Technology, Media, and Telecom Practice

# Offline and falling behind:

## Barriers to Internet adoption

October, 2014

**4.4** billion
offline individuals worldwide

**3.4** billion
of the offline population
live in just 20 countries

**920** million
of those 3.4 billion are illiterate


**1.1** billion

between 1.1 billion and 2.8 billion individuals cannot get online via the mobile network because they do not live within sufficient mobile network coverage

**2.8** billion

**500-900** million forecast to be added to the global online population by **2017**

# *Preface*

The Internet has transformed the world's economic and social landscape. Internet access, either through a mobile network, wireless access point, or fixed-broadband connection, gives individuals a gateway into an online experience that is expanding by the day. Users across the world have been able to join the global community as never before—from global financial centers to remote villages, where in some countries vendors now sell their goods via e-commerce platforms; from successive waves of youth for whom social media is common currency to older population segments who have new ways to stay connected. There's no shortage of examples that illustrate in vivid detail the Internet's impact for those fortunate enough to be members of the online population.

Due to the Internet's potential to improve the lives of individuals, drive the growth of businesses, and accelerate the economic development of countries, its absence has profound implications for the billions of people around the world who are still offline as well as for the broader world community. Those who do not or simply cannot go online increasingly suffer from constrained prospects for economic attainment, class mobility, education, and other areas related to quality of life. As the Internet becomes even more embedded in every facet of our lives, the costs of the digital divide will mount, and we risk leaving substantial portions of the global population at a disadvantage that they might never overcome. This is an issue for all of us. The voices, ideas, and contributions of the offline population can't be heard and often can't be made until they're connected. It is therefore crucial to identify and aggressively pursue opportunities to make the Internet accessible to all.

This report examines the barriers that the offline population, defined as those who have not used the Internet (from any device) in the past 12 months, faces in adopting the Internet. As the latest in a series on the Internet (see *Internet matters: The Net's sweeping impact on growth, jobs, and prosperity; Online and upcoming: The Internet's impact on aspiring countries; Online and upcoming: The Internet's impact on India; Lions go digital: The Internet's transformative impact on Africa; China's e-tail revolution: Online shopping as a catalyst to growth; and China's digital transformation: The Internet's impact on productivity and growth*), this report builds on our previous work; here, we have taken a global approach to the challenge of expanding the Internet user base while also offering in-depth profiles of six countries grappling with specific barriers. In the future, we plan to examine the mechanisms or solutions that might help overcome the barriers we have identified.

Our research focused on the many factors that deter individuals from going online. By evaluating trends that have driven Internet adoption over the past several years, we gained insight into the role those same trends may play in shrinking the offline population in the coming years. A key challenge in completing this research was compiling robust data for our sample countries to enable comprehensive assessments and detailed comparisons. In the coming years, as data sources improve, we anticipate adding to our research and sharing new insights on progress as well as ongoing challenges.

To further illuminate the hurdles the offline population faces, we created the Internet Barriers Index, which ranks 25 developed and developing countries based on their scores in four categories of barriers: incentives, low incomes and affordability, user capability, and infrastructure. We defined a basket of standard metrics to quantify each category of barriers, normalized, and then weighted to create the index. Our analysis indicated that the Internet Barriers Index has a strong ability to predict the Internet penetration within a country, explaining more than half the variance in Internet penetration across countries. We also conducted clustering analyses to group countries with similar barriers and offline demographics. To verify our methodology and findings, we reviewed the research with industry experts and academics.

This is an independent McKinsey & Company report that draws on various sources: research from McKinsey's high tech, media, and telecom practice; information from academic and public sources; research conducted in collaboration with Facebook (on behalf of Internet.org); and research from the McKinsey Global Institute (MGI), the business and economics research arm of McKinsey. Without the contributions of the academics and researchers cited throughout the report, our effort would not have been possible.

The project was led by McKinsey & Company principal Kara Sprague, along with MGI director James Manyika; McKinsey & Company directors Bertil Chappuis and Jacques Bughin; and McKinsey & Company principals Ferry Grijpink and Lohini Moodley. The project team was managed by Kanaka Pattabiraman and consisted of Adhikar Babu, Debadrita Dhara, Gurneet Singh Dandona, Soyoko Umeno, and Anoushka Vaswani. Thanks to Scott Leff, Brittany Petersen, and Heather Ploog for editorial support and to our communications, operations, and production colleagues—including Hayun Cho, Anna Gressel-Bacharan, Rebeca Robboy, Humphry Rolleston, and Sarah Smith—for their much appreciated contributions.

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Finally, we are grateful for the review, challenge, and advice provided by our academic advisers for this research: Martin Baily, a senior adviser to McKinsey and a senior fellow at the Brookings Institute; Bill Dutton, a professor of Internet studies at the University of Oxford; and Christian Saint-Etienne, professor and chair of industrial economics at the National Conservatory of Arts and Crafts.

The goal of this report is to provide detailed research and analyses that characterize the offline population and the challenges they face in going online. Our hope is that these findings will help to frame the conversation regarding the ways that government, industry, policy makers, and nonprofits can work together to expand Internet adoption around the world.

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# Contents

# Executive summary

In a little more than a generation, the Internet has grown from a nascent technology to a tool that is transforming how people, businesses, and governments communicate and engage. The Internet's economic impact has been massive, making significant contributions to nations' gross domestic product (GDP) and fueling new, innovative industries. It has also generated societal change by connecting individuals and communities, providing access to information and education, and promoting greater transparency.

However, not all countries have harnessed the Internet's benefits to the same degree. For this report, we examined the evolution of Internet adoption around the world, the factors that enable the development of a vibrant Internet ecosystem, and the barriers that are impeding more than 60 percent of the global population from getting online. Several key findings emerged:

1. **Over the past decade, the global online population grew to just over 2.7 billion people, driven by five trends.** The worldwide Internet user population was around 2.7 billion people in 2013, with 1.8 billion joining the ranks since 2004.[1] This growth has been fueled by five trends: the expansion of mobile network coverage and increasing mobile Internet adoption, urbanization, shrinking device and data plan prices, a growing middle class, and the increasing utility of the Internet.

2. **At the current trajectory, an additional 500 million to 900 million people are forecast to join the online population by 2017. However, these gains will still leave up to 4.2 billion people offline.** The rate of growth of worldwide Internet users slowed from a three-year compound annual growth rate (CAGR) of 15.1 percent in 2005–2008 to 10.4 percent in 2009–2013.[2] Without a significant change in technology, in income growth or in the economics of access, or policies to spur Internet adoption, the rate of growth will continue to slow. The demographic profile and context of the offline population makes it unlikely that these individuals will come online solely as a result of the trends that have driven adoption over the past decade. Estimates from multiple sources suggest that 500 million to 900 million people will join the online ranks by 2017, expanding the online population to 3.2 billion to 3.6 billion users.[3] By these projections, between 3.8 billion and 4.2 billion people—more than half of the forecasted global population—will remain offline in 2017.

3. **About 75 percent of the offline population is concentrated in 20 countries (Exhibit 1) and is disproportionately rural, low income, elderly, illiterate, and female.** We estimate that approximately 64 percent of these offline individuals live in rural areas, whereas 24 percent of today's Internet users are considered rural. As much as 50 percent of offline individuals have an income below the average of their respective country's poverty line and median income.[4] Furthermore, we estimate that 18 percent of non-Internet users are seniors (aged 55 or older), while about 7 percent of the online

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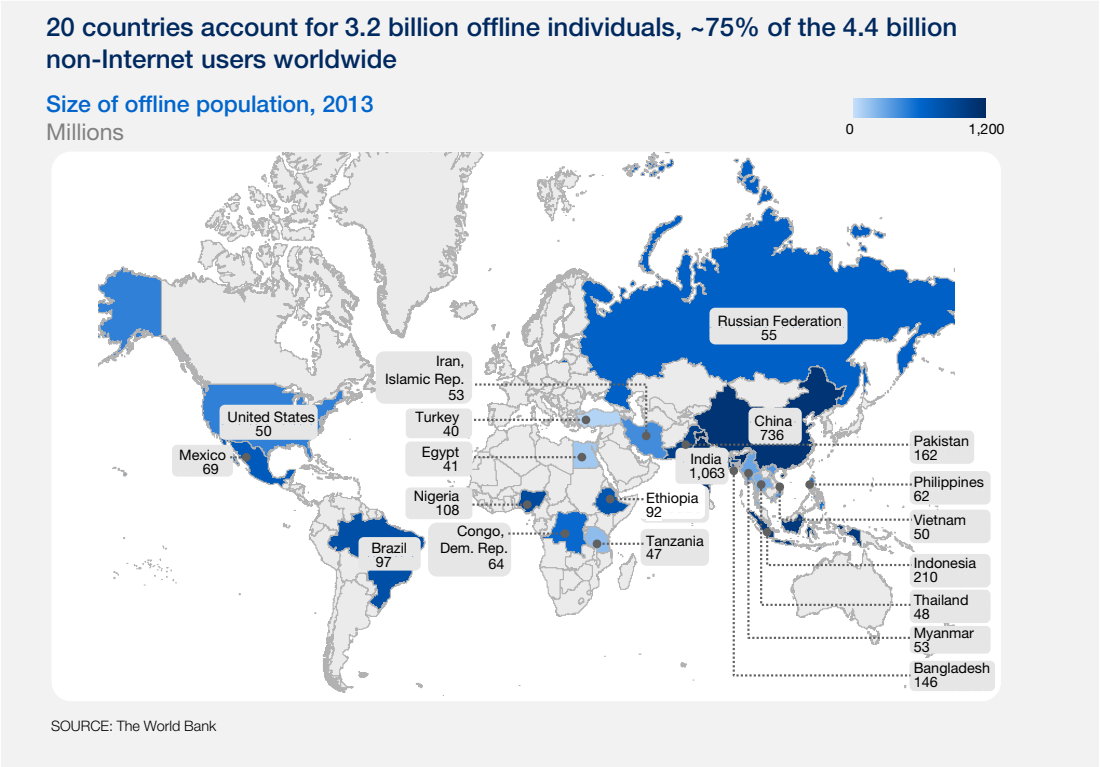
1 "World development indicators," World Bank, 2013 estimates, accessed 2014. Sourced from the International Telecommunication Union (ITU), "World telecommunication/ICT development report" and database, and World Bank estimates.
2 McKinsey analysis based on World Bank longitudinal data.
3 Cisco forecasts the online ranks will reach 3.6 billion users in 2017, while Forrester estimates a total of 3.5 billion. Microsoft estimates that the online population will reach 4.7 billion users by 2025. "Cisco's Visual Networking Index forecast projects nearly half the world's population will be connected to the Internet by 2017," cisco.com, May 29, 2013; *World online population forecast, 2012 to 2017 (Global)*, Forrester Research, August 2012; David Burt et al., *Cyberspace 2025: Today's decisions, tomorrow's terrain—Navigating the future of cybersecurity policy,* Microsoft, June 2014.
4 This estimate is based on the simplifying assumption that the highest earners are members of the online population.

Exhibit 1




population are in that age bracket. Approximately 28 percent of the offline population is illiterate, while we estimate that close to 100 percent of the online population can read and write. Last, we estimate that 52 percent of the offline population is female, while women make up 42 percent of the online population.

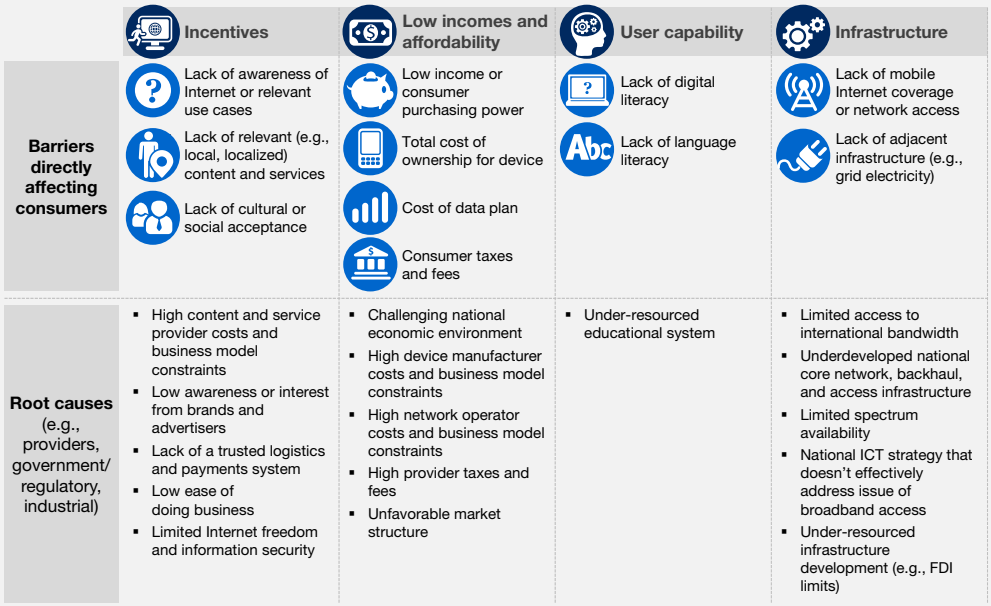
4. **The offline population faces barriers to Internet adoption spanning four categories: incentives, low incomes and affordability, user capability, and infrastructure (Exhibit 2).**

**Incentives.** Despite the increasing utility of the Internet in providing access to information, opportunities, and resources to improve quality of life, there remain large segments of the offline population that lack a compelling reason to go online. Barriers in this category include a lack of awareness of the Internet or use cases that create value for the offline user, a lack of relevant (that is, local or localized) content and services, and a lack of cultural or social acceptance. The root causes of these consumer barriers include the high costs that content and service providers face in developing and localizing relevant content and services and their associated business model constraints, low awareness or interest from brands and advertisers in reaching certain audiences, a lack of a trusted logistics and payment systems (thereby limiting Internet use cases such as e-commerce and online banking), low ease of doing business in specific regions (thereby impeding development of local or localized content and services), and limited Internet freedom and information security.

**Low incomes and affordability.** In this area, the predominant barrier is the low income of individuals in the offline population. This barrier is exacerbated by the high costs associated with providing access to the Internet for these populations, which are disproportionately rural. The low incomes reflect the poor economic circumstances of large segments of the offline population, often including unemployment and the need for economic development, employment, and income growth opportunities in their regions. At the same time, there is often a lack of adjacent infrastructure (such as roads and electricity), thereby increasing the costs faced by network operators in extending coverage. Several other factors can contribute to high costs of service for device manufacturers and network operators, including taxes and fees, and, in the case of some countries, an unfavorable market structure.

Exhibit 2

## Non-Internet users face four categories of barriers




SOURCE: Literature review; expert interviews; McKinsey analysis

**User capability.** This category includes barriers such as a lack of digital literacy (that is, unfamiliarity with or discomfort in using digital technologies to access and use information) and a lack of language literacy (that is, the inability to read and write). The root cause of such literacy barriers is often an under-resourced education system.

**Infrastructure.** Barriers in this area include a lack of mobile Internet coverage or network access in addition to a lack of adjacent infrastructure such as grid electricity. The root causes of these consumer barriers include limited access to international bandwidth; an underdeveloped national core network, backhaul, and access infrastructure; limited spectrum availability; a national information and communications technology (ICT) strategy that doesn't effectively address the issue of broadband access; and under-resourced infrastructure development.

5. **These issues cannot be considered in isolation—we found a systematically positive and, in some cases large, correlation between barrier categories and with Internet penetration rates.** We measured the performance of 25 countries against a basket of metrics relating to each category of barriers to develop the Internet Barriers Index (Exhibit 3).[5] We found that all factors correlate strongly and separately with Internet penetration, and all regressions indicate an elastic effect on Internet penetration—that is, improvements on each individual pillar of the Internet Barriers Index will have a disproportionately positive impact on Internet penetration. In addition, we found a systematically positive and, in some cases large, correlation between barrier categories. This implies that the factors are not totally independent, and that countries with low Internet penetration tend to have multi-dimensional bottlenecks when it comes to increasing their Internet adoption. Further, it means that meaningfully addressing these barriers and boosting Internet penetration will require coordination across Internet ecosystem participants.

5 The Internet Barriers Index ranks 25 developed and developing countries based on their scores in four categories of barriers: incentives, low incomes and affordability, user capability, and infrastructure. To create the index, we defined a basket of standard metrics to quantify each category of barriers, normalized each metric to a scale of 100 points, weighted each of the metrics equally within each category to generate barrier category scores, and then normalized and weighted each of the category scores equally to generate the final index score. Our analysis indicated that the Internet Barriers Index has a strong ability to predict the Internet penetration within a country, explaining more than half the variance in Internet penetration across countries.

