GSMA

The State of Mobile Internet Connectivity 2022

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GSMA Connected Society

The Connected Society programme works with the mobile industry, technology companies, the development community and governments to increase access to and adoption of mobile internet, focusing on underserved population groups in developing markets.

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Key findings

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Mobile internet use has reached 55% of the world's population. By the end of 2021, 4.3 billion people were using mobile internet, an increase of almost 300 million since the end of 2020. Growth in mobile internet adoption has almost entirely been driven by people living in low- and middle-income countries (LMICs). As a result, for the first time, half of the population in LMICs is using mobile internet.

Mobile broadband coverage continues to slowly expand, with 95% of the world's population covered by a mobile broadband network. At the end of 2021, the coverage gap – those living in areas without mobile broadband coverage – represented 5% of the world's population (400 million people). The coverage gap has only reduced by 1 percentage point (pp) per year between 2018 and 2021, showing how challenging it is to cover the remaining population, who are predominantly poor and rural. In the least developed countries (LDCs), more than one in six people live in areas without mobile broadband coverage.

At the end of 2021, there were 3.2 billion people living within the footprint of a mobile broadband network but not using mobile internet. With network expansion slowing, mobile internet adoption has begun to outpace increases in mobile broadband coverage. After remaining relatively unchanged between 2014 and 2019, the share of the population living within the footprint of a mobile broadband network but not using mobile internet (i.e. the usage gap) decreased from 45% in 2019 to 40% in 2021. However, the usage gap remains substantial and is almost eight times the size of the coverage gap.

Connectivity varies significantly by different socioeconomic groups and by country income levels, with 94% of the 'unconnected' living in LMICs. In LMICs, adults in rural areas are still 33% less likely to use mobile internet than those living in urban areas. Women in LMICs are 16% less likely to use mobile internet than men and progress in reducing the mobile internet gender gap has stalled. Across LMICs, the poorest 20% in terms of income are 49% less likely to access the internet than the richest 20%. At the end of 2021, only 20% of the population in LDCs were using mobile internet, compared to 55% in other LMICs (excluding LDCs).

Across all regions, there are now more mobile connections using 3G or 4G/5G smartphones than basic or feature phones. While Sub-Saharan Africa and South Asia have the lowest share of smartphone connections, they are also the regions with the highest growth rates. Over the last five years, they have had average annual growth rates of 20%.

Data usage and network quality continue to increase – but with a persistent gap between high- and lower-income countries. Global mobile data traffic per user reached more than 8.2 GB per month in 2021, compared to 6.2 GB per month in 2020. Data usage is on average twice as large in high-income countries (HICs) than in LMICs, with the exception of India. Upload and download speeds have improved but the gap in network quality between HICs and LMICs is widening.

Across the surveyed countries, mobile internet users are using their mobile phones more frequently for a range of online activities. Instant messaging, voice and video calling are the most popular internet activities with other activities growing in frequency of usage. For instance, the proportion of users using mobile internet for education purposes at least once a week has increased from 27% to 38% between 2019 and 2021.

Awareness of mobile internet continues to grow but has slowed significantly since 2019. In most of the countries surveyed, more than 80% of the population was aware of mobile internet in 2021. Women and people living in rural areas are increasingly aware but still lag behind men and those living in urban areas.

Affordability and skills remain the two greatest barriers to mobile internet adoption and use. For example, among mobile users who are aware of mobile internet but don't use it, the top-reported barriers preventing mobile internet use are still affordability, particularly of handsets, and literacy and digital skills.

Across LMICs, affordability of data has continued to improve but affordability of entry-level internet-enabled handsets has remained relatively unchanged. Data costs have continued to reduce. In 2021, 1 GB of data cost less than 2% of monthly income in 56% of LMICs compared to 45% in 2020. However, the affordability of an internet-enabled handset has not significantly improved across all regions and for the poorest 20% of the population, the cost of a handset represents 54% of their monthly income.

KEY FINDINGS

CONNECTED:

55% of the world's population are now **using mobile internet**

4.3bn people

1/2

For the first time, **half of the population in LMICs is using mobile internet**

COVERAGE GAP:

5% of the world's population is not covered by mobile broadband

with mobile broadband coverage continuing to expand slowly

400m people

USAGE GAP:

40% of the world's population live within the footprint of a mobile broadband network but are not using it

3.2bn PEOPLE

CONNECTIVITY

varies significantly by socio-economic groups and by country income level

94% of the 'unconnected' live in LMICs

There are now **more mobile connections using**

3G or **4G/5G**

smartphones in all regions than with basic or feature phones

IN LOW- AND MIDDLE-INCOME COUNTRIES

Adults living in rural areas are

33% less likely than those living in urban areas to use mobile internet

Women are **16%** less likely than men to use mobile internet

Affordability and **a lack of literacy and digital skills**

remain the **top barriers** to **mobile internet adoption** and **use**

AFFORDABILITY of data has continued to improve

but affordability of entry-level internet-enabled handsets has remained relatively unchanged

ACROSS THE LMICS SURVEYED

MOBILE INTERNET USERS

are using their mobile phones **more frequently for a range of online activities**

AWARENESS

of mobile internet continues to grow

but has slowed significantly since 2019

In most of the countries surveyed, more than **80%** of the population are **aware** of mobile internet

Introduction

Over the past five years, nearly 1.4 billion people have gained access to the internet through a mobile phone and by the end of 2021, 55% of the world's population was using mobile internet. This is providing people with access to critical information and services such as healthcare, education, e-commerce, financial services and income-generating opportunities.

Mobile is the primary – and in some cases only – way most people in low- and middle-income countries (LMICs) access the internet, particularly for women and those living in rural areas. While mobile has been driving digital inclusion, there remain significant connectivity gaps, with 3.6 billion people who still cannot realise the benefit of the internet, either because they are not covered by a mobile broadband network or, more often, because they face other barriers to using mobile internet.

The COVID-19 pandemic reinforced the importance of getting access to the internet. Mobile phones enabled people to mitigate some of the negative impacts of the pandemic by providing ongoing access to information and services online when movement was restricted. However, the lingering effects of the pandemic and the unequal global economic recovery threaten to exacerbate inequalities. In 2021, the situation worsened for those who are already the most likely to be digitally excluded – the poorest 40% of the world's population, those with low education and women.[1] This highlights the importance of continuing to monitor the impact of the pandemic on digital inclusion, particularly among those most affected.

The State of Mobile Internet Connectivity 2022 analyses the trends over the last five years; in particular, it focuses on trends since 2019, before the onset of the pandemic. Mobile internet connectivity is not just about coverage but also ensuring that people are able to use the internet to meet their needs. As defined by a multi-stakeholder working group as part of the United Nations Secretary-General's Roadmap for Digital Cooperation, "meaningful connectivity" is about ensuring users have a safe, satisfying, enriching and productive online experience that is affordable.[2] This requires an examination of the key barriers and enablers to meaningful connectivity, including infrastructure, affordability, skills, safety and security, and relevant content and services, each of which are considered in this report.

This report presents the latest updates on mobile internet connectivity globally and by region, with a focus on LMICs, where 94% of the unconnected population live (Chapter 1). For the first time, it also presents the data on connectivity for adults only. The report then examines mobile broadband coverage and infrastructure (Chapter 2). While 5G adoption is growing rapidly in high-income countries (HICs),[3] LMICs are still catching up on 3G and 4G coverage. Half of those living outside the footprint of a mobile broadband network (200 million people) are not even covered by a 2G network. Chapters 3 and 4 focus on adults in LMICs, providing insights into how they are using mobile internet as well as the barriers to mobile internet adoption and use for those not using it and how these barriers have changed over the past two years. Finally, Chapter 5 covers the key challenges to address to ensure everyone can connect to the internet.

The findings of this report are based on the GSMA Consumer Survey and the GSMA Mobile Connectivity Index[4] (MCI), along with a range of other industry reports. The GSMA Consumer Survey has been carried out every year since 2017 to understand access and use of mobile and mobile internet in LMICs. In 2021, it was conducted in 10 LMICs.[5] The MCI measures the key enablers of mobile internet connectivity across 170 countries (representing 99% of the world's population) against 42 indicators for the period 2014–2021. The indicators are grouped into four overarching enablers: infrastructure; affordability; consumer readiness; and content and services. Together, these provide objective, quantitative metrics to track the key enablers of mobile internet adoption and usage, as well as insights from consumers on what they use mobile internet for or what prevents them from using it.[6]

1. World Bank (2021). Poverty, median incomes, and inequality in 2021: a diverging recovery; World Bank (2021). 2021 year in review in 11 charts: the inequality pandemic
2. United Nations Secretary-General's Roadmap for Digital Cooperation and ITU (2021). Achieving universal and meaningful digital connectivity Setting a baseline and targets for 2030
3. GSMA (2022). The Mobile Economy 2022
4. The web tool is available at www.mobileconnectivityindex.com
5. Bangladesh, Egypt, Guatemala, India, Indonesia, Kenya, Mexico, Nigeria, Pakistan and Senegal
6. For further details on the methodology for the MCI, see Mobile Connectivity Index Methodology. For further details on the methodology of the GSMA Consumer Survey, see Appendix 1.

1. Trends in mobile internet connectivity

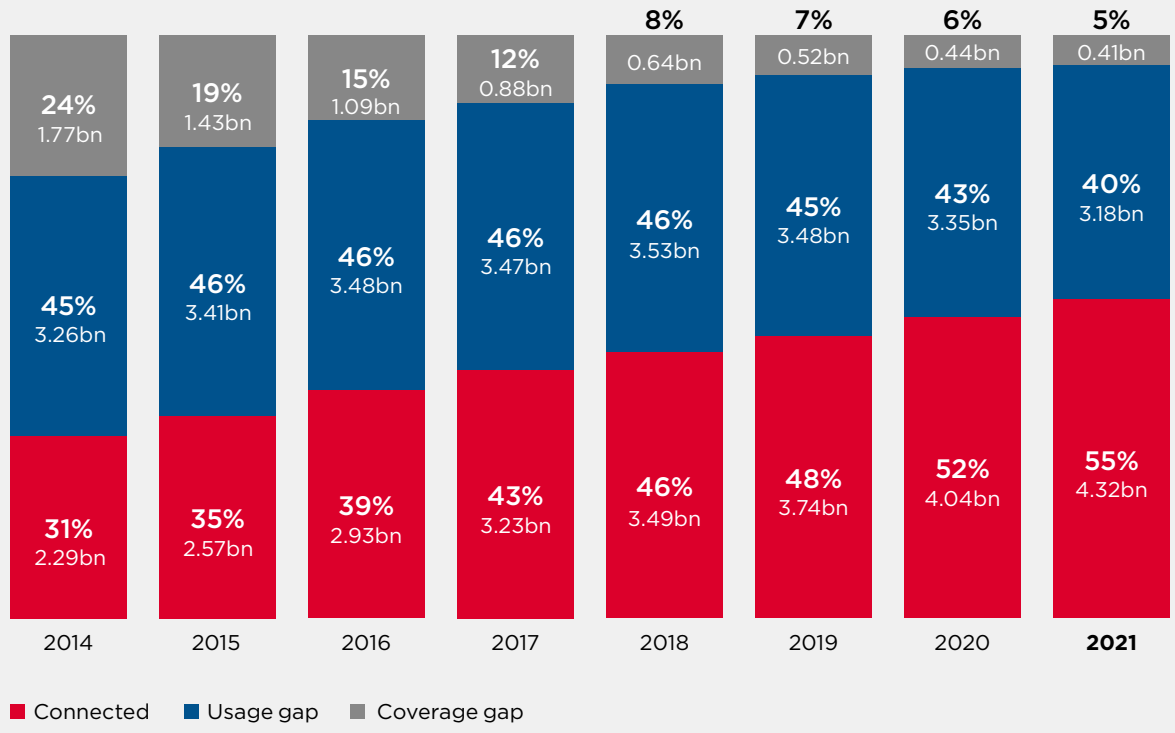
The share of the population using mobile internet continues to steadily increase. In 2021, a further 300 million people started using mobile internet, with 92% from LMICs. With growth in mobile broadband coverage slowing, mobile internet adoption is starting to outpace network expansion. Reaching those who are not yet using mobile internet despite living within the footprint of a mobile broadband network is critical since they are the majority of the unconnected.

By the end of 2021, 4.3 billion people were using mobile internet, representing 55% of the world's population, up from 31% in 2014 (see Figure 1). This translates into almost 300 million people coming online in the past year. Most of the people who started using mobile internet in 2021 came from LMICs, where 94% of the unconnected population live.

By the end of 2021, the share of the world's population living in areas without mobile broadband coverage stood at 5%, meaning that 400 million people are still not covered by a mobile broadband network. Since 2018, this coverage gap has reduced by only 1 pp a year (see Figure 1), highlighting how the remaining uncovered communities – which are predominantly rural, poor and sparsely populated – are the most challenging to reach in a financially sustainable manner. For example, in least developed countries (LDCs) almost 30% of people living in rural areas are still not covered by a mobile broadband network.

A much larger proportion of the unconnected live in areas already covered by mobile broadband networks. By the end of 2021, 40% of the world's population (3.2 billion people) were living within the footprint of a mobile broadband network but not using mobile internet. While this usage gap remained relatively unchanged between 2014 and 2019, it declined by 300 million people (or 5 pp) over the past two years. However, the usage gap remains substantial and is now almost eight times the size of the coverage gap. It is worth noting that these numbers are for the total population, some of whom would never be expected to use the internet (e.g. young infants). Indeed, taking adults (18 years old and above) only, the usage gap stands at 25%, a much smaller though still significant gap (see *Spotlight: State of mobile internet connectivity among adults*).

Figure 1: **Evolution of global mobile internet connectivity, 2014–2021**



Base: Total population, 198 countries

Note: Totals may not add up due to rounding. Every year, GSMA Intelligence updates its estimates of the number of mobile internet subscribers in each country, incorporating new (and/or updated) data from operators, regulators, national statistics agencies and consumer surveys where available. In some countries and regions, estimates of mobile internet adoption may therefore differ from what was presented in previous State of Mobile Internet Connectivity reports.

Source: GSMA Intelligence

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:
Those who live in an area not covered by a mobile broadband network.

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

Connected:
People who use mobile internet.

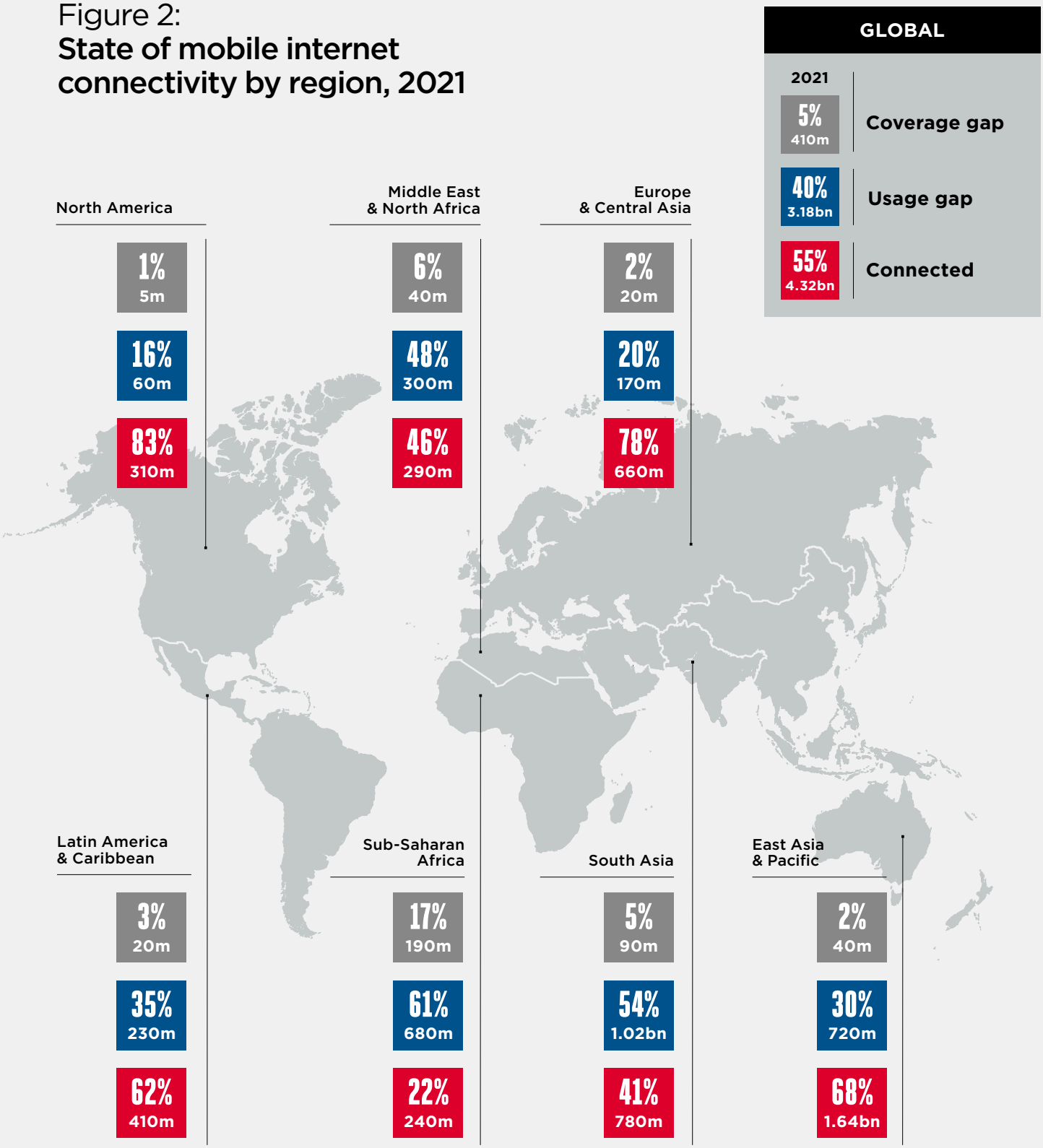
The global connectivity figures mask wide regional disparities

Connectivity varies substantially by and within regions. Sub-Saharan Africa remains the region with the largest coverage and usage gaps (see Figure 2). Nonetheless, as a result of continuing mobile broadband investments in the region, there has been a reduction in the coverage gap from 19% in 2020 to 17% at the end of 2021. Mobile operators have expanded coverage in countries such as Ghana (increasing from 91% in 2020 to 97% in 2021) and Niger (from 59% in 2020 to 67% in 2021). Since the uptake of mobile internet tends to lag behind coverage expansion, the usage gap is growing in the region, standing at 61% at the end of 2021 (see Figure 3). For example, as coverage increased in Ghana and Niger, the usage gap rose from 66% to 71% and from 48% to 55%, respectively.

Almost 200 million people live in areas without mobile broadband coverage in Sub-Saharan Africa, but this figure masks important differences at the sub-regional level. In Central Africa, 39% of the population (60 million) remains outside the reach of a mobile broadband network, while this stands at 16% in Western Africa (64 million), 13% in Eastern Africa (45 million), and 12% in Southern Africa (26 million).

In other regions, coverage deployment broadly stalled in 2021; at the same time, the percentage of the population using mobile internet increased, thus reducing the usage gap. In these regions, the increase in mobile internet use in the last year comes from people previously covered by mobile broadband but not using it. In 2021, South Asia and East Asia and Pacific had the biggest increases in mobile internet adoption, which accounted for 64% of new mobile subscribers globally because of the large population sizes of both regions. In the Middle East and North Africa, growth in mobile internet use increased more in HICs (where it increased from 62% in 2020 to 67% in 2021) than LMICs (where it increased from 40% in 2020 to 43% in 2021). In Latin America and the Caribbean, the region's biggest country, Brazil, accounted for more than a third of the connectivity gains. Around two thirds of the country's population now use mobile internet, similar to the region's other leading countries such as Chile, Uruguay and Argentina.

Figure 2:
State of mobile internet connectivity by region, 2021

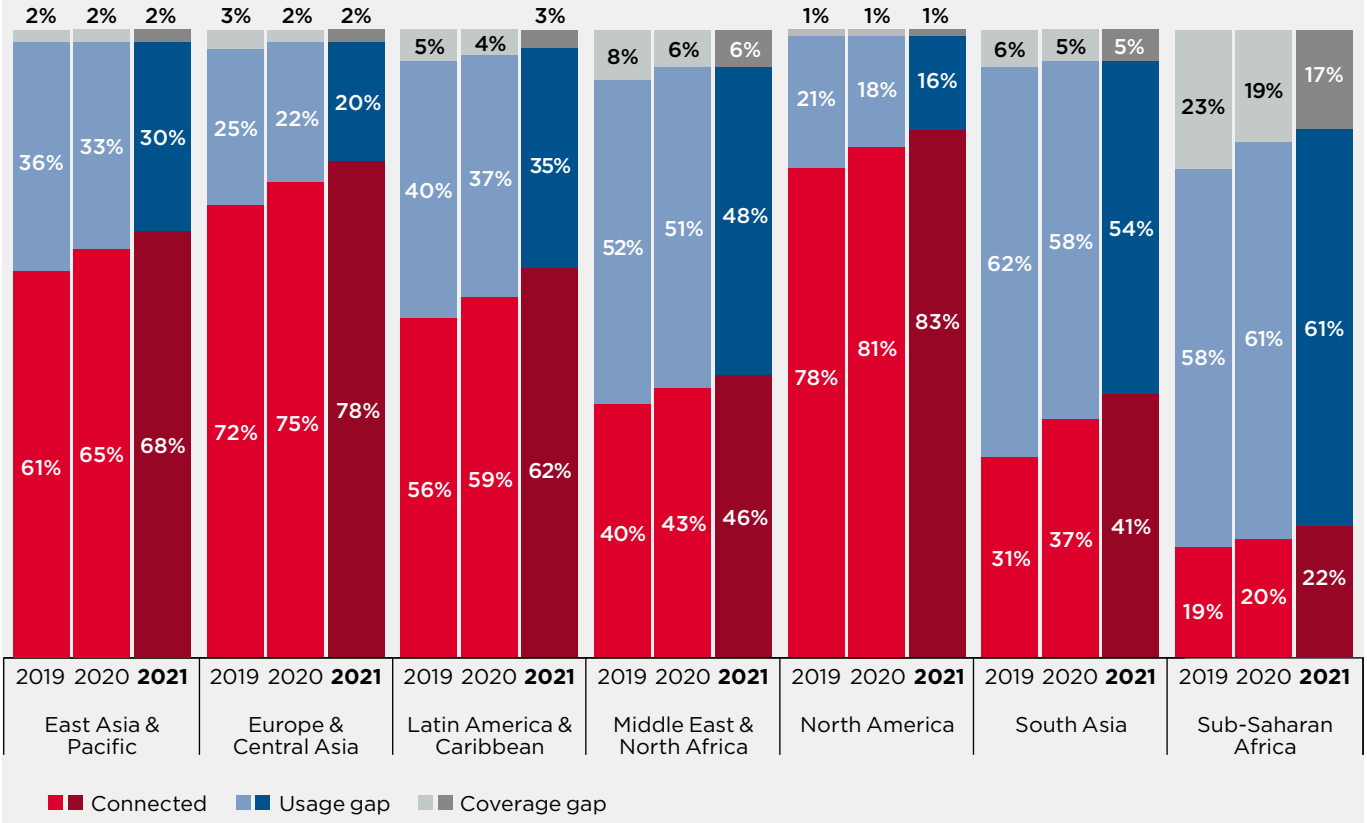


Base: Total population

Note: Totals may not add up to 100% due to rounding. Every year, GSMA Intelligence updates its estimates of the number of mobile internet subscribers in each country, incorporating new (and/or updated) data from operators, regulators, national statistics agencies and consumer surveys where available. In some countries and regions, estimates of mobile internet adoption may therefore differ from what was presented in previous State of Mobile Internet Connectivity reports.

