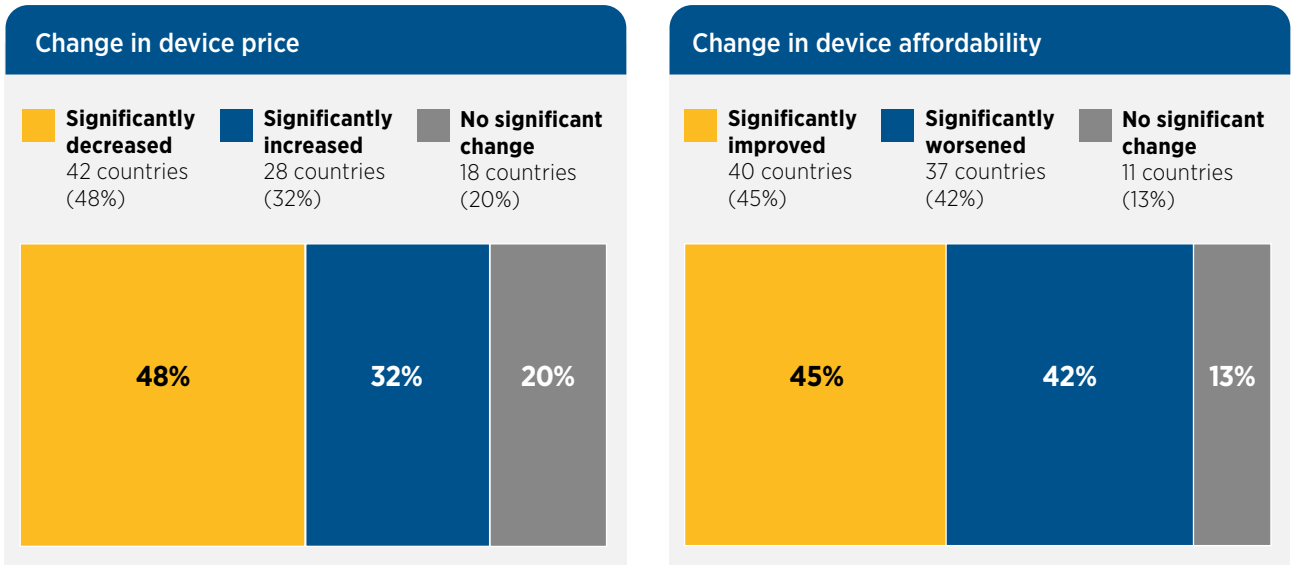
Source: GSMA Intelligence calculations based on pricing data from Tarifica

Affordability worsens when consumers either face an increase in handset costs and/or when average incomes reduce and a positive change in one factor cannot compensate for a negative change in the other. Affordability worsened in many countries (see Figure 16), with a reduction in average incomes, driven mainly by COVID-19. However, an increase in the cost of an entry-level internet handset in many LMICs also contributed to worsen affordability of handsets. This is likely to be driven by a combination of factors, including changes in the portfolios of handsets offered by operators and distributors to include more higher-priced handsets. In some markets, the increasing cost of smartphones was due to component shortages during the pandemic (especially semi-conductors[27]), higher logistics costs, taxes and/or currency devaluations.

27. See for example moneycontrol.com (May 2021). "Semiconductor shortage triggers rise in smartphone prices".

Figure 16

Change in entry-level internet-enabled handset cost and affordability in LMICs between 2019 and 2020



For this analysis, we define a significant change as being more than 5%. For example, a 'significant increase in price' refers to countries where the cost increased by more than 5%; a 'significant improvement in affordability refers to countries where the cost of a handset as a percentage of monthly GDP per capita decreased by more than 5%.

Source: GSMA Intelligence analysis based on Tarifica data for 88 countries with handset pricing available.

In most countries across Sub-Saharan Africa, internet-enabled handsets are becoming more affordable due to the emergence of smartphones and smart feature phones at prices that have been low enough to compensate for the loss in income. Smart feature phones do not offer the full capabilities of a smartphone but allow for installation of a range of applications and provide a faster, better browsing experience than traditional feature phones.[28] Their introduction in many Sub-Saharan African markets meant that in 2020 the region had the lowest median price for an entry device of all regions, at $28 (down from $36 in 2019). While South Asia had seen a marked improvement in device affordability, from 36% of monthly income in 2016 to 22% in 2019, this increased to 25% in 2020 (see Appendix 3).

It is important to note that handsets must be accessible to consumers too. Those in rural and peri-urban areas who have less disposable income often do not gain access to the cheapest internet-enabled handsets because distributors (including operators) may have a limited presence in such areas. Expanding the availability of – and access to – these handsets is therefore important to accelerate the adoption of mobile internet.

28. For further details, see spotlight in GSMA (2020). The State of Mobile Internet Connectivity Report 2020.

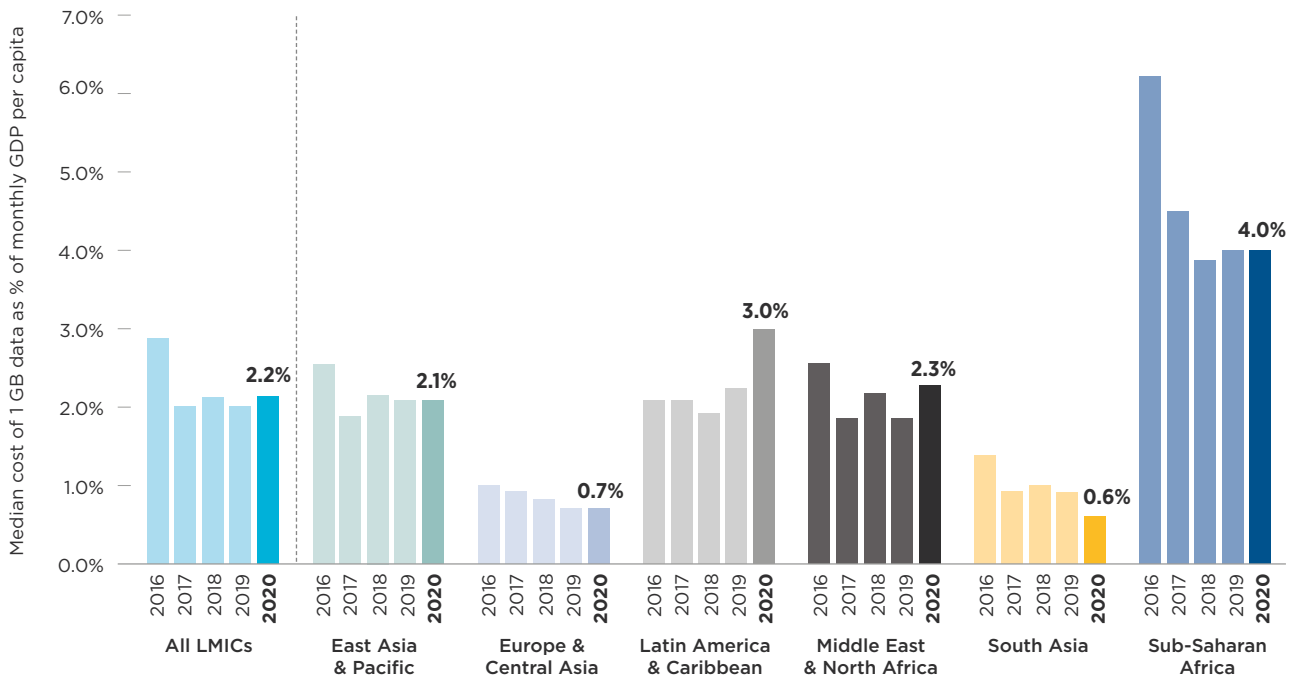
As incomes fall, mobile data becomes less affordable in many markets

The median cost of 1 GB of data as a share of monthly GDP per capita increased from 2.0% in 2019 to 2.2% in 2020 (see Figure 17), which means that more than half of LMICs are falling short of the Broadband Commission's affordability target.[29] This represents 68 out of 128 countries with pricing data.

These overall trends mask significant differences by region. Mobile data remains least affordable in Sub-Saharan Africa, where the median cost as a share of monthly GDP per capita has remained relatively flat at around 4%. Data affordability deteriorated in most countries in Latin America and MENA; these regions saw the largest reductions in GDP per capita. In Latin America, for example, although the cost of data decreased or remained stable in most markets, affordability for consumers worsened due to losses in income (see Appendix 3). Meanwhile, data is most affordable for consumers in South Asia, where reductions in data costs were large enough to compensate for the contraction of the economy.

Figure 17

Affordability of 1 GB in LMICs, 2016-2020



Price of 1 GB is the price of the cheapest plan available (at the time of collecting data) to purchase at least 1 GB of data per month. Further details on how pricing data is gathered can be found in the Mobile Connectivity Index Methodology. To determine affordability, we divide the price by monthly GDP per capita (sourced from IMF World Economic Outlook).

Source: GSMA Intelligence calculations based on pricing data from Tarifica and ITU

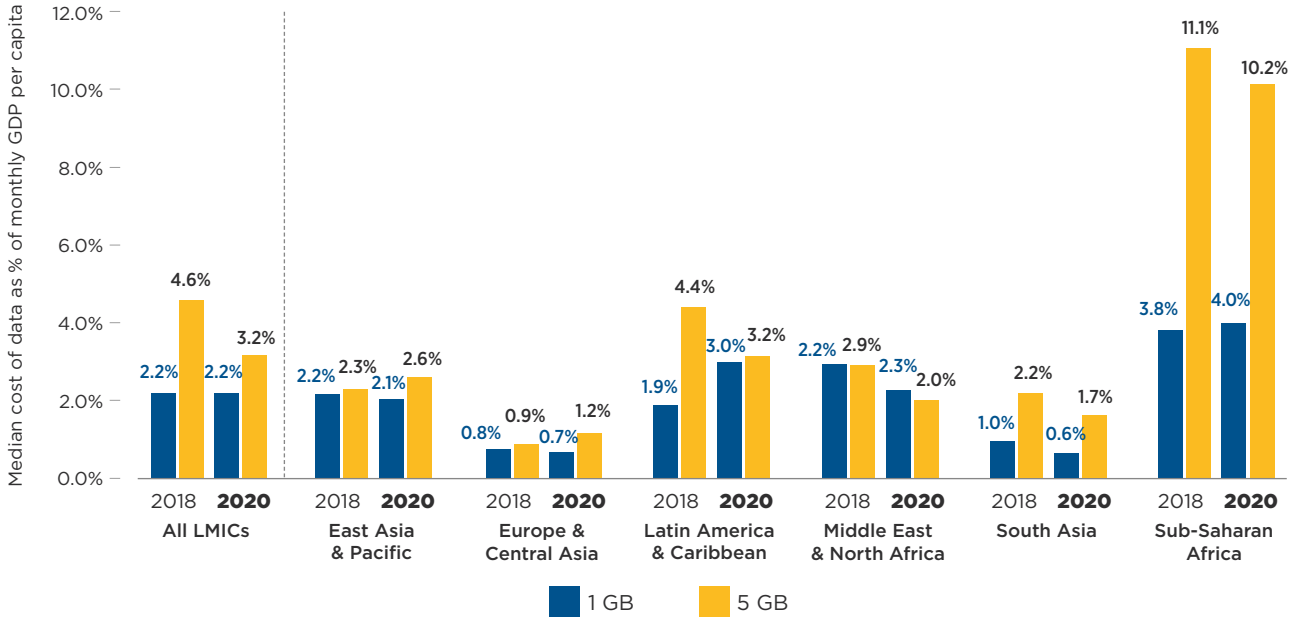
29. The UN Broadband Commission has set a target to make entry-level data services less than 2% of monthly income per capita by 2025. See 2025 Targets: Connecting the Other Half, Broadband Commission, 2018. While the Commission's target refers to affordability based on GNI per capita, we use GDP per capita to incorporate more up-to-date data on income per capita. In any case, GDP and GNI per capita are very highly correlated, so our results do not materially change based on the income metric used.