## Exhibit 3

### Internet Barriers Index

**Maximum score of 100**

*Low score indicates high barriers, high score indicates low barriers*

Top quartile · Second quartile · Third quartile · Bottom quartile

| Country | Incentives | Low incomes and affordability | User capability | Infrastructure | Internet Barriers Index score |
|---|---|---|---|---|---|
| United States | 100 | 93 | 99 | 85 | 94 |
| Germany | 72 | 100 | 99 | 100 | 93 |
| South Korea | 91 | 89 | 97 | 94 | 93 |
| Japan | 79 | 88 | 99 | 92 | 90 |
| Spain | 66 | 91 | 97 | 80 | 84 |
| Italy | 40 | 88 | 99 | 87 | 78 |
| Russia | 30 | 84 | 100 | 61 | 69 |
| Turkey | 40 | 67 | 91 | 57 | 64 |
| Thailand | 37 | 79 | 90 | 48 | 63 |
| Mexico | 49 | 67 | 90 | 41 | 62 |
| China | 28 | 81 | 92 | 43 | 61 |
| Sri Lanka | 38 | 74 | 86 | 45 | 61 |
| Brazil | 42 | 64 | 85 | 53 | 61 |
| South Africa | 38 | 62 | 89 | 49 | 59 |
| Colombia | 46 | 60 | 90 | 39 | 59 |
| Philippines | 35 | 65 | 93 | 35 | 57 |
| Indonesia | 29 | 79 | 89 | 30 | 57 |
| Vietnam | 29 | 69 | 90 | 34 | 55 |
| Egypt | 38 | 79 | 57 | 35 | 52 |
| India | 38 | 65 | 39 | 19 | 40 |
| Nigeria | 33 | 49 | 37 | 5 | 31 |
| Pakistan | 21 | 63 | 29 | 10 | 30 |
| Bangladesh | 29 | 45 | 31 | 5 | 28 |
| Tanzania | 13 | 27 | 47 | 0 | 22 |
| Ethiopia | 0 | 0 | 0 | 5 | 1 |

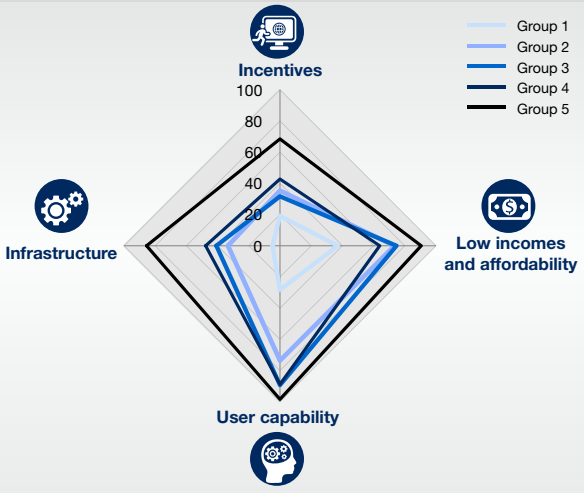
Low barriers

High barriers

## Exhibit 4

### Countries fall into one of 5 groups based on the barriers they face to Internet adoption

**Performance on the Internet Barriers Index**
Average score
Minimum - 0
Maximum -100




**Group 1: High barriers across the board; offline populations that are young, rural, and have low literacy**

**Countries:** Bangladesh, Ethiopia, Nigeria, Pakistan, Tanzania
**Offline population, 2013:** 556 million
**Internet penetration, 2013:** 15%

**Group 2: Medium to high barriers with larger challenges in incentives and infrastructure; mixed demographics**

**Countries:** Egypt, India, Indonesia, Philippines, Thailand
**Offline population, 2013:** 1,424 million
**Internet penetration, 2013:** 19%

**Group 3: Medium barriers with greatest challenge in incentives; rural and literate offline populations**

**Countries:** China, Sri Lanka, Vietnam
**Offline population, 2013:** 802 million
**Internet penetration, 2013:** 45%

**Group 4: Medium barriers with greatest challenge in low incomes and affordability; offline populations are predominantly urban, literate, and low income**

**Countries:** Brazil, Colombia, Mexico, South Africa, Turkey
**Offline population, 2013:** 257 million
**Internet penetration, 2013:** 49%

**Group 5: Low barriers across the board; offline populations that are highly literate and disproportionately low income and female**

**Countries:** Germany, Italy, Japan, Korea, Russia, USA
**Offline population, 2013:** 182 million
**Internet penetration, 2013:** 78%

SOURCE: The World Bank; McKinsey analysis from Internet Barriers Index

6. **Approximately 2 billion people, or nearly half the offline population, reside in ten countries that face significant challenges across all four barrier categories. An additional 1.1 billion people live in countries in which a single barrier category dominates.** Based on the combination and severity of the barriers they face (as indicated by the Internet Barriers Index), countries fall into one of five groups (Exhibit 4). These groupings provide insight into each set's common challenges, which could stem from similar root causes.

   **Group one: High barriers across the board.** This group consists of five countries in Africa and Asia—Bangladesh, Ethiopia, Nigeria, Pakistan, and Tanzania—that are home to just over 550 million offline individuals and face entrenched obstacles to expanding Internet adoption. Each of the countries in this group performed poorly across all four barrier categories of the Internet Barriers Index; their scores in individual pillars fall primarily in the lowest quartile. The offline populations in these countries are predominantly young and rural and have low literacy rates. The aggregate Internet penetration rate across the group was 15 percent in 2013.

   **Group two: Medium to high barriers.** Countries in this group include Egypt, India, Indonesia, the Philippines, and Thailand, each of which faces medium to high barriers to Internet adoption. The countries in this group rank in the lowest two quartiles in several categories in the Internet Barriers Index, with their greatest challenges lying in the incentives and infrastructure barrier categories. Home to an offline population of more than 1.4 billion individuals, this group had an aggregate Internet penetration rate of 19 percent in 2013.

   **Group three: Medium barriers, greatest challenges in incentives.** Comprised of China, Sri Lanka, and Vietnam, this group is home to approximately 800 million offline individuals. The offline population in each country is largely rural and literate. With the exception of the incentives category, where both China and Vietnam scored in the bottom quartile, the countries in this group rank in the middle (second or third) quartiles across each pillar of the Internet Barriers Index. In aggregate, this group has an Internet penetration rate of 45 percent.

   **Group four: Medium barriers, greatest challenges in low incomes and affordability.** This group consists of Colombia, Mexico, Brazil, South Africa, and Turkey and accounts for an offline population of just under 260 million individuals. With an aggregate Internet penetration rate of 49 percent, these countries are characterized by offline populations that are predominantly urban, literate, and low income. All of the countries in this group score in the middle (second or third) quartiles in the user capability and infrastructure categories of the Internet Barriers Index, and a couple countries rank in the first quartile in the incentives category. However, in contrast with those bright spots, low incomes and affordability remains a significant challenge; each of the countries in this group faces some combination of low gross domestic product (GDP) per capita, large proportions of their population with low incomes, and a high poverty rate.

   **Group five: Low barriers across the board.** This group is composed of countries that face relatively low barriers compared with the other four groups, resulting in an aggregate Internet penetration rate of 79 percent. Countries in this group include Germany, Italy, Japan, Korea, Russia, and the United States. Despite the low barriers, these six countries are still home to aggregate offline population of approximately 180 million people. Interestingly, given the high Internet penetration rates in this group, the offline populations are disproportionately low income and female.


7. **Current initiatives, forthcoming innovations, and lessons from countries that have made headway are cause for optimism.** Nations around the world have recognized the transformational impact of bringing more of their population online and are moving aggressively on several fronts to do just that. Governments are setting ambitious goals for mobile Internet coverage and investing to extend fixed-broadband infrastructure and increase public Wi-Fi access. At the same time, network operators and device manufacturers are exploring ways to further reduce the cost of access and provide service to underserved populations. In addition, content and service providers are innovating on services that could improve the economic prospects and quality of life of Internet users.

Going forward, sustained, inclusive Internet user growth will require a multipronged strategy—one that will depend on close collaboration among players across the ecosystem, including governments, policy-makers, non-governmental organizations (NGOs), network operators, device manufacturers, content and service providers, and brands.

## About the research

In exploring the barriers to Internet adoption for populations in different countries, this research report assesses challenges from the perspective of individual consumers rather than the perspective of companies. The report's analysis focuses on the level of Internet adoption as an indicator of a country's online development rather than Internet usage, which relates more to the intensity of engagement of a given online population. We have also sought to identify and characterize the primary barriers to Internet adoption, using available data and analysis to enrich the dialogue. This report does not provide a detailed review of the solutions that would address the barriers identified.

A large literature, mostly published in either academic journals or in reports commissioned by global institutions (for example, ITU, GSMA, World Economic Forum, and the World bank) has addressed the question of diffusion of various ICT technologies. Especially in the last 15-20 years, research has focused on the diffusion of the Internet across countries, emphasizing differences in adoption speed and highlighting a rather persistent digital divide. In producing this report, we reviewed the available research and incorporated three important distinctions into our approach:

1. Much of the digital divide research examines the use of multiple different technologies (for example, mobile broadband, personal computers). In this research, we have focused singularly on understanding the factors that drive Internet adoption. The single output metric in our analysis is Internet penetration (Internet users per 100), as defined and measured by the ITU. The maximum theoretical limit for this output metric is 100 percent, but that assumes that all individuals, including new-born children, are capable of directly accessing the Internet. A more realistic estimate of saturation should take into account the age distribution of the population.

2. We found much of the academic research to be dated, conducted in the mid-2000's and looking at time periods from the late 1990's to early 2000's. Given Internet services and capabilities are still rapidly evolving and the recent emergence of mobile as the primary point of access for the majority of users, we believe this research provides an important update on barriers to Internet adoption facing today's offline population. For countries comprising the largest fringe of the digital divide (for example, India, Indonesia, Nigeria), the proportion of Internet users that are adopting purely via mobile, thus bypassing the co-diffusion dynamics of personal computers and fixed-line broadband, is large and growing.

3. Most of the existing research tends to concentrate on a subset of barriers to Internet adoption. For example, telecom-oriented reports focus on infrastructure and the price of access, or regulation and policies governing the telecom and Internet sectors. Our research demonstrates that at least four categories of barriers must be taken into account, even if they all correlate with each other. We believe this report thus captures a more comprehensive picture of the system dynamics at work and uncovers different insights (for example, country groupings) than would be revealed from looking at a single barrier category.

# 1. Why the Internet matters

Since the protocols for the World Wide Web were finalized in 1990, the Internet has grown from a small collection of user communities to an integral element in the lives of 2.7 billion people around the world.[6] In every country and sector, the Internet has evolved into a powerful economic engine that has improved quality of life and transformed the way that governments, businesses, and individuals connect, engage, and access critical information and services.

For individuals, the Internet provides direct consumer benefits; in developed and developing nations alike, users can now access a wide range of information such as research tools in education and health, take advantage of e-government services, and get the latest commodity pricing and weather reports in real time. Furthermore, the Internet alters how economic activity is organized at a fundamental level. By facilitating the centralization and distribution of large amounts of information and data, the Internet has spawned new business models, fueled the emergence of new industries, and accelerated innovation. The potential for the Internet to accelerate a country's economic growth is widely recognized. Indeed, research has established a direct link between Internet penetration and economic vitality in countries across the globe.[7]

## *Individuals and society*

The Internet has had a transformational impact on the daily lives of its users. Anyone with a personal computer (PC) or mobile device and an Internet connection has access to an unprecedented amount of information, and the Internet has become a critical tool in marshaling resources, raising awareness about issues, and coordinating social movements. As a result, Internet users enjoy an enhanced sense of empowerment. These individuals benefit from several different uses of the Internet.

**Greater awareness and engagement.** We live in an age when any event or news can enter the global consciousness instantaneously. Incidents that used to remain largely obscured are now front and center—not just at home but around the world. The online population plays a huge role in political movements, with social media becoming a potent tool to reach voters. In 2014, for example, political parties in India used Twitter and Facebook to shore up support and solicit donations.[8] The Internet has also been used to mobilize aid for people affected by natural disasters; for example, following the catastrophic Haiti earthquake in 2010, the Red Cross raised millions of relief dollars in a matter of days through a Twitter and text message campaign.[9]

**E-government services.** In developing nations, e-government services have often played an active role in driving Internet adoption and use. Although still nascent in many countries, the proliferation of such offerings is changing the way citizens engage with government and access critical services. South Africa, for example, shifted many tasks online, such as tax filing, car registration, and driver's license renewal, with impressive results: in 2011, more than 99 percent of tax returns were filed electronically.[10] Similarly,

6 "World development indicators," World Bank, 2013 estimates, accessed 2014. Sourced from ITU, "World telecommunication/ICT development report" and database, and World Bank estimates.
7 Nina Czernich et al., *Broadband Infrastructure and economic growth,* CESifo working paper, number 2861, 2009.
8 Arshiya Khullar and Alisha Haridasani, "Politicians slug it out in India's first social media election," CNN.com, April 10, 2014.
9 Doug Gross, "Red Cross text donations pass $21 million," CNN.com, January 18, 2010.
10 *Lions go digital: The Internet's transformative impact in Africa,* McKinsey and Company, November 2013.

Senegal's e-government project has committed resources to digitizing education, public administration, and health care services.[11]

**Increased transparency.** Thanks to the ever-growing mass of information available online, Internet users have greater transparency into government, business, and society than ever before. The rise of Internet search engines has made finding relevant information easier. Sites such as Wikipedia allow users to report and shape the information they consume, and social media outlets enable users to cross-check and verify information from multiple channels. In addition, online forums and product sites empower consumers to share their views and make informed decisions.

**Social connection.** In many developing countries, the use of social media is the top online activity, enabling links between users and their friends and relatives both at home and abroad. In a 2011 survey of African Internet users, 57 percent of respondents said they visit social media sites frequently.[12] Similarly, a 2013 survey of Internet users in India found that 89 percent of the urban online population uses the Internet for online communication and 75 percent for social networking.[13]

**Education.** The Internet is increasingly a source of high-quality educational content and online courses, which can increase the availability of formal instruction to underserved population segments. Already a fixture in developed nations, educational institutions and for-profit universities are expanding their online offerings in emerging countries, where rapid economic growth has increased the demand for skilled workers. Analysts forecast that global revenues from online learning will reach USD 51 billion by 2016, with developing nations such as China, India, Malaysia, and Vietnam all boasting annual growth rates of more than 30 percent.[14]

**Entertainment.** The Internet also serves as a form of entertainment as well as a way to comment on news and events. Due to the proliferation of feature phones, smartphones, and tablets, mobile devices have become a popular mode of entertainment for millions of people. For example, Internet users in Europe spend nearly half of their daily Internet time on mobile devices, which they use to access social media, watch videos, send e-mail, and play games.[15] These patterns cut across countries regardless of the level of Internet penetration. For instance, in 2013, some 70 percent of China's Internet users used online streaming, and about half used mobile online streaming.[16]

## *Consumers*

The growth of the Internet economy has conferred multiple advantages to individual consumers, although to date these benefits have accrued largely to consumers in developed nations and reflect the higher Internet penetration rates in these countries. As developing markets mature and more people come online, individuals in these countries may benefit in different ways.

**Variety.** Compared with the offline population, online consumers have access to a greater array of goods, products, and services. Global retailers Amazon, Alibaba, and eBay, for example, offer millions of items online from sellers all over the world. (For reference, a typical Wal-Mart Supercenter carries around 125,000 distinct items.[17]) In emerging markets such as Brazil, China, Mexico, and Russia, the swift growth of online retailers is giving consumers unprecedented access to a diverse array of goods.[18]

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11 "Senegal launches its administrative intranet," Educational Research Network for West and Central Africa (ERNWACA), July 11, 2009.
12 McKinsey African Consumer Insights Center (ACIC), 2011.
13 *Internet in India 2013,* Internet and Mobile Association of India (IAMAI) and IMRB International, June 2013.
14 *The worldwide market for self-paced e-learning products and services: 2011–2016 forecast and analysis,* Ambient Insight Research, January 2013.
15 *iConsumers: Life online,* McKinsey & Company, January 2013.
16 *33rd statistical report on Internet development in China,* China Internet Network Information Center (CNNIC), January 2014.
17 Alistair Barr, "Wal-Mart opens largest online fulfillment center," *USA Today,* October 1, 2013.
18 *E-commerce is the next frontier of global expansion,* A.T. Kearney, 2012.

**Cost savings.** In large part due to the transparency provided by search tools, online prices are, on average, around 10 percent lower than offline prices, generating tens of billions of dollars of consumer surplus in the nations with the widest Internet use.[19] Indeed, McKinsey research found that the consumer surplus has nearly doubled in the past three years, with almost the entire net increase attributable to mobile usage.[20] The Internet also provides the technical foundation of the "sharing economy," enabling consumers (and businesses) access to capital goods in ever-smaller increments, thereby improving overall asset utilization and reducing costs for all.

**Ascribed value.** Online advertising essentially subsidizes access to e-mail, search engines, and social networks. Other free resources include research sources, user reviews, product forums, and classified ads. In 2010, IAB Europe estimated that free, ad-supported Internet services account for USD 44 billion of consumer surplus in the United States and USD 95 billion in Europe each year.[21]

**Time savings.** From scheduling trips to arranging for the delivery of goods, consumers can carry out a wide array of tasks without leaving the comfort of their homes or offices. Hal Varian, Google's chief economist, estimated the total value of time savings to consumers at USD 65 billion to USD 150 billion annually in the United States alone.[22]

## *Businesses*

The Internet has become a key enabler of global commerce, providing companies of all sizes with a platform to manage global operations, engage consumers, and tap new markets.

**Global operations management.** Thanks to globalization, multinational companies must manage increasingly complex operations across multiple regions. The Internet has become a crucial tool for companies to coordinate vendors, oversee global supply chains, and monitor the flow of goods in real time.

**Customer engagement.** For the largest online retailers, the Internet is the backbone for omnichannel consumer engagement and marketing efforts tailored to each individual. Digital market research company eMarketer forecast that global business-to-consumer (B2C) online sales will hit USD 1.5 trillion in 2014, a jump of 20 percent over the previous year.[23] In some developed markets, two-thirds of all businesses have an online presence, and one-third of small and midsize enterprises (SMEs) extensively use Internet technology.[24]

**Lower barriers to entry.** The Internet offers companies of all sizes access to the same information, technology, and markets as global corporations. Internet-enabled offerings, including enterprise cloud services (for example, Infrastructure as a Service, Platform as a Service, and Software as a Service), make it possible for businesses to take advantage of advanced information technology capabilities while minimizing upfront expenditures.

**Access to new markets.** Companies with a robust online presence can greatly extend their reach into new markets, resulting in increased exports. On eBay, for instance, more than 90 percent of commercial sellers export goods to customers in foreign countries compared with less than 25 percent in the case of traditional small businesses.[25]

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19 The consumer surplus is the difference between what an individual would pay for a good or service and the actual cost. In addition, consumers derive considerable value from free content, research tools, social media, and other information sources. James Manyika and Charles Roxburgh, *The great transformer: The impact of the Internet on economic growth and prosperity,* McKinsey Global Institute (MGI), October 2011.

20 Jacques Bughin and James Manyika, "The mobile Internet's consumer dividend," *McKinsey Quarterly,* February 2014.

21 *Consumers driving the digital uptake: The economic value of online advertising-based service for consumers,* IAB Europe, September 2010.

22 "Net benefits: How to quantify the gains the Internet has brought consumers," *Economist,* May 9, 2013.

23 "Global B2C ecommerce sales to hit $1.5 trillion this year driven by growth in emerging markets," *eMarketer,* February 3, 2014.

24 *Internet matters: The Net's sweeping impact on growth, jobs, and prosperity,* MGI, May 2011.

25 *Global flows in a digital age: How trade, finance, people, and data connect the world,* MGI, April 2014.

## *National and global economy*

The Internet's economic impact can be assessed by not only its contribution to the global economy but also its potential to accelerate growth, particularly in emerging countries.