Source: GSMA Intelligence

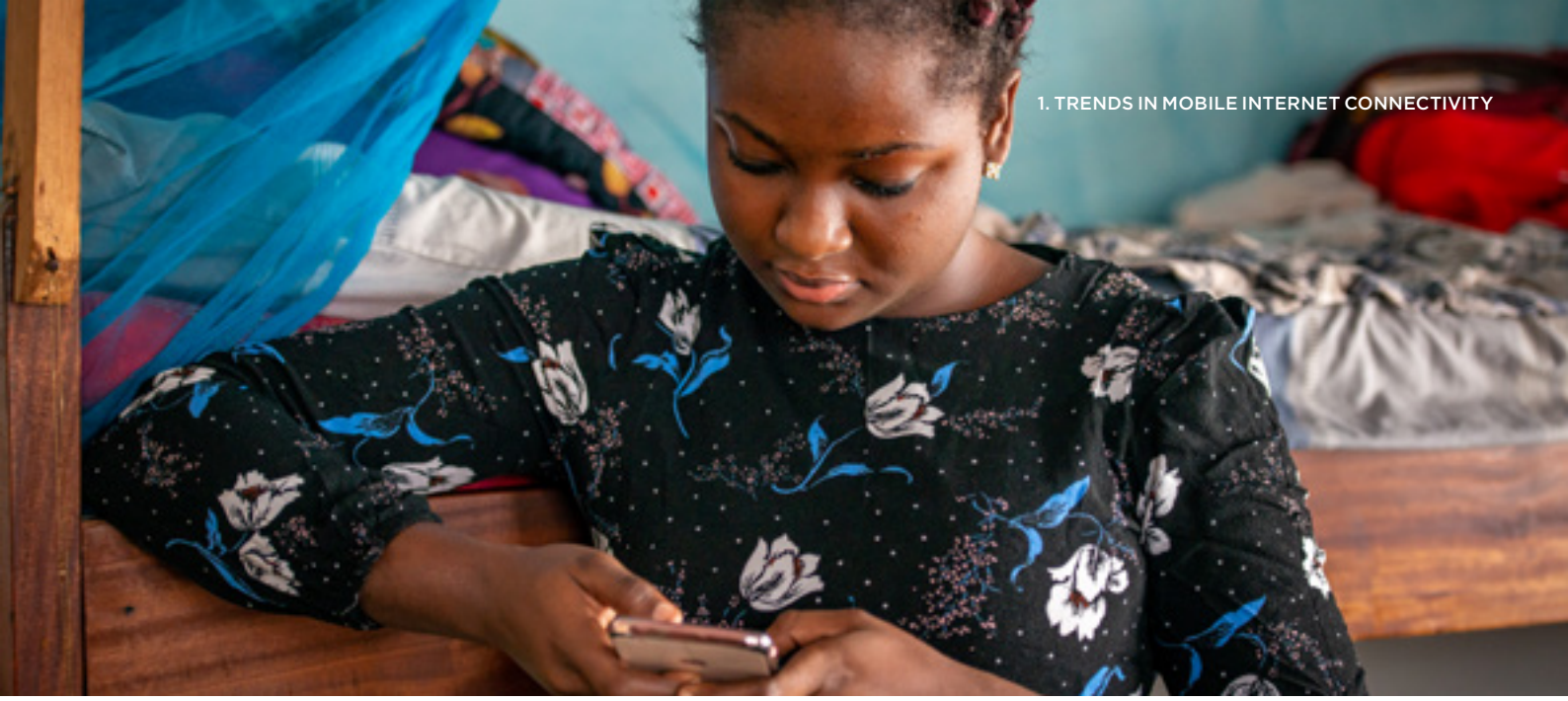
Figure 3: **Evolution of mobile internet connectivity by region, 2019–2021**



Base: Total population, 198 countries.

Note: Totals may not add up due to rounding. Every year, GSMA Intelligence updates its estimates of the number of mobile internet subscribers in each country, incorporating new (and/or updated) data from operators, regulators, national statistics agencies and consumer surveys where available. In some countries and regions, estimates of mobile internet adoption may therefore differ from what was presented in previous State of Mobile Internet Connectivity reports.

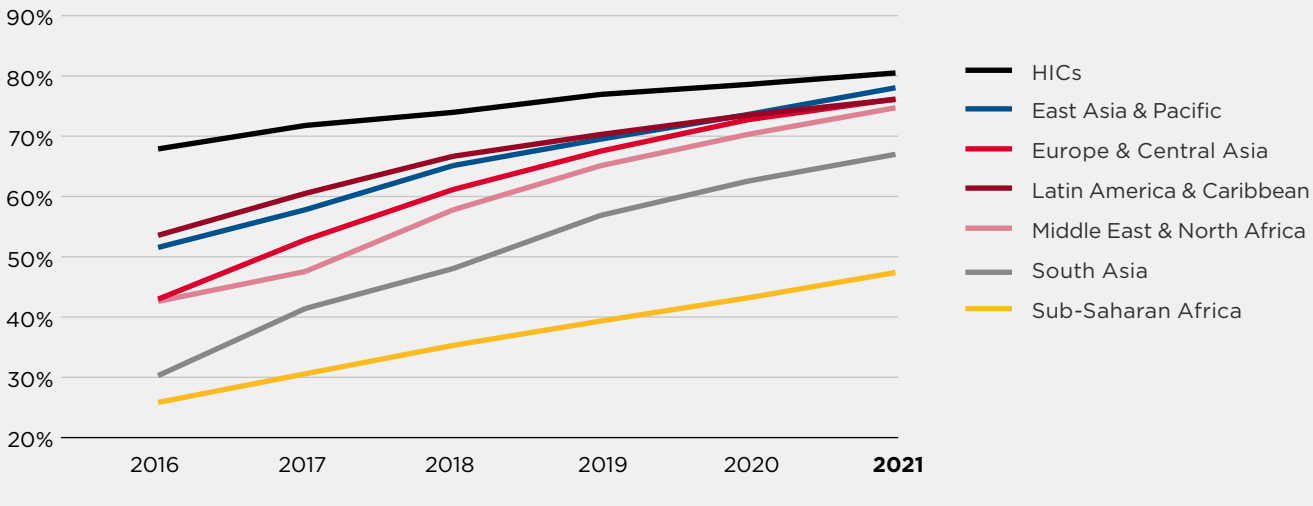
Source: GSMA Intelligence



There are now more mobile connections using 3G or 4G/5G smartphones in all regions than basic or feature phones

Growth in smartphone use continues at a steady pace (see figure 4). Globally, smartphones accounted for nearly three quarters (73%) of total mobile connections in 2021, compared to 69% in 2020 and 47% in 2016. Smartphone connections grew by 7% in 2020 and by 9% in 2021. This means that despite economic slowdowns because of the COVID-19 pandemic, smartphone connectivity has continued to steadily rise. Sub-Saharan Africa and South Asia had the highest growth rates in smartphone connections over the past five years with an average annual growth rate of 20% in each region.

Figure 4: **Evolution of smartphones* as a proportion of total mobile connections for HICs and LMICs (by region), 2016–2021**



* The smart feature phone category of handsets is included in the definition of smartphones.
Source: GSMA Intelligence

Spotlight

State of mobile internet connectivity among adults (18 years old and above)

When measuring mobile internet adoption, the population being considered can make a substantial difference. While tracking total population is useful, it is important to note that this includes those who would not realistically be expected to use mobile internet such as young infants. This means that considering the total population overestimates the number of potential internet users and understates progress in achieving connectivity for the population expected to access it. It could also mean that current internet adoption estimates are biased against countries where children make up a disproportionately high proportion of the population, such as those in South Asia and Sub-Saharan Africa.

Here, we analyse how many people aged 18 and above use mobile internet to provide new insights. Figure 5 shows that at the end of 2021, 70% of adults aged 18 and above were using mobile internet (compared to 55% when based on total population).[7] The usage gap for adults is 25% and the coverage gap is 4% (compared to 40% and 5% respectively when based on total population).[8] This means that even when looking at connectivity among adults only, the usage gap is still six times greater than the coverage gap.

The difference is even more striking when considering the results by region, especially those with disproportionally young populations. In Sub-Saharan Africa the median age is 19 and in South Asia it is 28, compared to 43 in Europe and 39 in North America.[9] In 2021, the percentage of adults in Sub-Saharan Africa using mobile internet was 40%, compared with 22% when considering the total population. In South Asia these numbers were 60% and 41%, respectively. Year-on-year changes in Sub-Saharan Africa and South Asia when considering adults only are also more apparent, with more significant increases in mobile internet adoption being shown (see Figure 5).

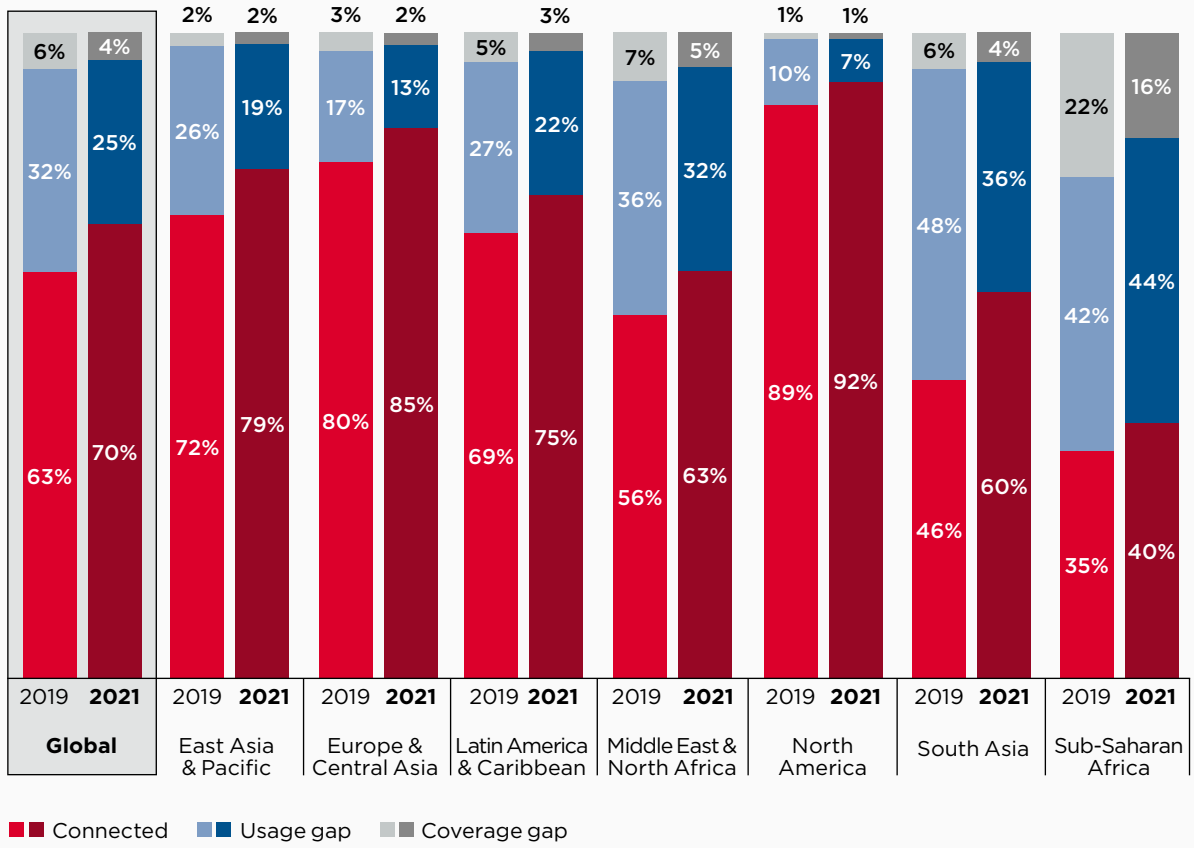
Nevertheless, even when looking at adults only, a significant proportion of individuals remain unconnected: more than half of adults in Sub-Saharan Africa; more than one third in South Asia and the Middle East and North Africa; and around one quarter in Latin America and the Caribbean.

Furthermore, it is important to consider that this analysis does not account for connectivity among young populations that would benefit from internet access. This is reflected by the fact that the ITU aspirational targets for 2030 aim to achieve universal connectivity for everyone aged 15 and above,[10] while the Broadband Commission's 2030 targets for Africa include achieving 90% internet access for populations aged 10 and above.[11]

7. To estimate mobile internet use among those aged 18 and above, we leveraged the GSMA Consumer Survey. For countries not included in this survey, we estimated mobile internet adoption among adults using third-party survey data and/or modelled estimates that were based on countries with similar social, economic, demographic and geographic characteristics.
8. As we are only considering coverage for adults aged 18 and above, the coverage gap differs slightly compared to when looking at total population.
9. UN population data. See https://population.un.org/wpp/
10. See https://www.itu.int/itu-d/meetings/statistics/wp-content/uploads/sites/8/2022/04/UniversalMeaningfulDigitalConnectivityTargets2030.pdf
11. Broadband Commission for Sustainable Development (2019). Connecting Africa Through Broadband: A strategy for doubling connectivity by 2021 and reaching universal access by 2030

Spotlight continued

Figure 5: **Evolution of mobile internet connectivity among adults aged 18 and above, 2019–2021**



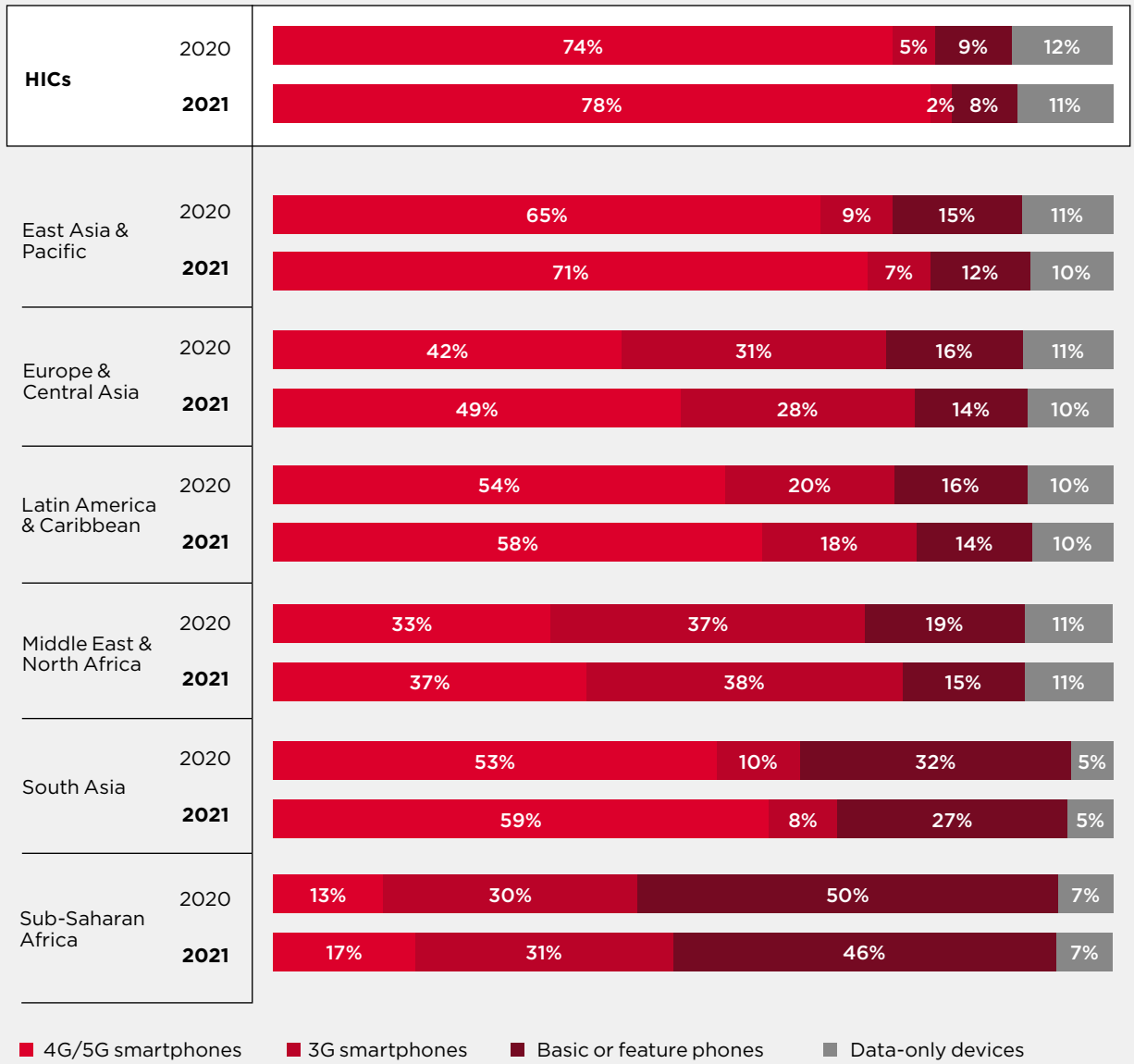
Base: Adults aged 18 and above, 198 countries.

Note: Totals may not add up due to rounding. Unique subscriber data among adults 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 UN.

Source: GSMA Intelligence

For the first time, the share of mobile connections being made by 3G or 4G/5G smartphones is now higher than those being made using basic or feature phones in all regions. Smartphones now account for almost half of total connections in Sub-Saharan Africa (48%). This is due to an increase in the proportion of 4G/5G smartphone connections in the region, which accounted for 17% of total connections in 2021, up from 13% in 2020. Yet, despite these gains, Sub-Saharan Africa still has the largest proportion of basic or feature phones connections (46%), followed by South Asia (27%). In other regions, basic or feature phone connections account for less than 15% of mobile connections (see Figure 6).

Figure 6: **Mobile connections by device type for HICs and LMICs (by region), 2021**



Source: GSMA Intelligence

Half of the population in LMICs is now using mobile internet

2021 marked the first year that half the population in LMICs was connected. The proportion of people using mobile internet rose from 43% in 2019 to 47% in 2020 and 50% in 2021. Although progress is being made, there are significant gaps between economies, as connectivity correlates with the level of economic development of a country. For example, at the end of 2021, only 20% of the population in LDCs were using mobile internet compared to 83% in HICs (see *Spotlight: Connectivity in the LDCs*).

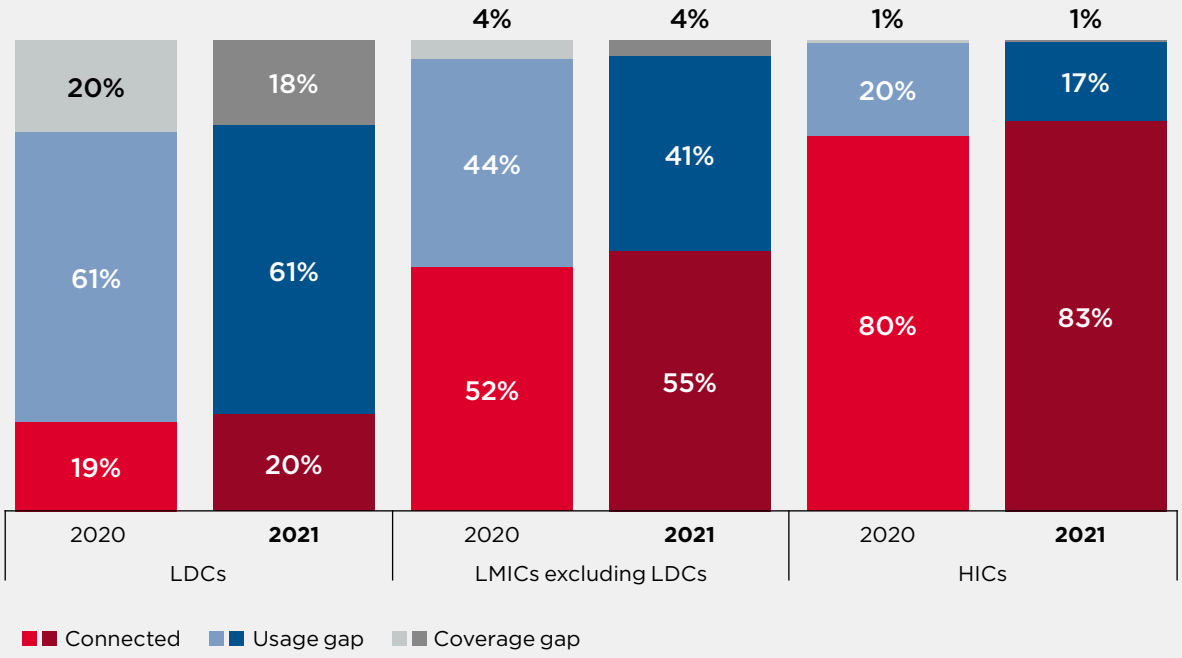
Spotlight

Connectivity in the LDCs

Connectivity varies by geographic region but also by level of economic development. Within the low-income group of countries, LDCs are highly vulnerable to economic and environmental shocks and have low levels of human assets.[12] At the end of 2021, only 20% of the population in LDCs was using mobile internet, compared to 55% in other LMICs (excluding LDCs). The usage gap in LDCs compared to the usage gap in other LMICs is increasing, with adoption increasing more slowly in LDCs (a 1 pp increase between 2020 and 2021, compared to a 3 pp increase in other LMICs). Furthermore, the coverage gap remains much larger in LDCs than other countries, with more than one in six people still living in areas without mobile broadband coverage (see Figure 7).

Within LDCs, the connectivity gaps for women and rural populations are larger than in other LMICs. Rural populations in LDCs are 50% less likely to use mobile internet than urban populations, compared to 27% in other LMICs. When looking at the gender gap, women in LDCs are 42% less likely to use mobile internet than men, compared to 13% in other LMICs. This shows that these underserved groups in the poorest countries are most at risk of being excluded from digital access.

Figure 7: **Mobile connectivity in LDCs, LMICs and HICs, 2020–2021**



Base: Total population, 198 countries

Note: Totals may not add up due to rounding. Unique subscriber data among adults is sourced from GSMA Intelligence. Coverage data is sourced from GSMA Intelligence, combining data reported by mobile operators and national regulatory authorities. Population data is sourced from the UN.

Source: GSMA Intelligence

12. UN definition. For further information on the indices, see https://www.un.org/development/desa/dpad/least-developed-country-category.html.

The mobile internet rural-urban gap persists across LMICs

Across LMICs, adults living in rural areas are still 33% less likely to use mobile internet than those living in urban areas.[13] While the overall rural-urban gap has remained relatively unchanged since 2019, differing trends were seen at the regional level (see Figure 8). Changes in this gap are most notable in South Asia, where, having reduced from 47% in 2017 to 30% in 2019, the gap has now widened – in 2021, rural populations were 38% less likely than their urban counterparts to use mobile internet. This trend in South Asia is driven by faster adoption of mobile internet in urban areas, rather than fewer people using it in rural areas.

Despite overall reductions in the rural-urban gap between 2017 and 2019, in the other regions the gap has remained broadly unchanged since 2019. Sub-Saharan Africa still has the largest rural-urban gap, with rural populations 54% less likely to use mobile internet than their urban counterparts. Connecting rural populations in this region remains a challenge, with only 27% of adults living in rural areas using mobile internet, compared to 46% in the Middle East and North Africa and 49% in South Asia.

It is worth noting that in 2021, for the first time more than half (53%) of the adults in LMICs living in rural areas were using mobile internet.[14] While this is significantly below the urban average of 78%, it represents significant progress compared to the previous years.