Affordability of higher data allowances has improved since 2018

With usage increasing in many countries following the onset of the pandemic (see Chapter 3), consumers are requiring more data to meet their needs.[30] While the affordability of 1 GB has remained relatively stable across all LMICs since 2018, the affordability of a 5 GB monthly data bundle improved significantly in most regions (see Figure 18). However, despite reductions, data costs as a share of monthly GDP per capita remain the highest in Sub-Saharan Africa at 10.2% for 5 GB, compared to 1.7% for the same data allowance in South Asia.

Figure 18

Affordability of 1 GB and 5 GB in LMICs, 2018 versus 2020

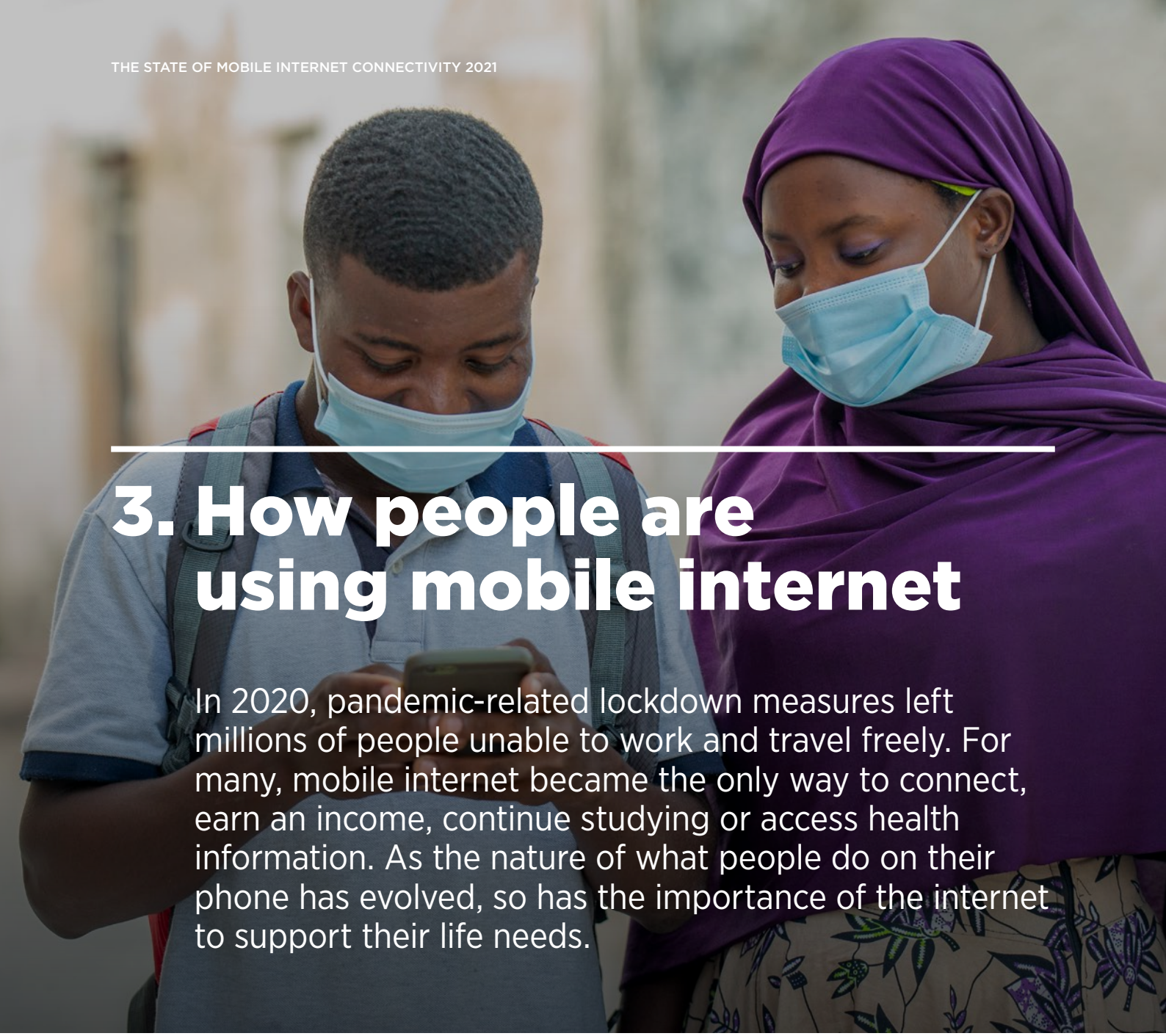


Source: GSMA Intelligence calculations based on pricing data from Tarifica

Affordability is likely to remain a key barrier for the poorest

With many people struggling to meet their basic needs, reducing the absolute cost of handsets and mobile data will not be sufficient to improve affordability. Furthermore, production costs for handsets are unlikely to decline further in the near future. Alternative solutions are needed to increase consumers' buying power. For example, in recent years, consumers in many LMICs have benefitted from the availability of mobiles using a lightweight operating system that minimises data usage, as well as asset financing models, including pay as you go, that reduce the upfront cost of a handset. However, for the latter, analysis from the GSMA Consumer Survey indicates that take-up of repayment plans remains limited. Across the LMICs surveyed, the proportion of consumers paying for their handset in instalments ranged from 2% in Guatemala to 4% in Pakistan.

30. See for example The World Bank (2021). "Minimum Data Consumption: How much is needed to support online activities and is it affordable?"



3. How people are using mobile internet

In 2020, pandemic-related lockdown measures left millions of people unable to work and travel freely. For many, mobile internet became the only way to connect, earn an income, continue studying or access health information. As the nature of what people do on their phone has evolved, so has the importance of the internet to support their life needs.

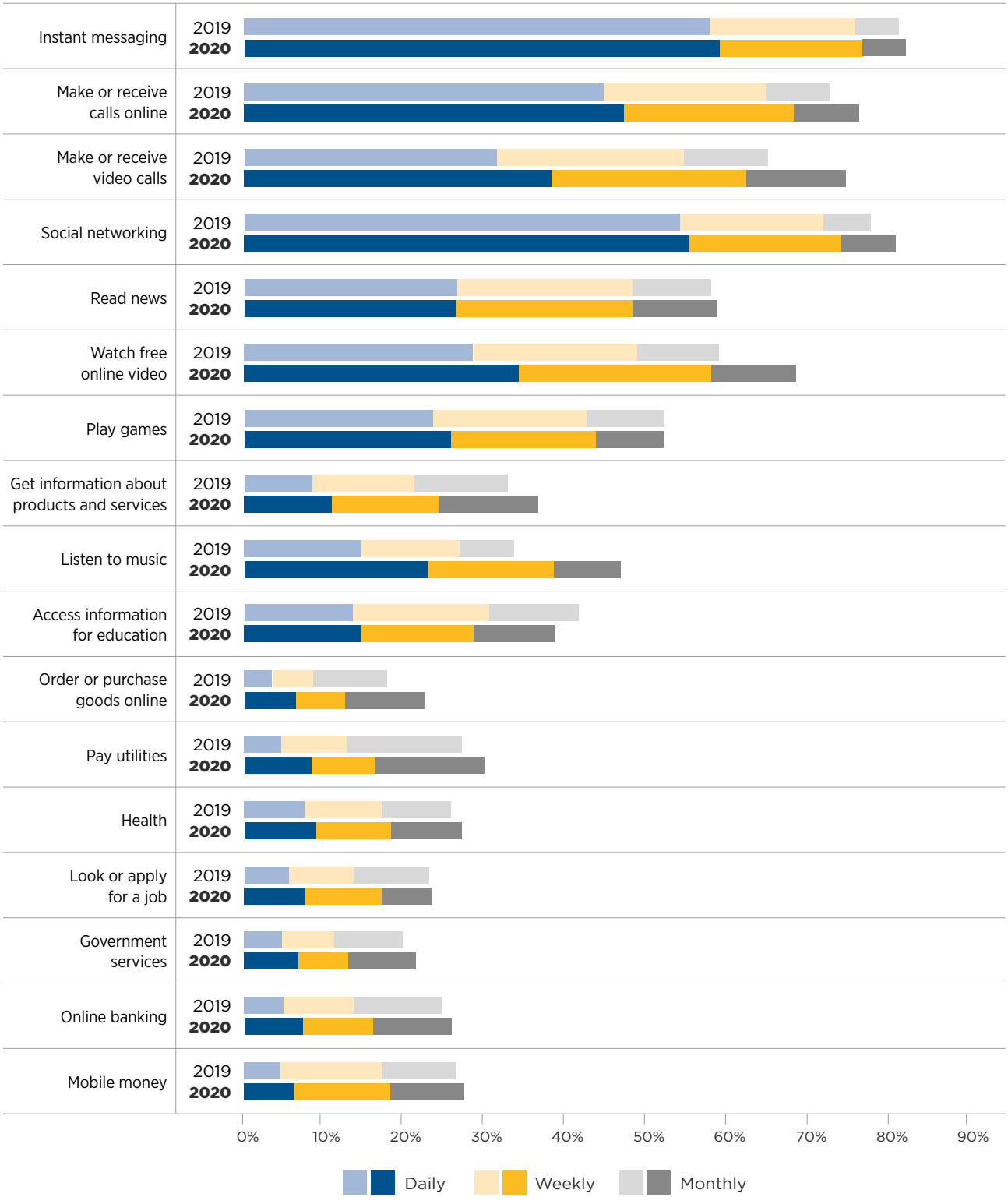
The diversity and frequency of online activities have increased since the onset of the COVID-19 pandemic in surveyed countries

Across all surveyed countries, mobile internet users have been engaging in a greater range of online activities compared to 2017. Notably, since 2019, users in Kenya, Nigeria, Algeria and Bangladesh have significantly increased the number of online activities they engage in at least once per month. For example, in Nigeria, the average number of activities that mobile internet users carried out at least once per month increased from 7.5 to 8.5.

Across the LMICs surveyed, users are also using mobile internet more frequently for a range of activities. While instant messaging, social networking and voice calls online remain the most popular mobile internet use cases, using video for calls, watching free online videos and listening to music are on the rise. Across the countries surveyed, daily usage of these activities increased significantly between 2019 and the end of 2020, possibly driven by pandemic-related social-distancing measures (see Figure 19). Although still relatively low, it is interesting to note the increase in online ordering or purchasing goods or services and utility payments via mobile in 2020. This suggests that the internet is becoming increasingly useful to people in their lives.

Figure 19

Frequency of activities undertaken on mobile internet in surveyed LMICs, 2019–2020



Base: Adults aged 18+ who have used mobile internet in the last three months.

N = from 216 to 765.

Percentages indicate the proportion of respondents who answered that they engaged in the relevant activity on a mobile phone at least once per day, week or month. Respondents may have engaged in some use cases on a phone other than their own. Calculations are based on an average of the eight countries surveyed in 2020.

For further details on the questions asked, see Appendix 1.

Source: GSMA Consumer Survey.

Analysing mobile internet activities helps to understand what people are doing on their phones and get an indication of data consumption. However, it does not provide an understanding of the different needs being met with mobile internet, as activities are often undertaken to meet more than one need. For example, watching free videos online can be used for the purpose of entertainment but also for education or to learn a new skill. Similarly, it is important to note that social media is now commonly used not only for communicating with friends and family, and for entertainment but also for the dissemination of news and information and as a platform for small or informal businesses to grow their customer bases.