**Internet contribution to GDP (iGDP).** The McKinsey Global Institute (MGI) estimates that in 2010, the Internet accounted for USD 1,672 billion of the global economy, or an average 2.9 percent of total GDP.[26] That year, the total contribution of the Internet to GDP in all aspiring countries was USD 366 billion.[27] Of this figure, Brazil, Russia, India, and China were responsible for USD 243 billion—almost two-thirds of the total.[28] The contribution from developed countries is greater. The economic value generated annually by the Internet in aspiring countries is USD 119 per capita compared with USD 1,488 per capita in developed countries.[29]

**GDP growth.** The Internet has a great deal of room to bolster further economic growth in developing countries, and robust Internet ecosystems could unlock much more value. Research by the World Bank in 2009 found that for every 10 percentage-point increase in high speed Internet connections in developing countries, there is an increase of 1.3 percentage points in economic growth.[30] From 2004 to 2009, for example, MGI estimates that the Internet contributed 10 percent or more to the total GDP growth in China, India, and Brazil—and its impact is accelerating.[31] Many countries in Africa are poised to derive more value from the Internet in the coming years thanks to large investments in infrastructure that aim to increase bandwidth, reduce costs, and connect new segments of the continent's population to the Internet. McKinsey estimates that the Internet could transform sectors from agriculture to retail to health care and account for up to USD 300 billion of Africa's annual GDP by 2025.[32]

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26 *Online and upcoming: The Internet's impact on aspiring countries,* McKinsey & Company, January 2012.
27 Aspiring countries included Algeria, Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Egypt, Hungary, India, Indonesia, Iran, Kazakhstan, Malaysia, Mexico, Morocco, Nigeria, Pakistan, the Philippines, Poland, Romania, the Russian Federation, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey, Ukraine, Venezuela, and Vietnam. *Online and upcoming: The Internet's impact on aspiring countries,* McKinsey & Company, January 2012.
28 Ibid.
29 Ibid.
30 *Information and communications for development 2009: Extending reach and increasing impact,* World Bank, June 2009.
31 *Internet matters: The Net's sweeping impact on growth, jobs, and prosperity,* MGI, May 2011.
32 *Lions go digital: The Internet's transformative impact in Africa,* McKinsey and Company, November 2013.

# 2. The current global state of the Internet

In the past decade, the number of Internet users has increased rapidly. This growth has been fueled by the expansion of mobile network coverage and increasing mobile Internet adoption, urbanization, shrinking device and data plan prices, a growing middle class, and the increasing utility of the Internet. While this progress is impressive, an estimated 4.4 billion individuals remain offline.[33]

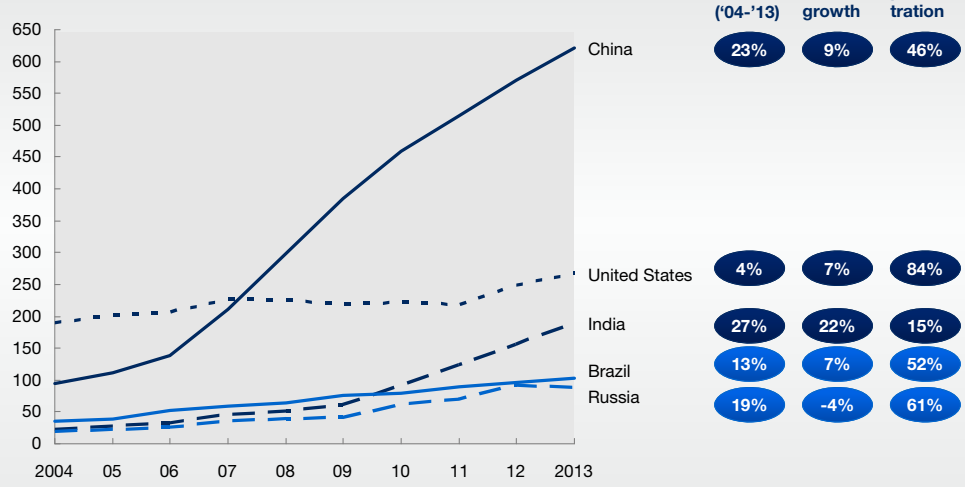
## *Five trends fueling Internet adoption*

The number of Internet users has exploded over the past decade. From 2004 to 2013, approximately 1.8 billion people joined the online ranks, with Brazil, China, India, Russia, and the United States accounting for almost half of these individuals (Exhibit 5).[34]

**Exhibit 5**

**~48% of the ~1.8 billion users that came online from 2004 to 2013 are from Brazil, China, India, Russia, and the United States**

**Top 5 countries with the greatest absolute increase in number of Internet users, 2004-2013**




SOURCE: The World Bank

Five trends—the expansion of mobile network coverage and increasing mobile Internet adoption, urbanization, shrinking device and data plan prices, a growing middle class, and the increasing utility of the Internet—have fueled the growth in the online population.

33 McKinsey analysis based on data from "World development indicators," World Bank, 2013 estimates, accessed 2014. Sourced from ITU, "World telecommunication/ICT development report" and database, and World Bank estimates.

34 McKinsey analysis based on data from "World development indicators," World Bank.

## Trend #1: Expansion of mobile network coverage and increasing mobile Internet adoption

ITU found that for consumers in developed nations, mobile Internet generally serves as a compliment to, rather than a substitute for, fixed-broadband. In contrast, in developing nations, mobile Internet is often the only means available for accessing the Internet, especially in remote or rural areas.[35]

Around the world, 2G, 3G, and now 4G networks are all used for mobile communications. 2G networks (also known as GSM) can support voice communications, text messaging, and data speeds of up to 9.6 kilobytes per second (Kbps).[36] 2.5G networks (also known as GPRS) marked a significant advancement in mobile network technology as they offered a bolt-on for GSM networks that enabled "always on" data services.[37] Essentially, as long as the device and account are properly configured, 2.5G subscribers can seamlessly consume data services whenever they need at speeds ranging from 35 Kbps to 145 Kbps.[38] 2.75G networks (also known as EDGE) offer an incremental improvement in speed, ranging from 120 Kbps to 384 Kbps, and can be used for simple Web browsing.[39] 3G networks deliver speeds of up to 2 megabytes per second (Mbps), suitable for most modern Internet services, mobile applications, and multimedia consumption.[40] 4G networks (also known as LTE) offer even higher speeds ranging from 3 Mbps to 10 Mbps on average.[41]

In developed countries and many developing nations, 2G networks are widely available; in fact, Ericsson estimates that more than 85 percent of the world's population is covered by a 2G signal.[42] Germany, Italy, and Spain boast 2G networks that reach 100 percent of the population, while the United States, Sri Lanka, Egypt, Turkey, Thailand, and Bangladesh have each attained 2G coverage for more than 98 percent of the population.[43] Some developing markets don't fare as well: as of 2012, 2G network coverage extended to 90 percent of the population of India, 55 percent of Ethiopia, 80 percent of Tanzania, and just under 60 percent of Colombia.[44]

Growing demand and accelerated rates of smartphone adoption in many markets have spurred mobile network operators to invest in 3G networks. Ericsson estimates that 60 percent of the world population now lives within coverage of a 3G network.[45] The level of 3G infrastructure by country reveals a stark contrast between countries with robust 3G networks and extensive coverage, such as the United States (95 percent), Western European nations (ranging from 88 to 98 percent), and Vietnam (94 percent), and many developing markets such as India, which are still in the early stages of deploying 3G networks.[46]

As mobile network coverage has expanded, the number of mobile subscribers has exploded. From 2003 to 2013, the number of unique mobile subscribers grew from just over 1 billion globally—equivalent to just under one in six people—to 3.4 billion—equivalent to a unique subscriber penetration rate of 47 percent.[47] It is important to note the distinction between a mobile connection and a mobile subscriber. Many mobile subscribers have multiple devices or use multiple SIM cards; at the end of 2013, GSMA estimates that there were 6.9 billion SIM connections, or an average of 1.8 active SIM cards per unique subscriber.[48]

The number of mobile Internet connections around the world has also grown rapidly, increasing from around 200 million in 2008 to 2.2 billion by 2013.[49] Developing countries, which now account for around

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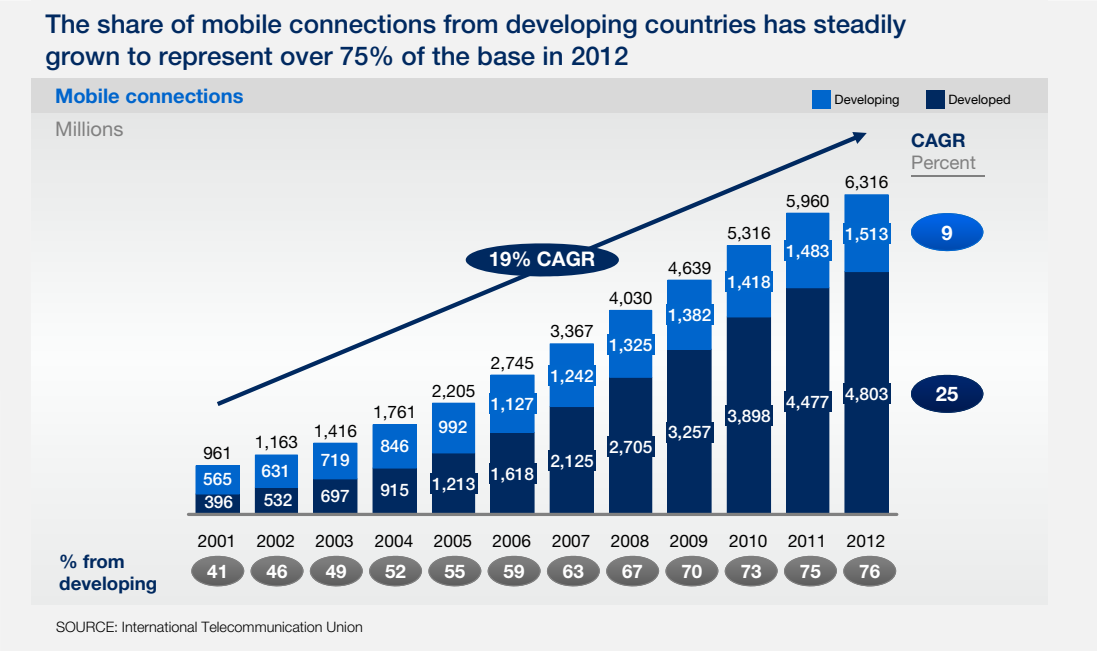
35 *Measuring the information society,* ITU, 2013.
36 Chris Ziegler, "2G, 3G, 4G, and everything in between: An Engadget wireless primer," Engadget.com, January 17, 2011.
37 Ibid.
38 Ibid.
39 Ibid.
40 Ibid.
41 Ibid.
42 *Ericsson mobility report: On the pulse of the networked society,* Ericsson, June 2014.
43 GSMA Intelligence, 2012 estimates.
44 Ibid.
45 *Ericsson mobility report: On the pulse of the networked society,* Ericsson, June 2014.
46 GSMA Intelligence, 2012 estimates.
47 *The mobile economy 2014,* GSMA, 2014.
48 Ibid.
49 Ibid.

Exhibit 6




SOURCE: International Telecommunication Union

75 percent of the world's total mobile subscribers (Exhibit 6) and 55 percent of mobile Internet users, are expected to fuel growth in the coming years.[50]

The proliferation of mobile Internet subscribers in developing countries is due in part to a lack of fixed-line infrastructure as well as the relatively high price of PCs. As a result, many Internet users in developing countries are leapfrogging fixed-line connections and using their mobile phones instead to get online. In fact, while just one-quarter of Internet users in developed countries gain access principally through mobile phones, that figure swells in developing countries such as Egypt (70 percent) and India (59 percent).[51] Worldwide, mobile Internet connections overtook fixed-broadband connections in 2008, reflecting the sheer volume of new Internet adopters in developing countries.[52] Today, mobile Internet connections exceed fixed-broadband connections by three to one.[53] However, while growth in mobile Internet connections has far outpaced that of fixed-broadband connections, mobile still accounts for only a small portion of total Internet traffic. Cisco estimates that in 2013, mobile accounted for 3 percent of total Internet traffic, whereas fixed broadband and wireless broadband (such as Wi-Fi) accounted for 56 and 41 percent, respectively.[54]

## *Outlook ahead*

There is limited aggregate information on future 3G and 4G coverage projections across the world. Given that most countries already feature extensive 2G mobile coverage and many developing countries are still early in their deployment of 3G and 4G networks, it is likely that most investments in 3G and 4G networks in developing countries in the near term will go towards extending coverage to areas already covered by 2G networks. Satellites could play an increasingly important role in providing access for extremely rural populations—for example, by providing backhaul between remote mobile base stations and national core fiber networks. GSMA predicts that by 2017, there will be approximately 4 billion unique mobile subscribers and 8.5 billion mobile connections, 4.4 billion of which will be mobile Internet–enabled.[55] That year, GSMA expects 3G and 4G to account for about half of the total mobile connections.[56]

50 *The world in 2014: ICT facts and figures,* ITU, April 2014.
51 Here, an individual who gains access primarily through a mobile device is defined by On Device Research as one who does not, or very rarely, uses a desktop, laptop, or tablet to access the Web. Figures from *Online and upcoming: The Internet's impact on aspiring countries,* McKinsey & Company, January 2012.
52 *State of broadband report 2013,* Broadband Commission for Digital Development, ITU, September 2013.
53 Ibid.
54 *Cisco® Visual Networking Index™ global forecast and service adoption for 2013 to 2018,* Cisco, June 2014.
55 *The mobile economy 2014,* GSMA.
56 Ibid.

Fixed-broadband connections will continue to play an important role in the Internet access story; data consumption via fixed-broadband connections in the coming years is expected to continue to exceed data consumption via mobile Internet. In addition, "free" and high-quality Internet access via public and private Wi-Fi will also play a material role in increasing Internet penetration as operators offload more data from their mobile networks and as providing such access becomes a cost of doing business for malls, cafés, hotels, and other similar establishments in urban markets. Cisco estimates that by 2018, Internet traffic via fixed-broadband connections will account for 39 percent of the total, compared with 12 percent on mobile and 49 percent on Wi-Fi.[57]

## Trend #2: Urbanization

More than half of the world's population now lives in urban areas. From 1950 to 2011, the urban population increased fivefold, growing from approximately 750 million to 3.6 billion individuals.[58] The urbanization trend is particularly pronounced in developing countries, where populations are expanding at more than four times the rate of the developed world.[59] Furthermore, the level of urbanization varies greatly by region. The Caribbean and Latin America, for example, have an urban population rate of 79 percent—even higher than that of Europe—but Africa and Asia remain largely rural, with urban populations accounting for 40 and 45 percent, respectively.[60]

Not surprisingly, there's a high correlation between urbanization and Internet penetration. Conversely, countries with a high percentage of rural residents—such as Ethiopia, Tanzania, and Bangladesh—have very low Internet penetration rates. Urban areas typically have better basic infrastructure (for example, electricity, transportation) and Internet infrastructure (for example, network coverage) due to higher population density compared with rural areas. In addition, urban residents typically are better educated and have higher incomes than their rural counterparts—two factors that also correlate to higher Internet penetration rates.

### *Outlook ahead*

Worldwide, the urbanization trend is expected to continue; the United Nations (UN) estimates the urban population will reach 6.3 billion, or 67 percent of the total world population, by 2050.[61] By these estimates, developing countries will account for approximately 80 percent of the world's total urban population by 2020.[62] The UN also forecast that half the population of Asia will live in urban areas by 2020; China and India alone will account for more than a third of the total global growth in urban dwellers between 2011 and 2030.[63] Meanwhile, UN forecasts project Africa's urban population will reach 50 percent of the total population by 2035.[64]

This continuing trend of urbanization should bring more individuals online given that they will have greater access to basic infrastructure, Internet infrastructure, education, and employment opportunities in most urban centers relative to rural areas.

## Trend #3: Shrinking device and data plan prices

When mobile phones were first introduced to the consumer market in 1983, their high prices made them the province of the privileged. In the ensuing three decades, the cost of both mobile devices and data plans has fallen sharply, particularly in developed countries. The International Data Corporation (IDC) reports that, in 2013 alone, the average price for a smartphone around the world declined nearly 13 percent from 2012 prices, to USD 337.[65] In 2014, IDC forecast that prices will drop to an average of USD 308.[66]

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57 *Cisco® Visual Networking Index™ global forecast and service adoption for 2013 to 2018,* Cisco, June 2014.
58 *World urbanization prospects: The 2011 revision,* United Nations Department of Economic and Social Affairs (UNDESA)/Population Division, 2011.
59 Ibid.
60 Ibid.
61 *World urbanization prospects: The 2011 revision,* UNDESA/Population Division, 2011.
62 Ibid.
63 Ibid.
64 Ibid.
65 *Worldwide quarterly mobile phone tracker,* International Data Corporation (IDC), November 2013 and February 2014.
66 Ibid.

The price for mobile data plans has dropped at a similar pace. Portio Research estimates that the cost per megabyte of mobile data around the world decreased by 93 percent from 2008 to 2012—and the mobile data traffic per smartphone user increased by almost 700 percent over the same time frame.[67] In Latin America, GSMA observed that the monthly price of low-end smartphone data plans (250 Mb usage cap) fell from USD 17.68 in 2010 to USD 8.33 in 2013—a decline of 52 percent in just three years.[68] Plans with a higher usage cap (1GB) also saw significant declines, dropping 37 percent annually from 2010 to 2013, from USD 23.07 to USD 14.44.[69]

Some credit for the overall price reduction is owed to the proliferation of prepaid data plans, which have enabled low-income consumers to access the Internet for the first time. In some markets, increased competition for growing subscriber bases has driven down mobile data plan prices. In India, for example, competing network operators traded price reductions on their data plans of up to 90 percent in the first half of 2013.[70] Service delivery innovations such as mobile network offloading (for example, to Wi-Fi) have also contributed to the decline in mobile data plan prices. For example, Free, a Wi-Fi–centric network operator in France, offers a 20GB mobile data package for EUR 19.99 that includes calls to 100 countries, texts, multimedia messages, and Internet.[71] The price is reduced to EUR 15.99 for those who already use Free for home Internet.[72]

Fixed-broadband service prices are also shrinking but remain more expensive than mobile data plan prices in most countries. The price of fixed-broadband connections declined by 82 percent from 2008 to 2012, as measured by the International Telecommunication Union (ITU).[73] The biggest decline during this period occurred in developing countries, where fixed-broadband prices dropped from 164.6 percent of gross national income (GNI) per capita to an average of 31 percent.[74] Despite the drop in price, fixed-broadband subscriptions are still considered unaffordable for many members of the offline population given their low income levels—an obstacle that highlights the need to address economic development, employment, and income challenges of these populations. An analysis by the ITU found that in 28 percent of developing countries with data available for 2012, prices were above 20 percent of GNI per capita, down from 115 percent in 2008.[75] In ten countries, mostly in the Africa and Asia-Pacific regions, fixed-broadband prices actually exceeded those countries' monthly GNI per capita.[76] GSMA analysis paints a similar picture; in Latin America, 60 percent of households at the top of the pyramid have adopted fixed broadband, but penetration at the bottom of the pyramid is just 8 percent.[77]

The overall drop in prices on all fronts—devices, mobile data, and fixed-broadband service—has helped to increase penetration, particularly in developing markets. In light of the shrinking costs of mobile phones and data plans in particular, mobile Internet serves as a gateway to online access for those who cannot afford a fixed-broadband subscription.