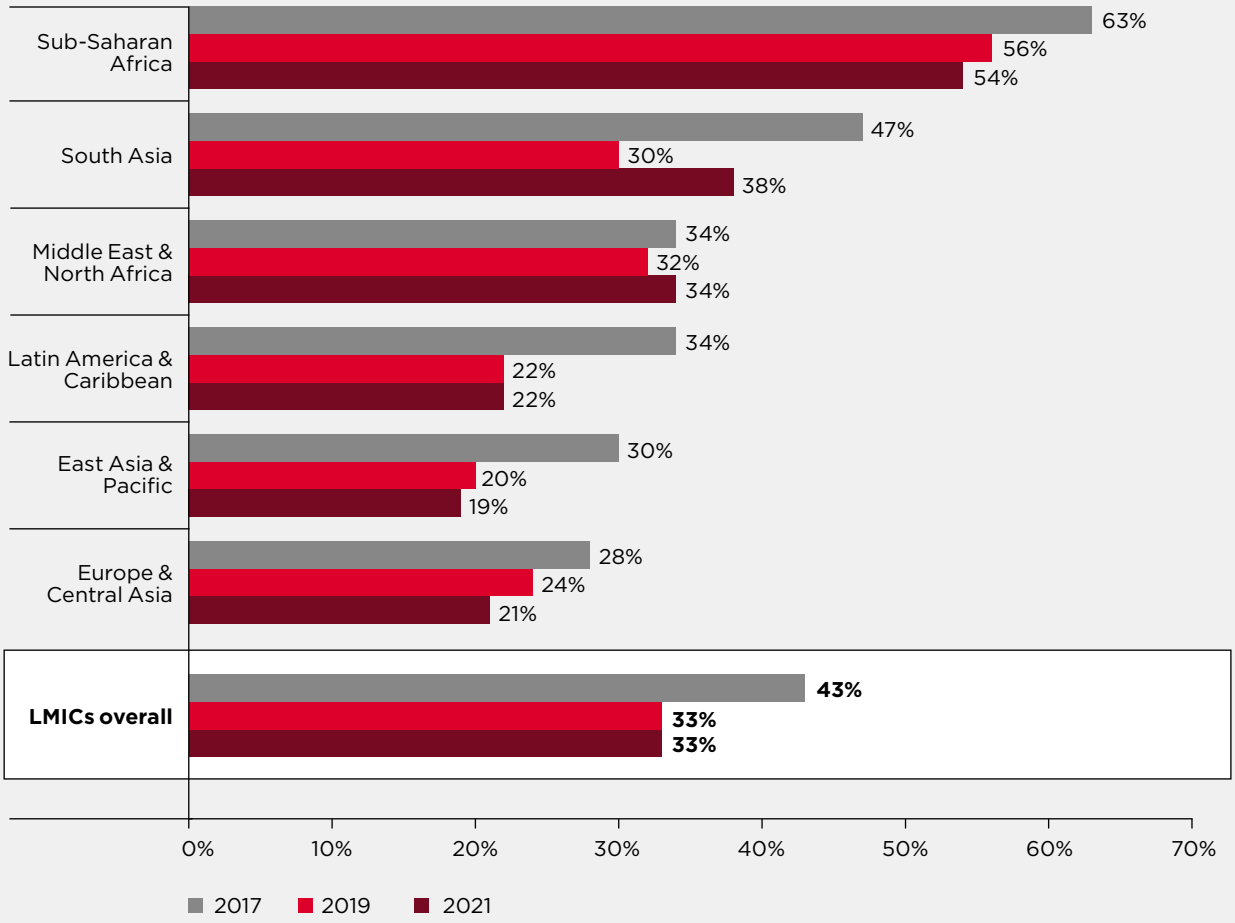
The '**rural-urban gap**' refers to how much less likely a person living in a rural area is to use mobile internet than a person living in an urban area.

It is calculated as:

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

13. It is worth noting that adults living in rural areas account for nearly half of the adults in LMICs (47%).
14. Based on survey results and modelled data for adults aged 18 and above.

Figure 8: **Rural-urban gap in mobile internet use in LMICs (by region), 2017–2021**



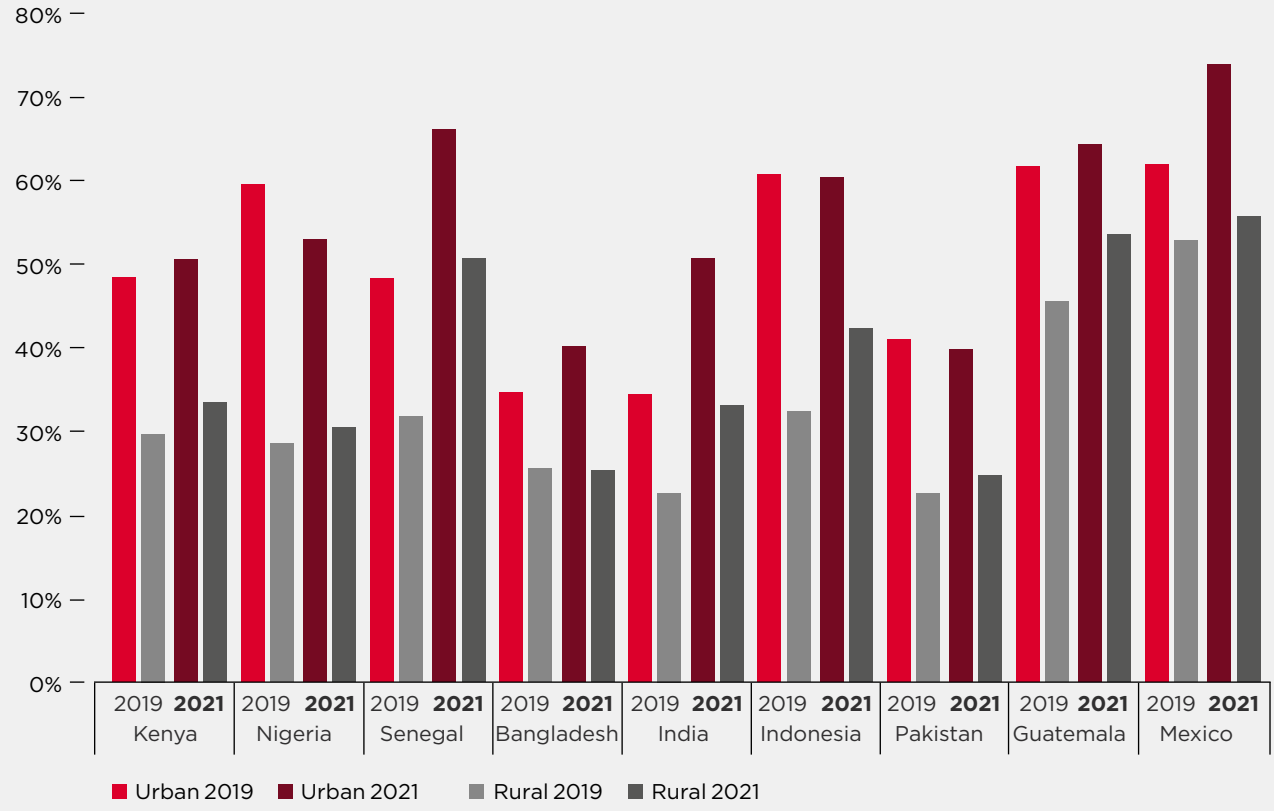
Base: Adults aged 18 and above.

Data was sourced from the GSMA Consumer Survey and Gallup World Poll (for countries not included in the former). There are differences between the two questions used for the analysis. The GSMA Consumer Survey refers to individuals who have used the internet on a mobile phone at least once in the last three months. The Gallup World Poll survey refers to individuals that have access to the internet in any way, whether on a mobile phone, computer or some other device. The survey questions are therefore not wholly comparable. However, data for countries covered in both surveys have a high correlation (0.8) and the 28 countries included in the GSMA Consumer Survey represent 75% of the total adult population of all LMICs.

Source: GSMA Intelligence calculations

Smartphone ownership is important for driving mobile internet use. Since 2019 smartphone ownership in rural areas has increased in most of the countries included in the GSMA Consumer Survey, except in Nigeria, Pakistan and Bangladesh, where growth has been minimal (see Figure 9). However, people living in rural areas remain significantly less likely to own a smartphone than those in urban areas.

Figure 9: **Smartphone ownership, 2019–2021**



Base: Adults aged 18 and above.
n = from 327 to 853 for urban and from 200 to 1,525 for rural
For further details on the questions asked, see Appendix 1
Source: GSMA Consumer Survey

Progress in closing the mobile internet gender gap has stalled

Women's uptake of mobile internet in LMICs has continued to increase in 2021 but at a slower rate compared to men, stalling progress in reducing the mobile internet gender gap. Across LMICs the mobile internet gender gap had been reducing year on year from 25% in 2017 to 15% in 2020, largely driven by South Asia. However, in 2021, women in LMICs were 16% less likely than men to use mobile internet (see Figure 10). While 60% of women in LMICs are now using mobile internet, their rate of adoption has slowed.

The gender gap in mobile internet use varies across regions, with the widest gaps in South Asia and Sub-Saharan Africa. The mobile internet gender gap has remained relatively unchanged in all regions since 2017 except South Asia, where the mobile internet gender gap had narrowed significantly, from 67% in 2017 to 36% in 2020, but has now widened to 41%. This is due to a continued increase in mobile internet adoption among men but without a notable increase among women, particularly in India.[15]

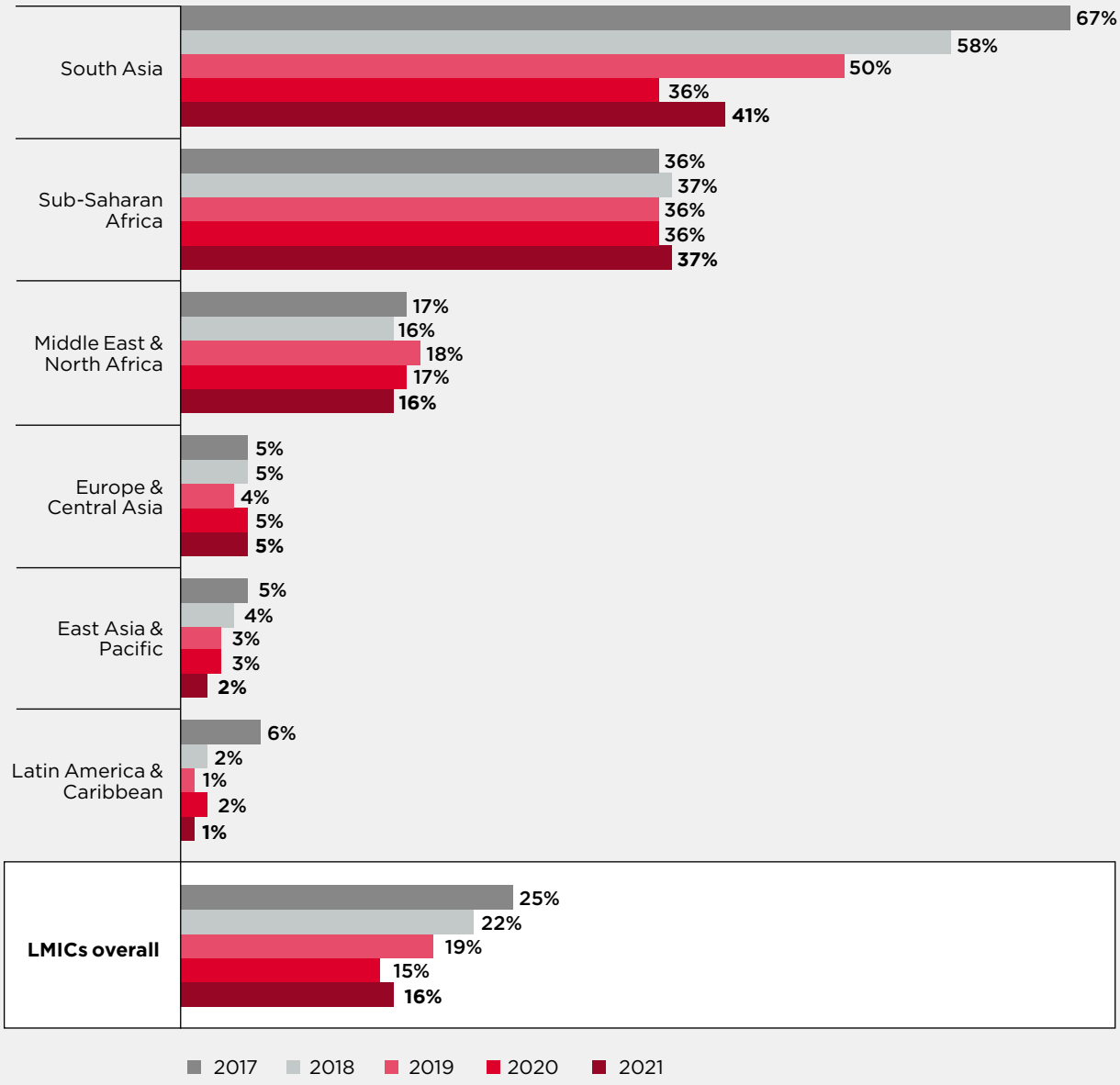
The **gender gap in mobile internet use** refers to how much less likely a woman is to use mobile internet than a man.

It is calculated as:

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

15. GSMA (2022). The Mobile Gender Gap Report 2022

Figure 10: **The gender gap in mobile internet use in LMICs (by region), 2017–2021**



Source: GSMA (see The Mobile Gender Gap Report 2022)

The gender gap in smartphone ownership had also been reducing steadily across LMICs but has now widened slightly. In 2021, women were 18% less likely than men to own a smartphone, compared to 16% in 2020 and 20% in 2017. This has been driven by an increase in the smartphone gender gap in South Asia, in addition to a continued increase in the smartphone gender gap in Sub-Saharan Africa.

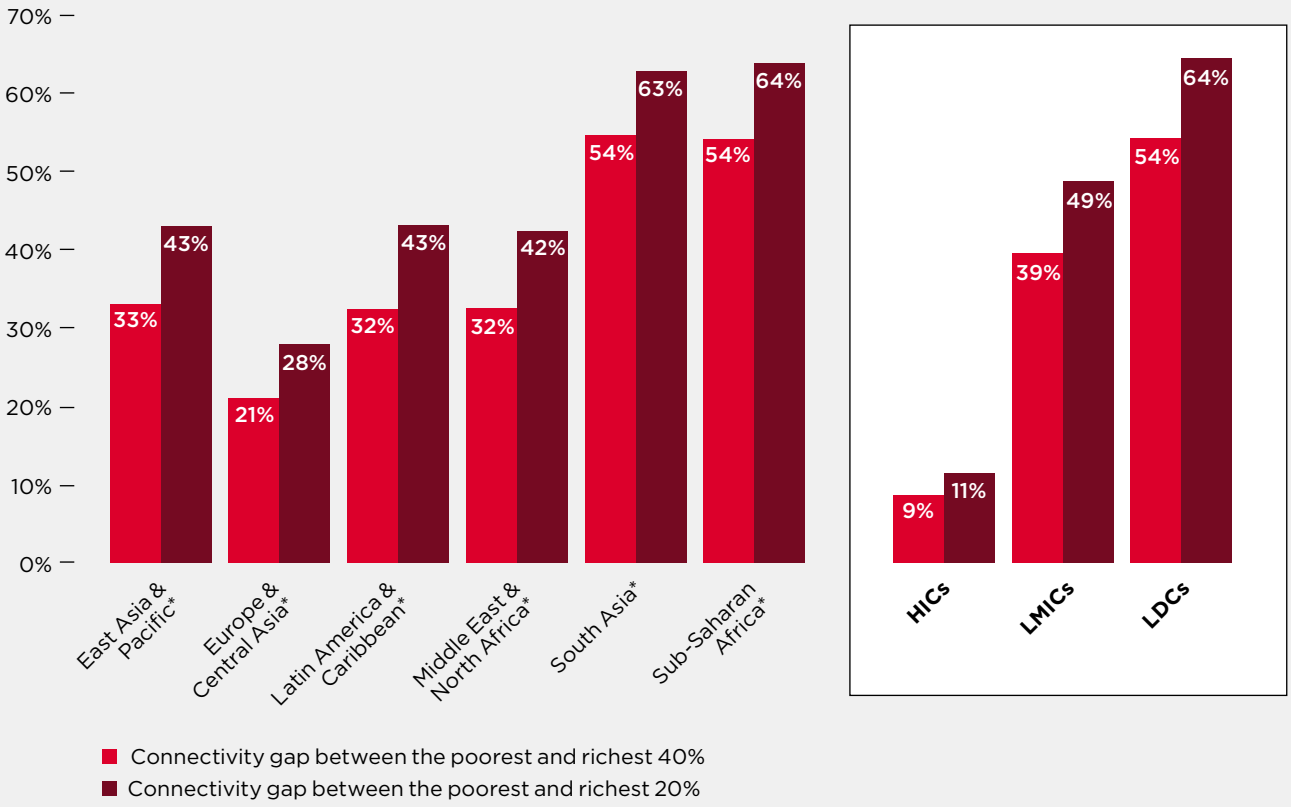
Spotlight

Connectivity by income group

Those with lower levels of income are more likely to be digitally excluded, live in areas without coverage and feel the barriers to mobile internet adoption more strongly. In particular, they are less likely to be literate or have the relevant digital skills, and they are much more likely to find the cost of devices and mobile data unaffordable (see Chapter 4). Across LMICs, the poorest 40% in terms of income are 39% less likely to access the internet than the richest 40% (see Figure 11).

Those in the bottom income quintile are further excluded, being 49% less likely to access the internet than the richest income quintile across LMICs, increasing to 64% in LDCs. The connectivity gaps by income are especially large in Sub-Saharan Africa and South Asia, highlighting that the gaps are not just between the richest and poorest countries, but also as a result of income inequalities within countries.

Figure 11: **Internet access gap by income group, 2021**



* excluding high-income countries

The gaps refer to how much less likely a person in the poorest 40%/20% income group is to access the internet (in any way) than a person living in the richest 40%/20% income group. It is calculated as 1 - (internet access in the poorest 20% or 40% / internet access in the richest 20% or 40%). Each region or income group reflects the average gap across countries with available data in 2021.

Source: GSMA Intelligence calculations based on data sourced from Gallup World Poll

2. Network coverage and infrastructure

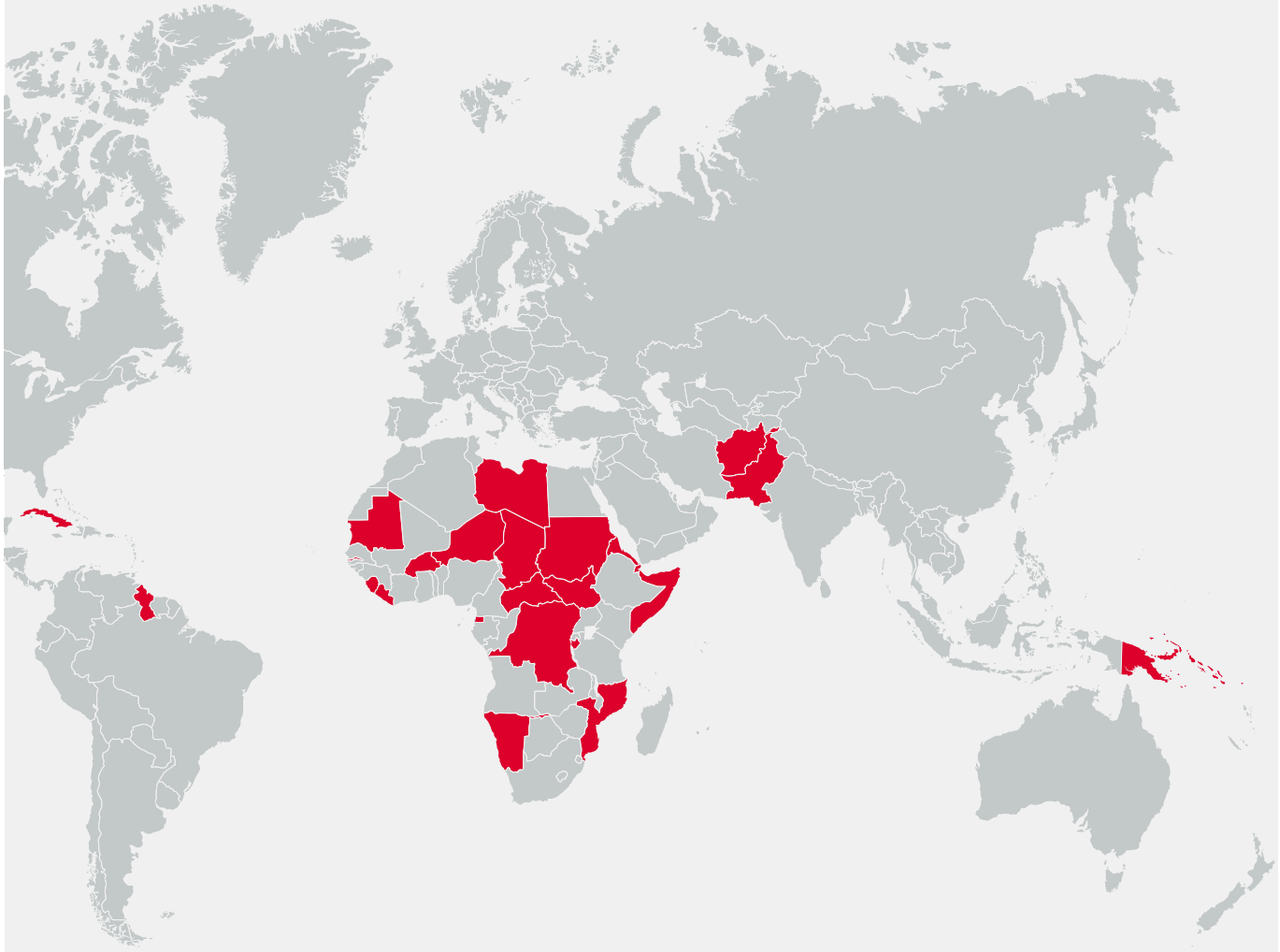
Expanding mobile broadband coverage is a question of balancing supply and demand. Around the world, 400 million people do not live in areas covered by 3G or 4G networks and reaching the remaining population is a significant challenge. The COVID-19 pandemic has accelerated data usage but there are still important gaps between countries and segments of consumers.

The coverage gap continues to decline, but reaching the remaining populations will be a major challenge

Globally, the coverage gap reduced from 19% in 2015 to 8% in 2019, providing an additional 1.2 billion people mobile broadband network access during the period. Since then, the coverage gap has declined by just over 100 million people and at the end of 2021 stood at around 5%. This means that there remains 400 million people worldwide who do not live in an area covered by a mobile broadband network.

However, there are several countries where the coverage gap remains persistently high. In 26 countries, at least 20% of the population are still uncovered; more than half of these are in Sub-Saharan Africa (see Figure 12). Since these are mostly low-income countries, the business case for network deployments is challenging. Many also face substantial geographic barriers to expanding coverage, with populations residing in mountainous areas or small islands with rugged terrain and limited access to electricity.