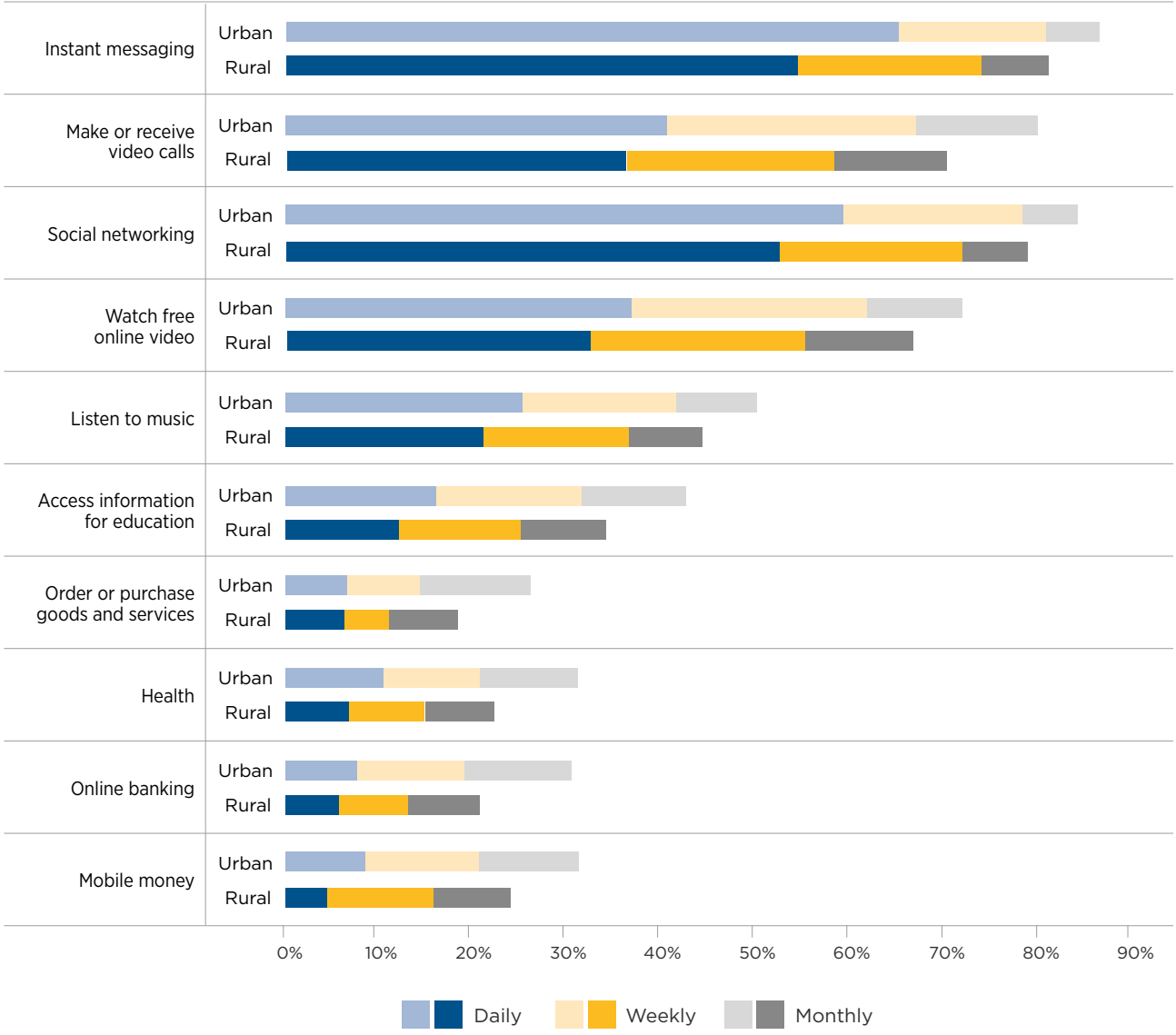
Location and gender influence how consumers engage with mobile internet services

Across the surveyed countries, both rural and urban mobile internet users reported using mobile internet for a wider range of activities and more frequently. However, there is still a rural-urban gap. With a few exceptions, urban mobile internet users were more likely to use a broader range of activities than their rural counterparts. Across the surveyed countries, the number of activities undertaken at least once per month using internet on a mobile ranged from 8 to 10 for urban users and 6 to 8.5 for rural users.

Rural users were 20–30% less likely to engage in activities such as ordering or purchasing goods online and using mobile to access education, health and financial services (see Figure 20). Rural users also tend to engage in online activities less frequently – even the most popular ones, though the rural-urban gap is smaller in this instance. As an example, rural users are 6% less likely than urban users to use instant messaging and social networking on a monthly basis.

Figure 20

Frequency of selected activities undertaken on mobile internet in urban and rural areas in surveyed LMICs, 2020



Base: Adults aged 18+ who have used mobile internet in the last three months.

N = from 99 to 486.

Percentages indicate the proportion of respondents who answered that they engaged in the relevant activity on a mobile phone at least once per day, week or month. Respondents may have engaged in some use cases on a phone other than their own. Calculations are based on an average of the eight countries surveyed in 2020.

For further details on the questions asked, see Appendix 1.

Source: GSMA Consumer Survey

Similarly, women and men mobile internet users report using mobile internet for a wider range of activities over the past four years, though men tend to report more uses. Across the surveyed countries in 2020, the number of activities undertaken at least once per month using internet on a mobile ranged from 7.5 to 9.5 for male users and from 5.0 to 8.5 for female users. However, the level of engagement varies by activity. For example, in many surveyed countries, women were just as likely (in some cases more likely) to use mobile to access educational or health services than men at least once per month. However, they were much less likely to use their device for financial services (such as mobile money or online banking) or to access information on products and services.

A range of factors influence the tasks users perform on mobile phones

There is currently little publicly available data on mobile digital skills in LMICs.[31] This year's Consumer Survey therefore included some questions to measure ability and confidence in performing mobile internet related tasks across different competency areas. Seven tasks were selected based on a synthesis of experience and lessons around mobile digital skills mapped across four competency areas.[32]

Overall, most mobile internet users had performed a range of mobile internet related tasks (see Figure 21). However, there are several factors influencing the range of tasks mobile users typically undertake. For example, users across surveyed countries in Sub-Saharan Africa were more likely than those in South Asia to be able to set limits on data usage. This is likely because data is less affordable in the region. Differences may also result from limited experience, especially among new mobile internet users. We also found a correlation between the number of actions performed and age, with younger users generally performing a wider variety of tasks.

Figure 21

Tasks performed by mobile internet users

Base: Adults aged 18+ who have used mobile internet in the last three months.

N = 2,140 to 2,737

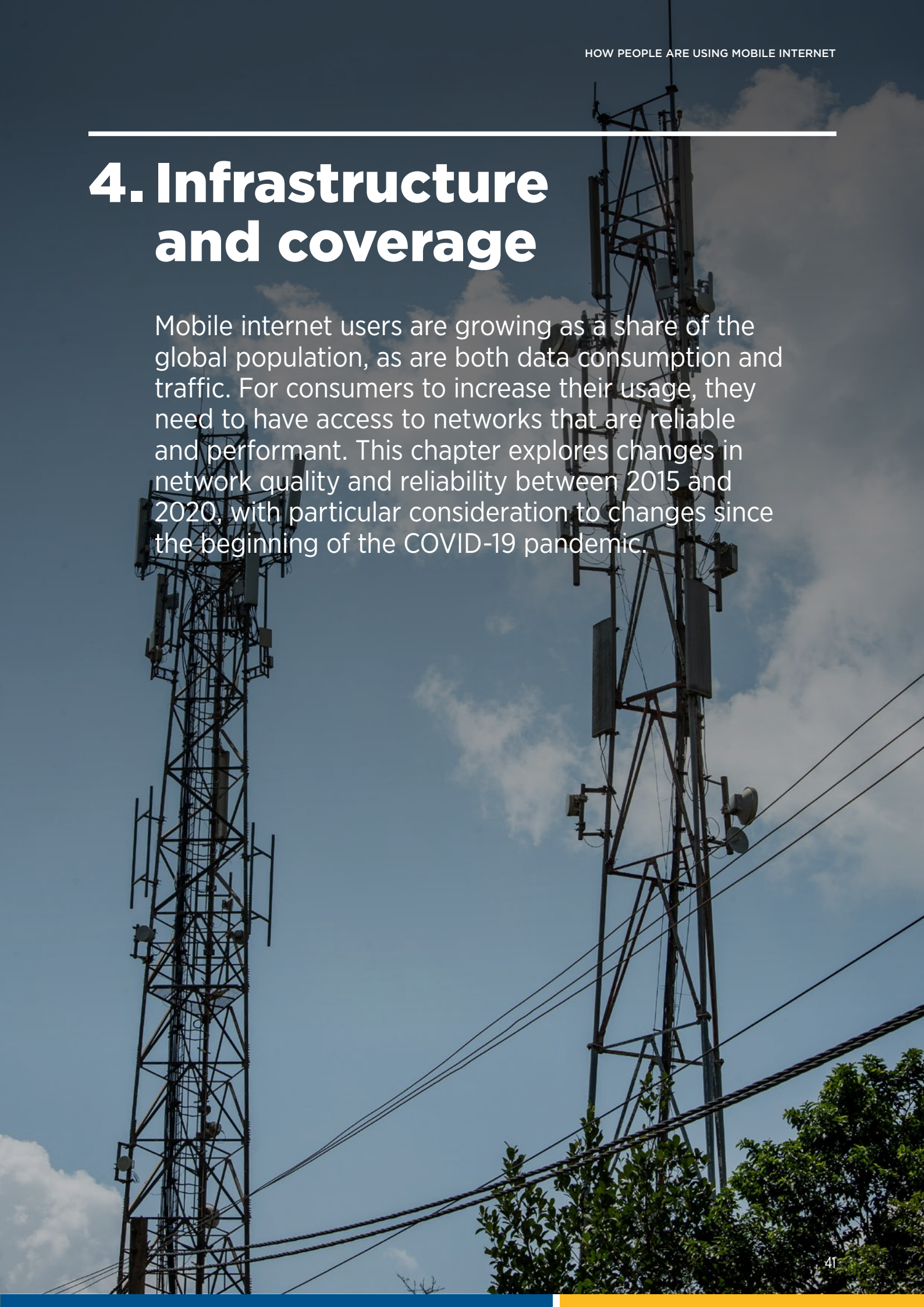
Percentages indicate the proportion of respondents who responded that they would be able to do a task that they have previously done before by themselves. Calculations are based on an average of the seven countries surveyed in 2020 (excludes Guatemala, where these questions were not asked).

Source: GSMA Consumer Survey.

31. Existing indicators for ICT skills are often based on outdated methods of access that do not reflect how most users – especially in LMICs – access the internet, i.e. on mobile devices.
32. Based on the Digital Literacy Global Framework developed by Unesco, the four competency areas selected were set-up and configuration; information management; digital content creation; and safety and security. For more information on the mobile digital skills framework, see GSMA (2021). Accelerating mobile internet adoption.

4. Infrastructure and coverage

Mobile internet users are growing as a share of the global population, as are both data consumption and traffic. For consumers to increase their usage, they need to have access to networks that are reliable and performant. This chapter explores changes in network quality and reliability between 2015 and 2020, with particular consideration to changes since the beginning of the COVID-19 pandemic.

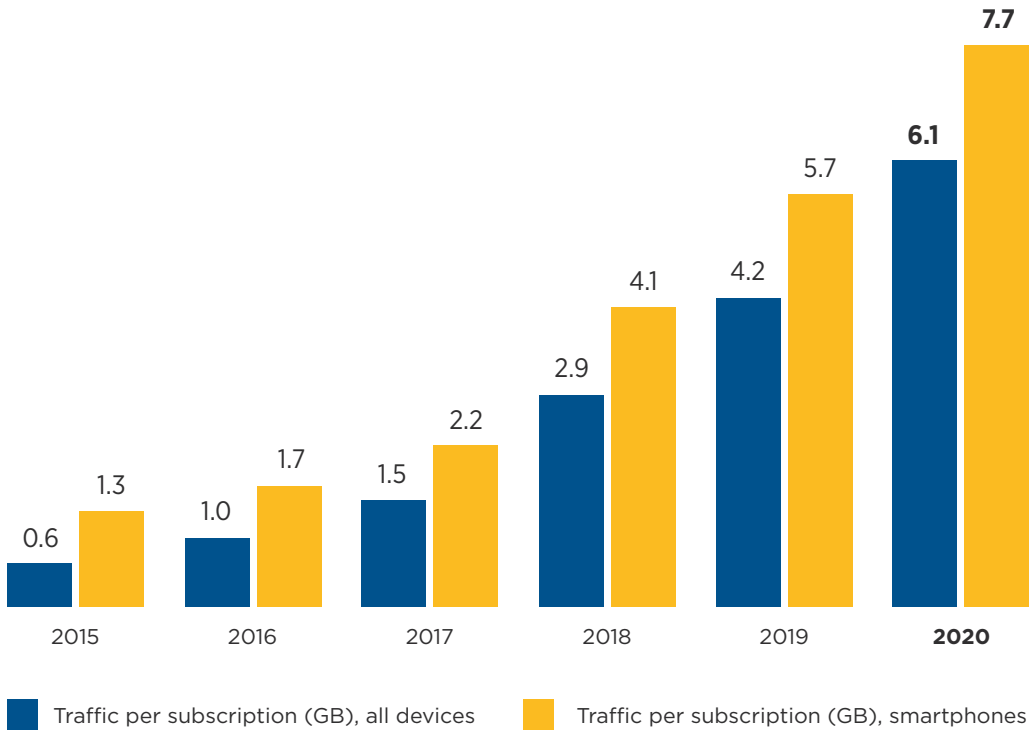


Mobile networks proved resilient despite the surge in data usage

Following the outbreak of COVID-19 and the subsequent mitigation measures put in place by governments, including stay-at-home instructions, unprecedented demand was placed on mobile networks. This was particularly the case in countries where users rely on mobile platforms to get online and do not have access to fixed broadband. As a result, global mobile data traffic per user reached more than 6 GB per month when considering all types of devices, and almost 8 GB per month for smartphones only (see Figure 22). This was the largest absolute increase over the previous five years and double the level of data usage in 2018.