## *Outlook ahead*

As device manufacturers pursue opportunities in developing countries, prices for mobile devices are expected to decrease rapidly in the coming years; in aggregate, IDC analysts forecast the worldwide average retail price for smartphones will fall from USD 308 in 2014 to USD 260 by 2018.[78] These dropping prices will contribute to rising smartphone penetration: the GSMA projects that the total number of smartphones in use will nearly double, from 1.5 billion in 2013 to 2.9 billion in 2017.[79] Assuming historical trends continue (and there's little reason to suspect they won't), fixed-broadband and mobile data plan prices will also continue

67 Portio Research.
68 *Mobile broadband at the bottom of the pyramid in Latin America,* GSMA, 2013.
69 Ibid.
70 Kartikay Mehrota, "Samsung surge spurs data war as tariffs slashed: Corporate India," Bloomberg.com, July 15, 2013.
71 Ruth Bender, "French mobile price war expands to 4G service," *Wall Street Journal,* December 3, 2013.
72 Ibid.
73 *Measuring the information society,* ITU, 2013.
74 Ibid.
75 Ibid.
76 Ibid.
77 *Mobile broadband at the bottom of the pyramid in Latin America,* GSMA, 2013.
78 *Worldwide quarterly mobile phone tracker,* IDC, February 2014.
79 *The mobile economy 2014,* GSMA, 2014.

to shrink. However, the biggest challenge remains that of addressing issues of low income in the offline population through economic development, employment, and income growth opportunities.

### Trend #4: Growing middle class

In the last half of the 20th century, the "global middle class" largely resided in developed countries, as developing nations struggled to ignite economic growth.[80] Even as countries such as China and India gained a foothold in the 2000s, the majority of the middle-class population remained concentrated in the developed world. In 2009, 1.8 billion people were part of this income segment, with the majority—54 percent—still residing in developed countries in Europe and North America.[81] Residents of the BRIC countries (Brazil, Russia, India, and China) made up 20 percent of the global total.[82]

Middle-class consumers have more disposable income than those in lower socioeconomic tiers, contributing to higher demand for goods and services. There is a clear correlation between income and Internet adoption. For example, a recent study conducted by the Pew Research Center on Internet usage in the United States found that while 99 percent of adults in households with incomes greater than USD 75,000 per year access the Internet, only 77 percent of adults in households with income less than USD 30,000 per year go online.[83]

#### *Outlook ahead*

The global middle class is poised for dramatic growth over the next 15 years. By 2030, the Organization for Economic Cooperation and Development (OECD) estimates the global middle class will total 4.9 billion people, with 54 percent residing in the Asia-Pacific region.[84] If trends continue, the middle class in developing countries will grow from 5 percent in 2005 to 25 percent in 2030, with China alone adding 1 billion people to this income segment.[85] Total spending by the middle class is also projected to rise, from more than USD 21 trillion in 2009 to nearly USD 56 trillion in 2030.[86] At that time, Asia-Pacific will account for three-fifths of the total spending of the global middle class.[87]

The successive waves of people entering the middle class in the coming years will have a transformational impact on developing countries. As disposable income rises, consumers will be more willing and able to pay for Internet access. Furthermore, as the global middle class grows and new markets emerge, providers across the Internet ecosystem, including operators, content providers, and brands, will be better equipped to make the business case for the investments that will enable new users to come online.

### Trend #5: Increasing utility of the Internet

The Internet has become an increasingly vital part of daily life for many across the globe. As more and more users have joined the online ranks, the number of potential connections and the value that individuals derive from their online activities have also grown. The rise of social media provides just one example; the total number of registered users on Facebook grew from 100 million users at the end of 2008 to 1.3 billion users in June 2014, reflecting the value of connecting with other users online.[88] Consumption of online content and media is also on the rise; McKinsey's iConsumer research found that in the United States, from 2008 to 2011, online newspaper subscriptions rose more than 30 percent per year, music downloads increased more

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80 The Brookings Institution defines the global middle class as households with daily expenditures between USD 10 and USD 100 per person.
81 Homi Kharas, *The emerging middle class in developing countries,* Organisation for Economic Co-operation and Development (OECD) Development Centre, working paper number 285, January 2010.
82 *Hitting the sweet spot: The growth of the middle class in emerging markets,* Ernst & Young, 2013.
83 "Part 1: How the internet has woven itself into American life," *The Web at 25 in the U.S.,* Pew Internet Research, February 27, 2014.
84 Mario Pezzini, "An emerging middle class," OECD Yearbook, oecdobserver.org, 2012.
85 Augusto de la Torre and Jamele Rigolini, *Rise of the middle class,* The World Bank, 2013.
86 Homi Kharas, *The emerging middle class in developing countries,* Organisation for Economic Co-operation and Development (OECD) Development Centre, working paper number 285, January 2010.
87 Ibid.
88 "Number of active users at Facebook over the years," *Associated Press (AP),* October 23, 2012; "Company info," Facebook, newsroom.fb.com, accessed July 2014.

than 20 percent per year, and video content subscriptions grew by 40 percent per year.[89] MGI estimates that these trends helped to increase cross-border Internet traffic 18-fold between 2005 and 2012.[90]

The total value of cross-border flows of goods, services, and finance grew from 23 percent of global GDP in 1990 to 36 percent in 2012.[91] The rise was fueled in part by the Internet, which has become the backbone of global commerce and business, supporting every function of operations and enabling new business models and ways to deliver goods and services. The evolution of online retailers—including Amazon, which expanded its offerings beyond books to include a massive inventory of consumer goods, and Alibaba, which revolutionized the shopping experience in China while connecting suppliers to new markets—demonstrates the enhanced utility of the Internet. Indeed, B2C e-commerce sales surpassed USD 1 trillion in 2012, led by rapid growth in Asia-Pacific, which surpassed North America in 2013 to become the largest B2C online market.[92]

### *Outlook ahead*

Several developments indicate that the Internet will be even more valuable and widespread in the coming years. In developing markets, the growth of online populations will extend the benefits of the Internet, particularly in countries that have yet to reach a critical mass of online users. Technology trends such as the proliferation of e-government services, the interconnectivity offered by the Internet of Things, and widespread use of big data by companies and governments, to name a few, will expand the benefits available to consumers and businesses alike, creating new uses for the Internet.[93]

## *Significant challenges in bringing more people online*

Despite the trends highlighted above, large portions of the offline population will continue to face real, structural barriers to going online. The demographic profile of the 4.4 billion non-Internet users (out of approximately 7.1 billion people worldwide) makes it unlikely that they will come online solely as a result of expanding mobile networks and mobile Internet connections, urbanization, falling prices, growth in the middle class, and increasing Internet utility.[94] Indeed, the worldwide rate of growth in Internet users has slowed from a three-year compound annual growth rate (CAGR) of 15.1 percent in the period 2005–2008 to 10.4 percent in 2010–2013.[95]

Without a significant change in technology, in income growth or in the economics of access, or in policies to spur Internet adoption, the rate of growth of Internet penetration will continue to slow. Estimates from multiple sources suggest that the online population will be in the range of 3.2 billion to 3.6 billion users by 2017.[96] By these projections, approximately 3.8 to 4.2 billion people—52 to 55 percent of the estimated global population—will remain offline in 2017.

In the coming years, as services, resources, and information continue to move online, it is likely that the population that remains offline will only fall further behind, widening the digital divide.

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89 *iConsumer survey, United States 2008–11,* McKinsey & Company. The survey covered U.S. online consumers aged 13 to 64.

90 *Global flows in a digital age: How trade, finance, people, and data connect the world,* MGI, April 2014.

91 Ibid.

92 "Ecommerce sales topped $1 trillion for first time in 2012," eMarketer, February 5, 2013; *2014 China online shopping report,* iResearch, May 2014.

93 According to Gartner, the Internet of Things is defined as "the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment." Big data is defined as "high-volume, high-velocity, and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making."

94 McKinsey analysis based on data from "World development indicators," World Bank, 2013 estimates, accessed 2014. Sourced from ITU, "World telecommunication/ICT development report" and database, and World Bank estimates.

95 McKinsey analysis based on The World Bank longitudinal data.

96 Cisco forecasts the online ranks will reach 3.6 billion users in 2017, while Forrester estimates a total of 3.5 billion. Microsoft estimates that the online population will reach 4.7 billion users by 2025. "Cisco's Visual Networking Index forecast projects nearly half the world's population will be connected to the Internet by 2017," cisco.com, May 29, 2013; *World online population forecast, 2012 to 2017 (Global),* Forrester Research, August 2012; David Burt et al., *Cyberspace 2025: Today's decisions, tomorrow's terrain—Navigating the future of cybersecurity policy,* Microsoft, June 2014.

# 3. Who are the unconnected?

Despite significant gains in Internet penetration, there is still a sizeable population of the world that is not online. This offline population is disproportionately rural, low income, illiterate, elderly, and female (Exhibit 7).

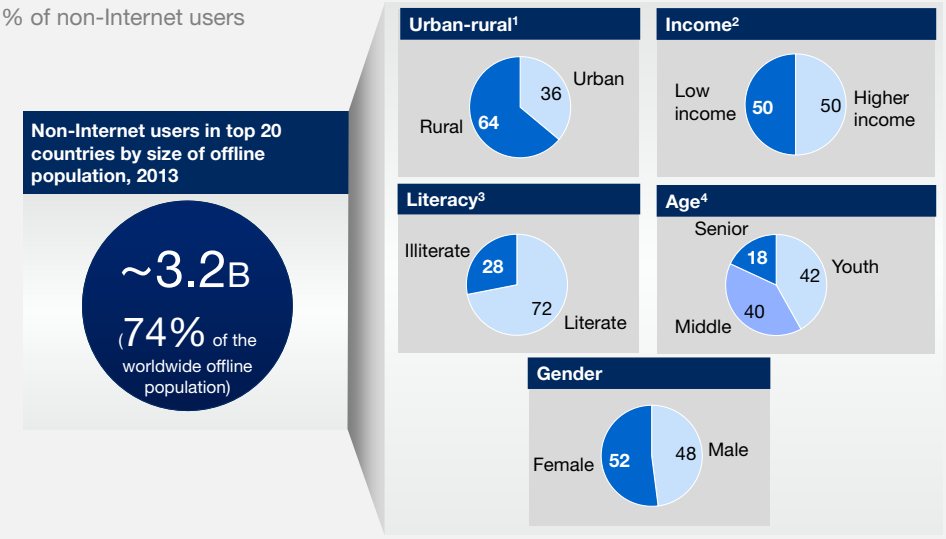
## *Demographic profile and context of the offline population*

To gain a better understanding of the profile and context of the offline population, we used basic demographic information for the overall population and the population of online users—the only available and somewhat consistent data for many countries—to characterize the offline population in 20 countries (chosen by size of offline population). These 20 countries account for approximately 74 percent of the worldwide offline population. Because 2013 data for the key demographic indicators was limited, we used 2012 data. Based on this analysis, we can shed light on who the offline are, where they live, and the challenges they face in becoming Internet users.[97]

**Exhibit 7**

**The offline population is disproportionately rural, poor, illiterate, elderly, and female**

% of non-Internet users




1 Urban areas have a core town with a minimum population of 50k and a high probability that area will be fully urbanized in a period of 2 decades
2 Low income defined as incomes below the average between the national poverty line and the median; assumption that the highest earners are online
3 Based on simplifying assumption that 100% of the online population is literate
4 Youth is defined as 0-24 years, middle is defined as 25-54 and senior is defined as 55+
Note: Data shown for top 20 countries with the largest offline populations; Myanmar and Iran excluded for age split, Myanmar excluded for gender split because of lack of data. 2012 or most recent available data points used to profile offline population.
SOURCE: McKinsey analysis; methodology and detailed source list included in appendix

97 We analyzed 20 countries (Bangladesh, Brazil, China, Colombia, Egypt, Ethiopia, India, Indonesia, Nigeria, Mexico, Pakistan, the Philippines, Russia, South Africa, Sri Lanka, Tanzania, Thailand, Turkey, the United States, and Vietnam) that are home to 74 percent of the 2012 worldwide offline population. The numbers reported in this section are based on those countries only and on 2012 demographic indicators. For further details on methodology, see the Appendix.

## 64 percent are rural (compared with 24 percent of the online population)

The rural experience is characterized generally by lower access to basic infrastructure (for example, clean water, roads, electricity), health care, quality education, employment, and income opportunities—all factors that can not only contribute to a lower quality of life but also serve as impediments to Internet adoption. Indeed, as of 2010, approximately 70 percent of the world's poor resided in rural areas.[98] In India, approximately 45 percent of the rural population lives without electricity.[99] These challenges translate into lower Internet adoption among rural populations. For example, while rural residents represent around 68 percent of India's overall population, our analysis indicates they account for approximately 73 percent of India's offline population. China is even more extreme—47 percent of the overall population and 63 percent of the offline population is rural.

By definition, rural areas have lower population densities than urban areas. However, between countries, there can be a large variance in the population density of what is considered a rural area. For example, sub-Saharan Africa has 36.2 people per square kilometer compared with 393.8 people in rural India.[100] Regarding network coverage, progress has been made worldwide. Based on ITU estimates, in 2012, 87 percent of the world's rural population was covered by a mobile signal, compared with 45 percent in 2003.[101] Given that connecting people to the Internet is heavily dependent on proximity to a fiber line, the cost and quality of the Internet connections can vary significantly between rural areas in different countries.

## 50 percent are low income (assuming the highest earners are online)

Drawing on the available data for the countries researched, our analysis defined the low-income population for each country as those with incomes below the midpoint between the national poverty line and the median income. As income distribution of the online population was not available for the majority of the countries we researched, we used the simplifying assumption that the highest earners in each country would be members of the online population. Based on this assumption, we estimate that in the top 20 countries by size of offline population, low-income individuals account for 33 percent of the total population and 50 percent of the offline population—a total of approximately 1.6 billion people. Even with the prices of devices and data plans declining significantly, Internet affordability remains a real challenge for this population segment. In many cases, spending on Internet access takes a backseat to food, shelter, clean water, and energy, among other items.

## 28 percent are illiterate (assuming the online population is entirely literate)

While emerging trends and technologies could enable the use of the Internet without the need for language literacy (for example, voice and video), currently a vast amount of the information and content online is in text-based form, making it difficult for someone without basic language literacy to take full advantage of being online. Thus our analysis is based on the assumption that the online population is literate and, furthermore, that a country's adult literacy rate is a contributing factor to its level of Internet penetration. In the top 20 countries by size of offline population, 920 million people are illiterate—19 percent of the total population and 28 percent of the offline population.

Worth noting, there is a large variation in the literacy rates of the non-Internet user population among the different countries included in this report. Countries like China, Indonesia, and Mexico are at one end, where over 90 percent of their offline population is literate. On the other end are countries like Ethiopia, Bangladesh, and Pakistan, where less than 50 percent of the offline population is literate. However, it is important to remember that language literacy is not always necessary for a person to be able to use an Internet-enabled device.

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98 James Melik, "Rural areas face challenges to eradicate extreme poverty," BBC.com, December 6, 2010.
99 India Census 2011, Government of India.
100 Tradingeconomics.com, accessed 2014; "Rural poverty portal," International Fund for Agricultural Development, ruralpovertyportal.org, accessed 2014.
101 *Final WSIS targets review: Achievements, challenges and the way forward,* Partnership on Measuring ICT for Development, ITU, 2014.

## About the data

We derived the profile and context of the offline population by inferring it from the profile and context of the overall country population and the online users within that country. We used three criteria when aggregating our data set. First, the data had to be available from a reputable public source. Second, we looked for sources that would refresh the data on a regular basis and thereby enable a review of trends over time. Third, where multiple data sources existed, we selected the data source that covered the largest number of countries in the most consistent manner.

In surveying available public data sources, we encountered several challenges.

**Primary research is not conducted in all countries.**
Very few single data sets track metrics of Internet adoption across multiple countries. For example, the World Bank bases many of its Internet penetration estimates on data from the International Telecommunication Union (ITU), which in turn aggregates data from a mix of individual country sources (for example, ministries, industry associations) and ITU models.

**Data freshness varies significantly among countries.**
Internet penetration and country-level census data sets often aren't updated with the same frequency across countries. In general, there are few metrics tracking Internet usage that are updated on a consistent basis across countries and available in a time-series format. Data for some countries is particularly outdated. For example, the last data point for Internet penetration in Ethiopia sourced from an Ethiopian ministry was 2008; the more recent data points are estimates generated from ITU models. Similarly, as of this report's publication, the most recent adult literacy estimates available from the World Bank for India are from 2006. Data freshness is particularly important when evaluating the use of rapidly evolving technologies such as the Internet.

**Established data sources use different definitions.**
Even for the most basic of metrics such as Internet penetration, we encountered several definitions in use by the various organizations. For example, the CIA's *World Factbook* defines "Internet users" as those who access the Internet at least several times a week as well as those who access it only once within a period of several months. By contrast, in some data sets, ITU defines "Internet users" as those aged two years and older who went online in the past 30 days. The definitions for Internet penetration data also vary greatly by measure of the age of the population considered. In many countries, the data represents those aged 16–75. In others, the ages considered are not specified. Similar definitional variations exist for data concerning rural and urban populations, literacy, and income.

Given the recognized role of the Internet in driving economic growth and improving individual quality of life, there is a tremendous opportunity for a more rigorous and systematic approach to measuring Internet adoption and impact.

### 42 percent are younger than 25 years old (compared with 47 percent of the online population)

The offline population skews young, but less so than the online population; approximately 42 percent of the offline population is under the age of 25 compared with 47 percent of the online population.[102] Two factors contribute to this skew: First, for many of the countries included in this research, the available data for the online population only considers individuals above a certain age. Thus, by definition, any individuals below that age were classified as offline, skewing the offline population younger. Second, the population pyramid in some developing economies tends to skew toward a younger demographic. In Ethiopia and India, for example, 41 and 31 percent of the respective populations are below the age of 15.[103] We expect this younger age segment to be a significant driver of Internet adoption in developing countries, given their generally greater familiarity with technology and willingness to adopt it.

### 18 percent are older than 54 years old (compared with 7 percent of the online population)

Seniors are disproportionately represented in the offline population due to several challenges. While younger population segments have grown up using their mobile device to access a range of information and entertainment sources, older people are more likely to rely on televisions, print publications, and radios. Thus, the elderly are less familiar with computers and mobile devices, and the rapid evolution of online technologies can be daunting for older users trying to keep pace. Furthermore, physical constraints such as failing eyesight and reduced dexterity can also present issues, particularly on smaller mobile devices. Last, life stage can be an impediment for seniors, who are more likely to be retired or unemployed and thus have less exposure to the Internet and the latest technologies.

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102 Figures were extrapolated based on demographic characterization of top 20 countries.
103 "Global health facts," Henry J. Kaiser Family Foundation, kff.org, accessed 2014.