Figure 12: **Geographical spread of countries with a coverage gap of 20% or greater**



Countries (from highest to lowest coverage gap): Eritrea, Burundi, Central African Republic, Chad, Congo Democratic Republic, Equatorial Guinea, Mozambique, Liberia, Afghanistan, Mauritania, Burkina Faso, South Sudan, Niger, Sudan, Guyana, Tuvalu, Cuba, Solomon Islands, Gambia, Papua New Guinea, Namibia, Somalia, Djibouti, Libya, Pakistan, Sierra Leone

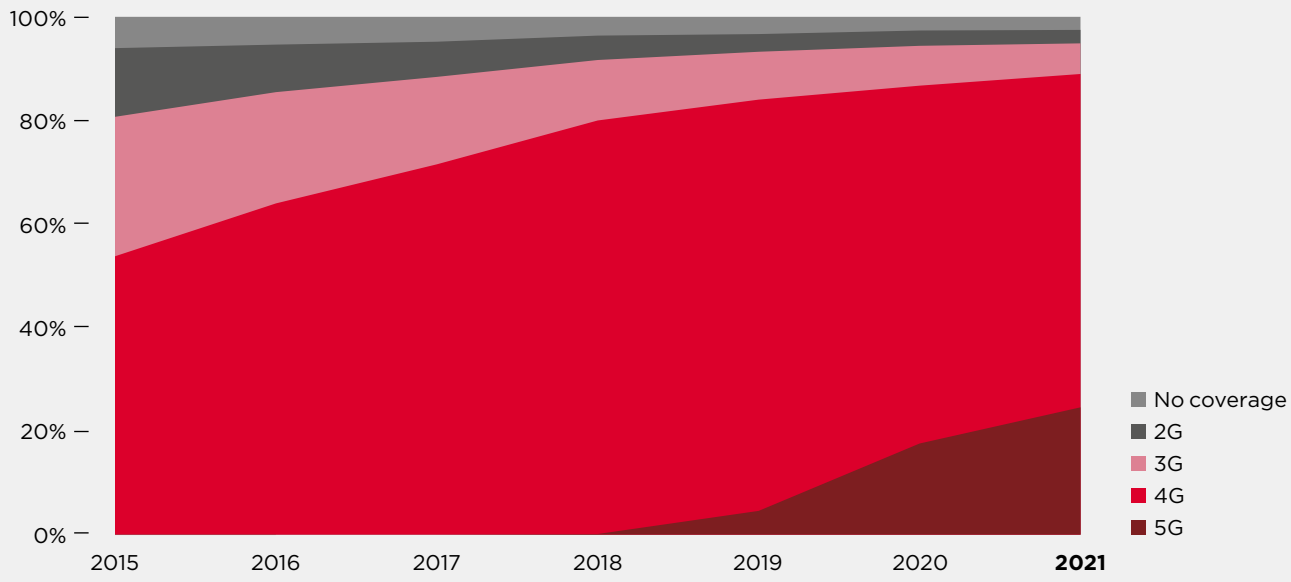
Source: GSMA Mobile Connectivity Index

4G and 5G deployment is now the focus for many countries

4G and 5G technologies enable existing and potential mobile internet users to access a greater range and quality of services. As such, these technologies have become the focus for many countries in recent years. In HICs and some LMICs – China in particular – the deployment of 5G is the primary focus of operators and governments. At the end 2021, one in four people worldwide were covered by a 5G network.

Globally, the gap between 3G and 4G coverage continues to close, from 17 pp in 2017 to 5 pp in 2021 (see Figure 13). At the end of 2021, 89% of the world's population was covered by a 4G network, compared to 94% covered by 3G.[16]

Figure 13: **Global population coverage by technology, 2015–2021**



Source: GSMA Intelligence

16. Global 3G coverage (94%) is slightly less than global mobile broadband coverage (95%) because in some countries, 4G exceeds 3G coverage.

The two sides of the coverage gap: populations with 2G infrastructure and those with no mobile infrastructure

The populations that do not have mobile broadband coverage can be categorised into two groups, each accounting for half of the coverage gap:

1. **Populations covered by 2G networks:** At the end of 2021, 2G networks covered just over 97% of the world's population. In recent years, operators have primarily expanded 3G and 4G coverage by upgrading existing 2G sites, especially in Sub-Saharan Africa. This has been done in some countries by assigning digital dividend spectrum in the 700 and 800 MHz bands and also by permitting the refarming of existing spectrum so that it is technology neutral. For example, operators in Nigeria increased mobile broadband coverage from 61% in 2015 to 82% at the end of 2021 to a large extent by using the refarmed 900 MHz band to deploy 3G.

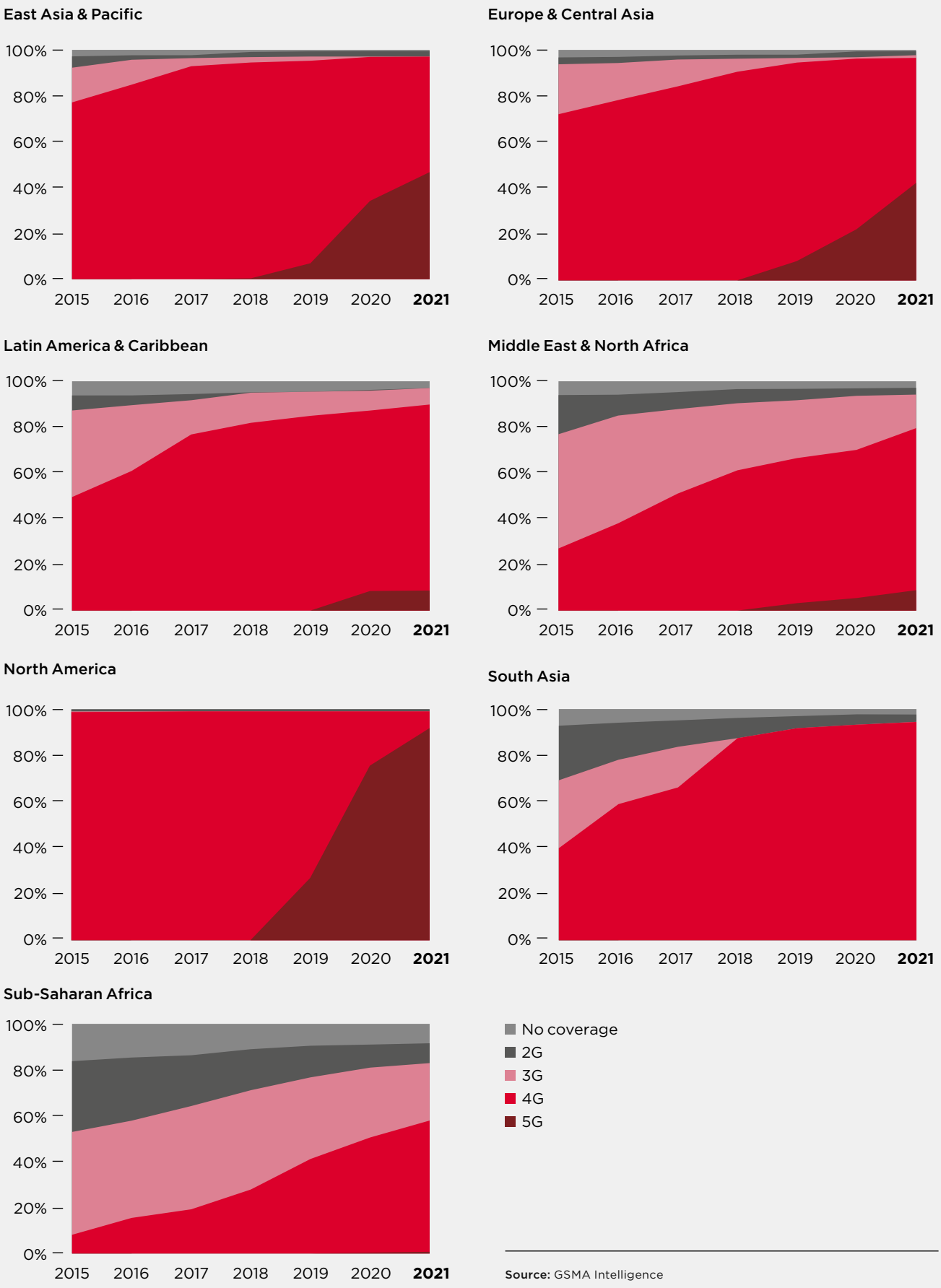
   Further progress in closing the coverage gap is most likely to be driven by continuing to upgrade existing 2G-only sites. For instance, in Sub-Saharan Africa, 9% of the population is only covered by 2G (see Figure 14). However, upgrading these sites to 3G or 4G will remain a challenge in remote areas due to the incremental costs associated with equipment, backhaul and power, which may not generate sufficient returns to justify the investment. For many operators in Africa, the majority of service revenues still come from 2G-enabled voice/SMS and, in some countries, mobile money.[17] If 2G device users are able to upgrade to 3G/4G devices and if demand increases for mobile broadband services, this will improve the commercial case for expanding coverage. A World Bank report that assessed policy options to expand coverage and connectivity in seven Sub-Saharan African markets showed that if uncovered areas had an expected 4G adoption rate of 40%, operators could sustainably expand 4G coverage to more than 90% of the population in all countries and more than 95% in five of the seven countries considered.[18]

2. **Populations living in areas with no pre-existing mobile infrastructure:** Around 200 million people fall in this category, with almost half of those living in Sub-Saharan Africa. This group is harder to provide coverage for due to the high costs of deploying physical infrastructure for mobile broadband. For these populations, investment and alternative technology solutions will be required. This is an area where operators and other providers have been increasingly active. For example, in Uganda, MTN has partnered with iSAT Africa to deploy a pilot of five sites, covering 6,500 people. Through a partnership with Parallel Wireless, these sites offer open RAN 2G and 3G connectivity to rural communities that were previously 30 kilometres away from the nearest active network tower. In Ghana, Vodafone partnered with NuRAN Wireless (with support from the Ghana Investment Fund for Electronic Communications (GIFEC)) to provide a low-power technology that utilises solar power and TV white space backhaul to provide 2G and 3G coverage to over 15,000 people. NuRAN has since adopted an innovative business model, which involves working with mobile operators to identify areas with potential for revenue. It then covers the capex and opex of the sites and enters a revenue share agreement with the operators. At the end of the contract, the sites can be transferred to the operators at a cost, which allows them to expand their coverage in rural areas with minimal risk.

   Satellite is another technology that is likely to play an important role in expanding coverage in areas with no existing infrastructure, particularly when providing backhaul solutions in remote areas where microwave or fibre is not viable. However, this will be conditional on satellite solutions becoming more cost effective, as satellite backhaul for 3G or 4G is currently too costly to deploy at scale.[19]

17. GSMA analysis of operator annual reports for MTN (2020), Airtel (2020), Sonatel (2020) and Vodacom (2019).
18. World Bank (2022). Using Geospatial Analysis to Overhaul Connectivity Policies: How to Expand Mobile Internet Coverage and Adoption in Sub-Saharan Africa
19. ibid.

Figure 14: **Population coverage by technology and region, 2015–2021**



Source: GSMA Intelligence

Data usage and network quality continue to increase – but with a persistent gap between high- and lower-income countries

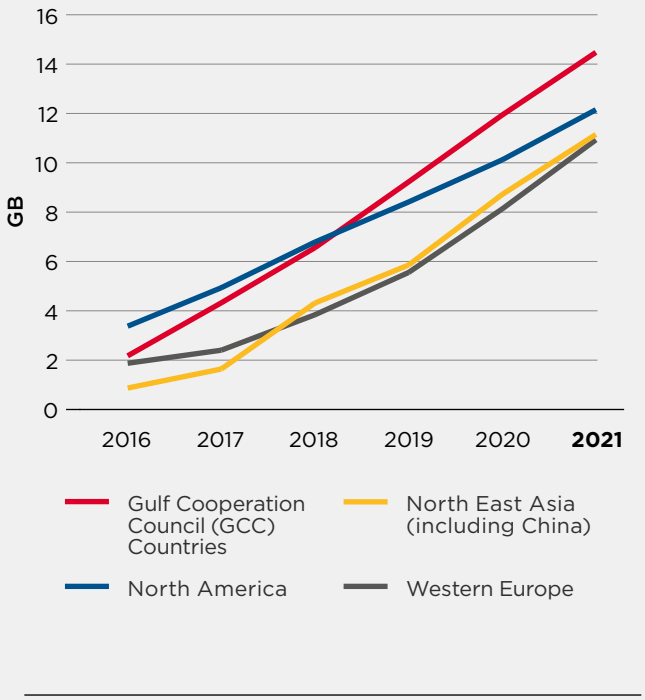
At the end of 2021, the demand placed on mobile networks since the COVID-19 outbreak showed no signs of slowing down. Global mobile data traffic per user reached more than 8.2 GB per month, compared to 6.2 GB per month in 2020 and 4.2 GB per month in 2019. Average data usage on smartphones reached almost 12 GB per month, compared to 9.3 GB in 2020 and 6.7 GB in 2019.[20] Usage increased across all regions, but it remained on average more than twice as large in high-income regions than in lower-income countries, with the notable exception of India.

However, the average amount of data consumption can significantly overstate the level of usage for most consumers, since the average is skewed by very intense data users. For example, more than half of MTN's data subscribers in Ghana are not 'active' data subscribers, meaning they do not use more than 5 MB per month.[21] In 2021, Safaricom Kenya reported that of its 20 million active data customers, half used less than 100 MB per month.[22] In May 2022, Airtel Africa reported that 80% of its data traffic is driven by 4G, which accounts for only 20% of its devices.[23] In the UK, a study of crowdsourced data from Android users gathered in Q1 2021 by Ofcom, the UK's communications regulator, found that average mobile data use was 2.3 GB per user per month – but more than half (57%) of consumers were "light users", consuming less than 500 MB per month, and only 13% were "heavy users" who consumed more than 2.5 GB per month.[24] Analysis of mobile data consumption for smartphone users by Opensignal in 2021 shows that across 65 countries, an average of 63.8% of consumers used less than 50 MB of mobile data per day, while an average of 8.3% of consumers used more than 1 GB of mobile data per day (i.e. more than 30 GB per month).[25] The gap between 'heavy' and 'light' users has also widened in most markets since 2020.[26]

This highlights how most data traffic on mobile networks is typically driven by a minority of heavy data users, meaning that the majority of mobile internet users are likely to be consuming much less data than the averages reported in Figure 15.

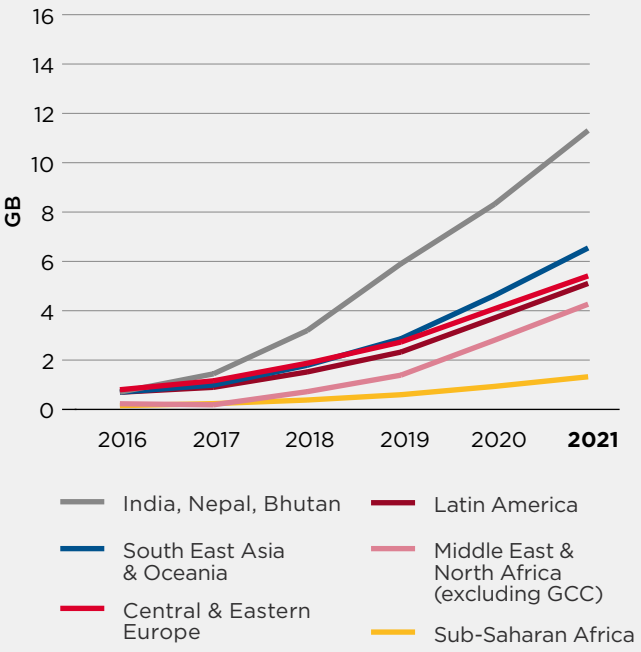
20. Ericsson (2022). Ericsson Mobility Report June 2022
21. Summary of MTN Ghana consolidated annual results for the year ended 31 December 2019
22. Safaricom PLC (2021), FY21 Investor Presentation
23. Airtel Conference call transcript, FY 2022 results, 11 May 2022
24. Ofcom (2021). Mobile Matters: Using crowdsourced data to assess people's experience of using mobile networks
25. OpenSignal
26. Opensignal (2021). Quantifying the Impact of 5G and Covid-19 on Mobile Data Consumption

Figure 15a: **Mobile data traffic per mobile connection in HICs (by region), 2016–2021**



Source: Ericsson Mobility Report, June 2022

Figure 15b: **Mobile data traffic per mobile connection in LMICs (by region), 2016–2021**



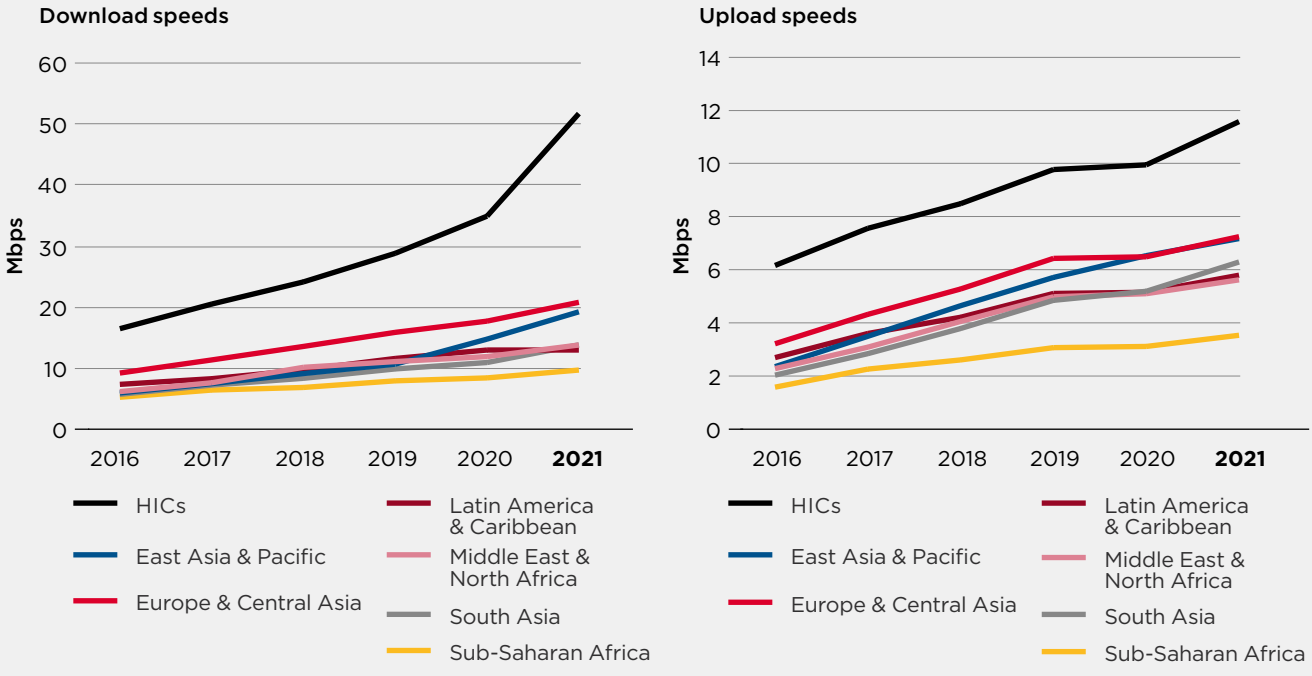
Source: Ericsson Mobility Report, June 2022

When looking at network quality, consumers across all regions have experienced faster download speeds year on year over the past five years, driven by a combination of improved networks and consumers migrating to 4G or 5G. All regions now have average download speeds of at least 10 Mbps, except for Sub-Saharan Africa, which only just falls short (see Figure 16). However, the deployment and adoption of 5G has started to increase the gap in network quality between HICs and LMICs. In the 2016–2020 period, speeds increased at a similar rate in relative terms, such that they were 2.7–2.9 times higher on average in HICs. However, in 2021, download speeds in high-income countries were 3.6 times higher than in LMICs, primarily due to the adoption of 5G by consumers.

Similarly, there is a significant gap in upload speeds, with HICs achieving average upload speeds that are twice as high as LMICs (see Figure 16). Following the outbreak of COVID-19, there was a significant increase in demand for upload capacity as a result of video calls, streaming and the increasing use of enterprise traffic, which is less asymmetric than consumer traffic (i.e. the proportion of traffic accounted for by upload data is greater for enterprises). This resulted in a temporary reduction in upload speeds across most countries at the start of the pandemic, as upload data demand exceeded upload capacity.[27] Going forward, if data usage trends continue, for example if people continue to work from home, upload capacity and speeds will become increasingly important.

27. GSMA (2021). How networks stayed the course as everyone stayed at home

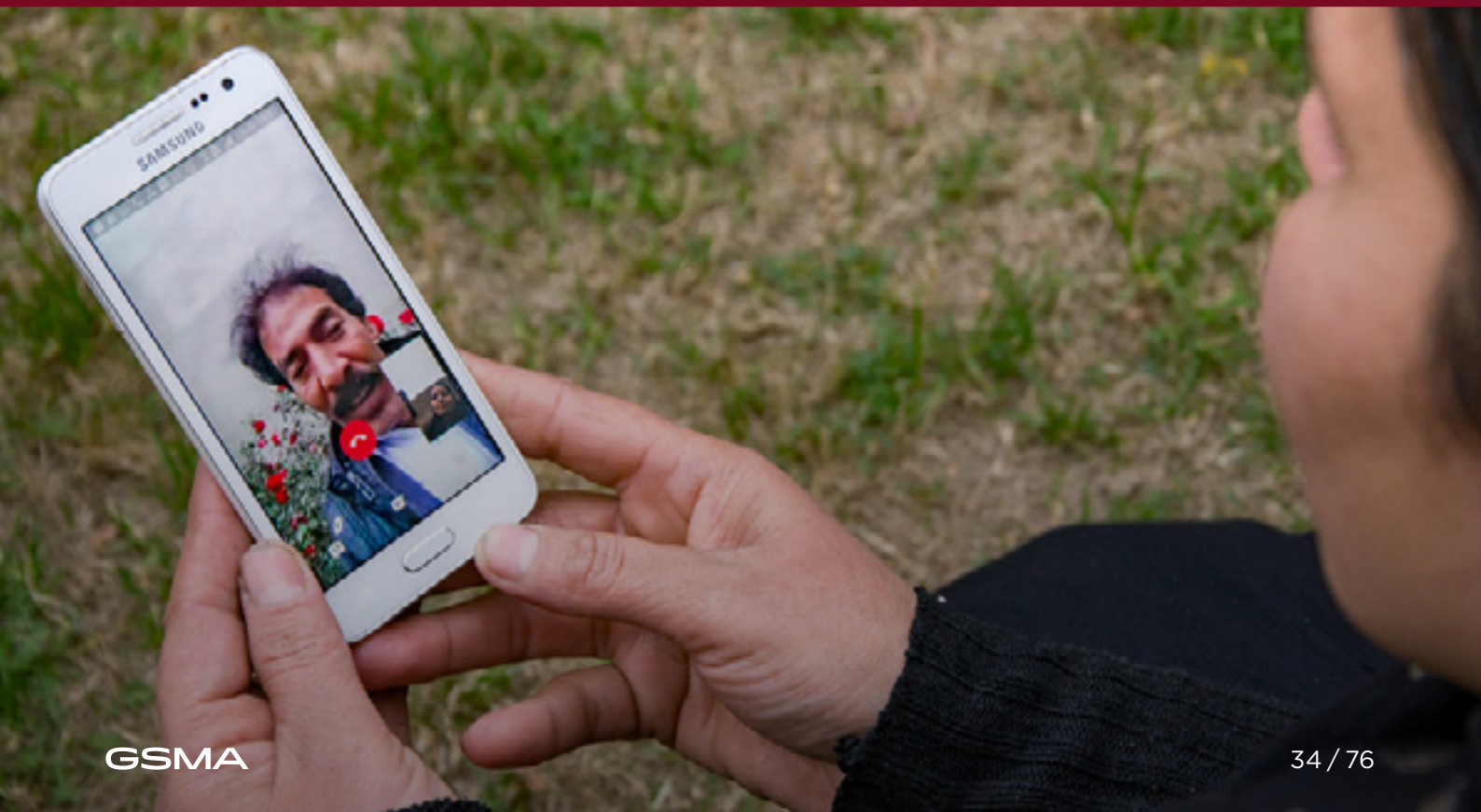
Figure 16: **Average download and upload speeds in HICs and LMICs, 2016–2021**



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

3. How people are using mobile internet

Overall, mobile internet users in the countries surveyed are using internet more frequently for various activities. Communication remains the main use case, but other activities are being done more frequently as well. What people are doing online varies by country, gender and geographic area.