Figure 22

Global mobile data traffic per mobile connection, 2015–2020



Source: Ericsson Mobility Report (June 2021)

This increase in data traffic has been substantial across all regions (see Figure 23a and 23b). While significant increases in data usage occurred in LMICs, overall data traffic per user in 2020 was around three times lower in LMIC regions compared to most high-income regions, and nine times lower in Sub-Saharan Africa. The notable exception is India, where average data usage per user is among the highest in the world. This has been driven by an increasing number of 4G users and more affordable handsets and data plans. While data demand is primarily urban, it is also growing in rural areas. For example, rural India accounted for 45% of total traffic in India at the end of 2020, compared to 40% before the pandemic.[33]

33. Economic Times (2020). "Covid impact: Rural India beats urban in mobile data usage".

Figure 23a

Mobile data traffic per mobile connection in high-income countries (by region), 2015–2020

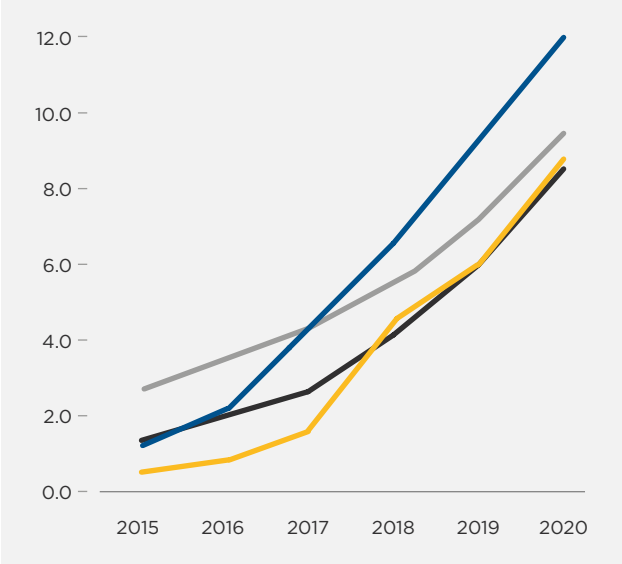
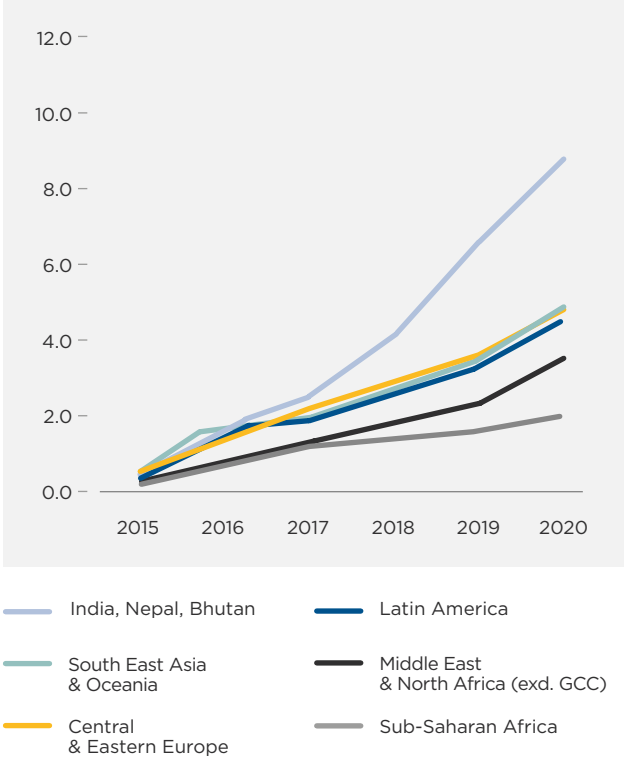


Figure 23b

Mobile data traffic per mobile connection in LMICs (by region), 2015-2020



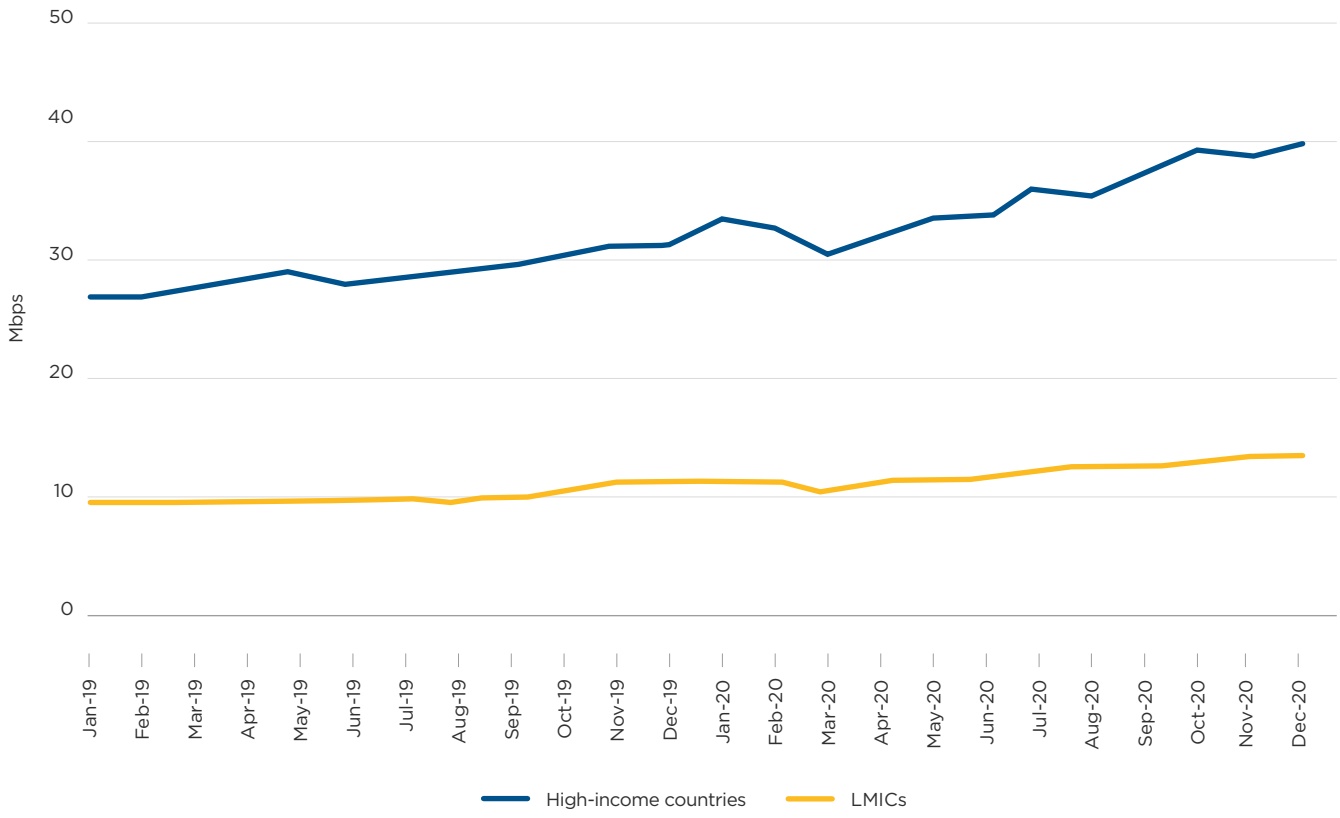
Source: Ericsson Mobility Report (June 2021)

When networks operate close to maximum capacity, surges in data usage can lead to congestion and impact the user experience, in terms of reduced download speeds, for example. At the beginning of 2020, when many countries began to lock down,[34] there was a reduction in average download speeds as online usage increased (see Figure 24). However, this proved to be temporary; over the course of the year, download speeds increased. By December 2020, speeds were, on average, higher than the year before.

This includes increases in download speeds across all LMIC regions, with significant increases in East Asia & Pacific reaching similar levels to those seen in Europe & Central Asia. However, the gap in download speeds between high-income countries and LMICs is widening, with the former seeing download speeds three times higher. In addition, average download speeds remain below 20 Mbps in all LMIC regions and below 10 Mbps in Sub-Saharan Africa.

Figure 24

Average download speeds in high-income countries and LMICs before and after the COVID-19 outbreak



Source: GSMA Intelligence analysis, based on Speedtest Intelligence® data provided by Ookla®

34. See for example the Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford

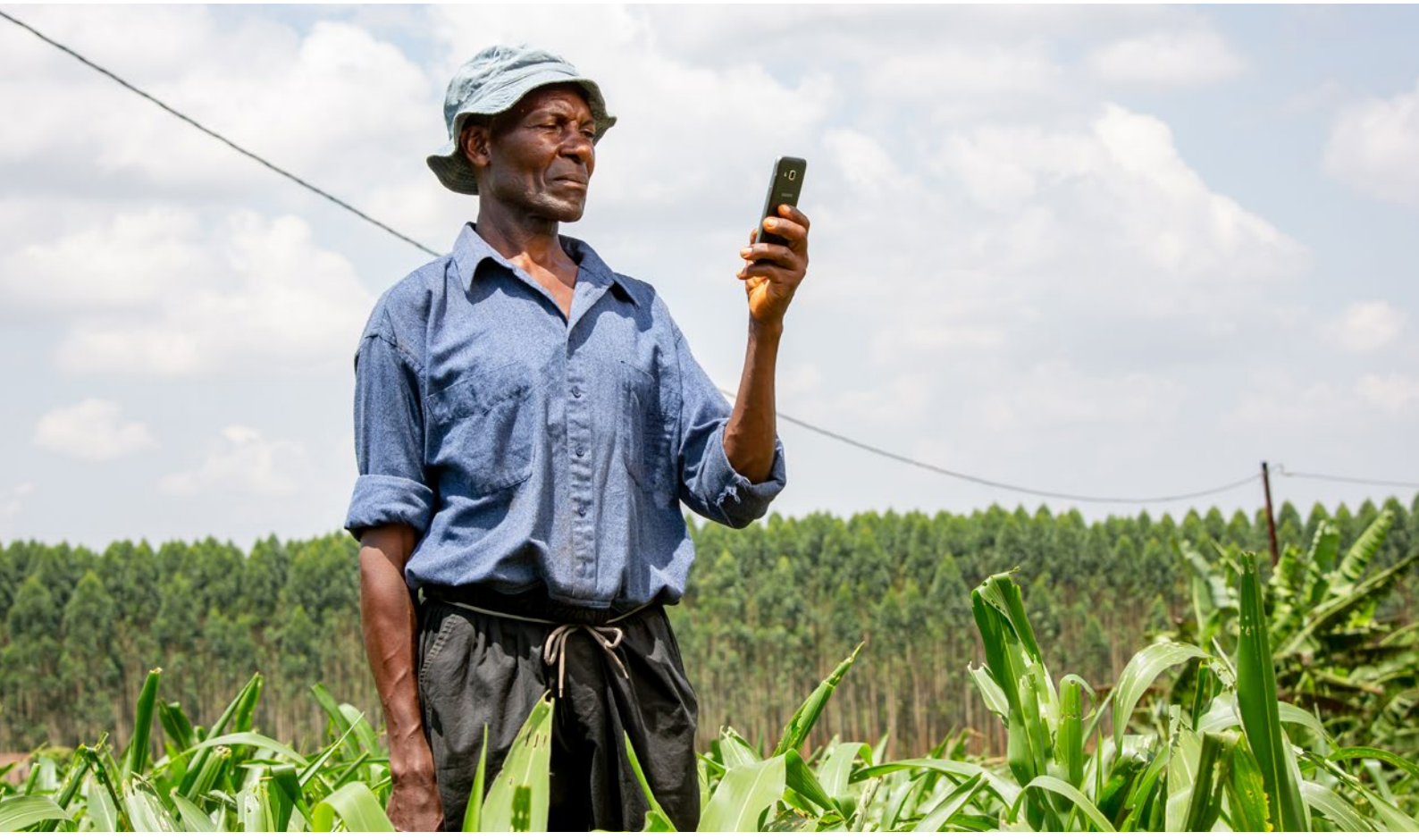
The private and public sectors have responded to the surge in traffic