52 percent are female
(compared with 42 percent of the online population)

While 52 percent of non-Internet users in our 20-country sample are women, the size of this segment can differ markedly among nations. Many factors—cultural, religious, and economic—have been found to contribute to this discrepancy. Women may not have the disposable income for phones or data plans, and barriers relating to affordability disproportionately affect women.[104] Illiteracy is also more prevalent in women in developing countries; across all developing countries around the globe, approximately 14 percent of men and 25 percent of women are illiterate.[105] Intel research in 2012 found that overall, in developing countries, nearly 25 percent fewer women have access to the Internet compared with men.[106]

## *Comparison with the online population*

For the top 20 countries by size of offline population, a comparison of the online and offline populations (Exhibit 8) reinforces the importance of the demographic profile and context in understanding Internet adoption trends. For example, the fact that approximately 76 percent of online users reside in urban areas illustrates the important role of robust mobile network coverage in driving Internet adoption. While literacy doesn't guarantee Internet adoption, the inability to read and write is a critical barrier to overcome for more than 900 million people in the countries we studied. Regarding age and gender, the gap in the online and offline populations of seniors and women suggests material social and cultural barriers.

### Exhibit 8

**There are striking demographic differences between the online and offline populations**

**Demographic profile and context of online and offline users in top 20 countries with the largest offline populations**

| | Online | Offline |
|---|---|---|
| Population, 2013 (billions) | 1.7 | 3.2 |
| Living in rural areas[1] | ~24% | ~64% |
| Low income[2] | ~0% | ~50% |
| Illiterate[3] | ~0% | ~28% |
| Younger than 25 | ~47% | ~42% |
| Older than 54 | ~7% | ~18% |
| Female | ~42% | ~52% |

1 Urban areas have a core town with a minimum population of 50k and a high probability that area will be fully urbanized in a period of 2 decades
2 Low income defined as incomes below the average between the national poverty line and the median; assumption that the highest earners are online
3 Based on simplifying assumption that 100% of the online population is literate
Note: Data shown for top 20 countries with the largest offline populations; Myanmar and Iran excluded for age split, Myanmar excluded for gender split because of lack of data. 2012 or most recent available data points used to profile offline and online population.
SOURCE: McKinsey analysis; methodology and detailed source list included in appendix

104 *Women and the Web : Bridging the Internet gap and creating new global opportunities in low and middle-income countries,* Intel, 2012.
105 Ibid.
106 Ibid.

## *Demographics of the offline population, by country*

The aggregate figures highlight prevailing patterns, but a more detailed look at the offline populations in the 20 countries profiled reveals significant variations (Exhibit 9). Although overall, rural residents are more likely to be without Internet access, approximately three-quarters of the offline populations in Brazil and Mexico are urban dwellers. Similarly, low income is a major hurdle for individuals around the world, but 60 percent of both Ethiopia's and Pakistan's offline populations have incomes above what we define in this report as low income. In contrast, the offline populations in Mexico, Nigeria, and the United States skew heavily low income. Indonesia's offline population is quite literate (90 percent), while China's youth and Russia's seniors buck the age trend. These exceptions reinforce the importance of understanding the interconnected demographic factors in each country's offline population.

### Exhibit 9

**Demographic profile and context of the offline population, by country**

| Country | Total non-Internet users, 2013 | Urban-rural split[1] | | Income[2] | | Literacy | | Age | | | Gender | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Millions | Urban | Rural | Low | Higher | Literate[3] | Non-literate | Youth[4] | Middle[5] | Senior[6] | Male | Female |
| India | 1,063 | 27% | 73% | 46% | 54% | 57% | 43% | 46% | 41% | 13% | 46% | 54% |
| China | 736 | 37% | 63% | 49% | 51% | 92% | 8% | 17% | 51% | 32% | 49% | 51% |
| Indonesia | 210 | 43% | 57% | 36% | 64% | 91% | 9% | 47% | 39% | 14% | 50% | 50% |
| Pakistan | 162 | 32% | 68% | 40% | 60% | 50% | 50% | 55% | 36% | 9% | 47% | 53% |
| Bangladesh | 146 | 25% | 75% | 43% | 57% | 55% | 45% | 52% | 38% | 10% | 49% | 51% |
| Nigeria | 108 | 37% | 63% | 72% | 28% | 42% | 58% | 74% | 21% | 5% | 43% | 57% |
| Brazil | 97 | 76% | 24% | 69% | 31% | 81% | 19% | 45% | 33% | 22% | 50% | 50% |
| Ethiopia | 92 | 16% | 84% | 45% | 55% | 38% | 62% | 65% | 29% | 6% | 50% | 50% |
| Mexico | 69 | 75% | 25% | 83% | 17% | 89% | 11% | 41% | 40% | 19% | 38% | 62% |
| Congo, Dem. Rep. | 64 | n/a | n/a | 62% | 38% | 66% | 34% | 66% | 29% | 5% | 65% | 35% |
| Philippines | 62 | 57% | 43% | 60% | 40% | 93% | 7% | 62% | 26% | 12% | 46% | 54% |
| Russian Federation | 55 | 44% | 56% | 65% | 35% | 99% | 1% | 33% | 19% | 48% | 37% | 63% |
| Iran, Islamic Rep. | 53 | 62% | 38% | 46% | 54% | 80% | 20% | n/a | n/a | n/a | 42% | 58% |
| Myanmar | 53 | 33% | 67% | 42% | 58% | 93% | 7% | n/a | n/a | n/a | n/a | n/a |
| Vietnam | 50 | 26% | 74% | 51% | 49% | 89% | 11% | 47% | 38% | 15% | 46% | 54% |
| United States | 50 | 52% | 48% | 80% | 20% | 95% | 5% | 46% | 0% | 54% | 34% | 66% |
| Thailand | 48 | 31% | 69% | 43% | 61% | 91% | 9% | 30% | 46% | 24% | 52% | 48% |
| Tanzania | 47 | 26% | 74% | 45% | 55% | 66% | 34% | 65% | 29% | 6% | 50% | 50% |
| Egypt, Arab Rep. | 41 | 67% | 33% | 64% | 36% | 53% | 47% | 48% | 36% | 16% | 36% | 64% |
| Turkey | 40 | 55% | 45% | 61% | 39% | 89% | 11% | 38% | 44% | 18% | 49% | 51% |

1 Urban areas have a core town with a minimum population of 50k and a high probability that area will be fully urbanized in a period of 2 decades
2 Low income defined as incomes below the average between the national poverty line and the median; assumption that the highest earners are online
3 Based on simplifying assumption that 100% of the online population is literate
4 Youth is defined as ages 0-24 years
5 Middle is defined as ages 25-54 years
6 Senior is defined as ages 55+
Note: 2012 or most recent available data points used to profile offline population.

SOURCE: McKinsey analysis; methodology and detailed source list included in appendix

# 4. Four categories of consumer-facing barriers to Internet adoption

Our empirical evidence, research, and analysis reveal four categories of barriers facing the offline population around the world: incentives, low incomes and affordability, user capability, and infrastructure (Exhibit 10). While these categories are defined through the lens of the consumer, we explore them here in the context of several contributing factors, including root causes and obstacles faced by providers, some of which can be traced back to the government, regulatory, and industrial context of individual countries.

**Exhibit 10**

## Non-Internet users face four categories of barriers

| | Incentives | Low incomes and affordability | User capability | Infrastructure |
|---|---|---|---|---|
| **Barriers directly affecting consumers** | Lack of awareness of Internet or relevant use cases<br>Lack of relevant (e.g., local, localized) content and services<br>Lack of cultural or social acceptance | Low income or consumer purchasing power<br>Total cost of ownership for device<br>Cost of data plan<br>Consumer taxes and fees | Lack of digital literacy<br>Lack of language literacy | Lack of mobile Internet coverage or network access<br>Lack of adjacent infrastructure (e.g., grid electricity) |
| **Root causes** (e.g., providers, government/ regulatory, industrial) | ▪ High content and service provider costs and business model constraints<br>▪ Low awareness or interest from brands and advertisers<br>▪ Lack of a trusted logistics and payments system<br>▪ Low ease of doing business<br>▪ Limited Internet freedom and information security | ▪ Challenging national economic environment<br>▪ High device manufacturer costs and business model constraints<br>▪ High network operator costs and business model constraints<br>▪ High provider taxes and fees<br>▪ Unfavorable market structure | ▪ Under-resourced educational system | ▪ Limited access to international bandwidth<br>▪ Underdeveloped national core network, backhaul, and access infrastructure<br>▪ Limited spectrum availability<br>▪ National ICT strategy that doesn't effectively address issue of broadband access<br>▪ Under-resourced infrastructure development (e.g., FDI limits) |

SOURCE: Literature review; expert interviews; McKinsey analysis

Our analysis sought to determine how these four categories of barriers impede individuals from going online. Each barrier has root causes that vary among countries and can affect different population segments more acutely. It is worth noting that some of these barriers stem from conditions in each country that are not specifically related to the Internet (for example, lack of language literacy or low income).

## *Incentives*

Even among those who have Internet access; who can afford the device, service, and associated costs; and who are able to use the Internet, there are still millions of individuals who choose not to go online. While the Internet can offer its users myriad benefits, there are many individuals who perceive greater costs or risks associated with going online that outweigh the potential advantages.

### Consumer barriers

A significant portion of the offline population has not gone online because they lack awareness of the Internet or its use cases, they perceive a lack of relevant (for example, local or localized) content and services, or Internet use is not considered culturally or socially acceptable. Other factors such as life stage or age also correlate with Internet usage patterns (for instance, many elderly individuals have left the workforce and are not compelled to access the Internet on a regular basis).

#### *Lack of awareness of the Internet or relevant use cases*

To develop the motivation to go online, consumers must understand the benefits and value of the Internet. However, even a basic awareness of the Internet can be an issue. Some population segments—for example, rural residents in developing markets—are not aware of the Internet's existence and its potential value to them. A 2013 survey and report by IAMAI found that 69 percent of Indian survey respondents cited a lack of awareness of the Internet as a reason they weren't online.[107] This challenge also extends into urban centers—21 percent of the respondents in a 2011 survey of Ethiopian residents in Addis Ababa said they did not know what the Internet is.[108]

Beyond basic awareness, consumers require a concrete use case for going online—one that creates value for them. A significant number of individuals have been exposed to the Internet but choose not to go online because they don't see the value in its potential uses. For example, 34 percent of U.S. offline individuals cited the belief that the Internet was not relevant to them in a recent study by the Pew Research Center.[109]

Those who have already come online in developing countries are taking advantage of a variety of services. McKinsey research on the Internet habits of African consumers revealed that social media, e-mail, and music videos were the top three activities.[110] To date, commercial activities such as e-commerce have particularly low penetration in Africa. Another area with great potential for demonstrating value is e-government services. Colombia, Uruguay, and Panama have been successful in expanding e-government services, resulting in increased Internet use; in Colombia in 2012, 50 percent of residents and 78 percent of businesses engaged with the government through online channels.[111] Population mobility and dispersion can also serve as powerful motivators for Internet adoption. Still, for certain segments of the offline population, these explicit use cases may be lacking or simply not compelling enough to motivate an individual to overcome other barriers to going online.

#### *Lack of relevant (localized or local) content and services*

According to the World Bank, at least 80 percent of all content on the Internet is in one of ten languages: English, Chinese, Spanish, Japanese, Portuguese, German, Arabic, French, Russian, or Korean.[112] As a result, languages in developing nations, particularly Africa and Asia, often aren't well represented on the Internet. Language fragmentation within a country compounds the challenge. India, for example, has 22 official languages in 11 scripts and hundreds of unofficial languages.[113] Despite the large number of individuals who speak the country's major languages, none appears among the top ten languages on the Internet.

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107 *Internet in India 2013,* IAMAI and IMRB International, June 2013.
108 McKinsey African Consumer Insights Center (ACIC), 2011.
109 Kathryn Zickhur, *Who's not online and why?,* Pew Research Internet Project, September 2013.
110 *iConsumers: Life online,* McKinsey & Company, January 2014.
111 *The global competitiveness report 2013–2014,* World Economic Forum (WEF), September 2013.
112 "Internet access, yes, but in my mother language!," World Bank, July 3, 2014.
113 Leo Mirani, "Why language is the key to winning India's mobile market," qz.com, February 27, 2013.

In many countries, mobile devices have not been designed and manufactured to accommodate the official language, let alone dialects or unofficial languages. Issues include the rendering of fonts, limited memory that supports a limited number of fonts, default phone settings to English, and the lack of input keyboards. Thai and Hindi, for example, have complex scripts that require sophisticated engineering to translate to mobile devices. In India, one workaround to the lack of devices tailored to the local language is the use of Hinglish, where users use English script to type out words in Hindi or a different Indian language.[114]

Not surprisingly, language can have a direct impact on consumer adoption of Internet-enabled mobile devices. China—which has the advantage of phones that can support the language—has a smartphone penetration rate of approximately 33 percent; by contrast, Vietnam's penetration rate is just 20 percent, due in part to the dearth of devices customized to the local language.[115] More intuitive mobile applications, services with simple graphical interfaces, and stronger local language support could significantly reduce the language and digital literacy barriers to Internet adoption in countries with these issues.

Social-networking sites are a major draw for individuals in developing markets—in Ethiopia, for example, 55 percent of mobile broadband users identified social networking as their top online activity.[116] The popularity of social media stems in part from the ability of individuals to converse in their own language and share user-generated content that reflects local interests. However, developing nations often lack content—news stories, media, and e-commerce sites, and so forth—that reflect local information and are in local languages. While respondents in one survey believed that global providers offer the highest-quality content, they favored local providers because the information was in their local language and they could better understand it.[117]

Much work remains to be done to increase the amount of local content in developing countries. In Africa, many nations lack content that local users find useful, though exceptions demonstrate the demand for information that can make a tangible impact on daily living. For example, in Ghana, Nigeria, and Zimbabwe, a mobile app that enables users to search their country's constitution had been downloaded millions of times.[118] Similarly, farmers in Senegal that use apps to track the agriculture process earn 15 percent more on their crops at market.[119] Local content categories that often hold the highest value for consumers include social media, entertainment, weather, agriculture, utilities, e-government, and telemedicine, among other areas.

### *Lack of cultural or social acceptance*

In many countries, women have been largely excluded from Internet adoption due to several cultural factors. In a 2012 report, Intel found that female non-Internet users were less likely than their male counterparts to be aware of the Internet, more likely to be uncomfortable with technology, and less likely to recognize the value or benefits of Internet use.[120] Other barriers such as low incomes and affordability, user capability, and infrastructure are often amplified for women. In addition to a gender gap in education, women also earn substantially less than men; for example, in China, urban women earned 70 percent of what their male counterparts did in 2010, and rural Chinese women brought home just 56 percent of the income that rural men did.[121]

114 Rahul Gupta, "Swiftkey adds Hinglish language support," themobileindian.com, December 21, 2012.
115 *Global mobile statistics 2014 part A: Mobile subscribers; handset market share; mobile operators,* MobiThinking, May 2014.
116 McKinsey ACIC, 2011.
117 *Western brands are failing to connect with emerging markets due to lack of local understanding,* Upstream, April 2014.
118 *2013 Web Index report,* World Wide Web Foundation, November 2013
119 Ibid.
120 Intel also found that this is not because women are less technically adept, but rather due to disparities in education, employment, and income. *Women and the Web: Bridging the Internet gap and creating new global opportunities in low and middle-income countries,* Intel, 2012.
121 He Dan, "Gender income gap continues to widen," *China Daily,* May 16, 2013.

In many corners of the world, women also have less ability to leave the household to access the Internet through cafés or other public access points due to family and domestic duties such as child care or because it is unsafe or considered culturally inappropriate.[122] Furthermore, device and mobile service plan prices disproportionately affect women because, in many countries, women don't have control over large purchasing decisions. In developing countries, the gender gap is striking—Intel's 2012 research found that nearly 25 percent fewer women have access to the Internet compared with men.[123] The gap widens in some regions, including sub-Saharan Africa and South Asia, where the gap is 45 percent and 35 percent, respectively.[124]

Family support is an important driver of Internet adoption for both men and women. Intel's 2012 report found that active Internet users were nearly three times as likely as non-users to have families or partners that were "very supportive" of their online activities.[125] However, women in certain countries encounter a socially enforced stigma against using the Internet. For example, one in five women in Egypt and India believe that it is not appropriate for them to be online.[126]

Other cultural factors can further erode the desire of specific population segments to get online. For instance, one survey found that just 16 of 81 selected countries have a legally binding requirement that government websites be accessible for people with disabilities.[127] Of those, only four have championed accessibility as a government priority; South Korea is the only country where Internet access for people with disabilities is viewed as a priority among tech and Web developers.[128] People with disabilities could preemptively decide not to venture online if they knew they could not access certain popular websites—much as they might determine cities or landmarks that do not invest in accessibility are not worth visiting.

## Root causes

In certain countries, a range of constraints and risks can exacerbate the lack of incentives consumers have to go online. These same factors can serve as a disincentive for content producers and businesses as well, further undermining the growth of the online population.

### *High content, app, and platform costs and associated business model constraints*

Gauging user demand and growth trends can be difficult in countries with low Internet penetration. As a result, stakeholders can be challenged to establish a business case for investment. From the content side, developers must overcome several technological challenges, including solving for high-availability website hosting, Internet connectivity for developers, and management of the fragmentation caused by multiple operating systems and device form factors. The situation is exacerbated by the cost of generating, localizing, and translating content, which can be significant. Go-to-market costs are also substantial, as marketing investment to build awareness and discoverability in app stores is challenging; often, only the top global 1,000 apps show up rather than the app that is most relevant to the individual. Without a sound model to acquire a sufficient volume of customers or the marketing channels and viral networks to reach individuals, the return on investment remains unclear.

122 *Women and the Web: Bridging the Internet gap and creating new global opportunities in low and middle-income countries,* Intel, 2012.
123 Ibid.
124 Ibid.
125 *Women and the Web: Bridging the Internet gap and creating new global opportunities in low and middle-income countries,* Intel, 2012.
126 *2013 Web Index report,* World Wide Web Foundation, November 2013.
127 Ibid.
128 Ibid.

### *Low awareness or interest from brands and advertisers*

Brands and advertisers are critical to making many Internet services available without a direct cost to the individual users. Critical Internet services such as search, social media, and many content sites depend on ad-funded business models. In general, brands and advertisers have been reluctant to devote resources to reaching far-flung and unconnected populations, the rationale being that the potential value of reaching consumers at the bottom of the pyramid does not justify the costs of engagement. As a result, websites and content providers do not have access to the same advertising dollars to support more robust offerings and engage with underserved populations. As countries continue to evolve and their demographics change, however, certain untapped segments could represent a huge opportunity. The challenge lies in companies' ability to gain a better understanding of how to unlock the value of lower-income segments as they move online. Such efforts will likely involve greater collaboration with local stakeholders and potentially new business models.