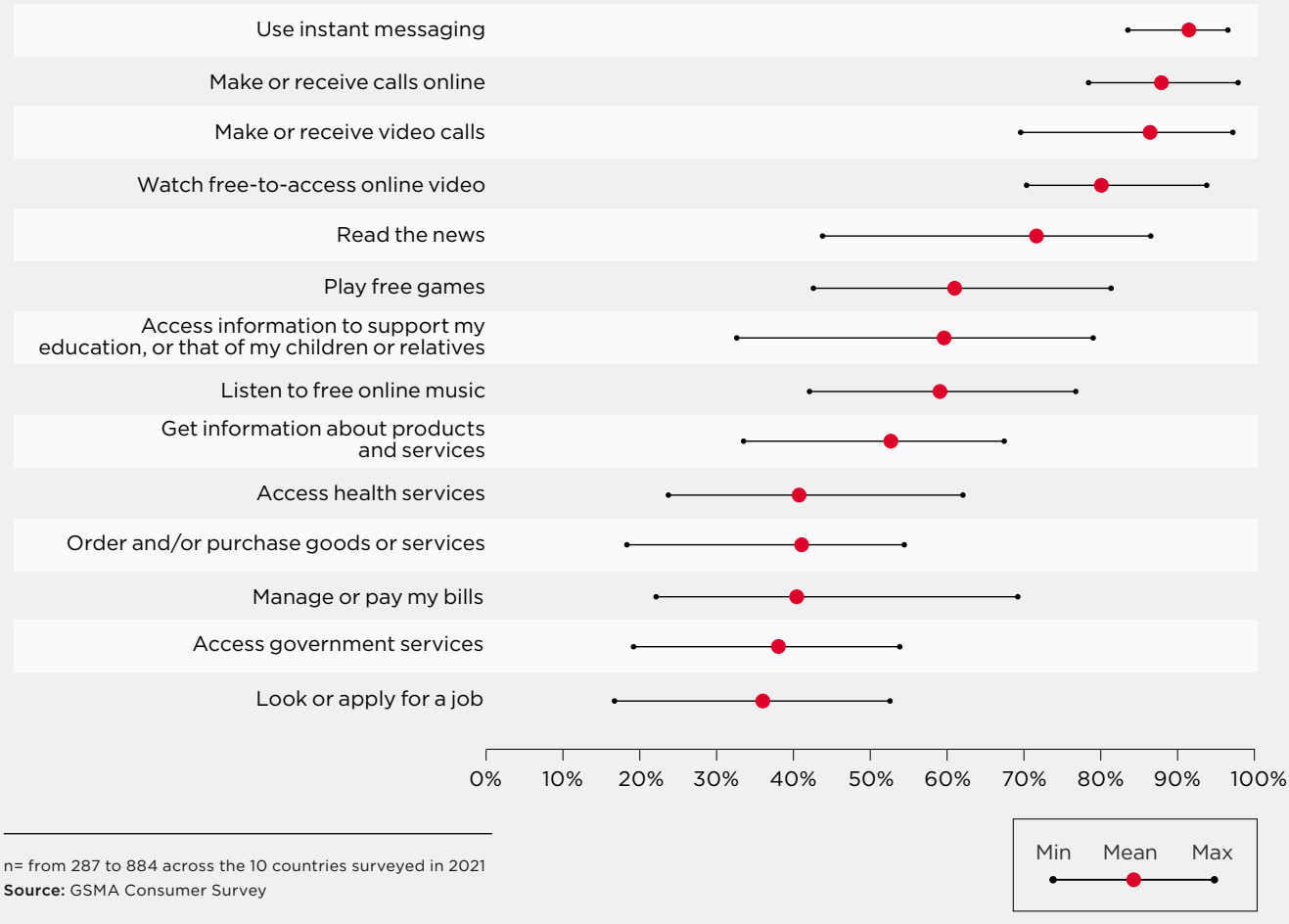
Across the countries surveyed, instant messaging, voice calling and video calling are the most popular internet activities

People use mobile internet to meet a range of life needs from communication and entertainment to work and education.[28] To better understand mobile internet usage in LMICs, the GSMA Consumer Survey asks mobile internet users what they do online and how frequently they do it.[29]

Communication services, such as instant messaging and video and voice calling online, were the most popular activities done by mobile internet users in 2021. On average, more than 86% of mobile internet users reported having done these activities across the countries surveyed (see Figure 17).

However, there are large disparities at the country level in the use of mobile internet for different activities, particularly for non-communication-related activities. For example, compared to other countries surveyed, using mobile internet for health, government services, job applications and education support was most popular in Mexico and least popular in Senegal (see Appendix 3).[30]

Figure 17: **Activities that mobile internet users report having done at least once on a mobile phone, 2021 (percentage of mobile internet users)**



n= from 287 to 884 across the 10 countries surveyed in 2021

Source: GSMA Consumer Survey

28. For further details on the different needs internet can fulfil, see GSMA (2021). Developing mobile digital skills in low- and middle-income countries
29. Mobile internet users were asked about how frequently they did any of a list of activities on a mobile phone. This list is not exhaustive and has expanded over the years. For further details, see Appendix 1. Trends are presented for six markets for which we have data across the three years and markets for which we have data for 2019 and 2021. In 2021, 10 markets were surveyed. It is worth noting that while some of these activities can be done exclusively using mobile internet, some other (such as playing games, using a mobile money account or managing and paying bills) could be done using standard GSM.
30. For these activities, the lowest point on the chart represents Senegal and the highest point represents Mexico.

The range of activities done on mobile internet varies by gender and location

Within countries, there are some variations in activities undertaken online. For example, while both male and female mobile internet users use communications services, men were more likely than women to have used mobile internet to access government services, read the news and manage or pay bills in Kenya, Nigeria, Pakistan and Senegal.

Similarly, rural mobile internet users were less likely than urban users to report using mobile internet to manage or pay their bills or order goods online in most countries surveyed. For example, in Bangladesh, 53% of mobile internet users living in urban areas reported having ordered goods or services online at least once compared to 39% of users living in rural areas.

People are using mobile internet more frequently for various activities

Across countries surveyed, the most reported activities done daily by mobile internet users are instant messaging, calling online, making video calls, watching free videos and reading the news (see Figure 18). These activities are similar for men and women and also for urban and rural populations, with little change in ranking since 2019. Instant messaging is the activity which has the highest percentage of daily use among mobile internet users. Across the 10 markets surveyed in 2021, 62% of mobile internet users used instant messaging daily, ranging from 53% in Egypt to 86% in Indonesia.

Since the beginning of the pandemic, people have been using mobile internet more frequently for communication but also for other activities. Figure 19 shows the frequency of activities

Figure 18: **Most popular activities done daily for male and female mobile internet users in surveyed countries**

	Men	Women
1	Use instant messaging	Use instant messaging
2	Make or receive phone calls on a mobile phone using an online provider	Make or receive phone calls on a mobile phone using an online provider
3	Watch free-to-access online video	Make or receive video calls
4	Make or receive video calls	Watch free-to-access online video
5	Read the news	Read the news

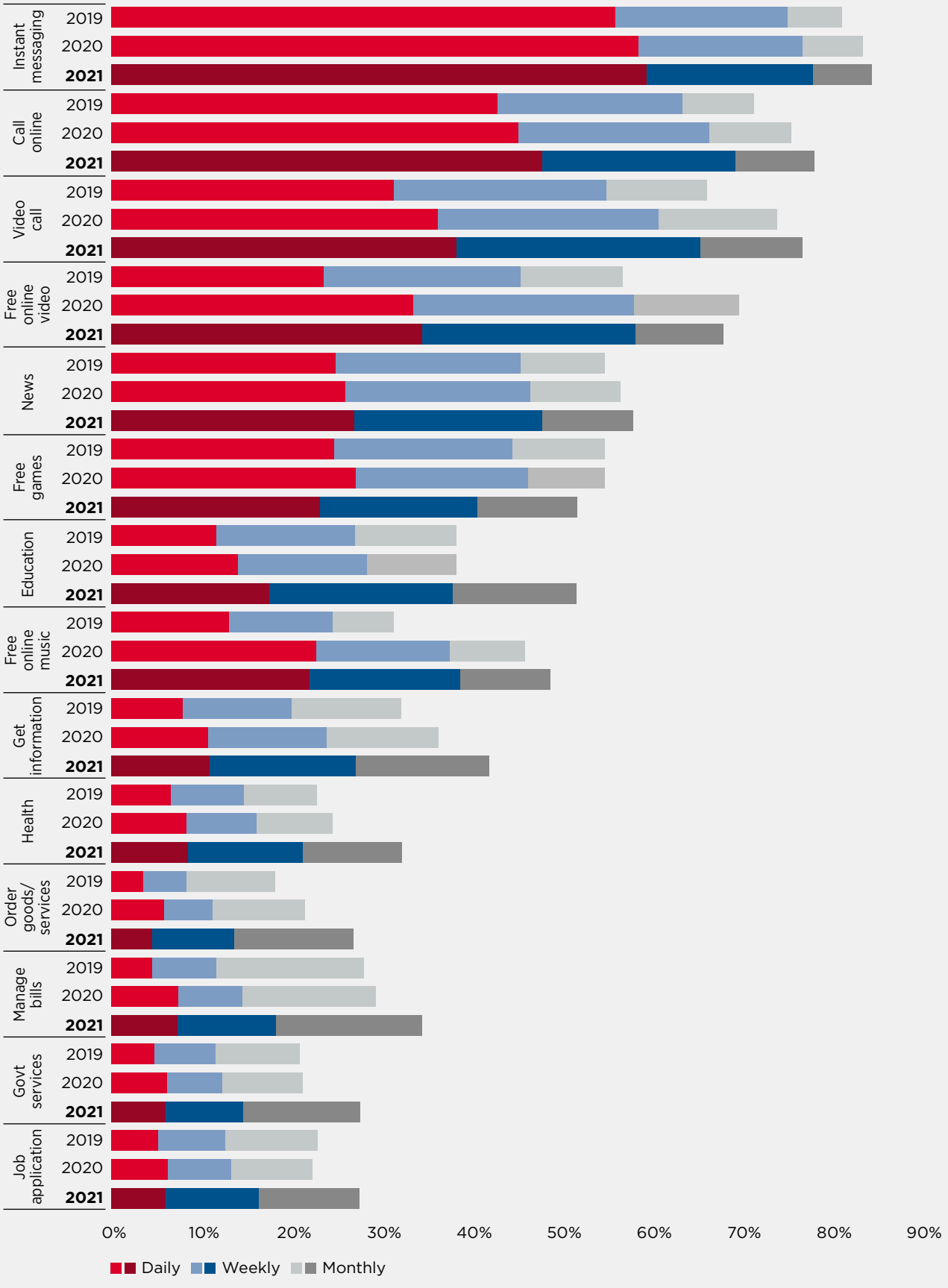
n= from 287 to 884 across the 10 countries surveyed in 2021

Note: Ranking is based on the proportion of mobile internet users reporting having done different activities daily.

Source: GSMA Consumer Survey

across the six countries surveyed in 2019, 2020 and 2021. For instance, overall, 38% of mobile internet users surveyed reported using mobile to support their education (or that of their children or relatives) at least once a week, compared to 27% in 2019. Similarly, on average in 2021, 21% of mobile internet users said they went online for managing their health at least once a week compared to 16% in 2020 and 15% in 2019. The proportion of mobile internet users who order goods or services online at least once a week increased from 8% in 2019 to 14% in 2021. This shows that activities traditionally done face to face have moved online rapidly and reinforces the urgent need to close the digital gap in mobile internet access and use.

Figure 19: Frequency of activities that mobile internet users report having done on a mobile phone in countries surveyed, 2019–2021 (percentage of mobile internet users)



n= from 267 to 884 across the six countries surveyed in 2019, 2020 and 2021

Source: GSMA Consumer Survey

People use social media for many different purposes

Social media is increasingly used to meet a range of needs. For example, many people in LMICs use social media not only for entertainment and communication but also to access information and for business purposes. A recent study in Ghana found that female micro-entrepreneurs used WhatsApp and Facebook to market their products and to communicate with customers and suppliers.[31] Likewise, social media is becoming a popular way to access news.[32]

However, while social media penetration has increased in most regions (for LMICs only), it remains below 50% in South Asia and below 20% in Sub-Saharan Africa. In comparison, average social media penetration at the end of 2021 in LMICs in Europe and Central Asia, East Asia and Pacific, and Latin America and the Caribbean was 60% or more.[33]

31. NetHope (2022). "5 learnings for connecting women to smartphones"
32. Reuters Institute for the Study of Journalism (2022). Reuters Institute Digital News Report 2022
33. GSMA Intelligence analysis of data sourced from DataReportal

4. Key barriers to mobile internet adoption and use

The number of ‘unconnected’ people is progressively decreasing. However, 44% of adults in LMICs are still not using mobile internet despite being covered by a mobile broadband network. They face a range of barriers that prevent them from adopting and using mobile internet, including barriers related to knowledge and skills, affordability, safety and security concerns, and a lack of relevant content and services.

This chapter explores the trends in key categories of barriers that prevent people from accessing and using mobile internet: awareness, affordability, literacy and digital skills, safety and security, and relevance (see Figure 20). It is important to note that while barriers related to access – beyond access to networks covered previously – are not examined in detail here, they remain key barriers for some people. Indeed, people face a range of economic, social and structural obstacles that translate into barriers to mobile internet adoption. Each 'unconnected' person has their own story, their own unique mix of barriers. As such, a comprehensive response is required to address the mobile internet usage gap.

Figure 20: **Barriers to mobile internet adoption and use**

Knowledge and skills	Affordability	Safety and security	Relevance	Access
Lack of digital skills and literacy, and lack of awareness and understanding of mobile internet and its benefits.	Inability to afford devices, data plans or other service fees.	Concerns about the negative aspects and risks of mobile and the internet, such as harassment, theft, fraud and online security.	Lack of relevant content, products and services that meet users' needs and capabilities.	Lack of access to networks and enablers, such as internet-enabled handsets, agents and formal IDs, or devices and services are not accessible or easy to use.

Results from the GSMA Consumer Survey show that a lack of awareness of mobile internet is an important initial barrier to using it. Mobile users who were already aware of mobile internet but did not use it were asked what barriers were preventing them from doing so (see Appendix 1). Overall, barriers related to literacy and digital skills and affordability were most often reported and ranked as top barriers (see Figure 21).

Figure 21: **Top reported barriers to mobile internet use in surveyed countries among mobile users who are aware of mobile internet but do not use it**

Ranking	All countries
1	Literacy and digital skills
2	Affordability
3	Safety and security

Based on the single most important barrier to using mobile internet as identified by mobile users who are aware of mobile internet but have not used it in the last three months prior to the survey. For more details, see Appendix 3.

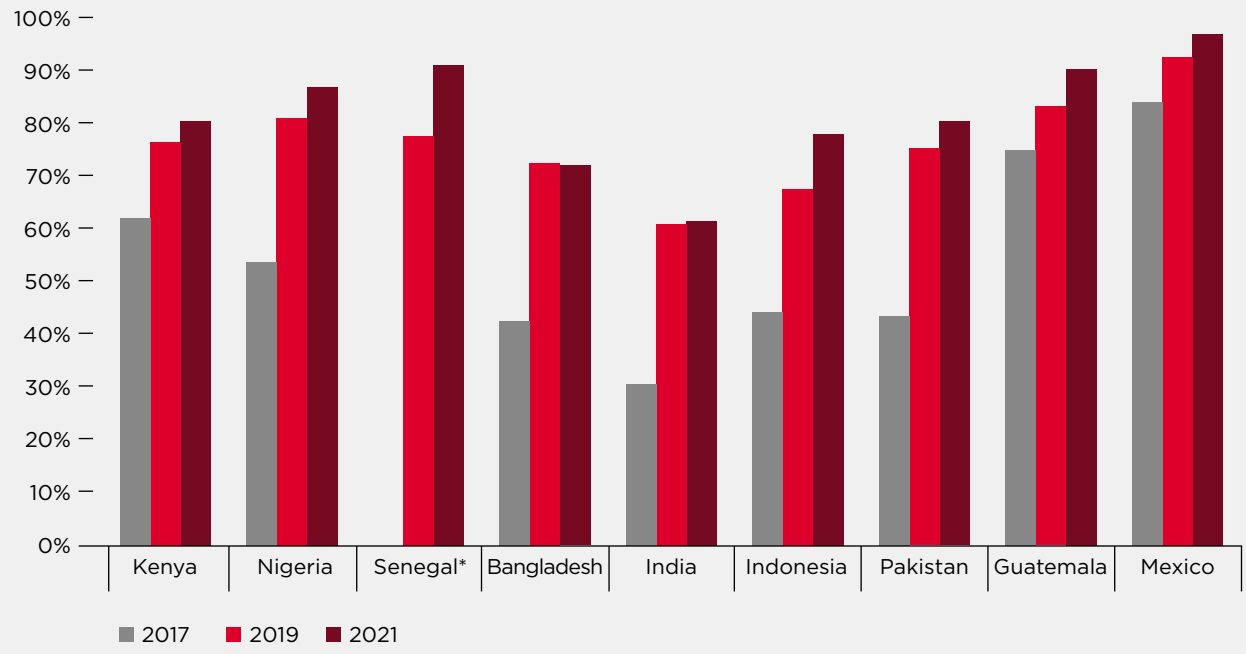
Source: GSMA Consumer Survey

Awareness continues to increase but growth has significantly slowed over the past two years

Awareness of mobile internet continues to increase, although it has slowed in recent years following a substantial rise between 2017 and 2019 (see Figure 22). Despite the need for many people to use the internet as a result of restrictions in mobility during the COVID-19 pandemic, awareness of mobile internet has not increased significantly in the countries surveyed, except in Senegal and Indonesia. At country level, increases in awareness have mostly been driven by people living in rural areas and women, who are disproportionately less aware.

However, in most countries surveyed there are relatively high levels of awareness, with at least 80% of the population aware of mobile internet. Awareness of mobile internet is the lowest in India and Bangladesh, with only 60% and 70% of the population aware of it, respectively (see Figure 22). More concerning is that awareness in these countries has barely changed since 2018.

Figure 22: **Proportion of the adult population aged 18 and above who are aware of mobile internet, 2017–2021**



Base: Adults aged 18 and above.

n = from 1,007 to 2,378

A person is considered aware of mobile internet if they have either used mobile internet before or have not used mobile internet, but are aware they can access the internet on a mobile phone.

Note: *Senegal was not surveyed in the 2017 GSMA Consumer Survey.

Source: GSMA Consumer Survey

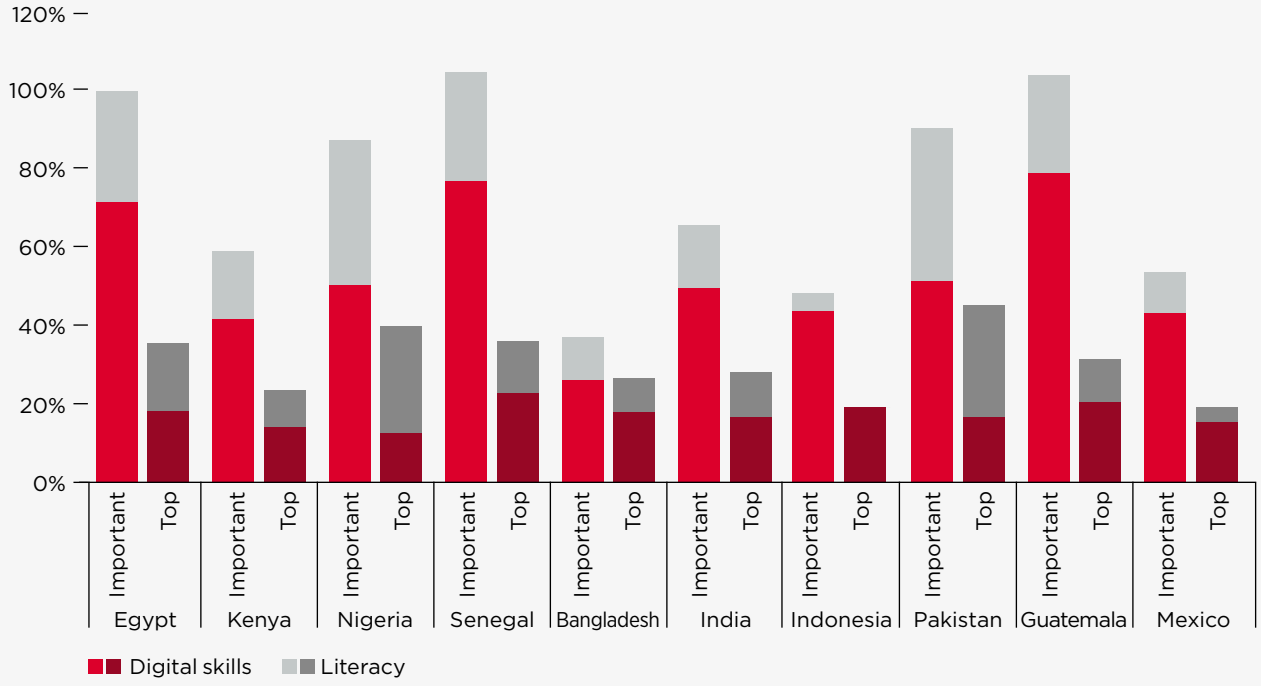
A lack of literacy and digital skills remains the top barrier to mobile internet usage

A lack of literacy and digital skills[34] ranked as the top barrier to mobile internet adoption among mobile users who are aware of mobile internet across the 10 countries included in the GSMA Consumer Survey 2021. Those who are disproportionately affected by this barrier tend to be poorer, women, those living in rural areas and people over the age of 35 years old.

Across all countries surveyed, a lack of digital skills is reported as an important barrier more often than illiteracy. However, in half of the countries surveyed, illiteracy is still reported as an important barrier by at least a quarter of those who don't use mobile internet despite being aware of it (see Figure 23). Illiteracy is cited more than a lack of digital skills as a top barrier by people in Pakistan and Nigeria. While solutions exist for low-literate populations, such as voice assistants, voice response chatbots and customer support in local languages,[35] people are often unaware of these solutions. Most of these innovations require access to internet-enabled handsets, which often come with useful accessibility features as standard, but these handsets are often the least affordable. Tackling this affordability barrier remains important for users to make use of many of these innovations.

34. This barrier is a composite of five sub-barriers that include functional literacy as well as mobile-related digital skills. For further details, see Appendix 1.
35. GSMA (2021). Making mobile internet more accessible for people with reading or writing difficulties

Figure 23: **Proportion of mobile users aware of mobile internet who report barriers related to literacy and digital skills, 2021 (reported as an important versus top barrier)**



Base: Adults aged 18 and above 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 78 to 310. For further details on the questions asked, see Appendix 1

A person is considered aware of mobile internet if they have either used mobile internet before or have not used mobile internet, but are aware they can access the internet on a mobile phone

Source: GSMA Consumer Survey

Affordability of handsets is a significant barrier to mobile internet adoption

As a category, affordability of handsets and data is a top barrier to mobile internet adoption and use. The affordability of handsets, in particular, is the most cited barrier among mobile users who are aware of mobile internet across the 10 countries surveyed.