In many countries, networks had enough capacity headroom to meet the increased demand. Additionally, operators took a number of steps to manage the surge in traffic, including:

- optimising network configuration and routing, as work transitioned from business to residential areas and as traffic increased in rural and semi-urban areas[35]
- deploying new mobile sites to densify networks and increase capacity in busy areas
- expanding capacity in existing sites to cater to the increase in demand, and expanding capacity in core and transit networks.[36]

Many governments supported operators in responding to the increased demand for data, with initiatives such as:

- assigning temporary additional spectrum (e.g. in Ghana, Zambia, Zimbabwe and South Africa) or making all spectrum technology neutral (e.g. in Tunisia and Cabo Verde)
- expanding spectrum licence validity (e.g. in Mauritius)
- reducing or suspending regulatory fees (e.g. in the Philippines and Colombia)
- enabling infrastructure expansion – for example, simplifying the processes to deploy shared telecoms infrastructure in the Philippines.[37]



35. See for example annual reports for MTN, Axiata, Airtel India and Ooredoo.
36. See for example annual reports for Etisalat and Vodacom, and Nokia (2020). Network traffic insights in the time of COVID-19.
37. For further details and examples, see 'Global Digital Development Policy Response Database' (World Bank) and 'REG4COVID database' (ITU)

Operators also increased capacity by continuing to invest in network upgrades and expanding 3G, 4G and (in some markets) 5G coverage, particularly in the second half of the year. In Sub-Saharan Africa, operators in several countries extended their 3G and 4G network coverage, increasing from 76% to 81% and from 41% to 51%, respectively, between 2019 and 2020 (see Figure 25). This was driven particularly by coverage gains in West Africa – for example, in Benin, Guinea, Mali and Nigeria. There were also substantial increases in mobile broadband coverage in the Pacific Islands, where 4G coverage increased from 36% to more than 50%. Across all LMICs, 4G coverage stood at 84% at the end of 2020, only eight percentage points less than 3G; this represents a huge leap since 2015, when 4G coverage was 31 percentage points behind 3G.

Figure 25

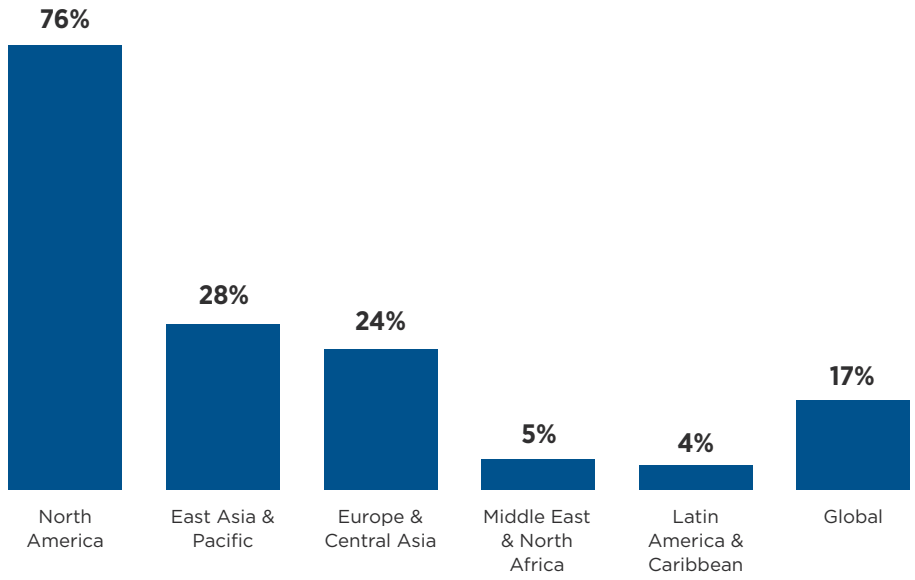
3G and 4G population coverage in LMICs by region, 2015–2020

Source: GSMA Intelligence

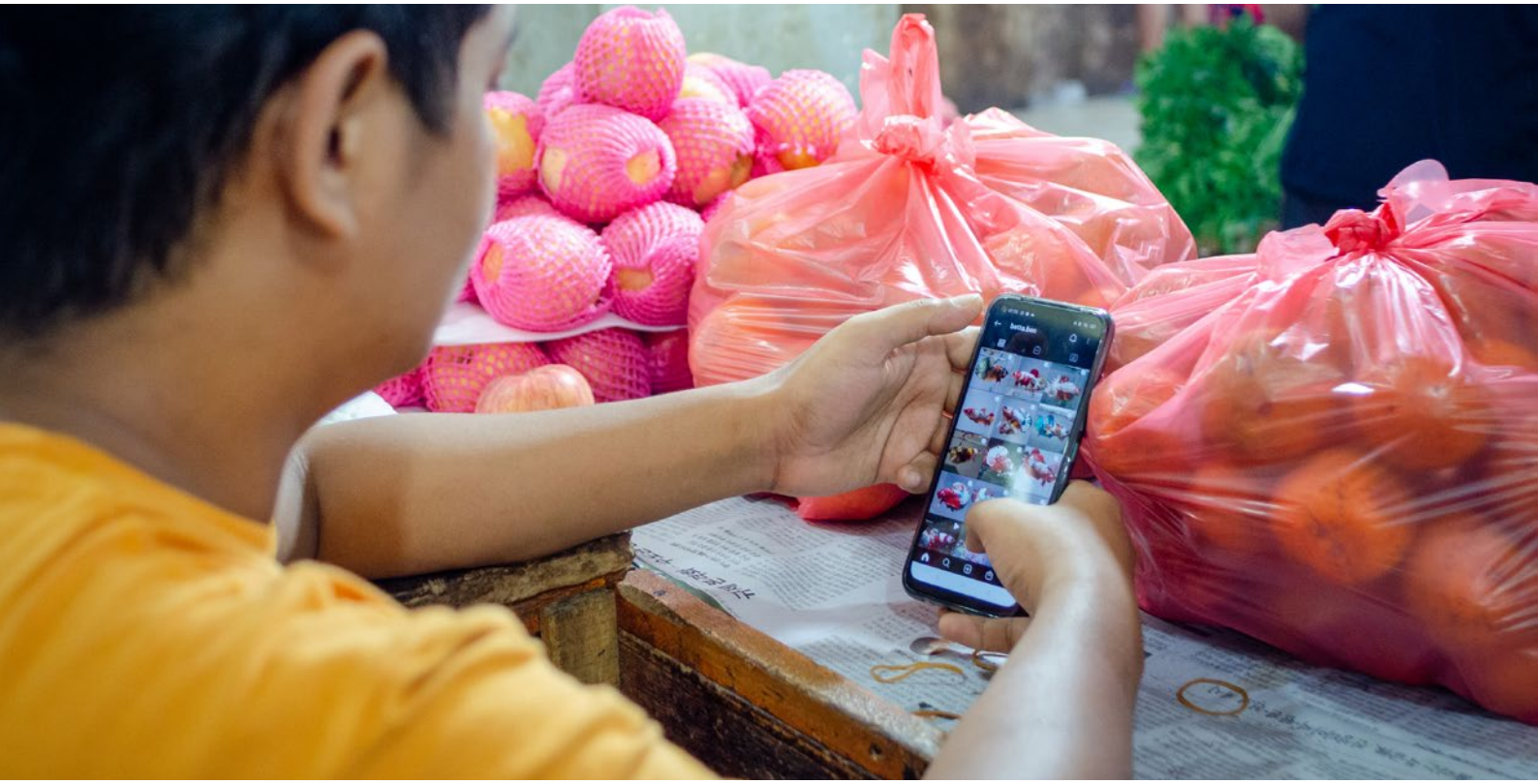
In many markets, especially high-income countries, the transition to 5G continued – in some cases accelerated by the pandemic. At the end of 2020, 57 countries had launched 5G networks (47 of which were in high-income countries), increasing global coverage to 17% (up from 5% at the end of 2019).

Figure 26

5G population coverage by region, 2020



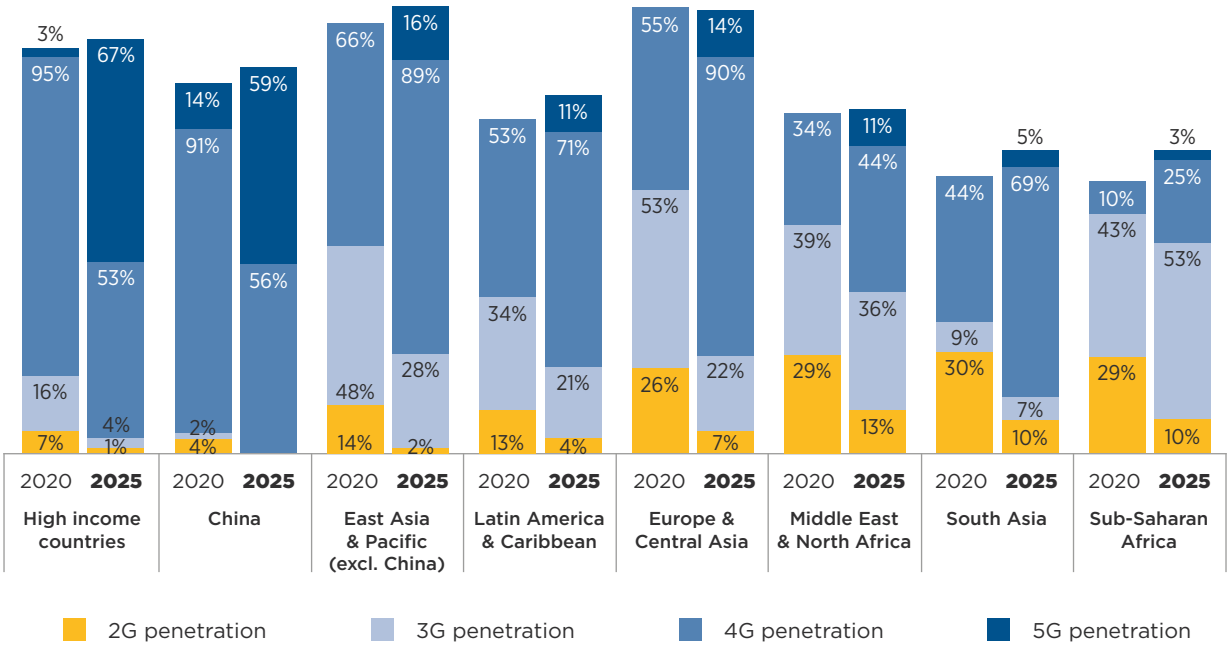
Source: GSMA Intelligence



While technology lags have reduced over time,[38] 5G adoption is not expected to take off in most LMICs (outside of China) in the next few years (see Figure 27), unless there are significant changes in use cases and demand. Provision of affordable 5G handsets will be particularly important to driving demand. An increasing number of 5G handsets are available for wholesale purchase between $100–399, and more affordable devices are expected to become available as more consumers migrate to 5G in emerging markets.[39] However, they will remain out of reach for large segments of the population in LMICs in the near future, particularly in markets where 3G and 4G handsets are available at much lower cost.