### *Lack of a trusted logistics and payments system*

Online shopping has the potential to lure consumers onto the Internet, but the development of a robust e-commerce offering relies on the ability of consumers to pay for the goods electronically and, in the case of physical goods, companies to deliver the purchased items. Researchers have found a high correlation between e-commerce adoption and logistics infrastructure, which is crucial to support the delivery of goods purchased online.[129] In too many countries, poor roads, ports, and other transport infrastructure problems hinder the flow of products, particularly to remote areas. The difficult terrain of some countries further complicates the improvement of logistics systems.

A reliable and secure credit card or alternate electronic payments system is also likely to increase e-commerce activity.[130] The online payments systems in many developing markets are still in their infancy, so further investment is needed to address latent demand—but several examples of payments system innovations exist. M-Pesa, the mobile payments system in Kenya and Tanzania, is one such example.[131] Globe Telecom created G-Cash, enabling foreign workers to make remittances to the Philippines via SMS.[132] China's Alipay, a third-party payments platform and the business segment of Alibaba, claims 300 million registered users and 100 million mobile users.[133] Overall, global consumers are getting more comfortable with paying for goods online—in fact, eMarketer predicts the e-commerce market will grow by 17 percent a year from 2012 to 2017—but this evolution could be undercut by high dropout rates of online consumers and concerns about fraud.[134] Many individuals, especially in developing countries, continue to operate using only cash and lack the bank accounts and credit cards needed to complete payment transactions online.

### *Low ease of doing business*

Start-ups, tech companies, and entrepreneurs have made a huge impact on e-commerce and the online delivery of goods and services around the world. Countries that create an unwelcoming environment for companies, especially new businesses, can limit the growth of organizations whose products and services could entice consumers to go online.

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129 R. Mangiaracina, A. Perego, and F. Campari, "Factors influencing B2C ecommerce diffusion," *World Academy of Science, Engineering and Technology,* volume 6, 295–303, 2012.
130 Ibid.
131 "Why does Kenya lead the world in mobile money?," *Economist,* May 27, 2013.
132 María Elena Labastida Tovar et al., "Financial inclusion, mobile banking, and remittances in Mexico and the Philippines," *Journal of Political Risk,* volume 2, number 1, January 2014.
133 John Heggestuen, "Alipay overtakes PayPal as the largest mobile payments platform in the world," *Business Insider,* February 11, 2014.
134 "Global B2C eCommerce sales to hit $1.5 trillion this year driven by growth in emerging markets," eMarketer, February 3, 2014.

### *Limited Internet freedom and information security*

A lack of Internet freedom and information security (real or perceived) can be a powerful deterrent to Internet activity. Common concerns cited by offline and online individuals alike include Internet-based crime, misuse of personal information by individuals and institutions, and government intrusion. With more individuals online and goods exchanged via the Internet with each passing year, Internet-based crime around the world is exploding. Indeed, the cost of cybercrime in the European Union has been estimated at USD 979 million each year, with 80 percent of this total attributed to organized crime.[135] Revelations about the misuse of personal information by companies can also undermine consumer confidence and deter online activity. Laws and government regulations can also have a dampening effect on the online exchange of information. Some government agencies have been accused of actively using the Internet to spy on civilians, instilling deep distrust among the general population in the Internet's access to and use of information.

Regulations over data use and privacy are still early in their development, and their net impact on Internet adoption by individuals and businesses is not yet clear. On the one hand, several countries have enacted legislation that provides authorities with access to enterprise data, regardless of the data's legal protection rights in the originating jurisdiction.[136] This data could include information on individuals collected by businesses. At the same time, other regulations seek to empower individuals by giving them more control over their personal information. For example, the May 2014 "right to be forgotten" ruling by the European Union bestows individuals with the right, under certain conditions, to ask search engines to remove links with personal information about them.[137]

## *Low incomes and affordability*

While the shrinking costs of devices and data plans and the growing middle class are both historical trends that have contributed to the rise in Internet penetration, low incomes and affordability remains a major challenge for much of the offline population. To be clear, the primary affordability-related obstacle to adopting the Internet is the low income of the offline population. Indeed, the offline population is disproportionately poor, with very low incomes and few employment options; these individuals often live in the most underdeveloped circumstances, which offer limited economic prospects. And so, despite huge strides in the reduction of device and service costs associated with going online, accessing the Internet remains beyond the reach of these individuals.

To facilitate adoption, the total cost of ownership—including devices, data plans, taxes, and related expenses (such as charging solutions)—would need to be at a level that these low-income consumers can afford. Large swaths of the offline population are simply too poor to afford even the cheapest devices and data plans at prices that provide a sustainable business model for device manufacturers and network operators.

### Consumer barriers

Getting an accurate assessment of affordability requires that we first consider the income or consumer purchasing power of the offline population. Other factors that contribute to affordability include the cost of the device, data plan, government taxes and fees, and related expenses (such as the electricity cost for charging).

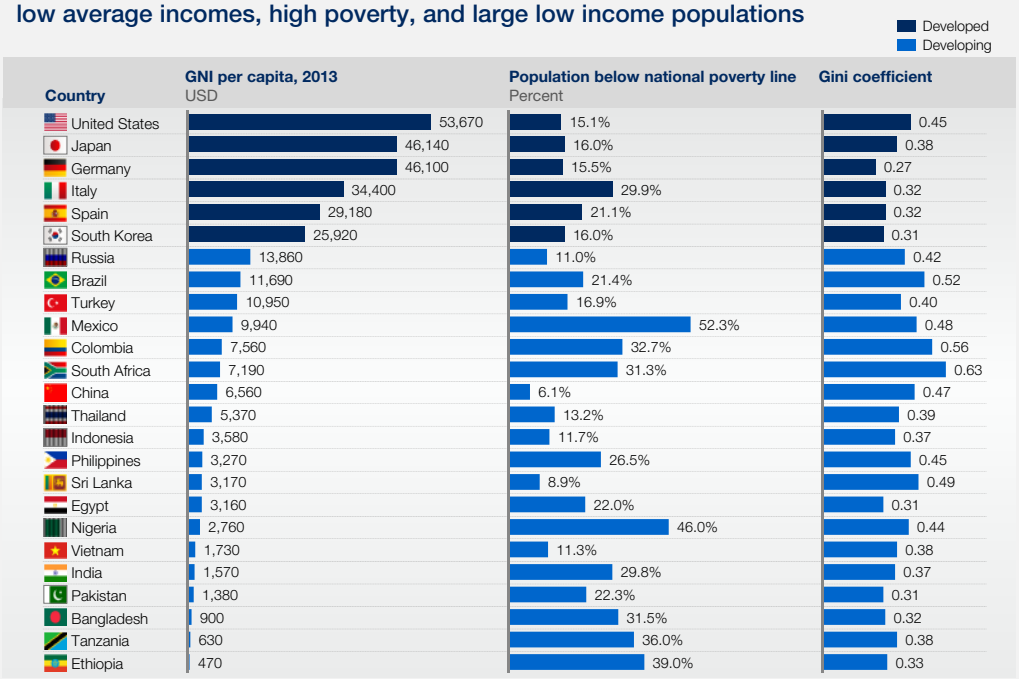
### *Low income or consumer purchasing power*

Despite the rapid growth of the global middle class in recent years, low incomes remains a challenge for a large segment of the world's population (Exhibit 11). Worldwide, the World Bank estimates that approximately 1.3 billion people live on less than USD 1.25 per day; these individuals' primary concern is

135 "Interpol: Organized gangs behind internet crime boom," investmentwatchblog.com, May 8, 2012.
136 *Five cloud data residency issues that must not be ignored,* Gartner, December 2012.
137 *Factsheet on the "Right to be Forgotten" ruling (C-131/12),* European Commission, June 2014.

Exhibit 11

**Much of the developing world is characterized by some combination of extremely low average incomes, high poverty, and large low income populations**




| Country | GNI per capita, 2013 USD | Population below national poverty line Percent | Gini coefficient |
|---|---|---|---|
| United States | 53,670 | 15.1% | 0.45 |
| Japan | 46,140 | 16.0% | 0.38 |
| Germany | 46,100 | 15.5% | 0.27 |
| Italy | 34,400 | 29.9% | 0.32 |
| Spain | 29,180 | 21.1% | 0.32 |
| South Korea | 25,920 | 16.0% | 0.31 |
| Russia | 13,860 | 11.0% | 0.42 |
| Brazil | 11,690 | 21.4% | 0.52 |
| Turkey | 10,950 | 16.9% | 0.40 |
| Mexico | 9,940 | 52.3% | 0.48 |
| Colombia | 7,560 | 32.7% | 0.56 |
| South Africa | 7,190 | 31.3% | 0.63 |
| China | 6,560 | 6.1% | 0.47 |
| Thailand | 5,370 | 13.2% | 0.39 |
| Indonesia | 3,580 | 11.7% | 0.37 |
| Philippines | 3,270 | 26.5% | 0.45 |
| Sri Lanka | 3,170 | 8.9% | 0.49 |
| Egypt | 3,160 | 22.0% | 0.31 |
| Nigeria | 2,760 | 46.0% | 0.44 |
| Vietnam | 1,730 | 11.3% | 0.38 |
| India | 1,570 | 29.8% | 0.37 |
| Pakistan | 1,380 | 22.3% | 0.31 |
| Bangladesh | 900 | 31.5% | 0.32 |
| Tanzania | 630 | 36.0% | 0.38 |
| Ethiopia | 470 | 39.0% | 0.33 |

SOURCE: World Bank (GNI p.c., Atlas method); CIA World Factbook (% of population below poverty line and Gini coefficient)

paying for basic needs.[138] Considering a poverty level of USD 2 per day raises the estimate to 2.5 billion people worldwide living without suitable means to afford basic necessities.[139]

Even when countries have made gains in GDP per capita, these top-level numbers can belie persistent low incomes of large segments of the population. For instance, South Africa has a Gini coefficient of .63, indicating a large consumer segment with very low incomes.[140] High unemployment in urban centers and a lack of upward mobility in rural areas also contribute to low purchasing power.

As discussed above, there is a clear correlation between income levels and Internet adoption. For example, a recent Pew Research Center study on Internet usage in the United States found that while 99 percent of adults in households with an income greater than USD 75,000 per year access the Internet, only 77 percent of adults in households with an income less than USD 30,000 per year go online.[141]

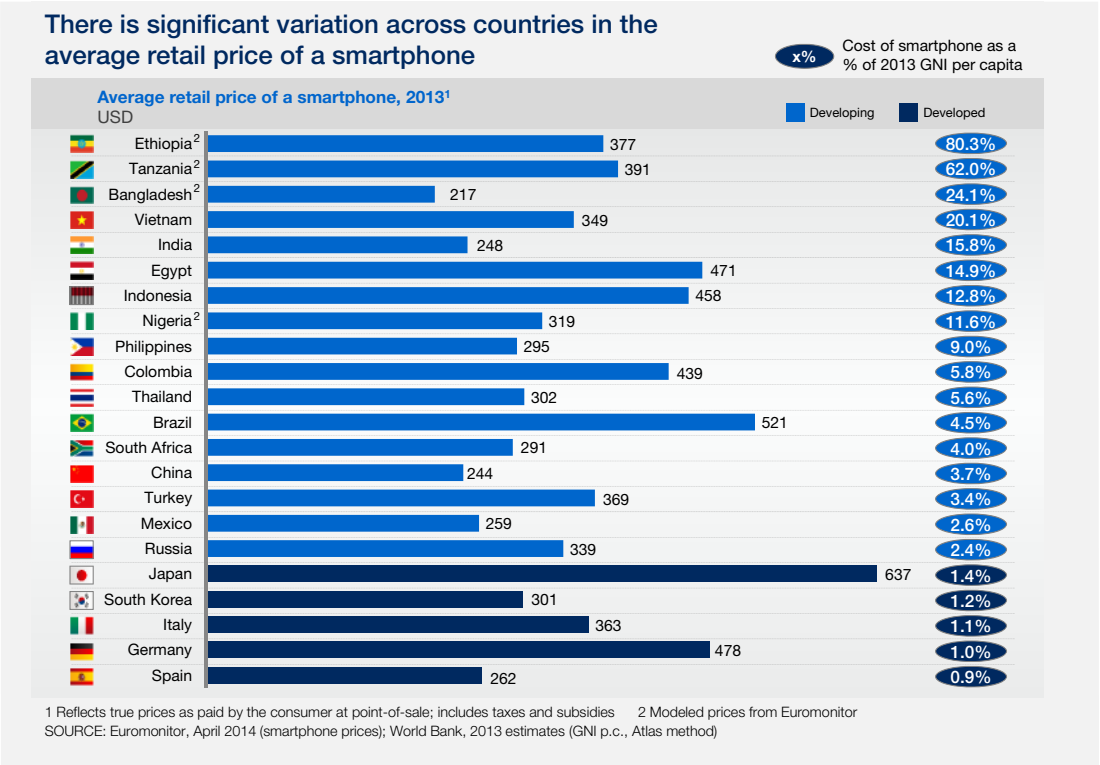
### *Total cost of ownership for a device*

In most markets, prices for devices have fallen over the past several years. The increased manufacturing output of devices from China has helped drive the price of devices down even in countries such as India that don't manufacture devices themselves. It is now common, in some of the most populous markets like India, to see smartphone models below USD 100.[142] These less expensive devices typically deliver only a portion of the functionality of high-end smartphones, but companies such as Google and Microsoft are partnering with local smartphone makers to enhance the user experience while keeping prices low.[143]

138 Pratibha Joshi, "World Bank: Poverty levels in in the developing world," *Journalist's Resource,* March 19, 2012.
139 Ibid.
140 The Gini coefficient is a measure of income inequality. A Gini coefficient of zero expresses perfect equality, where all values are the same (for example, where everyone has the same income). A Gini coefficient of one (or 100 percent) expresses maximal inequality among values (for example, where only one person has all the income). *The World Factbook,* CIA, accessed 2014.
141 "Part 1: How the internet has woven itself into American life," *The Web at 25 in the U.S.,* Pew Research Internet Project, February 27, 2014.
142 Shiv Putcha, *The next billion: Consumer services,* Ovum, June 2013.
143 Ravi Sharma, "Google announces Android One to revolutionize low-end smartphones," *Times of India,* June 25, 2014.

In considering affordability, it's important to weigh the absolute price of the mobile devices in the context of the income of the population (Exhibit 12). In some countries, including Bangladesh, Ethiopia, Tanzania, and Vietnam, the average smartphone costs more than 20 percent of GNI per capita.[144] However, even this GNI adjustment can under-represent the affordability challenge if a country is characterized by a large proportion of the population with low incomes.

## Exhibit 12




1 Reflects true prices as paid by the consumer at point-of-sale; includes taxes and subsidies 2 Modeled prices from Euromonitor
SOURCE: Euromonitor, April 2014 (smartphone prices); World Bank, 2013 estimates (GNI p.c., Atlas method)

While the smartphone cost is a barrier to the adoption of more advanced Internet services and apps, many who are not able to afford smartphones still access the Internet via feature phones or shared devices (such as in an Internet café). In many developing nations, a grey market for refurbished or secondhand phones has sprung up and offers a lower-cost alternative to new mobile phones.

In addition to the purchase price of the device, there are ongoing costs associated with ownership, including maintenance, repairs, and charging. In the developing world, 500 million mobile phone users lack access to a reliable electricity source.[145] In Africa, where more than 80 percent of the population lives without grid electricity, the travel distance to charge a phone can be 15 kilometers or more.[146] For this reason, many African consumers pay local entrepreneurs—for example, those with bicycle-powered charging stations—to charge their phone on a pay-per-charge basis. This lack of adjacent infrastructure can raise the cost of charging a device far above the cost of a data plan; consider that a Canadian pays USD 0.03 per month to charge a phone, while a sub-Saharan African pays USD 6 per month, a price equal to half their monthly expense for mobile access.[147]

144 Euromonitor, April 2014: average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
145 Sebastian C. Manchester and Lukas G. Swan, "Off-grid mobile phone charging: An experimental study," *Energy for Sustainable Development,* Elsevier, 2013.
146 "Charging mobile phones in rural Africa," GVEP International, gvepinternationalblog.wordpress.com, September 30, 2011.
147 Sebastian C. Manchester and Lukas G. Swan, "Off-grid mobile phone charging: An experimental study," *Energy for Sustainable Development,* Elsevier, 2013.

## *Cost of service/data plan*

In addition to the cost of the device, the cost of the data plan also has an impact on affordability (Exhibit 13). According to ITU, the average monthly cost of a 500 Mb prepaid mobile data plan ranges from less than USD 5 in India, Pakistan, Sri Lanka, and Vietnam to over USD 150 in the Dominican Republic and São Tomé and Príncipe.[148] As a percentage of GNI per capita, this can range from 0.1 percent in Austria to over 100 percent in Zimbabwe, Niger, Sierra Leone, the Congo, and São Tomé and Príncipe.[149] It's important to note that due to the wide range of plan structures (for example, a la carte device, voice, and data versus bundled; family plans; data caps and allowances), direct comparison of prices between countries is often not like for like.

### Exhibit 13

**Developing countries have some of the lowest absolute prices on mobile data plans**

x% Cost of 500 Mb mobile plan as a % of 2013 GNI per capita

**Average monthly cost of a 500 Mb mobile data plan, 2013[1]**
USD

Developing Developed

| Country | Prepaid | GNI | Postpaid | GNI |
|---|---|---|---|---|
| Ethiopia | n/a | n/a | 9.5 | 24.3% |
| Bangladesh | 10.8 | 14.4% | 8.1 | 10.8% |
| Tanzania | 5.1 | 9.7% | 5.1 | 9.7% |
| Nigeria | 13.0 | 5.7% | 13.0 | 5.7% |
| Colombia | 29.8 | 4.7% | 13.5 | 2.1% |
| Philippines | 11.5 | 4.2% | 11.5 | 4.2% |
| Brazil | 35.8 | 3.7% | 35.8 | 3.7% |
| South Africa | 21.9 | 3.7% | 20.5 | 3.4% |
| Egypt | 8.4 | 3.2% | 8.4 | 3.2% |
| China | 15.5 | 2.8% | 24.1 | 4.4% |
| India | 3.4 | 2.6% | 3.4 | 2.6% |
| Pakistan | 2.9 | 2.5% | n/a | n/a |
| Mexico | 19.0 | 2.3% | 16.0 | 1.9% |
| Indonesia | 5.7 | 1.9% | 5.7 | 1.9% |
| Turkey | 17.3 | 1.9% | 15.8 | 1.7% |
| Spain | 40.4 | 1.7% | 25.2 | 1.0% |
| Russia | 17.0 | 1.5% | 17.0 | 1.5% |
| Vietnam | 2.1 | 1.5% | n/a | n/a |
| Japan | n/a | n/a | 55.3 | 1.4% |
| Sri Lanka | 3.3 | 1.2% | 1.8 | 0.7% |
| Italy | 13.9 | 0.5% | 7.0 | 0.2% |
| South Korea | n/a | n/a | 9.9 | 0.5% |
| Germany | 13.9 | 0.4% | 62.6 | 1.6% |

1 Prices are collected from the operator with the largest market share in the country and for the least expensive plan with a (minimum) data allowance of 500 Mb over (a minimum of) 30 days. Prices include taxes.