Defining affordability

Affordability refers to both the ability of consumers to pay for a handset and to 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.[36, 37]

In this context, 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. However, it is important to note that cheaper handsets are not the only way to lower the handset cost burden. Making financing more accessible and strengthening the enabling environment, including stimulating demand by increasing awareness and willingness to pay, can also increase affordability.[38]

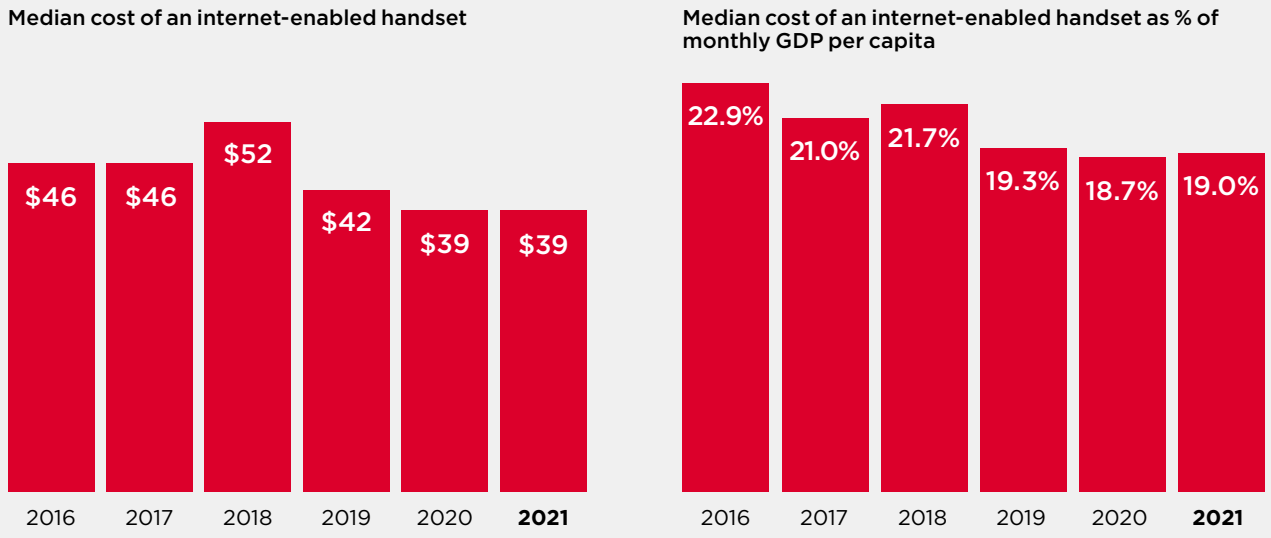
36. Income is an important factor to consider. If two consumers with different levels of income face the same handset and data costs, the consumer with the lower income will be less likely to purchase and will remain unconnected.
37. Changes in affordability over time can therefore be the result of changes in the costs of handsets and data, individual's income or both.
38. For further details, see GSMA (2022). Making internet-enabled phones more affordable in low- and middle-income countries

Cost and affordability of an entry-level internet-enabled handset remain relatively unchanged across LMICs overall but with regional variations

Across LMICs, the median cost of an entry-level internet-enabled handset was stable in 2021 at $39 (USD), while affordability also remained broadly flat at 19% of monthly GDP per capita (see Figure 24).

In 81% of LMICs, handset affordability either improved or did not significantly change in 2021. In the remaining 19%, it worsened (see Figure 25).

Figure 24: Median cost and affordability of an internet-enabled handset across LMICs, 2016–2021



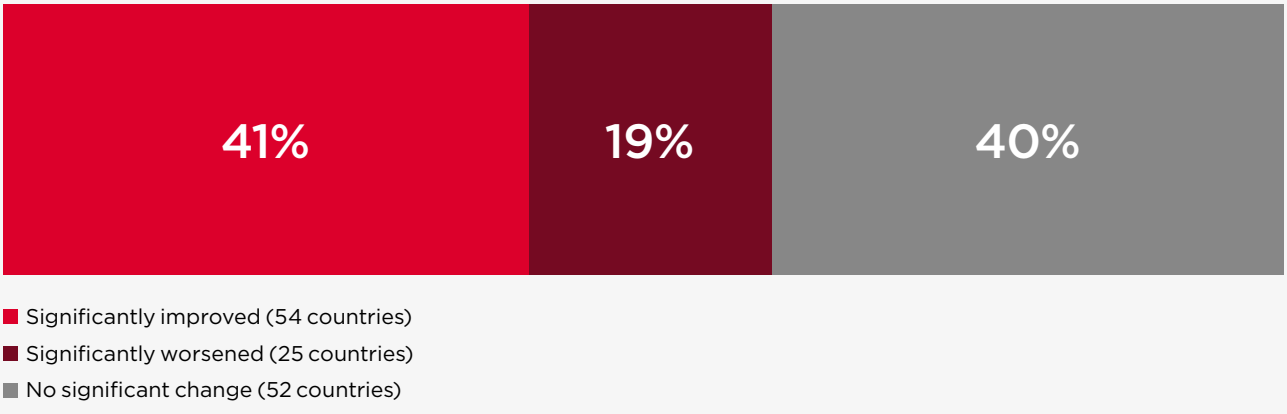
Note: Price of handset is the cheapest internet-enabled feature phone or smartphone available (at the time of collecting data) sold by mobile operators or mobile phone retailers (it does not reflect prices of second-hand or black-market handsets).

Source: GSMA Intelligence calculations based on pricing data from Tarifica

In Sub-Saharan Africa, affordability of handsets has significantly improved year on year between 2017 and 2020. In fact, Sub-Saharan Africa was the only region that saw an improvement in handset affordability in 2020, driven by the availability of lower-cost smartphones and smart feature phones (see Figure 26). This helped to offset the reduction in average incomes from the COVID-19 pandemic. However, the improvements in handset costs in 2020 have stagnated in the past year.

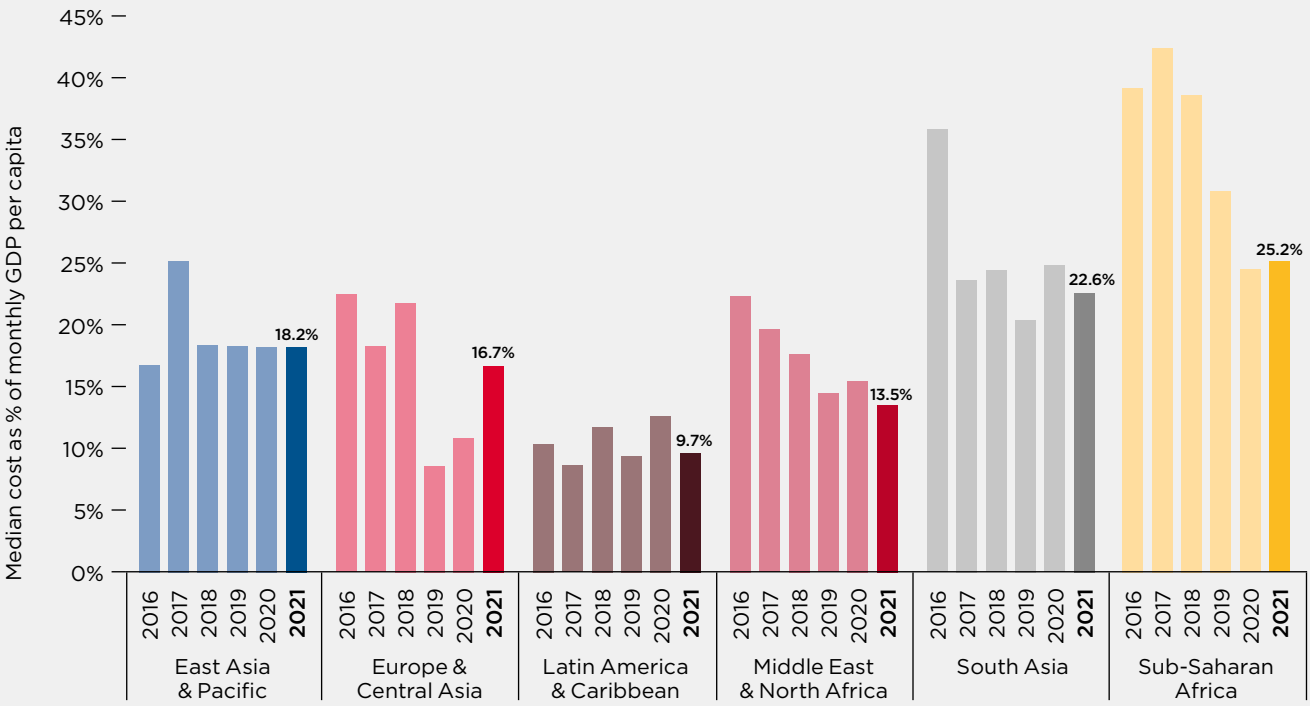
In other regions, economic recoveries and associated increases in average incomes in 2021 had a positive impact on handset affordability. The exception was for LMICs in Europe and Central Asia, where entry-level handset costs increased; this is likely to have been driven by a combination of factors, including changes in the portfolio of handsets offered by operators and distributors to include a greater number of higher-priced handsets. In some markets, smartphone costs either continued to rise or remained stable due to ongoing component shortages and higher logistics costs.

Figure 25: **Change in handset affordability in LMICs between 2020 and 2021**



Source: GSMA Intelligence calculations based on pricing data from Tarifica

Figure 26: **Affordability of an entry-level internet-enabled handset in LMICs (by region), 2016–2021**



Price of device is the cheapest 3G or 4G 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 the IMF World Economic Outlook).

Source: GSMA Intelligence calculations based on pricing data from Tarifica

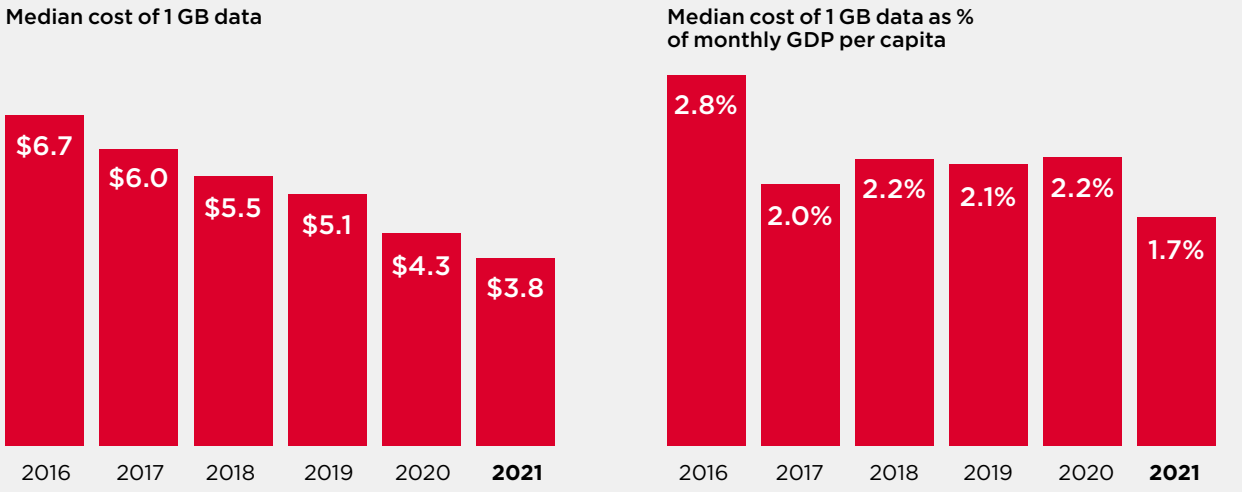
Affordability of 1 GB of data is now less than 2% of average monthly income in most LMICs

Affordability of data continues to improve. Across LMICs, the median cost of 1 GB of data as a share of monthly GDP per capita was 1.7% in 2021, compared to 2.2% in 2020 (see Figure 27). In most LMICs, the affordability of 1 GB of data significantly improved thanks to the continued reduction in data costs, combined with economic recovery in many markets.[39] In 56% of LMICs[40] 1 GB of data cost less than 2% of monthly income in 2021, compared to 45% of LMICs for which we had pricing data in 2020. With the exception of Sub-Saharan Africa, more than half of the LMICs of each region achieved this target in 2021 (see Figure 28).

39. Between 2020 and 2021, the affordability of 1 GB of data significantly improved in 70% of countries for which we had pricing data, significantly worsened in 11% of countries and did not significantly change in 18% of countries.

40. 73 countries out of 131 with pricing data.

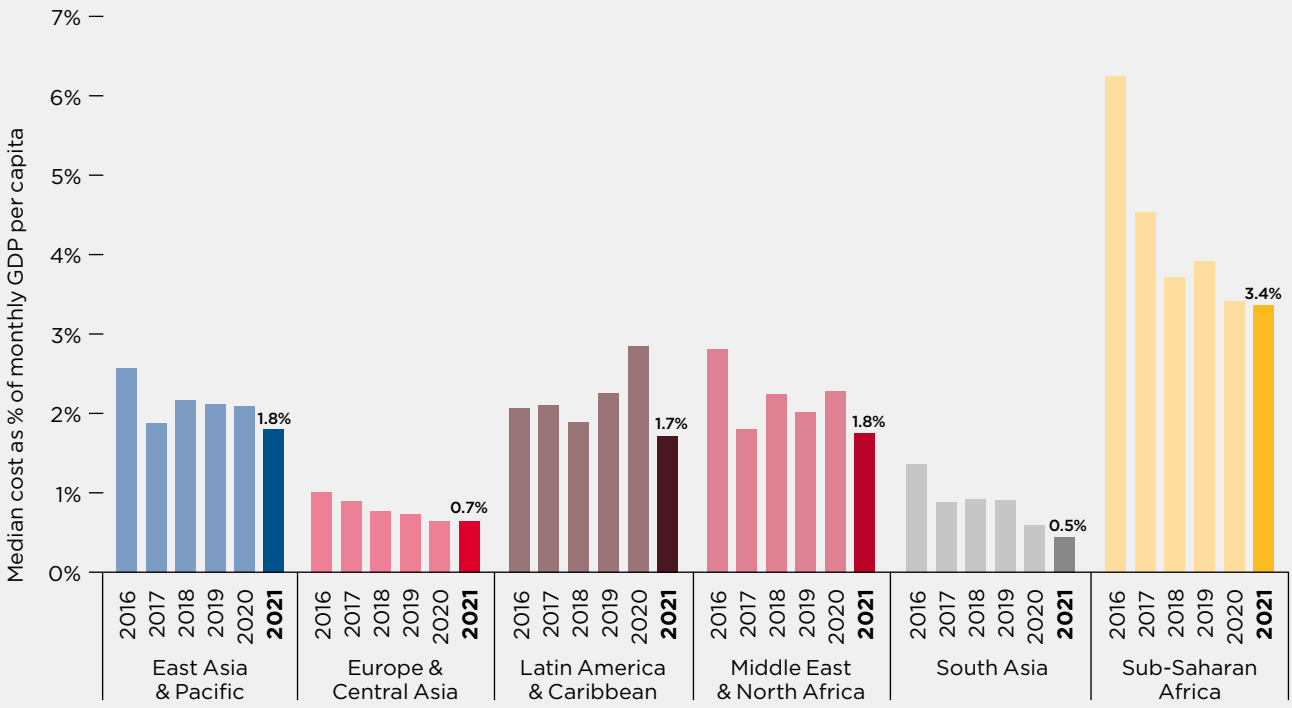
Figure 27: **Median cost and affordability of 1 GB of data across LMICs, 2016–2021**



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 MCI 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

Figure 28: **Affordability of 1 GB of data in LMICs (by region), 2016–2021**



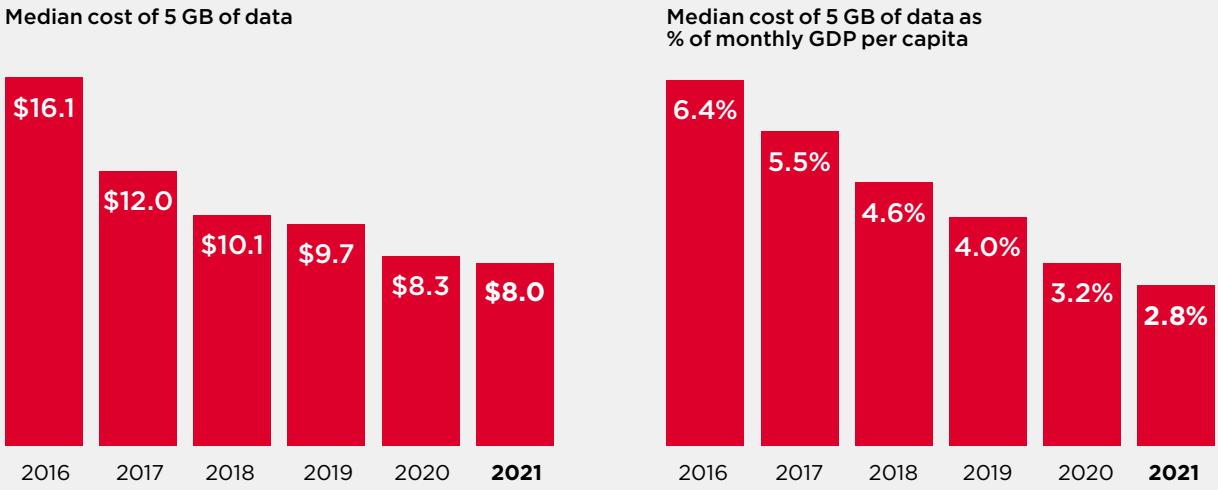
Price of 1 GB is the cheapest plan available (at the time of collecting data) to purchase at least 1 GB of data per month. Further details on how pricing data is gathered can be found in the MCI Methodology. To determine affordability, we divide the price by monthly GDP per capita (sourced from IMF World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

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

While this is an important achievement, the continued growth in data consumption means that consumers may want (and need) bigger data allowances.[41] Over the past five years, the cost of a 5 GB data bundle has decreased year on year and affordability has improved in LMICs overall (see Figure 29), but there are some regional differences. A 5 GB bundle became more affordable in Sub-Saharan Africa in 2021 (standing at 7.9% of monthly income per capita compared to 10% in the previous year), although it is still the region with the least affordable data. In Asia Pacific and Europe and Central Asia, it remained stable or became slightly less affordable. In Latin America and the Caribbean and the Middle East and North Africa, improvements in the affordability of 5 GB of data continue (see Figure 30).

It is also useful to consider the affordability of a 5 GB bundle relative to a 1 GB bundle. The cost of a 5 GB bundle as a share of monthly income had decreased relative to a 1 GB bundle since 2016. In 2020, 5 GB was 50% less affordable than 1 GB, compared to 130% in 2016. However, in 2021 the gap widened again, with 5 GB now being 65% less affordable than 1 GB. Despite this change, it is important to note that in many countries, particularly in South Asia, the cost of 5 GB is below 2% of monthly income.

Figure 29: **Median cost and affordability of 5 GB of data in LMICs, 2016–2021**

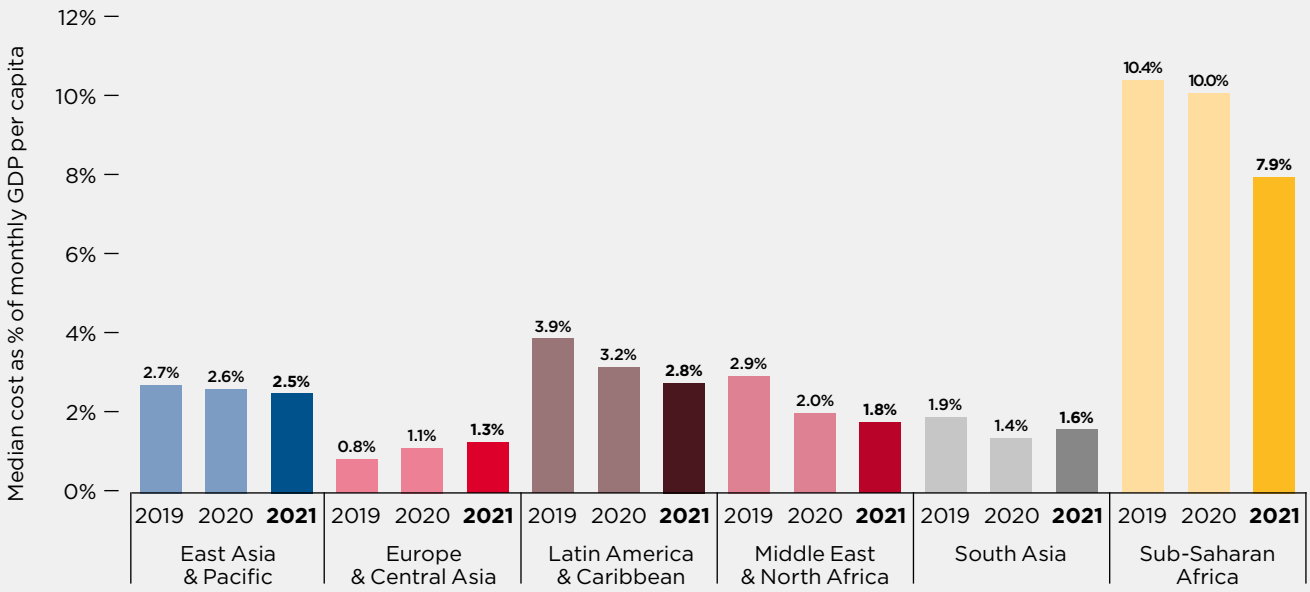


Price of 5 GB is the cheapest plan available (at the time of collecting data) to purchase at least 5 GB of data per month. Further details on how pricing data is gathered can be found in the MCI Methodology. In order to determine affordability, we divide the price by monthly GDP per capita (sourced from IMF World Economic Outlook).

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

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

Figure 30: **Affordability of 5 GB of data in LMICs (by region), 2019–2021**



Price of 5 GB is the cheapest plan available (at the time of collecting data) to purchase at least 5 GB of data per month. Further details on how pricing data is gathered can be found in the MCI Methodology. In order to determine affordability, we divide the price by monthly GDP per capita (sourced from IMF World Economic Outlook).

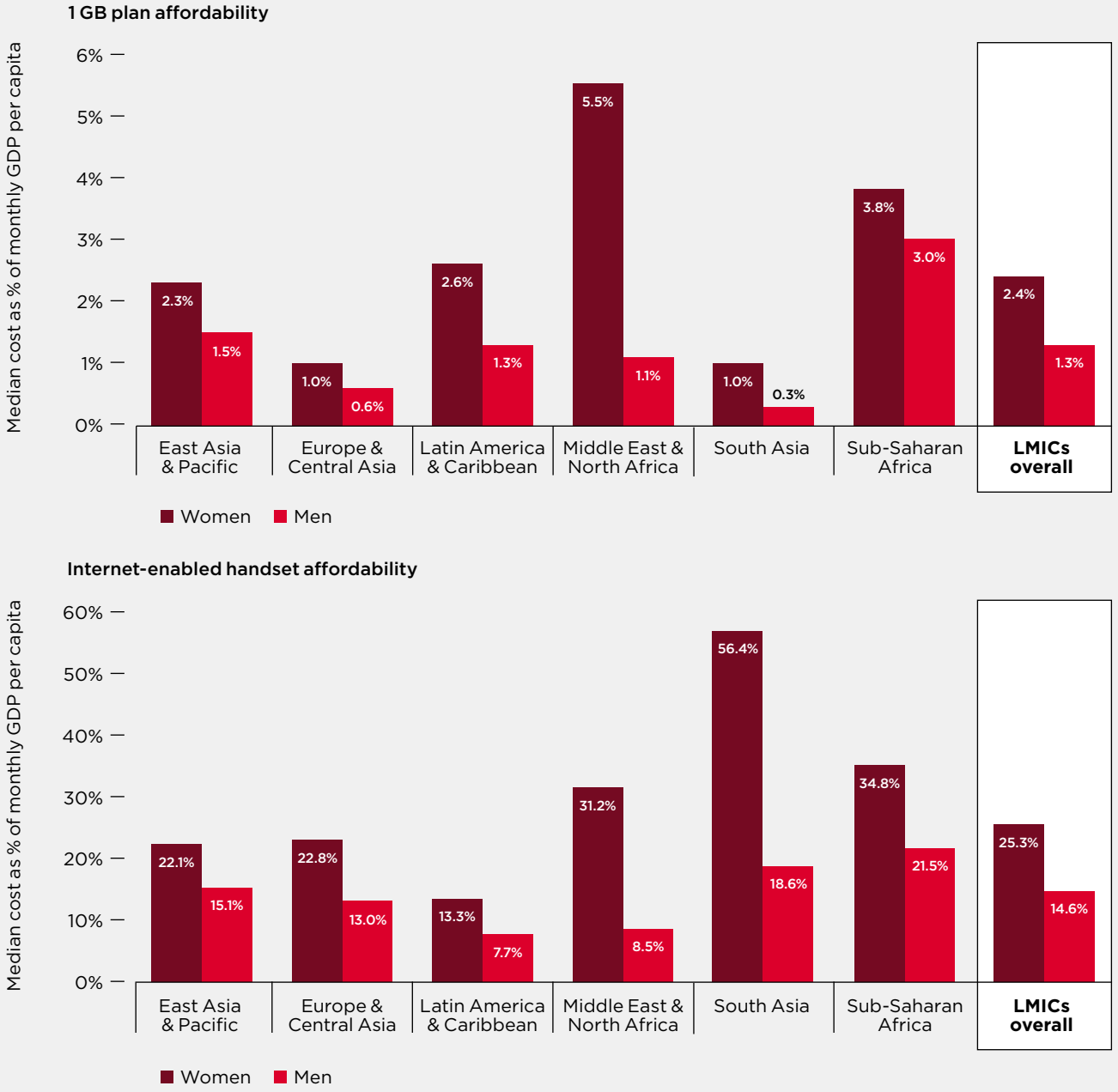
Source: GSMA Intelligence calculations based on pricing data from Tarifica and ITU

While affordability is improving for some, it remains a significant barrier for low-income and underserved populations

Better affordability in 2021, particularly of mobile data, is a welcome development and likely to be a factor driving the increases in mobile internet adoption and usage. However, in most LMICs, affordability remains a substantial barrier to internet access for the lowest-income and underserved populations. For example, women are disproportionately impacted by this barrier[42] given the lower levels of employment, gender pay gap and, in many countries, lower levels of financial autonomy compared to men.[43] While on average 1 GB of data costs less than 2% of monthly income in most LMICs, women would be expected to pay 2.4% of their monthly income (see Figure 31). Only in South Asia and Europe and Central Asia do the majority of women benefit from a 1 GB bundle below the affordable cost target of 2%. Similarly, the cost of an entry-level internet-enabled handset is higher for women in LMICs, with a median of 25% of monthly income, compared to 15% for men.