Figure 27

Market penetration by region and technology, current state and forecast



Penetration is calculated based on the number of connections (or SIM cards) rather than unique subscribers. Total penetration can therefore be greater than 100% as an individual can own multiple SIM cards.

Source: GSMA Intelligence

Mobile internet is a market where supply follows demand

It is expected that operators in LMICs will continue to upgrade existing networks and migrate consumers to 4G, particularly in urban areas. However, expanding 3G/4G to all uncovered areas will be challenging. The trends presented in Chapter 1 show that the reduction in the coverage gap has slowed down in the last two years, as the uncovered now mostly comprises those living in rural, low-income and sparsely populated areas. In many of these areas, the combination of high costs and low returns makes further deployments economically unviable (see *Spotlight: Supply and Demand for Coverage*). The limiting factor to increasing coverage of 3G and 4G networks is not a lack of suitable technology or limited investment capacity by mobile operators; rather, it is insufficient levels of user demand to sustain investments.

38. For example, it took LMICs around seven years to reach more than 80% coverage for 4G, compared to 10 years for 3G
39. Counterpoint Research (2021). Whitepaper – Making 5G Global: Accessibility for All.

Spotlight

The dynamics between supply and demand for coverage: **The example of Nigeria and The Democratic Republic of Congo**

3G and 4G coverage gaps in many countries, particularly in Sub-Saharan Africa, reflect fundamental economic challenges around the supply and demand for mobile services.

The challenge can be illustrated by comparing two markets: Nigeria and the Democratic Republic of the Congo (DRC). Between 2018 and 2020, both 3G and 4G coverage increased significantly more in Nigeria than in DRC, with 80% of people in Nigeria now living within the footprint of a mobile broadband network. This compares to just over 50% in DRC.

		2018	2020	2025 (FORECAST)
Nigeria	**3G coverage**	70%	80%	>90%
	4G coverage	17%	60%	>90%
DRC	**3G coverage**	53%	54%	67%
	4G coverage	11%	42%	50%

Will coverage in DRC catch up with Nigeria?
The key challenge to expanding mobile broadband coverage in DRC relates to lack of demand. Mobile internet adoption stood at around 20% at the end of 2020, compared to 35% in Nigeria. Both countries have a significant rural-urban gap, but rural adoption in Nigeria is much higher at around 16%, compared to less than 5% in DRC. Furthermore, most mobile data connections in DRC still use 2G, whereas in Nigeria the majority of data users connect with 3G or 4G. Demand in DRC, as well as some other Sub-Saharan African markets, still comes from voice rather than data, so innovations deployed in rural settings also tend to focus on 2G.

The GSMA has modelled the expected level of 3G/4G coverage that operators could provide under prevailing market conditions (i.e. limited adoption of 3G/4G in DRC and current ARPU levels). Specifically, the model simulates the additional economically viable sites that operators could deploy (or upgrade). The analysis shows that, over the next five years, operators could reach around 67% coverage for 3G and 50% coverage for 4G in DRC. By contrast, in Nigeria, operators could reach more than 90% coverage for both 3G and 4G.

Unless the barriers limiting the demand for mobile internet are addressed in DRC, it is likely that a third of the population will still be uncovered by 2025.

The demand barrier

To close the coverage gap in DRC, and other countries with large coverage gaps, in a manner that is financially sustainable, increasing demand will be vital. GSMA analysis shows that if 3G/4G adoption of mobile internet in uncovered areas was expected to be between 20% and 30% in DRC (compared to less than 5% currently in rural areas), further site deployments would be sufficiently profitable and operators could achieve around 90% mobile broadband coverage over the next five years.

A key challenge to expanding demand in DRC is affordability. At the end of 2020, the cost of 1 GB of monthly data represented almost 9% of monthly GDP per capita, well above the 2% international affordability target. By contrast, the cost in Nigeria is at 1.2%. Even for the highest income quintile in DRC, the cost of 1 GB still exceeds 2% of monthly income. Similarly, the cost of an entry-level, internet-enabled device was almost 45% in DRC, compared to 11% in Nigeria. As with other countries in the region, literacy and skills are a key barrier – particularly in rural areas, where almost a quarter of the adult population in DRC are illiterate.

Creating an enabling environment

Governments can put in place a more enabling framework that promotes the use of mobile internet. In the case of DRC, the country has one of the most heavily taxed mobile sectors in Africa (and globally) in terms of sector-specific taxes.[40] The reduction of such taxes could improve affordability as well as investment incentives for operators to upgrade and expand their networks. However, the introduction of the 'CEIR tax' – consisting of an annual payment of $7 for 3G/4G handsets that is equivalent to a price increase of almost 10% of the current cost of 1 GB of data – is a move in the wrong direction and likely to make it more challenging to achieve widespread coverage and adoption across the country. Aligning tax policy with best-practice principles to remove sector-specific taxes could improve affordability for consumers, as well as investment incentives for operators.[41] Targeted policies aimed at enhancing digital skills and literacy, expanding access to electricity, and increasing the availability of locally relevant content will also be critical to driving demand.

40. See for example GSMA (2019). Rethinking mobile taxation to improve connectivity, and FERDI (2020). The tax burden on mobile network operators in Africa.
41. See for example GSMA (2019) Rethinking mobile taxation to improve connectivity, and GSMA and Ernst & Young (2018) Reforming mobile sector taxation in the Democratic Republic of the Congo.

5. Conclusion and outlook

Early on in the COVID-19 pandemic, mobile operators in partnership with governments and regulators acted swiftly to ensure the resilience of network infrastructure and access to key services.[42] Mobile connectivity continues to play a crucial role as governments look to reinvigorate their economies and build a better, more inclusive society. It is essential that this sense of urgency is harnessed to bridge the digital divide and create a better digital future for everyone.

The mobile industry is leading efforts to advance inclusive digital growth

Mobile operators have traditionally held a strong position in driving digital growth, particularly in LMICs. In 2020 alone, industry investments in connectivity, new services, start-up programmes and other activities generated $4.4 trillion of economic value added (5.1% of GDP) globally. Over the next five years, mobile operators are expected to invest $900 billion in capex.[43] With a presence in local communities, operators are at the forefront of initiatives to boost digital inclusion.[44] However, improving connectivity further will require close collaboration and action by all stakeholders, based on a shared recognition of the importance of bridging the digital divide.

The COVID-19 pandemic has propelled digital inclusion to the top of the political agenda

Policy initiatives at the national, regional and global levels are raising ambitions for digitally driven development. For example, the European Union's €750 billion recovery fund earmarks 20% for digital transition.[45] Similarly, the US has included $65 billion for the expansion of broadband in its proposed infrastructure plan.[46] Other regions have also prioritised digital transformation, though financial commitments have not been as pronounced. For example, the African Union launched its Digital Transformation Strategy for Africa in 2020,[47] while ASEAN's Comprehensive Recovery Framework and its Digital Masterplan 2025 present policy and regulatory actions for the region to become a leading digital community.[48] The United Nations has also stressed the need to harness digitisation for sustainable development at the highest levels, appointing a UN

42. For an overview of immediate policy responses, see for example ITU's Reg4COVID platform or the World Bank's Global Digital Development Policy Response Database. See for example World Bank, ITU, WEF, GSMA (2020). Covid-19 Crisis Response: Digital Development Joint Action Plan and Call for Action.
43. GSMA (2021). The Mobile Economy Report 2021.
44. This is reflected, for example, in investments by operators in digital skills programmes or affordable internet-enabled devices, as well as the various initiatives the GSMA is jointly conducting with mobile operators and other stakeholders on behalf of the industry.
45. European Commission (2021). A recovery plan for Europe.
46. Reuters (2021). White House would back smaller broadband internet boost.
47. African Union (2020). The Digital Transformation Strategy for Africa (2020-2030).
48. ASEAN (2020). ASEAN Comprehensive Recovery Framework; ASEAN (2021). ASEAN Digital Masterplan 2025.

Envoy on Technology and organising a special session of the UN General Assembly on Digital Cooperation and Connectivity.[49]

The initiatives of the industry, policymakers and other stakeholders show that the urgency to accelerate digital transformation and address the digital divide is now widely shared. The pandemic has, so far at least, not resulted in a decline of mobile internet users as uptake continues to increase, including among women and people living in rural areas. However, the pandemic has pushed 124 million people into extreme poverty[50] and is impacting people who are more educated, urban and less dependent on agriculture for their livelihoods than those living in extreme poverty before the pandemic.[51] If left unaddressed, this may further exclude the most disadvantaged from benefiting from mobile internet. It is therefore crucial that strategies focused on driving digital inclusion are grounded in an understanding of the local context and address barriers that people face to going online.

Accelerating mobile internet adoption and use

Despite the significance of the usage gap, efforts to advance digital inclusion have tended to focus on increasing coverage. While enabling infrastructure investment should remain a priority to realise better mobile internet experiences, this alone will not be sufficient to achieve truly inclusive digital growth. A comprehensive approach is required that focuses on the usage gap. This includes focusing on the following:

- **Knowledge and digital skills** – Improving digital skills and literacy as well as increasing awareness and understanding of mobile internet and its benefits are critical to driving digital inclusion. Programmes to provide people with the skills to use mobile internet should be aligned with user needs and aspirations, and should focus on mobile since it is the primary way most people access the internet. Training and capacity building initiatives should equip users with the competencies required to effectively and safely use the internet, take into account the learning preferences of the target population and leverage technology for independent learning where appropriate. To achieve scale, mutually beneficial private-public partnerships should be pursued, digital skills development integrated into education policies at all levels and 'train-the-trainer' programmes implemented to enable ongoing community-based learning.

- **Affordability** – The scale of affordability as a barrier to mobile internet adoption and use highlights the need to improve the affordability of both handsets and data. Efforts include partnerships that lower the cost of internet-enabled handsets, financing mechanisms that reduce the upfront cost to consumers and promotions or subsidies that make handsets and data bundles more affordable for different user segments. It is also important that these efforts are supported by an enabling regulatory environment. Governments can directly impact affordability by, for instance, removing sector-specific taxes and considering subsidies that do not increase costs for others. Further driving down investment and operational costs will also be key to making connectivity more affordable. However, broader poverty reduction initiatives will be essential given the significant impact of low incomes on the affordability levels of data and handsets, which has worsened as a result of the pandemic.

- **Relevance** – To ensure there is a compelling value proposition for people to go online, more relevant content and services are needed that are designed to meet user needs and capabilities. This includes content and services available in relevant languages, which is a significant barrier preventing many people from benefiting from mobile internet. Improving relevance requires investment in local digital ecosystems that can accelerate growth in local content, services and applications that meet the needs of people in their communities. It also requires more people to have access to financial services so that they can make transactions and purchases online. Governments can take the lead by accelerating the digitisation of public services, specifically focussing on mobile channels.

- **Safety and security** – Safety and security concerns can prevent people from benefiting from – or even wanting to use – the internet. Every user should

49. See also the website of the UN Office of the Secretary General's Envoy on Technology for the Roadmap for Digital Cooperation and ongoing work (www.un.org/techenvoy)
50. United Nations (2021). Sustainable Development Goals Report.
51. World Bank (2020). Poverty and Shared Prosperity – reversals of fortune.

have a safe online experience, but disinformation, harassment and fraud pose an increasing threat. Users should be provided with the knowledge and tools to recognise threats and be able to address or reduce them. This can be achieved through, for example, awareness campaigns, digital skills training programmes, the development of safety apps and services, and the setting up of helplines. Products and policies should be based on privacy principles that protect the fundamental rights of individuals to privacy while at the same providing the flexibility to innovate in a responsible and accountable manner.

- **Access** – Even where mobile broadband coverage exists, people may not have access to key enablers such as electricity and formal IDs, or the services may not be accessible as a result of factors such as restrictive social norms or a lack of accessibility features. Addressing these issues requires, for example, the expansion of access to electricity, including the use of mobile technology for off-grid solutions, and ensuring registration processes for mobile and other digital services are inclusive and transparent. The needs of underserved groups including women and persons with disabilities should also be considered to enable greater access to sales channels, as well as training facilities. To promote better access to mobile internet for individuals with low literacy levels or for persons with disabilities, awareness of simplified products and services, as well as accessibility features, should be improved and their development encouraged.