SOURCE: ITU, *Measuring the Information Society*, 2013; World Bank, 2013 estimates (GNI p.c., Atlas method)

Consumers can typically choose between two types of mobile subscriptions: prepaid (also known as pay-as-you-go) and postpaid. Prepaid plans allow consumers to pay in advance for a monetary balance from which calls and data are deducted. In some cases, consumers pay in advance for a balance of data. Prepaid plans typically have low recharge denominations; in general, they reduce risk and are optimized for smaller wallets and cash flow. In contrast, postpaid plans enable consumers to pay for a standard amount of data, with additional costs when this limit is exceeded. In many countries, consumers pay the same data rate with either type of plan, though differences do exist.[150]

ITU analysis of mobile Internet and fixed-broadband service plan prices found that in developing countries, fixed-broadband is more expensive on average than all variants of mobile data plans (including both prepaid and postpaid and both handset and computer-based).[151] The same is true in developed countries—with the exception of prepaid, computer-based mobile Internet.[152] As is the case in comparing mobile data plans within and across countries, it's important to note that in discussing mobile Internet and fixed broadband, neither prices nor services are entirely comparable. For example, data caps and allowances, speeds, and subscription type all factor into data plan prices.

148 Prices are collected from the operator with the largest market share in the country and for the least expensive plan with a (minimum) data allowance of 500 Mb over (a minimum of) 30 days. Prices include taxes. *Measuring the information society,* ITU, 2013.
149 Ibid.
150 *Measuring the information society,* ITU, 2013.
151 Ibid.
152 Ibid.

### *Consumer taxes and fees*

Taxes and fees levied on consumers of mobile services are common practice, although they vary in level and nature across markets. These fees include taxes on handset purchases and connection activation as well as ongoing usage—making calls, sending messages, and accessing mobile data.[153] As developing markets attempt to establish their own manufacturing capacity to produce mobile devices, smartphones have become one of the primary targets of import duties and taxes. In Indonesia, for example, the government was contemplating a 20 percent tax on imported smartphones.[154] In the United States, CNN calculated that taxes add as much as 17.2 percent to the total cost of mobile plans; the Universal Service Fund alone accounts for nearly a third of this total.[155] Kenya levies a 10 percent airtime tax on mobile calls—in effect, a regressive tax that some argue provides a disincentive for mobile use.[156]

## Root causes

While suppliers across the globe are able to offer increasingly cheaper goods and services, they face challenges in reducing phone and data plans prices to levels that are affordable to the low-income population in certain markets while at the same time are economically sustainable. As a result, the gap between what consumers can afford and falling price points can remain wide.

### *Challenging national economic environment*

A challenging national economic environment is marked by high unemployment or income inequality and contributes to the low incomes that can undermine the ability of large segments of a country's population to afford Internet service. Some developed nations have been grappling with stubbornly high joblessness for years, leaving large portions of their population without steady income for extended periods of time. For instance, due to a housing bubble and stagnant economy, Spain had an unemployment rate of approximately 24 percent in August 2014, up from 20 percent in 2011.[157] Nations dealing with political unrest, economic instability, and armed conflict also suffer from high unemployment and a lack of growth. More than 13 percent of Egypt's population was without work in August 2014.[158] A lack of proper training and education—one of the factors in Nigeria's unemployment rate of nearly 24 percent that same month—can also leave large segments of the population without the means to fill available positions.[159]

The second factor that creates a challenging national economic environment—income inequality—can be a direct result of high unemployment and is often exacerbated by underdeveloped institutions, a dearth of resources, tax policy, and corruption. For the purposes of this report, we measure income inequality based on a country's Gini coefficient. A Gini coefficient of zero expresses perfect equality, where all values are the same (for example, where everyone has the same income). A Gini coefficient of one (or 100 percent) expresses maximal inequality among values (for example, where only one person has all the income). When a country suffers from a high level of income inequality, a large segment of its residents can find themselves without the disposable income to allocate to discretionary items such as the Internet.

### *High device manufacturer costs and associated business model constraints*

Handset and device manufacturers face a range of challenges that can substantially increase the cost of mobile devices. For example, IP licensing and royalties can account for a significant portion of the total price of a smartphone; one study estimated potential patenting fees at USD 120 for a USD 400 smartphone—almost as much as the cost of the device's components.[160]

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153 *Mobile taxes and fees: A toolkit of principles and evidence,* Deloitte and GSMA, 2014.
154 "Indonesia considers 20 percent tax on imported smartphones," TeleGeography, telegeography.com, April 7, 2014.
155 David Goldman, "The hidden 17 percent tax: Your cell phone bill," *CNNMoney,* money.cnn.com, July 7, 2013.
156 *Mobile telephony and taxes in Kenya,* Deloitte and GSMA, 2011.
157 "Unemployment rates by country," tradingeconomics.com, accessed 2014.
158 Ibid.
159 Ibid.
160 Ann Armstrong, Joseph J. Mueller, and Timothy D. Syrett, *The smartphone royalty stack: Surveying royalty demands for the components within modern smartphones,* Wilmer Hale, working paper, 2014.

Another factor in this equation is the impact of grey markets, whose lower-cost, secondhand phones can cut into the profits of incumbent device manufacturers. Bernstein Research predicts that the grey market will increase to approximately 257 million mobile phones by 2017, reducing total revenues to manufacturers from smartphones by as much as a quarter.[161] To gain a slice of the secondhand market, some device manufacturers and network operators have started to offer incentives for phone trade-ins.[162]

### *High network operator costs and associated business model constraints*

Given the significant costs associated with building out Internet infrastructure, network operators need a strong business case to justify the investment. Particularly high capital expenditures often plague rural networks in developing countries; thanks to some nations' low population density over a large area, an increased number of base stations are required for mobile coverage and more extensive backhaul networks for fixed-line access. In addition, site build costs can be high due to poor basic infrastructure such as the transportation systems (for example, roads and railway) for materials and construction.

Even after building the network, operators can face significant operating expenditures. For example, networks in rural, developing regions have to contend with the high cost of power (for example, diesel) in off-grid locations, difficult logistics for maintenance, and high security costs to guard against the theft common in several countries (for example, Nigeria).[163]

The business case for extending network coverage via the construction and operation of new base stations or cell sites is based on expected incremental revenue from local subscribers within the cell radius, set against the upfront and ongoing costs of running the site. Expected revenue is a function of the cell area, population density, expected average revenue per user (ARPU), and expected adoption rate by the local population. Rural regions in the developing world have both low population density and low expected ARPU, in addition to generally lower incomes which result in lower expected adoption rates; coupled with the higher cost of construction and access to these rural areas, the cost of extending backhaul to rural regions has been a particularly difficult hurdle for operators to overcome.[164]

For mobile network operators that have already rolled out mobile data services, the increase in data traffic by smartphone users poses a real challenge. As mobile service consumption has shifted from voice and SMS to data-intensive online activities such as streaming video and music, growth in the ARPU is not keeping pace with required investments to maintain service quality. In 2010, data consumed 54 percent of worldwide network resources but generated just 35 percent of revenues.[165] On the individual level, a smartphone customer who uses 600 Mb per month produces twice the revenue compared with the average SMS user—but he or she puts 6,000 times more load on the network.[166] Increasing smartphone penetration will further strain existing infrastructure and require additional investment.

### *High provider taxes and fees*

Device manufacturers and network operators are subject to a range of licensing fees, revenue charges, corporate taxes, and so forth. Manufacturers and operators may opt to absorb these taxes, pass them on to consumers in the form of higher prices, or pursue a mix of these two approaches.[167]

161 Tiernan Ray, "Smartphones: Resale market to clip growth, says Bernstein," *Barrons,* August 7, 2013.
162 Connie Guglielmo, "Used smartphone market 'poised to explode,' Apple iPhone holding up better than Samsung Galaxy," Forbes.com, August 7, 2013.
163 "Nigeria arrests 12 including two Britons for oil theft," *Reuters,* March 28, 2014.
164 A high ARPU represents a dynamic market in which individual consumers are engaged in a high volume of online activity.
165 *The declining profitability trend of mobile data: What can be done?*, Alcatel-Lucent, 2011.
166 *The declining profitability trend of mobile data: What can be done?*, Alcatel-Lucent, 2011.
167 *Mobile taxes and fees: A toolkit of principals and evidence,* Deloitte and GSMA, 2014.

In a recent study, GSMA examined the total tax burden on the mobile sector (measured as the total taxes levied as a percentage of industry revenue) across several countries. GSMA estimated that this tax burden ranges from approximately 12 percent of industry revenue in Mexico to nearly 60 percent in Turkey.[168] More than half of the countries surveyed had a mobile services tax burden at, or above, 30 percent.[169] In many countries, the average ratio of tax payments to mobile operator revenues is significant—for example in Tanzania (40 percent), Madagascar (45 percent), and Zambia (53 percent).[170]

Several studies suggest a strong link between government tax policy and investment in mobile Internet infrastructure. One study by GSMA concluded that if governments were to reduce the tax burden on mobile Internet by one percent, they would see an estimated 1.8 percentage point increase in Internet penetration and up to a 0.7 percentage point increase in GDP over five years.[171] Another review of more than 400 studies suggests that in the mobile sector, a 1 percent increase in taxation of capital results in a four percent decrease in foreign direct investment (FDI).[172]

### *Unfavorable market structure*

As in other industries, telecommunications markets dominated by one network operator or composed of relatively few smaller operators can result in higher prices for consumers. Given the level of investment needed to build out Internet infrastructure, incumbent operators can possess a big advantage. However, they also shoulder the entire burden of capital investments, and these costs can be passed on to consumers in the form of higher prices. A number of developing nations have state-run operators, and others have relatively low levels of competition.

### *User capability*

The user capability gap evident in much of the offline population is twofold: a lack of familiarity with or ability to use digital technologies (for example, use a device or navigate a website) and a basic inability to read and write in any language. These limitations aren't just an indication of an inadequate education system; they're also a reminder that, as indicated in the discussion above on incentives, billions of people have yet to be sufficiently exposed to digital technologies.

## Consumer barriers

The emergence of the Internet as the common currency of business, government, entertainment, and social engagement has served to magnify the digital divide that exists within many countries. Individuals that lack familiarity with digital technology and basic literacy will continue to grapple with formidable challenges in joining the online population.


### *Lack of digital literacy*

Despite the widespread availability of Internet-enabled devices, large segments of the global population have little exposure to these technologies. Digital literacy—the ability to effectively and critically navigate, evaluate, and create information using a range of digital devices and technologies—is a critical enabler of Internet adoption, and it's a proficiency that many individuals lack. Numerous studies point to the lack of digital literacy as an impediment to more individuals going online: McKinsey research found that the most-cited reason for why Africans don't access the Internet is that they haven't developed the skills to do so.[173] A 2014 survey of and report on Chinese consumers by the China Internet Network Information Center (CNNIC) found that approximately 60 percent of the offline population cited a lack of knowledge of how to

168 *Mobile taxes and fees: A toolkit of principals and evidence,* Deloitte and GSMA, 2014.
169 Ibid.
170 *The role of ITC in advancing growth in least developed countries,* ITU, 2011.
171 *The impact of taxation on the development of the mobile broadband sector,* GSMA, 2012.
172 Ruud A. De Mooij and Sjef Ederveen, *Explaining the variation in empirical estimates of tax elasticities of foreign direct investment,* Tinbergen Institute, discussion paper, 2005.
173 *iConsumers: Life online,* McKinsey & Company, January 2013.

use a computer as the primary reason for not accessing the Internet.[174] A similar study in India found that 33 percent of those surveyed lacked the ability to operate a computer.[175]

The good news is that the ease of use of Internet-enabled devices is increasing. Today's relatively user-friendly, often touch-enabled devices are more accessible and easier to operate than an early-generation PC, which required the user to boot up, connect using a dial-up modem, and access early, text-based Internet services. While many individuals in developing countries are currently accessing the Internet through feature phones, the pricing trends in smartphones mean that more intuitive devices will be increasingly accessible. Other aspects of digital literacy (for example, critically navigating, evaluating, and creating information) still require instruction, familiarity, and exposure—but there are many examples of very young children, working-age adults with limited digital experience (for example, developing world rural inhabitants with mobile phones), and the elderly rapidly adopting Internet technologies when they are affordable and have a well-designed user interface.

### *Lack of language literacy*

Nearly 30 percent of the offline individuals in the countries we examined—920 million of 3.2 billion—are illiterate.[176] Despite gains over the past several decades, literacy levels in many developing markets remain stubbornly low. In India, for example, World Bank data suggests that approximately 470 million people (37 percent of the population) cannot read or write.[177] Ethiopia, where 61 percent of the population is reported to be illiterate, has the lowest adult literacy rate of the countries included in this report.[178] Absent technological solutions such as user interfaces that use text-to-speech and voice recognition to facilitate navigation, individuals who haven't attained a basic level of language proficiency are challenged to engage in a meaningful way with Internet content.

## Root causes

Accessing information online requires not only a basic level of language proficiency but also familiarity with technology and an understanding of Internet-specific skills such as using search engines and navigating websites. While in many cases, formal education won't replace the benefit of increased exposure to technology and the Web, an effective school system can serve a dual purpose of promoting both written language skills and digital literacy.

### *Under-resourced educational system*

One of the primary remedies for a lack of language and digital literacy is a strong education system, either formal or informal, and sufficient resources to provide a supportive learning environment. Developed countries and leading developing nations with highly literate populations have well-established education systems, even in rural areas. China and the Philippines, for example, have literacy rates of 95 percent, just a few percentage points below the United States, Germany, and Italy. Other developing countries face a steeper climb due to a history of poorly financed education systems. Rural children in particular may face hardship in attending school, as they often must travel long distances to attend classes—assuming their parents have the means to pay for their schooling at all.

These obstacles can be mitigated by developing a more robust network of schools that extend into rural areas and lower the barriers for enrollment. Increased funding is an important factor. In sub-Saharan Africa, funding for education is often crowded out by other priorities. Over the past two decades, however, these countries have increased their funding for education from 3.2 percent of GDP in 1990 to 4.7 percent in 2010.[179] As computers, mobile devices, and the Internet become important learning tools, schools can become an entry point for students of all ages to become more familiar with technology.

174 *Statistical report on Internet development in China,* China Internet Network Information Center (CNNIC), January 2014.
175 *Internet in India 2013,* IAMAI and IMRB International, June 2013.
176 Figure calculated based on 2013 data from World Bank.
177 The most recent data available from World Bank on India's adult literacy rate was from 2006.
178 The most recent data available from World Bank on Ethiopia's adult literacy rate was from 2007.
179 "Public spending on education," Tradingeconomics.com, accessed 2014.

## *Infrastructure*

Several factors, from obstructive government policies to the need for substantial investments to extend networks, can be obstacles to building out the infrastructure critical to providing access for large portions of the offline population.

### Consumer barriers

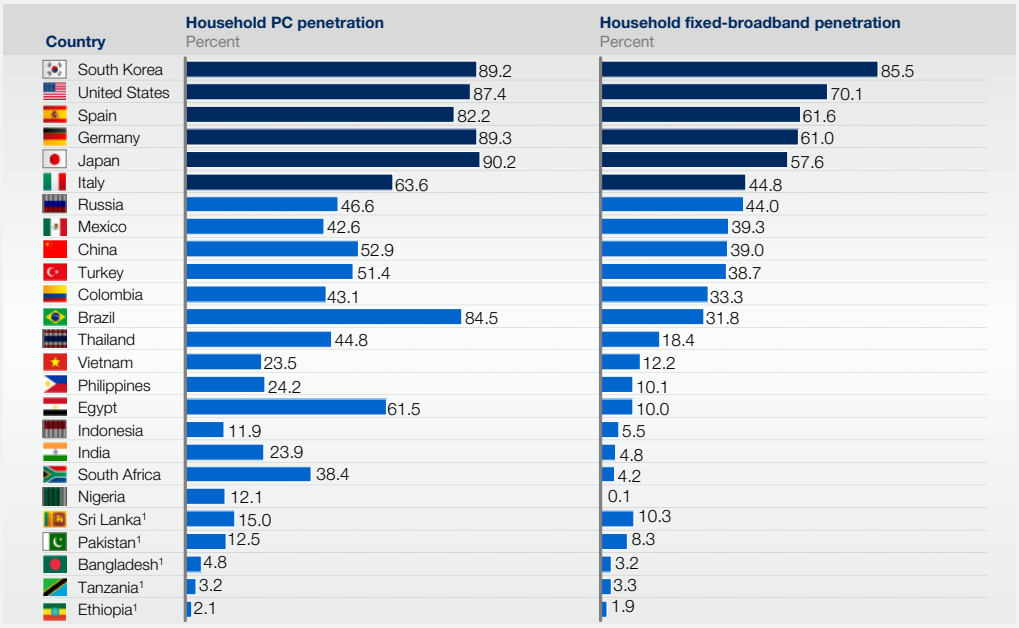
In many parts of the world, consumers live in areas without access to telecommunications infrastructure, including both fixed-line broadband and mobile network coverage. Others lack the basic or adjacent infrastructure—such as electricity or access roads—that are vital enablers of Internet penetration.