42. GSMA (2022). The Mobile Gender Gap Report 2022
43. This is highlighted in the MCI, which contains a dimension on Gender Equality that includes indicators on country gender gaps in income, schooling and financial inclusion, as well as gender gaps in mobile ownership and social media adoption.

Figure 31: Affordability of 1 GB of data and an internet-enabled handset for men and women in LMICs (by region), 2021

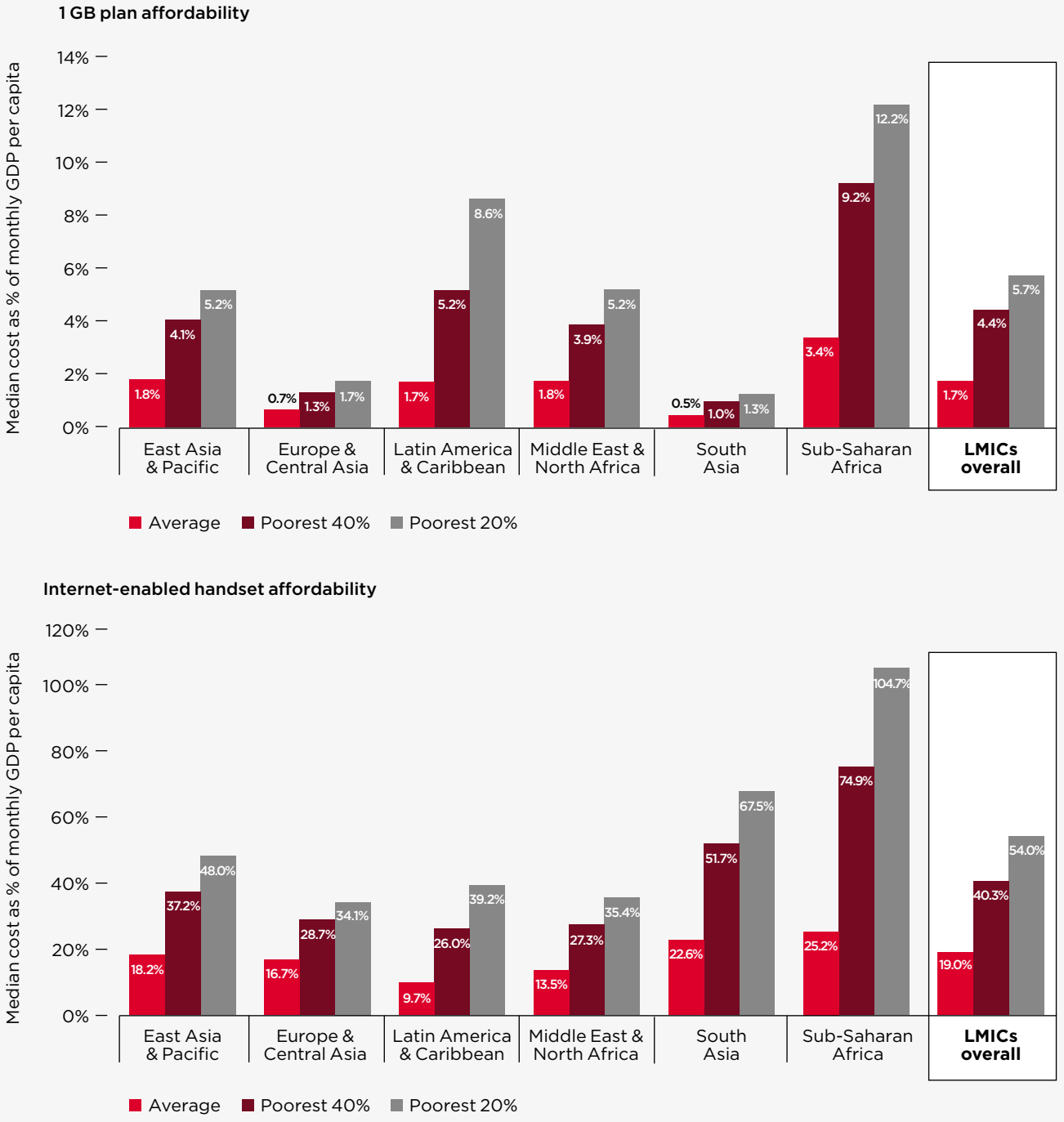


Data on the incomes for women and men are based on data sourced from the UN Human Development Index and the IMF World Economic Outlook.
Source: GSMA Intelligence calculations based on pricing data from Tarifica and ITU

Affordability is also a significant barrier for people with the lowest incomes. Across LMICs, the poorest 40% of the population are expected to spend 4.4% of their monthly income for 1 GB of data, and the poorest quintile would pay 5.7% (see Figure 32). Similarly, the cost of a handset represents 40% and 54% of the monthly income for these two groups, respectively. In Sub-Saharan Africa, an entry-level internet-enabled handset costs more than one month of average income for the poorest 20%. Furthermore, in practice, handset affordability is likely to be even more of a barrier for many in these groups because many of the cheaper handsets that are available in a market may not actually be available and accessible to all

consumers, particularly for those living in rural areas. In rural areas the price of a handset tends to be higher than in large cities due to high transportation and logistics costs, as well as commissions taken by intermediaries and a limited presence of handset distributors.[44]

Figure 32: **Affordability of 1 GB of data and an internet-enabled handset for the poorest populations in LMICs (by region), 2021**



Data on the incomes for the poorest 20% and 40% of the population are based on data sourced from the World Bank and the IMF World Economic Outlook.
Source: GSMA Intelligence calculations based on pricing data from Tarifica and ITU

44. GSMA (2022). Making internet-enabled phones more affordable in low- and middle-income countries

Safety and security remains an important barrier to mobile internet use

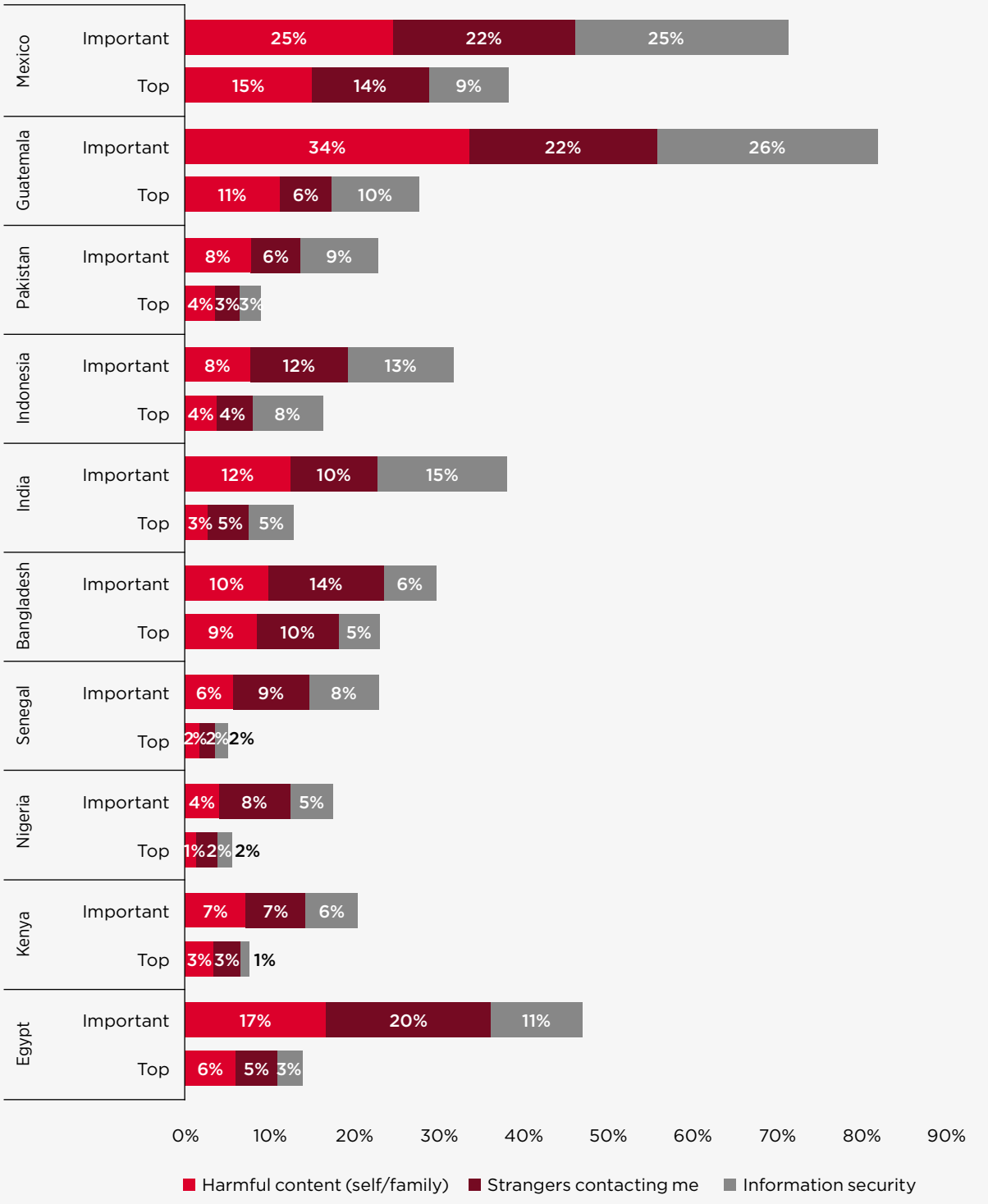
Across the countries surveyed, safety and security concerns remain an important barrier for mobile users aware of mobile internet but not using it. In 2021, in all countries surveyed except for Nigeria, at least one in five mobile users aware of mobile internet reported concerns about safety and security as an important reason why they do not use mobile internet services (see Figure 33). The percentage of mobile users aware of mobile internet who reported it as an important barrier increased from 12% in 2020 to 23% in 2021 in Bangladesh and from 15% to 23% in India.

In Latin America, safety and security concerns have consistently been a significant barrier. In Mexico and Guatemala, more than 70% of mobile owners not using mobile internet reported it as an important barrier, with 38% in Mexico reporting it as the top barrier.

Governments are increasingly recognising how important trust is for people to go online. This is reflected by trends in the ITU Global Cybersecurity Index, which measures the commitment of countries to cybersecurity at a global level.[45] It is also one of the indicators in the GSMA MCI. Since 2015, the average score for this indicator has increased from 34 (out of 100) to 57, meaning that governments are taking more substantial actions to address this issue. However, there are significant differences by region, with scores ranging from 99 in North America and 83 in Europe and Central Asia to 38 in Sub-Saharan Africa and 36 in Latin America and the Caribbean.

45. https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx

Figure 33: Proportion of mobile users aware of mobile internet who report barriers related to safety and security in LMICs, 2021



Base: Adults aged 18 and above 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 78 to 310

Source: GSMA Consumer Survey

Users are increasingly benefiting from locally relevant content, but it remains a challenge in many countries

The availability of online content and services that are accessible and relevant to the local population is a key enabler of mobile internet adoption and usage. Without it, people will not have a compelling reason to invest the time and financial resources needed to access the internet.

Over the past five years, many countries have seen improvements in the volume of content developed locally. For example, data from the MCI shows that in 2016, there were 2.2 million active mobile applications available on the main smartphone app stores (App Store and Google Play) and 22% were developed in LMICs. In 2021, there were 5.8 million active mobile apps available and 30% were developed in LMICs. Of the apps developed in LMICs, 61% were produced in Asia Pacific, while only 3% were developed in Sub-Saharan Africa.

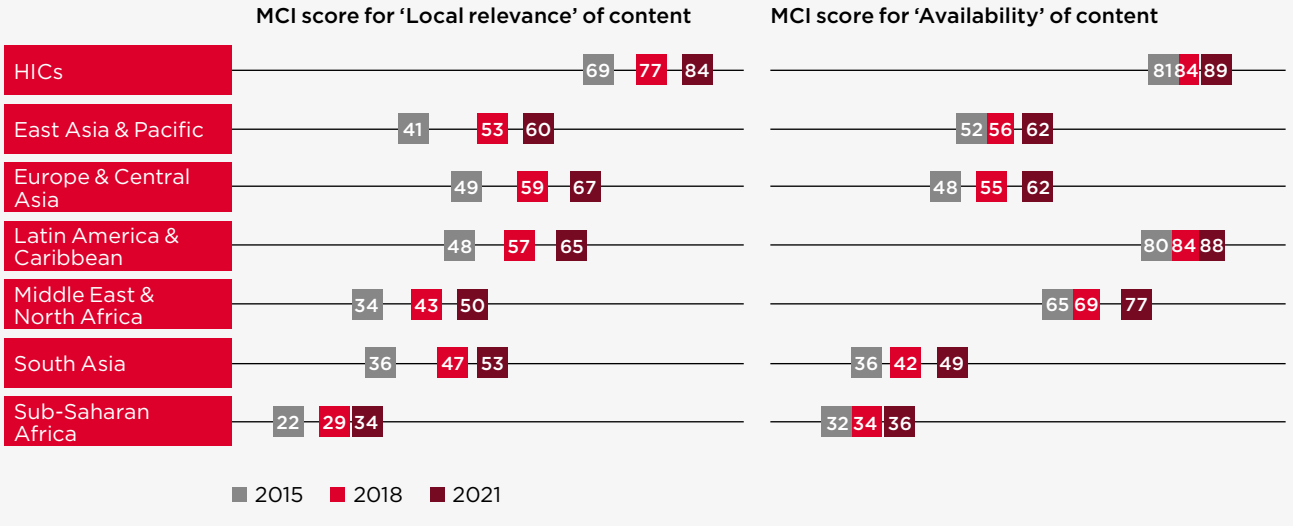
The latest update of the MCI reflects these recent changes in content and services as an enabler of mobile internet use. Figure 34 shows how scores against two key dimensions have changed over time for each region: 'Local relevance' and 'Availability', which includes measures such as availability of content in each country's national languages.

The biggest improvements in the overall MCI Content and Services enabler scores have been in Asia, where the development of digital ecosystems has increased the amount of content in local languages (e.g. in India, the Philippines, Indonesia and Vietnam) as well as other content such as e-government services and the growing use of social media.

However, many countries perform less well, particularly those in Sub-Saharan Africa and the Pacific Islands, which have a high degree of linguistic diversity and where a significant proportion of the population do not speak one of the European-based languages that dominate the internet. In these countries, it is challenging for content providers to develop sufficient scale, making it difficult to target underserved populations with relevant content.

In contrast, in Latin America and the Caribbean and the Middle East and North Africa, people have more content available to them because the vast majority can speak and read in a language that is widely catered for online (e.g. Spanish, Portuguese, French or Arabic). This is shown by the 'Availability' scores in Figure 34.

Figure 34: **Average Mobile Connectivity Index scores for 'Local relevance' and 'Availability'**[46]



Source: GSMA Mobile Connectivity Index

46. In the MCI, the Local Relevant Content dimension includes indicators on E-Government services, the number of web domains registered in each country, mobile social media penetration and the number of mobile applications developed per person in each country. The Availability dimension includes indicators on the number of apps available in local languages and the proportion of top-ranked apps that are available in local languages. For further details, see GSMA (2022). Mobile Connectivity Index Methodology.

Spotlight

Achieving better connectivity: examples of two 'most improved' countries of the MCI for the period 2014–2021

Zambia

Zambia's MCI score increased from 21 in 2014 to 41 in 2021, making it the most improved country in Sub-Saharan Africa over the period. This performance is the result of improvements in infrastructure, driven by operator investments, and affordability:

- **Infrastructure:**
  - 2G coverage has increased from 78% to 98% between 2014 and 2021 and is now almost universal.
  - In the same period, 3G coverage increased from 38% to 82%, while 4G coverage increased from 9% to 69%.

- **Affordability:**
  - 1 GB of data now costs less than 2% of monthly GDP per capita, compared to more than 10% in 2014, demonstrating Zambia's efforts to achieve the '1 for 2' affordability target (see chapter 4).[47]
  - The cost of an entry-level device has fallen from more than 50% of monthly GDP per capita in 2016 to less than 20% in 2021, as a result of cheaper smartphones and smart feature phones, including the MTN Ka Toffee smart feature phone, which is priced at less than $20.

As a result, mobile internet adoption among adults doubled from 18% in 2015 to 35% in 2021, which was 2 pp below the average in Sub-Saharan Africa (in 2015, adult adoption in Zambia was 5 pp lower than the regional average). In addition, the gender gap in mobile ownership has reduced from 13% to 6% (though it remains high for social media use at 26%).

Despite these gains, internet adoption in Zambia is still lagging behind others in the region. There are at least two key reasons for this.

First, it is important to have a strong environment across *all* enablers. If network coverage is widespread and services are affordable, adoption can still be limited if people are not aware of mobile internet, if they don't perceive it as being relevant to their lives or if they don't have the necessary skills to use it. In Zambia, one in six adults are not literate and adults have on average seven years of education.[48] Zambia also scores below average for the MCI Content and Services enabler, with limited content being developed in the country and less accessible e-government services. Operators are actively attempting to address these barriers. For example, MTN Zambia introduced the MTN Data Smart programme, which aims to improve consumers' understanding of and ability to use mobile internet and apps. In addition, Airtel Zambia has partnered with the Smart Zambia Institute, Ministry for Education and the ITU to provide digital skills training to schoolgirls.

Second, the policy environment for mobile operators is challenging. Zambia has one of the lowest MCI scores in the region and worldwide for taxation, as sector-specific taxes account for around 15% of the cost of mobile ownership. This imposes an additional affordability barrier for the poorest segments of the population, in a country with one of the world's highest levels of income inequality. The poorest 20% need to pay 14% of monthly income to access 1 GB of data, and 115% to purchase an entry-level device. On the operator side, investment is constrained by higher levels of corporate income tax (40%) than in other sectors (30%) - it is also higher than most other countries in the region.[49] This is likely to reduce the financial resources and incentives that are needed to expand 4G coverage to rural and less densely populated areas. It is therefore important that the government aligns its taxes with best-practice principles to avoid distorting markets and investment and so as not to undermine affordability and access to services.

47. 1 GB of mobile broadband data available for 2% or less of GNI per capita.
48. UNESCO. See http://uis.unesco.org/en/country/zm?theme=education-and-literacy
49. GSMA (2018). Reforming mobile sector taxation in Zambia

Vietnam

Vietnam is the third most improved country in the MCI since 2014 and the most improved country in Asia Pacific, increasing its score from 51 to 73 over seven years. Mobile internet use in the country nearly doubled from 27% of the population in 2014 to 53% in 2021. More than two thirds of adults in the country are now using mobile internet, with adoption accelerating after 2019, following the outbreak of COVID-19. This improvement has been broad and driven by better performance across all four enablers:

- **Infrastructure:** 4G networks were not available in 2015 but reached 95% of the population by 2018, following accelerated rollouts by operators. Average download speeds have also increased 10×, from 2 Mbps in 2014 to 20 Mbps in 2021.

- **Affordability:** In 2021, 1 GB of monthly data was less than 0.3% of monthly GDP per capita, compared to 1.5% in 2014. Similarly, affordability of 5 GB improved and is now less than 1% of monthly GDP per capita. Both figures are below the global and regional benchmarks. The cost of an entry-level device is 20% of monthly income, which is in line with other LMICs in the region and globally.

- **Consumer Readiness:** Mobile ownership has increased from 45% in 2014 to 61% in 2021, while there have also been smaller improvements in educational attainment. It is worth highlighting that compared to other LMICs, Vietnam already had a high adult literacy rate.

- **Content and Services:** There has been a significant increase in the development of local content, with almost 600,000 mobile applications available in local languages in 2021 (an increase of more than 700% since 2014). The UN's assessment of e-government services also increased from 42% in 2014 to 65% in 2021, while penetration of social media has significantly increased from 25% to 78% over the same period. Social media provides an important platform for consumers and firms to generate content that is relevant for local populations, in addition to being used for social networking.

Vietnam's experience highlights how the enablers are linked to each other. As more individuals acquire internet-enabled handsets and as the internet becomes more relevant, consumers will be more willing and able to use the internet,

which will in turn drive a more competitive and innovative market and incentivise operators to expand coverage.

Going forward, the government of Vietnam has set out its key digital goals in the National Digital Transformation Programme, which is focused on the digitalisation of government services and administration, businesses and wider society. It aims to make 80% of public services available online, including through mobile devices, and to digitise 70% of customer transactions.[50] However, looking ahead, to expand mobile internet adoption, several areas will need to be addressed, including:

- **The rural-urban divide:** Rural populations in Vietnam are almost 30% less likely to use mobile internet than urban populations.
- **Network quality:** Despite improvements, average download speeds remain below the regional average in East Asia and the Pacific. Quality of access in particular is poorer in rural and mountainous areas.[51]

As part of its National Digital Transformation Programme, the government is also aiming to upgrade mobile infrastructure and make 5G universal by 2030, enabling new services and improved networks.[52] To achieve this, spectrum is an important policy area to consider. Vietnam has assigned less spectrum per operator than others in the region and worldwide. Expanding the supply of spectrum will be crucial for the launch of 5G (with the major operators having tested commercial 5G in 2019) and enabling faster and higher-quality mobile internet services for consumers. Several bands – including 700 MHz, 2.3 GHz, 2.6 GHz and 26 GHz – have been identified for 5G by the Ministry of Information and Communication, while the 3.5 and 4.8 GHz bands are also under consideration. Establishing a clear spectrum roadmap that sets out forward-looking plans on future spectrum allocations and the conditions under which spectrum will be made available is important to create the right investment environment and allow for the efficient rollout of 5G networks.

50. "Vietnam's Digital Transformation Plan Through 2025", Vietnam Briefing, September 2021; "Vietnam sets the goal to become a digital nation by 2030", ICT Vietnam, December 2020
51. World Bank (2021). Digital Vietnam: The Path to Tomorrow
52. See https://opengovasia.com/hanoi-vietnam-digitlisation-plan-aims-for-complete-5g-coverage-by-2030/

5. Conclusion and recommendations

Enabling people everywhere to be connected is crucial and yet recent crises have further marginalised certain groups. While the social and economic impacts of COVID-19 disrupted almost every aspect of people's lives, they were especially devastating for the poorest and most vulnerable.