Increasing mobile broadband coverage

While 94% of the global population are now covered by mobile broadband, 450 million people still remain uncovered, with the vast majority in Sub-Saharan Africa. Expanding mobile internet coverage is typically an economic challenge. Addressing it requires careful collaboration between the mobile industry and policymakers and will involve the following:

- **Innovation** – Mobile operators should explore the use of innovative technologies that reduce the cost of deploying and operating networks in remote areas. Supported by policies that enable rationalisation of resources, such as spectrum technology neutrality, such innovations can help extend coverage in a commercially viable manner.

- **Partnerships** – Industry collaboration, in the form of voluntary infrastructure sharing and public-private partnerships, can increase the efficiency of private and public capital, and extend the reach and capacity of mobile broadband networks. Proactive policies that target rural areas – such as using universal service funds (USFs) to subsidise infrastructure or providing timely access to public infrastructure – are effective mechanisms to increase investment levels in rural connectivity.

- **Spectrum** – According to recent work by the GSMA, a forward-looking spectrum policy is key to incentivise investments in mobile broadband coverage and capacity. This includes the timely release of relevant spectrum and pricing that spectrum correctly, so that mobile operators invest in infrastructure that puts the spectrum to use. Finally, technology neutrality allows mobile operators to reallocate 2G spectrum for deploying 3G and 4G services more swiftly.

A strong, collective effort is needed to bridge the digital divide

The benefits of mobile internet are available to more people each day. However, in a world rocked by COVID-19, where people increasingly depend on digital technologies, we cannot afford to leave anyone behind. The responsibility for building an inclusive digital society reaches beyond any single sector. Connecting the 3.8 billion people that are left unconnected requires a collective effort. Only through targeted action and collaboration can we address the barriers people face to accessing and using mobile internet. Strategies also need to factor in the structural issues underpinning disparities in adoption and use, such as differences in income and education, and restrictive social norms. By recognising and acting on our shared responsibility to advance mobile broadband coverage and use, we can ensure the internet will benefit everyone.


86% 10:05
Face Unlock
Keep the phone a distance between 20cm and 50cm with the face, and align your face within the circle

Appendix 1: The GSMA Consumer Survey

This report uses the results of the GSMA Consumer Survey. As part of the survey, the GSMA conducted face-to-face interviews in eight LMICs in 2020, 15 LMICs in 2019, 18 LMICs in 2018 and 24 LMICs in 2017. The eight LMICs surveyed in 2020 were: Algeria, Bangladesh, Guatemala, India, Kenya, Mozambique, Nigeria and Pakistan. The countries included in the survey across all years account for around 78% of the population in LMICs.

Survey methodology

In all countries, a nationally representative sample of around 1,000 adults aged 18+ was surveyed, with the exception of India and China,[52] where the sample was around 2,000. The sampling frame was predominantly based on data from National Statistics Offices, including census data where possible and a range of other sources. To ensure a nationally representative sample, quotas were applied in line with census data.[53] To ensure a representative geographical distribution of interview subjects, particularly urban versus rural, around 100 sampling points were used per country. However, very remote areas or areas with security concerns were excluded. The research used a mix of purposive and random sampling approaches. Interviews were conducted under the direction of Ipsos with individuals in their local language, and typically on the doorstep of the home due to COVID-19 safety precautions. Data was collected using computer-assisted personal interviews (CAPI). Both female and male interviewers conducted the surveys. Data was weighted to known population profiles to correct any imbalances in the distributions achieved during fieldwork.

Question on mobile internet use

Survey respondents were asked *"Have you ever used the internet on a mobile phone?"* They then selected one of the following answers:

- Yes, I have used the internet on a mobile phone in the last three months
- Yes, I have used the internet on a mobile phone longer than three months ago
- No, I have never used the internet on a mobile phone
- Don't know

In this report, a respondent in the Consumer Survey is considered a mobile internet user if they have used the internet on a mobile phone in the last three months.

Question on smartphone ownership

Survey respondents were asked *"Do you have a mobile phone that you have the sole or main use of? This may be a handset that you carry with you most days".*

They were then asked a follow-up question, *"What type of mobile phone is that?"* and could respond with the following:

- A basic mobile phone
- A feature mobile phone
- A smartphone

In this report, a respondent in the Consumer Survey is considered a smartphone owner if they have a smartphone that they have the sole or main use of.

Question on awareness

Survey respondents were asked *"Which of the following best describes your knowledge of accessing the internet on a mobile phone?"* They then selected one of the following answers:

- I was not aware it is possible to access the internet on a mobile phone
- I was aware it is possible to access the internet on a mobile phone

In this report, a respondent in the Consumer Survey is aware of mobile internet if they: (i) have ever used the internet on a mobile phone, or (ii) are aware it is possible to access the internet on a mobile phone.

Question on barriers to mobile internet use

For mobile internet use, respondents that were aware of mobile internet but had not used it in the previous three months were asked what stops them from using the internet on a mobile phone, in three stages:

1. For each of the possible reasons, please indicate whether this is something that stops you at all from using the internet on a mobile phone.

2. Which, if any, of those factors would you say are the most important reasons stopping you from using the internet on a mobile phone?

3. And which ONE of those factors would you say is the single most important reason stopping you from using the internet on a mobile phone?

52. China was included in the 2017 and 2018 Consumer Surveys.
53. Quotas were applied on the following metrics: age category by gender, urban and rural distribution by gender, region/state, and socioeconomic class (SEC) to ensure representativeness of lower income segment (no such quota was applied in Mozambique in the absence of reliable profiling data on SEC).

For the purposes of analysis in this report, we grouped some of the responses into similar categories. Below are the barriers listed in the survey, along with the relevant categorisation.

Literacy and skills

- I do not know how to access the internet on a mobile phone
- I have difficulties with reading and writing
- I find it difficult to use a mobile in general (calling, texting or mobile internet)
- I do not have time to learn how to use the internet on a mobile phone
- There is nobody to teach or help me to use mobile internet

Relevance

- There is not enough in my own language on the internet
- I do not find the internet relevant enough for me (not useful or not interesting)

Affordability

- The cost of buying a mobile phone that can access the internet is too high for me
- The cost of buying data to use the internet on my mobile is too high for me

Safety and security

- I am concerned that I would receive unwanted contact from people online (e.g. scam emails or unwanted messages)
- I am concerned that it might expose myself or my family to harmful content
- I am concerned that my identity or other private information will be stolen or misused

Access

- There is limited or no coverage to access the internet in my area
- Using the internet on my mobile phone is too slow (e.g. connection speeds)

Other

- My family does not approve of me using the internet on a mobile phone
- It is hard to find a mobile phone agent or representative to buy mobile internet data from
- Using the internet on my mobile phone uses too much battery
- I cannot borrow or pay to use internet on another person's phone

Questions on tasks

Mobile users in seven of the eight surveyed countries[54] were asked about their perceived ability to do mobile related tasks that they had and had not done before.

For the following tasks they were asked *"For each activity, please tell me which of the following best describes your ability to do this if you had to do it today?"*

- Looked for information by typing a word or phrase into a search bar or app on a mobile phone
- Set up a mobile phone as a "hotspot" to share its internet connection
- Deleted files/apps to ensure that you have sufficient memory/space on a mobile phone
- Changed app security/privacy permissions on a mobile phone from the default settings
- Changed the settings on a mobile phone to set a limit on its data usage
- Created a photo/video on a mobile phone that you shared with several people at the same time
- Edited media such as photos/videos/documents or other files on a mobile phone

Respondents could answer with one of the following:

- I would be able to do this on my own with ease and I would be able to teach others
- I would be able to do this on my own with ease but I would not be able to teach others
- I would be able to do this on my own but with difficulty
- I would be able to do this but only if somebody helped me
- I would not be able to do this even if somebody helped me*
- Don't know*

**Only an option for tasks not done before*

Question on mobile internet use cases

For mobile internet use cases, this report uses data from the GSMA Consumer Survey on the tools and services used on a mobile phone.

The Consumer Survey framed the following question: *"Thinking now about different communication tools and services you may use on a mobile phone. How frequently, if at all, do you do each of the following on a mobile phone?"*

Respondents could answer with one of the following:

- At least once a day
- At least once a week
- At least once a month
- Less than once a month
- Never use

They were asked this question about the following use cases:

- Make or receive phone calls on a mobile phone using an online provider (e.g. Skype, WhatsApp, Facebook Messenger, KakaoTalk, Google Voice, Viber)
- Make or receive video calls where you can see the person you are speaking to (e.g. FaceTime, Skype, WhatsApp, Viber)
- Use instant messaging on a mobile phone (e.g. Facebook Messenger, WhatsApp, KakaoTalk, LINE, Viber, Snapchat)
- Visit social networking websites on a mobile phone (e.g. Facebook, Twitter, Kakao, LinkedIn, Pinterest)
- Play free games on a mobile phone
- Watch free to access online video on a mobile phone (e.g. YouTube, Dailymotion)
- Listen to free online music on a mobile phone (e.g. Deezer, Spotify, Pandora)
- Use my mobile money account to send or receive money from friends/relatives/business associates
- Get information about products and services on a mobile phone (e.g. pricing, availability)
- Order and/or purchase goods or services, online on a mobile phone
- Use my bank's mobile banking service/app
- Manage or pay my bills on a mobile phone (using mobile money or online banking)
- Access services that help me to improve or monitor my health, on a mobile phone
- Access government services on a mobile phone
- Look or apply for a job on a mobile phone
- Access information to support my education, or that of my children or relatives on a mobile phone
- Read the news on a mobile phone

54. Excluding Guatemala

Appendix 2: Methodology for measuring handset and data affordability

Mobile data cost

Estimating the cost (or price) of mobile internet services is a complex task, given the wide range of available tariffs. This is particularly the case in LMICs, where more than 80% of SIMs in 2020 used prepaid plans. A single operator in a given country will often have a large number of tariffs that consumers can choose from, with different data allowances and validity periods (e.g. daily, weekly or monthly allowances). Tariffs can also vary based on the service available (e.g. 3G, 4G or 5G), customer segments (e.g. discounts for younger or older users) and additional 'value-add' services (e.g. reduced prices for roaming or certain content). Furthermore, such tariffs can change regularly over time. To compare prices on a comparable basis across countries, we use a 'basket' approach: we look at the cheapest way a consumer can access 1 GB and 5 GB of data per month from any national operator in each market.[55]

Handset cost

In each country, consumers have a range of choices when deciding what handset to purchase. For this report, as we are primarily focused on affordability for those that are not connected, we look at the price of the cheapest internet-enabled smartphone or feature phone available in each market.[56] This represents the minimum cost required for a consumer to access a device that allows them to use mobile internet services. However, it may not reflect the phones that the majority of consumers have purchased historically (for example, premium handsets).

Income

With regards to income, we source data from the IMF World Economic Outlook on each country's GDP per capita. This allows us to express affordability as the cost of data/handset relative to monthly GDP per capita and to compare each country with the Broadband Commission's affordability target, which aims to make entry-level broadband services less than 2% of monthly income per capita by 2025.[57] One issue with this indicator is that average incomes do not reflect variations in income inequality, which can be significant in many LMICs. This means that while mobile broadband may be less than 2% of average monthly income per capita in a given country, it could be much higher than this threshold for a large segment of the population. We therefore also look at affordability in each country for the poorest fifth of the population, using income distribution data sourced from the World Bank.

55. This is similar to the approach taken by others (for example the ITU, OECD and A4AI) to measuring mobile prices. Data on mobile pricing is sourced from Tarifica, and further details on the methodology can be found in GSMA (2020). Mobile Connectivity Index Methodology.
56. Data on handset prices is sourced from Tarifica, and further details on the methodology can be found in GSMA (2020). Mobile Connectivity Index Methodology.
57. See Broadband Commission (2018). 2025 Targets: Connecting the Other Half. While the Commission's target refers to affordability based on GNI per capita, we use GDP per capita in the Index to incorporate more up-to-date data on income per capita. In any case, GDP and GNI per capita are very highly correlated, so our results do not materially change based on the income metric used.