The pandemic wiped out more than four years of progress on poverty eradication and caused greater inequality, reversing pre-pandemic trends.[53] Analysis by the World Bank suggests that in 2022, 75 million to 95 million more people could fall into extreme poverty.[54]

Furthermore, economic recovery from the pandemic has been unequal. In high-income countries, substantial government spending and the fast rollout of COVID-19 vaccines helped to stabilise economic activity in 2021 and into 2022. However, governments in many low-income countries have been constrained by their more limited access to both financing and vaccines. The recovery is further impacted by the war in Ukraine, which combined with rising inflation and disruptions of food supply chains is having a global impact that is disproportionately affecting vulnerable populations.[55]

Within this context, being digitally included remains critically important, but there are many who are now further at risk of remaining unconnected.

The risk of deepening the digital divide

While mobile internet adoption and use has continued to increase in 2021, growth has been unequal, and we are already seeing how the pandemic and ongoing economic turmoil is negatively impacting progress to reduce the digital divide. In 2021, the pace at which women were adopting mobile internet slowed compared to men. Similarly, adoption among people living in LDCs has been growing at a slower pace than for people living in other LMICs. Despite data becoming more affordable overall, both data and internet-enabled handsets have become less affordable for low-income populations and women, as the pandemic has impacted people's incomes and exacerbated existing structural inequalities. Furthermore, cost-of-living increases may result in more people forgoing internet services or not using it as much as they would like. It is worth noting that this issue is a global one, affecting both LMICs and HICs.[56]

This report provides evidence of the widening connectivity gap between LMICs and HICs. As HICs focus their efforts on deploying 5G and providing a greater user experience, LMICs continue to focus on 4G coverage. Many mobile internet users in LMICs are still using 2G and 3G, limiting their mobile internet experience while also impacting the migration to 4G.

The importance of increasing mobile internet connectivity

Mobile internet connectivity can deliver significant economic benefits, reduce poverty and transform people's lives, providing them with access to information and services that not only assists them in their daily lives but that they would not have had access to otherwise. Providing mobile broadband has a positive impact on the economy. Recent research shows that an increase of 10% in mobile broadband penetration leads to 1.5% GDP growth,[57] with even higher impacts of 2.5–2.8% GDP growth in LDCs.[58] At the micro-economic level, studies have shown that expanding mobile broadband coverage reduces poverty and increases household consumption.[59, 60] In addition, mobile internet is associated with higher levels of wellbeing among men and women.[61]

The pandemic was a catalyst for mobile internet use and has left its mark. The internet has become more of a necessity to access goods and services, with mobile phones a critical gateway. In this report, we've shown that people are using their mobile phone more frequently for a range of activities online, and it is very likely that people will require more data to meet their growing digital needs. While the cost and affordability of data are improving overall, for the majority of mobile internet users, data consumption remains relatively low. This highlights that even when connected, many people use mobile internet only in a limited way. It is important to address this consumption gap[62] alongside the usage and coverage gaps to ensure people are not limited in their ability to use the mobile internet to meet their needs.[63]

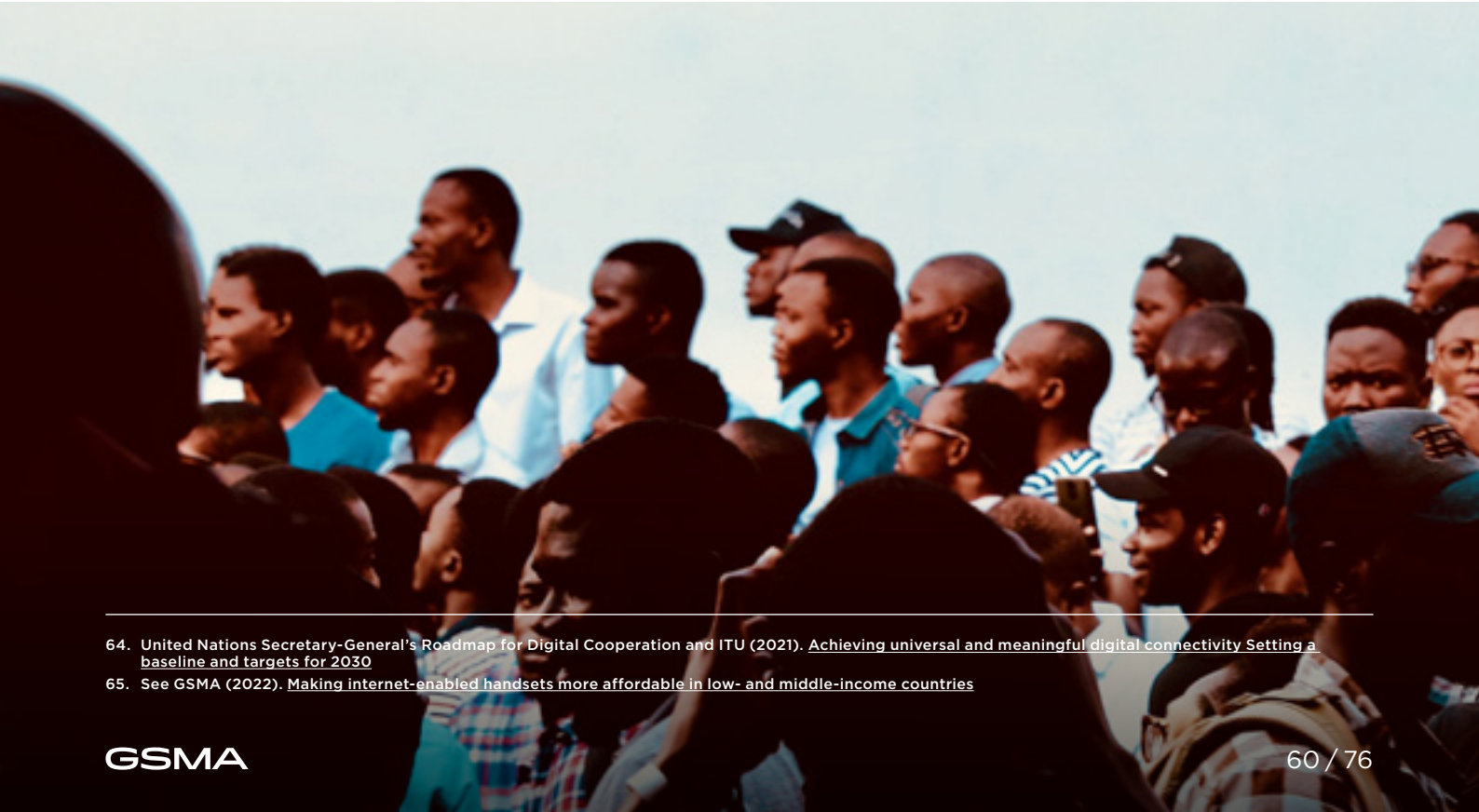
53. UN (2022). The Sustainable Development Goals Report 2022
54. "Pandemic, prices, and poverty", World Bank Blogs, April 2022
55. "How War in Ukraine Is Reverberating Across World's Regions", IMF Blog, March 2022
56. For example, see https://www.wired.com/story/phones-connectivity-tax-policy/
57. ITU (2020). How broadband, digitization and ICT regulation impact the global economy
58. ITU (2021). Economic impact of broadband in LDCs, LLDCs and SIDS
59. World Bank, GSMA (2020). The poverty reduction effects of mobile broadband in Africa: Evidence from Nigeria
60. Bahia, K. et al. (2021). Mobile Broadband Internet, Poverty and Labor Outcomes in Tanzania
61. GSMA (2022). Mobile Internet Use, Well-being and Gender: Understanding the Links; GSMA (2019). The Impact of Mobile and Internet Technology on Women's Wellbeing Around the World
62. World Bank (2021). World Development Report 2021
63. Broadband Commission Working Group on Smartphone Access (2022). Strategies towards universal smartphone access.

A collective effort is needed to bridge the digital divide

Strong collective effort is needed to achieve meaningful connectivity, which allows users to have a safe, satisfying, enriching and productive online experience that is affordable.[64] It requires informed, targeted action by all stakeholders, including mobile operators, policymakers, international partners and the broader private sector. Such strategies should factor in the structural issues underpinning the disparities in adoption and use, such as differences in income and education levels, and restrictive social norms.

The following barriers should be addressed:

- **Knowledge and digital skills:** Improving digital skills and literacy, as well as driving awareness and understanding of mobile internet and its benefits, is critical to increase digital inclusion. Digital skills initiatives should focus on the life needs and circumstances of users.
- **Affordability of handsets and data:** Affordability of handsets and data remains a key challenge. Approaches to improve affordability should include efforts to lower the cost of internet-enabled handsets and data, innovative data pricing strategies and handset financing options, in addition to providing targeted subsidies and tax policies that promote the uptake of internet-enabled devices and data services.[65]
- **Relevance:** Local digital ecosystems in many LMICs remain underdeveloped and under-resourced. Investment in local digital ecosystems and an enabling policy environment can accelerate growth in local content, services and applications that meet the needs of people in their communities, in their own language.
- **Safety and security:** Concerns about safety and security, including online harassment or cyberbullying, misinformation, disinformation and fraud, are keeping people from going online and having a positive internet experience. Stakeholders should provide users, especially women, with the tools to increase their knowledge and skills to mitigate online risks. Appropriate mechanisms and frameworks that recognise these online risks should be put in place to help build consumer trust.
- **Access:** Using the internet depends on enablers such as electricity, formal identification, sales agents and accessibility features. Stakeholders can increase mobile internet adoption by focusing on, for example, facilitating inclusive and transparent registration processes for mobile, and making services, sales channels and training facilities accessible to underserved groups, such as women and persons with disabilities, alongside improving accessibility features.

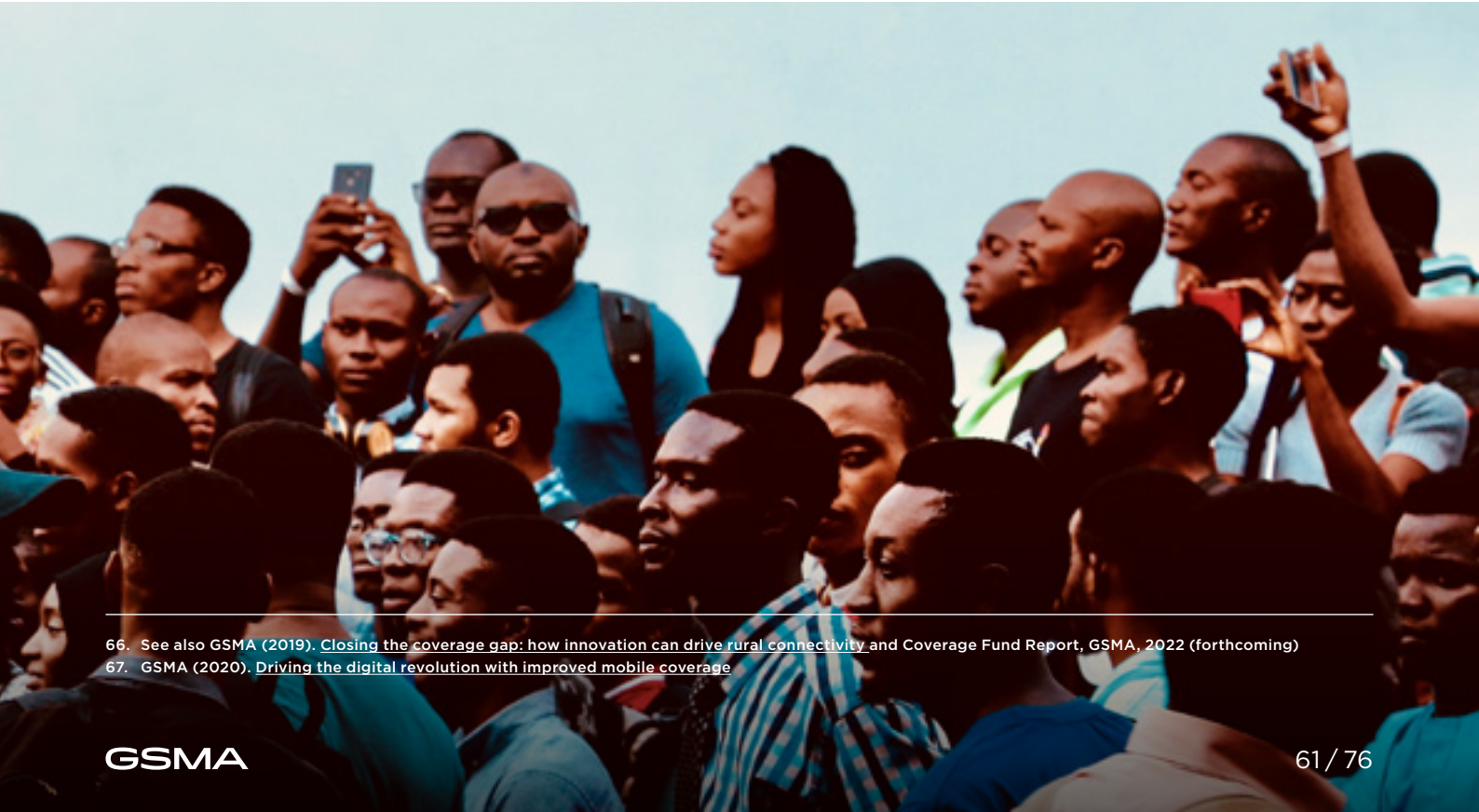


64. United Nations Secretary-General's Roadmap for Digital Cooperation and ITU (2021). Achieving universal and meaningful digital connectivity Setting a baseline and targets for 2030
65. See GSMA (2022). Making internet-enabled handsets more affordable in low- and middle-income countries

The persistently low uptake of mobile internet highlights that more needs to be done to complement efforts to expand and improve infrastructure with demand-side initiatives and policies. Such an approach focused on bridging the usage gap not only enables more people to participate online, but also helps unlock infrastructure investments as supply responds to demand.

Reaching the remaining 400 million people who are not covered by mobile broadband in a commercially sustainable manner will require reducing the cost of network deployment. Innovations in backhaul, low-cost base station technologies and power supply are already helping to achieve this.[66] However, an enabling policy environment that reduces cost and uncertainty around spectrum allocations, licensing, tax policy and network deployment is also necessary.[67] There will always be some areas beyond the scope of commercially sustainable mobile network coverage, which will need a form of government support. Such interventions to support coverage expansion should only be considered once all regulatory measures to maximise coverage through market-driven mechanisms have been exhausted.

Closing the digital divide will require substantial collaborative actions to both provide coverage for those living in areas without mobile broadband and targeted efforts to address the barriers to usage for those already living within the footprint of a mobile broadband network. Moreover, relevant, timely and accurate data on digital inclusion remains critical to highlight the digital gaps and to better understand the context, circumstances and needs of individuals not yet using mobile internet. No single actor or action can close this divide, but by working together stakeholders can ensure than no one is left unconnected in an increasingly connected world.



66. See also GSMA (2019). Closing the coverage gap: how innovation can drive rural connectivity and Coverage Fund Report, GSMA, 2022 (forthcoming)
67. GSMA (2020). Driving the digital revolution with improved mobile coverage

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 10 LMICs in 2021, eight LMICs in 2020, 15 LMICs in 2019, 18 LMICs in 2018 and 24 LMICs in 2017. The 10 LMICs surveyed in 2021 were Bangladesh, Egypt, Guatemala, India, Indonesia, Kenya, Mexico, Nigeria, Pakistan and Senegal. The countries included in the survey across all years account for 79% of the population in LMICs.

Survey methodology

In all countries, a nationally representative sample of around 1,000 adults aged 18 and above was surveyed, with the exception of India and China,[68] 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.[69] 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?"** and to select from 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 GSMA 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 to select from one of the following answers:

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

In this report, a respondent in the GSMA 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?"** and to select from 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 GSMA 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.

68. China was included in the 2017 and 2018 Consumer Surveys.
69. 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 segments (no such quota was applied in Mozambique in the absence of reliable profiling data on SEC).

Question on barriers to mobile internet use

Survey 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?

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 digital 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)
- 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
- It is hard to find somewhere to buy a mobile phone which is able to connect to the internet

Question on mobile internet activities

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 GSMA Consumer Survey framed the following question: **"Thinking now about different 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

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 2021 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.[70]

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 who are not connected, we look at the price of the cheapest internet-enabled smartphone or feature phone available in each market.[71] 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 regard 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 ITU aspirational affordability target, which aims to make entry-level broadband services less than 2% of monthly income per capita by 2030.[72] 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 20% and 40% of the population, using income distribution data sourced from the World Bank.

70. 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. For further details on the methodology, see Mobile Connectivity Index Methodology.
71. Data on handset prices is sourced from Tarifica. For further details on the methodology, see Mobile Connectivity Index Methodology.
72. See Aspirational targets for 2030, ITU, 2022. While the ITU'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 GSMA Consumer Survey 2021, 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 A1 shows the top barrier reported by urban and rural consumers in surveyed markets in 2021.

Respondents who were using mobile internet were asked what activities they were typically doing at least daily, weekly, monthly and less than monthly on a mobile phone. Figure A2 shows the proportion of mobile internet users in the surveyed countries that have done different activities at least once on a mobile phone.

Figure A1: **Top barrier to mobile internet use**

Percentage of mobile users who are aware of mobile internet but do not use it, and who identified the following as the single most important barrier to using mobile internet

		AFFORDABILITY				LITERACY AND DIGITAL SKILLS										RELEVANCE				SAFETY AND SECURITY						ACCESS											
		HANDSET COST		DATA COST		DO NOT KNOW HOW TO ACCESS INTERNET ON A MOBILE		DO NOT KNOW HOW TO USE A MOBILE		READING/ WRITING DIFFICULTIES		DO NOT HAVE TIME TO LEARN HOW TO ACCESS INTERNET ON A MOBILE		NOT SUFFICIENT SUPPORT IN LEARNING TO USE INTERNET		INTERNET IS NOT RELEVANT FOR ME		INSUFFICIENT CONTENT IN LOCAL LANGUAGE		HARMFUL CONTENT (SELF/ FAMILY)		STRANGERS CONTACTING ME		INFORMATION SECURITY		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		HARD TO FIND WHERE TO BUY INTERNET ENABLED PHONE	
		U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R
AFRICA	Egypt	22%	16%	12%	2%	4%	5%	4%	9%	10%	22%	1%	4%	6%	2%	9%	7%	1%	1%	9%	4%	2%	7%	1%	4%	4%	9%	10%	22%	1%	4%	6%	2%	9%	7%	1%	1%	0%	1%
	Kenya	48%	35%	8%	3%	1%	6%	0%	1%	6%	11%	1%	9%	4%	2%	10%	9%	1%	4%	2%	4%	4%	3%	2%	0%	0%	1%	6%	11%	1%	9%	4%	2%	10%	9%	1%	4%	0%	3%
	Nigeria	35%	25%	5%	7%	3%	5%	3%	2%	28%	26%	3%	6%	1%	1%	6%	8%	0%	2%	1%	1%	3%	2%	2%	1%	3%	2%	28%	26%	3%	6%	1%	1%	6%	8%	0%	2%	0%	1%
	Senegal	30%	24%	3%	6%	12%	11%	8%	6%	9%	15%	6%	1%	3%	0%	10%	4%	0%	1%	0%	3%	2%	1%	0%	2%	8%	6%	9%	15%	6%	1%	3%	0%	10%	4%	0%	1%	0%	1%
ASIA	Bangladesh	10%	14%	4%	7%	6%	4%	18%	5%	5%	10%	4%	4%	0%	1%	9%	6%	1%	2%	11%	7%	9%	10%	5%	5%	18%	5%	5%	10%	4%	4%	0%	1%	9%	6%	1%	2%	3%	1%
	India	12%	9%	12%	10%	3%	7%	0%	3%	7%	13%	6%	6%	3%	2%	8%	10%	2%	3%	5%	1%	6%	4%	8%	4%	0%	3%	7%	13%	6%	6%	3%	2%	8%	10%	2%	3%	0%	3%
	Indonesia	26%	29%	8%	4%	16%	14%	1%	0%	0%	0%	3%	3%	0%	2%	14%	11%	2%	0%	1%	7%	3%	6%	8%	8%	1%	0%	0%	0%	3%	3%	0%	2%	14%	11%	2%	0%	0%	0%
	Pakistan	10%	8%	4%	1%	1%	4%	6%	3%	35%	24%	8%	7%	4%	2%	6%	14%	2%	1%	2%	4%	3%	3%	4%	2%	6%	3%	35%	24%	8%	7%	4%	2%	6%	14%	2%	1%	0%	3%
LATIN AMERICA	Guatemala	12%	26%	5%	4%	3%	5%	6%	9%	15%	8%	6%	0%	5%	7%	3%	7%	0%	0%	17%	7%	5%	7%	6%	14%	6%	9%	15%	8%	6%	0%	5%	7%	3%	7%	0%	0%	0%	0%
	Mexico	4%	14%	7%	6%	2%	3%	2%	6%	4%	3%	6%	7%	2%	3%	6%	10%	0%	0%	19%	9%	16%	10%	9%	11%	2%	6%	4%	3%	6%	7%	2%	3%	6%	10%	0%	0%	2%	0%

Base: Mobile internet users aged 18 and above
Percentages indicate the proportion of respondents who answered that they have ever performed each use case a mobile
Respondents may have engaged in some use cases on a phone other than their own.
n = from 325 to 884
Source: GSMA Consumer Survey 2021

U URBAN R RURAL

Least frequently cited barrier in that country — Most frequently cited barrier in that country

Figure A2: **Activities done online**

Percentage of mobile internet users that report having done this at least once on a mobile phone

		USE INSTANT MESSAGING	MAKE OR RECEIVE CALLS ONLINE	MAKE OR RECEIVE VIDEO CALLS	WATCH FREE TO ACCESS ONLINE VIDEO	READ THE NEWS	PLAY FREE GAMES	ACCESS INFORMATION TO SUPPORT MY EDUCATION, OR THAT OF MY CHILDREN OR RELATIVES	LISTEN TO FREE ONLINE MUSIC	GET INFORMATION ABOUT PRODUCTS AND SERVICES	ACCESS HEALTH SERVICES	ORDER AND / OR PURCHASE GOODS OR SERVICES	MANAGE OR PAY MY BILLS	ACCESS GOVERNMENT SERVICES	LOOK OR APPLY FOR A JOB
AFRICA	Egypt	94%	93%	91%	93%	86%	81%	51%	74%	58%	51%	50%	42%	49%	40%
	Kenya	91%	79%	70%	78%	68%	62%	60%	61%	67%	36%	40%	69%	40%	46%
	Nigeria	90%	83%	78%	71%	82%	68%	68%	55%	66%	43%	41%	49%	40%	37%
	Senegal	94%	94%	88%	82%	67%	52%	33%	56%	38%	24%	27%	29%	20%	17%
ASIA	Bangladesh	93%	93%	97%	72%	64%	73%	68%	62%	46%	51%	45%	49%	53%	50%
	India	86%	83%	90%	87%	68%	58%	64%	72%	51%	47%	51%	41%	43%	45%
	Indonesia	96%	97%	96%	88%	81%	51%	64%	47%	57%	28%	54%	24%	35%	24%
	Pakistan	84%	82%	90%	76%	44%	56%	45%	45%	34%	30%	19%	28%	21%	23%
LATIN AMERICA	Guatemala	91%	86%	79%	71%	74%	43%	64%	43%	43%	34%	32%	23%	26%	26%
	Mexico	95%	90%	85%	83%	82%	65%	79%	76%	66%	62%	52%	50%	53%	52%

0-10% 11-30% 31-50% 51-70% 71-90% 91-100%

Base: Adults aged 18 and above who have used a mobile phone in the last three months but 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).
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 31 to 198
Source: GSMA Consumer Survey 2021

Appendix 4: Glossary

Connected	'The connected' or 'connected population' refers to people who use mobile internet. 'The unconnected' refers to those who 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 telecommunications services (voice, SMS, data). The coverage provided by 2G, 3G, or 4G networks[73] 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.
Least developed countries (LDCs)	Countries classified as low-income countries that are facing severe structural impediments to sustainable development. They are highly vulnerable to economic and environmental shocks and have low levels of human assets.
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 is 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.

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

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