Appendix 3: Additional figures

In the 2020 Consumer Survey, respondents who were aware of mobile internet were asked to identify the barriers preventing them from using mobile internet. Respondents were first asked to identify all relevant barriers, then to identify those that were most important and, finally, to identify the single most important barrier. Strongly related or thematically overlapping barriers were grouped into composites (see Appendix 1). Figure A3.1 shows the top barrier reported by urban and rural consumers in surveyed markets in 2020.

Figure A3.1

Top barrier to mobile internet use in LMICs 2020, by location (urban and rural)

		AFFORDABILITY		LITERACY AND SKILLS		RELEVANCE		SAFETY AND SECURITY		ACCESS											
										INTERNET DRAINS MY BATTERY		NETWORK COVERAGE		FAMILY DOES NOT APPROVE		ACCESS TO AGENT SUPPORT		SLOW CONNECTION/ CANNOT DO WHAT I WANT		NO ACCESS TO INTERNET ENABLED PHONE	
		URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
AFRICA	Algeria	14%	11%	43%	43%	9%	17%	14%	4%	2%	0%	5%	4%	6%	15%	0%	0%	5%	4%	1%	0%
	Kenya	47%	40%	21%	29%	13%	10%	10%	10%	2%	1%	1%	4%	2%	1%	0%	1%	0%	1%	4%	3%
	Mozambique	43%	26%	33%	37%	4%	6%	11%	9%	0%	3%	4%	11%	0%	1%	2%	3%	2%	3%	2%	1%
	Nigeria	43%	48%	29%	33%	13%	7%	8%	4%	1%	2%	1%	2%	0%	2%	1%	1%	2%	1%	1%	1%
ASIA	Bangladesh	7%	13%	36%	41%	28%	25%	7%	6%	0%	1%	1%	3%	17%	7%	2%	0%	1%	3%	1%	0%
	India	25%	24%	32%	45%	5%	8%	12%	6%	4%	4%	4%	2%	4%	2%	1%	1%	7%	5%	1%	2%
	Pakistan	22%	12%	42%	45%	16%	18%	5%	8%	1%	0%	2%	2%	8%	12%	0%	0%	2%	0%	1%	1%
LATIN AMERICA	Guatemala	21%	18%	23%	39%	1%	5%	45%	24%	6%	0%	0%	0%	0%	2%	0%	4%	1%	4%	3%	2%

Lowest barrier cited in that country — Highest barrier cited in that country

Base: Adults aged 18+ who have not used mobile internet in the last three months, despite being aware of mobile internet (excludes mobile users who are not aware of mobile internet).

Composite barriers are aggregates (not averages) of the responses for between two and five sub-barriers (see Appendix 1). Access-related barriers are not grouped as a composite since they cover a disparate range of topics. Percentages indicate the proportion of respondents who answered, "This is the most important reason stopping me" to the question, "Which one of those factors would you say is the single most important reason stopping you from using the internet on a mobile phone?"

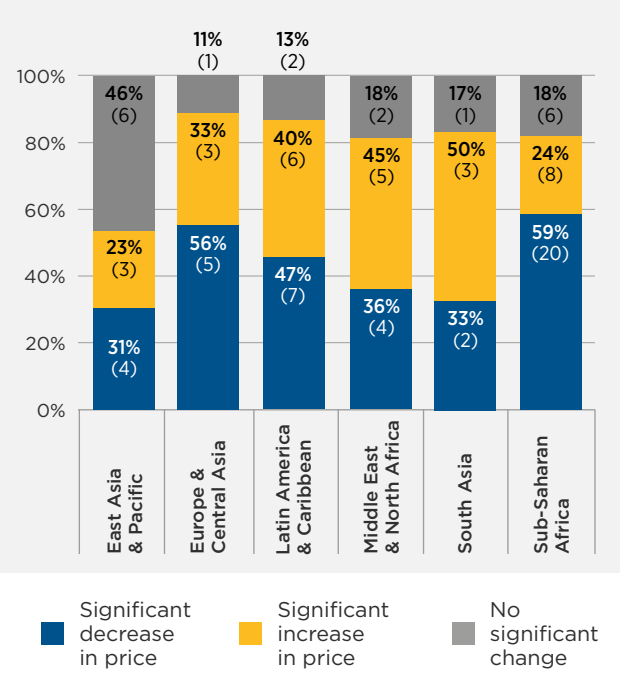
N = from 44 to 222

Source: GSMA Consumer Survey

Figures A3.2 and A3.3 show the change in handset price and handset affordability in 2020 compared to 2019 for 88 countries with handset pricing available. Numbers in brackets represent the number of countries in a given region.

Figure A3.2

Change in handset price in 2020, by region

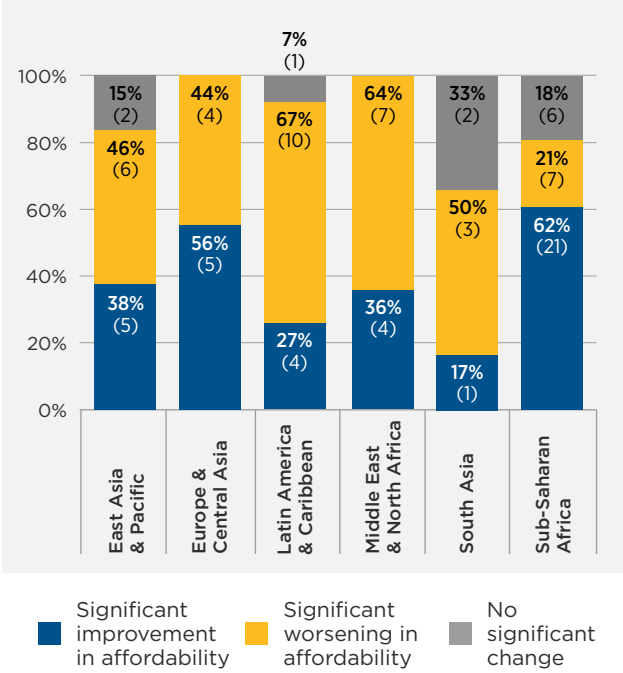


'Significant decrease in price' refers to countries where the cost fell by more than 5%. A 'significant increase in price' refers to countries where the cost increased by more than 5%. The remaining countries are categorised as having 'No significant change'.

Source: GSMA Intelligence calculations based on pricing data from Tarifica

Figure A3.3

Change in device affordability in 2020, by region



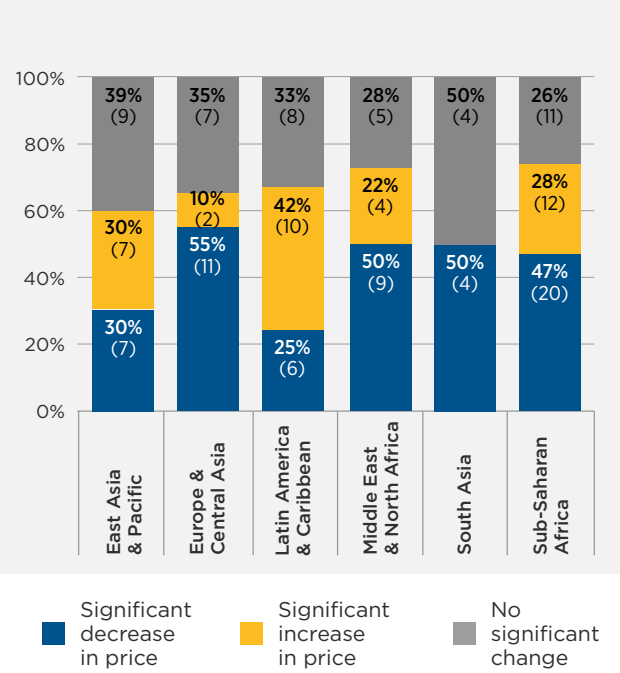
'Significant improvement in affordability' refers to countries where the cost of a handset as a percentage of GDP per capita decreased by more than 5%. A 'significant worsening in affordability' refers to countries where the cost of a handset as a percentage of GDP per capita increased by more than 5%. The remaining countries are categorised as having 'No significant change'.

Source: GSMA Intelligence calculations based on pricing data from Tarifica

Figures A3.4 and A3.5 show the change in the cost and affordability of 1 GB of data in 2020 compared to 2019 for 128 countries with 1 GB data plan pricing available. Numbers in brackets represent the number of countries in a given region.

Figure A3.4

Change in 1 GB data plan cost in 2020, by region

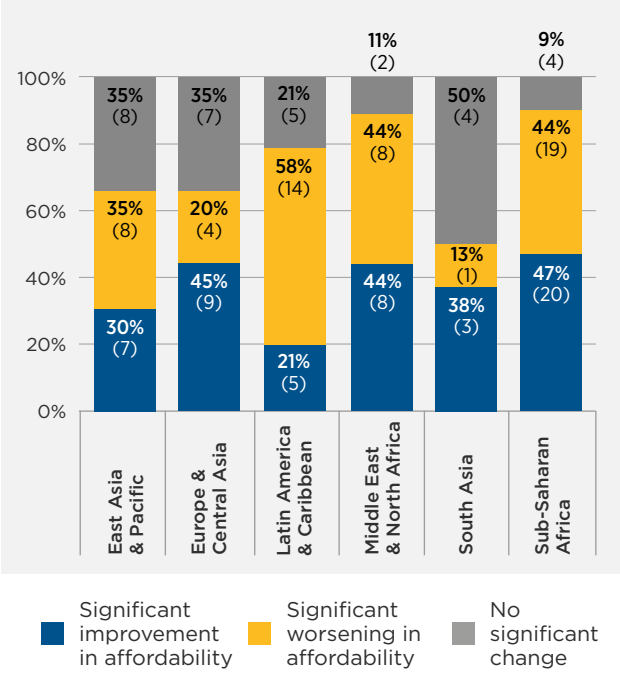


"Significant decrease in price' refers to countries where the cost fell by more than 5%. A 'significant increase in price' refers to countries where the cost increased by more than 5%. The remaining countries are categorised as having 'No significant change'.

Source: GSMA Intelligence calculations based on pricing data from Tarifica

Figure A3.5

Change in 1 GB affordability in 2020, by region



'Significant improvement in affordability' refers to countries where the cost of a handset as a percentage of GDP per capita decreased by more than 5%. A 'significant worsening in affordability' refers to countries where the cost of a handset as a percentage of GDP per capita increased by more than 5%. The remaining countries are categorised as having 'No significant change'.

Source: GSMA Intelligence calculations based on pricing data from Tarifica

Appendix 4: Definitions

Connected: 'the connected' or 'connected population' refers to people who use mobile internet. 'The unconnected' refers to those that do not use mobile internet.

Coverage: 'Population coverage' is the share of the population that lives in an area where the signal provided by a mobile network is strong enough to use telecommunication services (voice, SMS, data). The coverage levels provided by 2G, 3G, or 4G networks[58] are independent from each other.

Coverage gap: populations that do not live within the footprint of a mobile broadband network.

Feature phone: a mobile handset that allows basic access to internet-based services but on a closed platform that does not support a broad range of applications. The handset supports additional features such as a camera and the ability to play multimedia files such as music and video.

Low- and middle-income countries (LMICs): countries classified as low income, lower middle income and upper middle income by the World Bank Country and Lending groups.

Mobile connection: a unique SIM card (or phone number, where SIM cards are not used) that has been registered on a mobile network. Connections differ from subscribers in that a unique subscriber can have multiple connections.

Mobile broadband: 3G, 4G or 5G technologies.

Mobile internet user: a person who uses internet services on a mobile device. Mobile internet services are defined as any activities that use mobile data.

Mobile (phone) owner/subscriber: a person who subscribes to a mobile service. They do not necessarily use mobile internet.

Smart feature phone: a feature phone that has an operating system that supports a range of applications created by third-party developers and that are formatted to work on a smaller screen and accessed via a 9 key layout not a touch screen.

Smartphone: a mobile handset enabling advanced access to internet-based services and other digital functions. Smartphone platforms, such as Android, iOS, Windows Phone and BlackBerry, support a broad range of applications created by third-party developers.

Usage gap: populations that live within the footprint of a mobile broadband network but do not use mobile internet.

58. For further details on different technologies see https://www.itu.int/en/ITU-R/Documents/ITU-R-FAQ-IMT.pdf.

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