### *Lack of coverage or network access*

The maturity of a country's infrastructure as well as its demographics and geography all influence the degree of Internet coverage. In the past two decades, network operators around the world have made tremendous investments to build out Internet infrastructure and extend network access. Fixed-line broadband was the primary driver of Internet penetration in developed countries, but it has proved cost-prohibitive to build out in many developing markets (Exhibit 14). Even developed nations' rural areas face this challenge; for example, as of 2012, approximately 14.5 million people living in rural areas of the United States lacked access to fixed-broadband service.[180]

**Exhibit 14**

**Fixed-broadband penetration is significantly higher in developed countries**




1 Households with internet access, may not be broadband
SOURCE: Pyramid Research, September 2013; WEF Global information technology report 2014

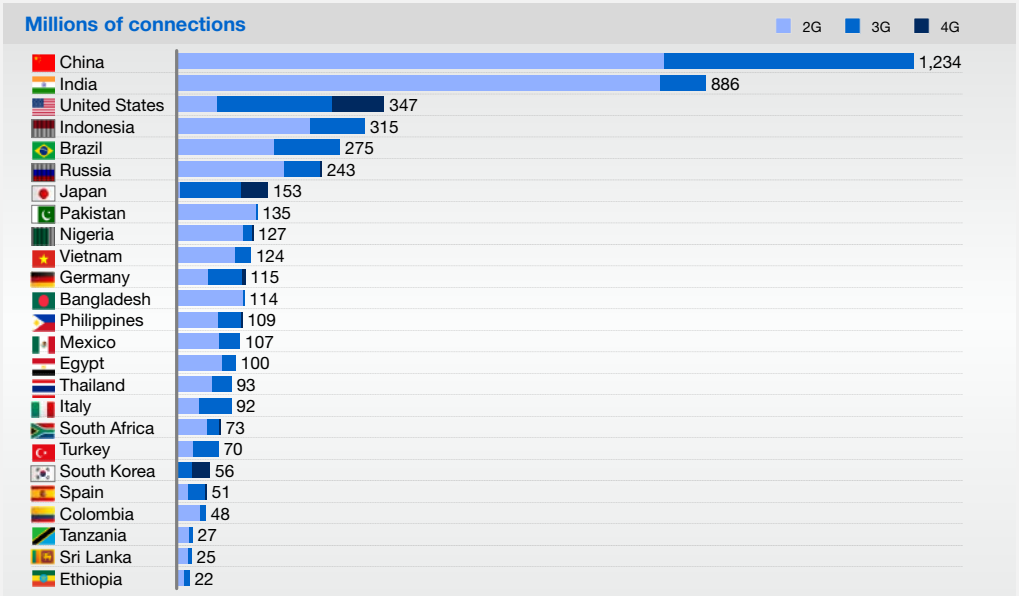
180 *Eighth broadband progress report,* U.S. Federal Communications Commission (FCC), August 2012.

Extending fixed-line broadband to community centers in villages and towns is one way for governments to provide shared access for the local population while limiting the expense of extending fixed lines to every residence. Colombia, for example, is in the process of extending broadband access to every village and city in the country over the next several years.[181] However, even providing fixed-line connectivity to a single point within each village and city requires substantial investment in infrastructure and is cost-prohibitive to build out in many developing markets.

In nations with less mature fixed-line Internet infrastructure, consumers access the Internet primarily through connections over mobile and, in some cases, satellite networks. To use mobile Internet, individuals must live in a region with at least 2.5G (GPRS) coverage. Ericsson estimates that over 85 percent of the world's population is covered by a 2G signal.[182] However, it is difficult to distinguish between 2G and 2.5G coverage as it is currently reported, so it is not clear how much of the 2G coverage is actually data-enabled (Exhibit 15). Ericsson estimates that only 60 percent of the world's population is covered by a 3G signal.[183] By these estimates, between 1.1 billion and 2.8 billion individuals worldwide cannot get online via the mobile network because they do not live within sufficient mobile network coverage. Some developed nations boast 3G coverage of more than 85 percent of their population, but most developing countries—where 3G network coverage is in relative infancy—have 3G coverage rates of less than 20 percent.[184]

## Exhibit 15

**Almost 70% of the mobile connections in India and China are on 2G networks, with potentially limited mobile Internet capabilities**




SOURCE: GSMA, Q4 2013

Populations that do not live within the coverage area of a 2.5G or 3/4G network can only connect to the mobile Internet via satellite. In sub-Saharan Africa, approximately 36 percent of the population lives more than 50 kilometers from a node on a fiber network, making satellite connectivity a key enabler of Internet access.[185] Satellites provide backhaul to mobile operators' cell sites where no good backhaul alternative like fiber or microwave exists. The company O3b, for instance, is pursuing an ambitious effort to use satellites for just this purpose, with the goal of providing service starting in 2014.[186]

181 Brian Fung, "What Washington can learn from Colombia's genius plan to lift millions out of poverty," *Washington Post,* March 12, 2014.
182 Ericsson mobility report: On the pulse of the networked society, Ericsson, June 2014.
183 Ericsson mobility report: On the pulse of the networked society, Ericsson, June 2014.
184 GSMA Intelligence, 2012 estimates.
185 *Lifting barriers to Internet development in Africa: Suggestions for improving connectivity,* Analysys Mason, report for the Internet Society, May 2013.
186 Jonathan Amos, "Lift-off for O3b satellite network," BBC.com, June 25, 2013.

Even with an Internet-enabled connection, the speed and quality of access can prove to be another obstacle to individuals going online. In many developing countries, the average speed of access is relatively low even for fixed-line connections, producing a poor user experience. Regarding mobile access, data transmission speed is the distinguishing factor between 2.5G, 2.75G, 3G, and 4G networks. 2.5G networks (also known as GPRS) allow subscribers to seamlessly consume data services whenever they need them at speeds ranging from 35 Kbps to 145 Kbps.[187] 2.75G networks (also known as EDGE) offer an incremental improvement in speed, ranging from 120 Kbps to 384 Kbps, suitable for simple Web browsing.[188] 3G networks deliver speeds of up to 2 Mbps, suitable for most modern Internet services, mobile applications, and multimedia consumption.[189] 4G networks (also known as LTE) offer even higher speeds, ranging from 3 Mbps to 10 Mbps on average.[190]

The quality of access also depends on factors other than speed; common occurrences in developing countries include network crowding and dropped connections from operators unable to handle peak demand. In India, this phenomenon is so ubiquitous that it has been used as a distinguishing feature in some operator commercials.[191]

### *Lack of adjacent infrastructure (such as grid electricity and paved roads)*

Even when investments in mobile networks extend coverage to previously unserved areas, consumers often must navigate a host of other logistical challenges to get online. In rural areas, adjacent infrastructure such as electricity grids and roads can lag behind Internet infrastructure, leaving residents without the ancillary support and resources that enable Internet usage. Lack of electricity and logistics infrastructure in developing regions, especially rural areas, is also a barrier to the cost-effective construction and operation of terrestrial and mobile networks.

Electricity is an obvious prerequisite for Internet penetration. Just 24 percent of the population of sub-Saharan Africa has access to electricity.[192] In fact, the entire installed generation capacity for sub-Saharan Africa (excluding South Africa) is only 28 gigawatts (GW), equivalent to that of Argentina, whose population is less than one-twentieth the size.[193] In Southeast Asia, approximately 134 million people—more than one-fifth of the region's population—lack access to electricity; electric access levels are below 75 percent in Cambodia, Myanmar, the Philippines, and Indonesia.[194]

The World Bank identified three key issues in electricity penetration in these areas.[195] First, the electric grid simply doesn't reach all consumers. In India, only 55 percent of rural households had access to electricity as of 2011.[196] A survey by the Indian government revealed that the percentage of rural households depending on firewood remained at 76 percent in 2009–2010—a drop of only 2 percentage points since 1993–1994.[197] In Africa, where more than 80 percent of Africans live without grid electricity, the challenge is even greater.[198] Even where there is electricity, capacity is often very low. The generation capacity of Nigeria, a nation of 150 million people, is 4,000 megawatts (MW); by comparison, New York City, with a population of 8 million people, has a generating capacity of 13,000 MW.[199]

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187 Chris Ziegler, "2G, 3G, 4G, and everything in between: An Engadget wireless primer," *Engadget,* January 17, 2011.
188 Ibid.
189 Chris Ziegler, "2G, 3G, 4G, and everything in between: An Engadget wireless primer," *Engadget,* January 17, 2011.
190 Ibid.
191 "Marketing a missed call," *Economist,* August 17, 2014.
192 "Fact sheet: The World Bank and energy in Africa," World Bank, accessed 2014.
193 Ibid.
194 *Southeast Asia energy outlook,* International Energy Agency (IEA), September 2013.
195 "Fact sheet: The World Bank and energy in Africa," World Bank, accessed 2014.
196 India Census 2011, Government of India.
197 *India energy statistics,* Government of India, Ministry of Statistics and Programme Implementation, 2013.
198 "Charging mobile phones in rural Africa," GVEP International, gvepinternationalblog.wordpress.com, September 30, 2011.
199 EcoPower Africa, ecopowerafrica.com, accessed 2014.

Second, in many countries, the electricity supply is characterized by blackouts, brownouts, and power surges. For instance, the World Bank reports that African manufacturing enterprises experience an average 56 days of power outages per year.[200] This poor reliability can translate to lower economic productivity in the form of lost output and wages, spoiled inventory, delayed production, inconvenience, and damage to the electric grid.

Lastly, the price of electricity can vary markedly among countries depending on generation capacity and regulatory policies. For example, according to Statista, in 2013, consumers in South Africa paid USD 0.09 per kilowatt hour (kWh) compared with more than USD 0.20 per kWh in Italy.[201] Power tariffs can also add significantly to the overall cost of electricity. While in most parts of the developing world power tariffs range from USD 0.04 to USD 0.08 per kWh, the average tariff in sub-Saharan Africa is USD 0.13 per kWh.[202] Many households and businesses in these regions use diesel generators, which at USD 0.30 per kWh or more is an even more expensive form of electricity.[203]

Beyond electricity, in rural areas and regions with difficult terrain, infrastructure that supports daily living and commerce—paved roads, bridges that can accommodate trucks and transportation vehicles, clean drinking water—can be sorely absent. In addition to the challenges that such conditions present for residents, the lack of logistics infrastructure is an impediment to the construction and maintenance of Internet infrastructure. Countries such as Colombia, the Philippines, and Tanzania all struggle to provide rural areas with the foundational elements that could help increase the viability of telecom investments.

## Root causes

Many factors can contribute to an underdeveloped Internet infrastructure. Maintaining a robust Internet infrastructure, including sufficient access to international bandwidth and a healthy national core network, backhaul, and access infrastructure (Exhibit 16), requires close collaboration between the private and public sectors. Government plays an important role; a supportive and predictable regulatory landscape helps attract investments in network infrastructure. In addition, governments may need to address some of the underlying factors that can create an unwelcoming environment for industry and limit the expansion

### Exhibit 16

**Data must travel through several networks to reach an end customer**

| | Internet | International Internet backbone | National core network / backbone | Backhaul | Last mile, cellular network, or wireless ISP |
|---|---|---|---|---|---|
| **Description** | | ▪ Connects international Internet exchanges to an exchange within a country | ▪ Connects the in-country exchanges to the network operators' Internet gateways and major parts (e.g., exchanges, service platforms, data centers) of operators' networks to each other | ▪ *Fixed-line:* connects the network operators' Internet gateways to their base stations or local exchanges<br>▪ *Mobile:* connects the mobile network operators' core networks to their cellular base stations | ▪ *Fixed-line / nomadic:* connects the network operators' base stations or local exchanges to the end customer device<br>▪ *Mobile:* connects the mobile network operators' base stations to end customer cellular devices |
| **Typical transmission technologies** | | ▪ Undersea cabling<br>▪ Satellite<br>▪ Terrestrial cabling (e.g., fiber, copper) | ▪ Terrestrial cabling (e.g., fiber, copper) | ▪ Terrestrial cabling (e.g., fiber, copper)<br>▪ Microwave<br>▪ VSAT (satellite) | ▪ Wireless (e.g., GPRS, 3G, LTE / WiMAX, Wi-Fi)<br>▪ VSAT (satellite)<br>▪ Terrestrial cabling (e.g., fiber, copper) |

200 "Fact sheet: The World Bank and energy in Africa," World Bank, accessed 2014.
201 "Electricity prices in selected countries," Statista.com, accessed 2014.
202 "Fact sheet: The World Bank and energy in Africa," World Bank, accessed 2014.
203 EcoPower Africa, ecopowerafrica.com, accessed 2014.

of Internet infrastructure. Such factors include limited spectrum availability, a national information and communications technology (ICT) strategy that does not effectively address the issue of broadband access, and under-resourced infrastructure investment (for example, due to limits on FDI).

### *Limited access to international bandwidth*

With the exception of China, the majority of Internet content and services consumed in developing nations originates from outside a country's borders. International bandwidth is required to connect in-country exchanges to internationally located servers, typically via submarine cables, terrestrial fiber, or satellite. While developed countries usually benefit from established access to international bandwidth, many developing nations, particularly landlocked nations, lack sufficient access.

As of 2012, most coastal countries and regions in the world were connected to submarine fiber cable networks.[204] Coastal countries have an advantage, as direct access to submarine fiber can keep prices down. However, countries with only one submarine cable, such as Algeria and Libya, may not benefit from competition on those cables.[205] Meanwhile, landlocked countries must connect to cables in neighboring countries through terrestrial fiber and by developing a virtual cable landing station at their border. There are 16 landlocked countries in Africa, including Chad, Zambia, Ethiopia, and Uganda, which have no direct access to submarine cables.[206] To get access to these cables, these countries may face several challenges, including uncooperative neighbors and higher prices.

Wireless networks such as satellite and microwave can also provide international connectivity, but at a higher cost and with added latency and limited capacity. In some parts of Africa, access to satellite connectivity can be as expensive as USD 6,000 per Mbps per month, equivalent to 60 times the price of a submarine fiber connection and 2,400 times the price of using the link between New York and São Paulo.[207]

Ultimately, limited access to international bandwidth manifests as reduced coverage from network operators. The high costs operators must pay to gain access to the bandwidth drastically alter the economics of their network and make it cost prohibitive to extend coverage to areas with lower population density or affluence.

### *Underdeveloped national core network, backhaul, and access infrastructure*

While investment in additional capacity and cable landing sites can improve international Internet accessibility, countries must also have a robust core network, backhaul, and access infrastructure to enable their citizens to access the Internet. Fiber is the predominant technology of core networks because of its capacity; a single fiber pair can connect up to 32 million broadband customers to the global network.[208] This can be costly to build out because network operators not only invest in the materials to complete the project, but also in civil works such as digging and burying the ducts to carry the terrestrial cabling. Additional complexities such as the need for permits to access the rights-of-way for each municipality passed add cost, time, and uncertainty to the investment.

Once the core network is constructed, traffic then needs to be carried from local exchanges or mobile base stations to central switching locations through terrestrial cabling, microwave, or satellite. Building out this backhaul infrastructure can be even more expensive than building out the national core network given that the lines must travel through densely populated areas with existing infrastructure such as power lines, roads, sewage, and buildings.

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204 "Submarine cable map," TeleGeography, submarinecablemap.com, accessed 2014.
205 *Lifting barriers to Internet development in Africa: Suggestions for improving connectivity,* Analysys Mason, report for the Internet Society, May 2013.
206 *Lifting barriers to Internet development in Africa: Suggestions for improving connectivity,* Analysys Mason, report for the Internet Society, May 2013.
207 *International cables, gateways, backhaul, and international exchange points,* Organisation for Economic Co-operation and Development (OECD), 2014.
208 Ibid.

Finally, operators provide the final link from the network to the end user. This "last-mile" step carries associated costs such as base station installations and ongoing maintenance costs, which represent the most expensive component of the network due to significant capital expenditures and fewer potential users against which to allocate the expense.

### *Limited spectrum availability*

Spectrum refers to the radio frequencies allocated to the mobile industry and other sectors for communication over airwaves. It is a prerequisite for wireless coverage and directly affects the speed, capacity, and reach of mobile Internet services.

Spectrum is divided into licensed and unlicensed spectrum. Licensed operators can secure exclusive rights to use part of the band over an assigned, designated geographic area, which limits interference and prohibits other area operators from transmitting over the same frequency.[209] Licensed spectrum is divided into frequency bands reserved for a single use or a range of compatible uses, which governments manage and license to different users, including mobile network operators, television broadcasters, and military. Meanwhile, while they don't offer exclusive use of the band, connections over unlicensed spectrum can be attractive because they enable operators to avoid the delay and expense of obtaining a license and they aren't restricted to a specific geographic area. Since equipment such as radios and antennae for unlicensed spectrum are typically less expensive to purchase and install, businesses or users can access unlicensed spectrum without a huge capital investment.[210] Wi-Fi is the most common use of unlicensed spectrum for Internet access. In places with Wi-Fi access points, consumers can use dual-band mobile devices to optimize their access to high-quality and high-speed data networks. For example, in the United Kingdom, Nielsen reported that Wi-Fi delivered over three-quarters of smartphone data in 2012.[211]

Some network operators, particularly in developed countries, have started to use Wi-Fi hotspots to offload traffic from their mobile networks. For example, Free, a mobile network operator in France, has made mobile network offloading to Wi-Fi a key part of its strategy in being the lowest-cost mobile data service.[212] As their mobile markets expand and network capacity becomes strained, some developing markets are also taking advantage of offloading mobile data to Wi-Fi. China Mobile has used this strategy to reduce congestion on its exploding mobile network.[213] In 2012, Wi-Fi handled almost two-thirds of the network's total wireless data traffic, and China Mobile had over 3.8 million Wi-Fi access points in place at the end of the year.[214] In Thailand, private and state-owned operators are collaborating on installing a combined 400,000 Wi-Fi hotspots by 2015.[215] Operators in several other countries are also making major investments in Wi-Fi, including Bharti Airtel across all of its 17 African markets (starting in Niger), Ooredoo's Indosat in Indonesia, TIM in Brazil, and Axiata in Malaysia.[216]

Wi-Fi is constrained, however, by the availability of fixed-line broadband infrastructure. In many emerging markets, especially Africa and Southeast Asia, fixed-line broadband infrastructure is extremely limited. Mobile is widely recognized as the primary method for connecting individuals in these markets.

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209 *Licensed versus unlicensed spectrum,* Motorola, 2007.
210 Ibid.
211 "Wi-Fi delivers over three-quarters of all U.K. smartphone data," Nielsen, nielsen.com, November 15, 2012.
212 Kevin Fitchard, "France's Wi-Fi gates swing open: Free mobile activates 4 million hotspots," Gigaom.com, April 19, 2012.
213 "Analysis: China Mobile leading the way as emerging market operators embrace Wi-Fi," GSMA Intelligence, March 2013.
214 Ibid.
215 Ibid.
216 Ibid.

GSMA maintains that if network operators do not receive access to sufficient high-quality spectrum to cope with the increased demand for Internet access, the result will be slower, more expensive mobile connections and limited network coverage.[217] A transparent, predictable, and rational approach to spectrum allocation is thus a critical element in motivating network operators to make strategic long-term investments—the kind that will result in bringing more individuals online. Regional spectrum harmonization is also important; it can drive economies of scale by reducing the number of different frequencies that mobile devices need to work around the region, which reduces handset costs. It also helps eliminate interference across borders and facilitates roaming within the region.

### *A national ICT strategy that doesn't effectively address the issue of broadband access*

As illustrated by the choices governments need to make on spectrum allocation, the development of a robust Internet ecosystem also requires long-term planning and a clear strategy for addressing obstacles to investment and the formation of public-private partnerships. In a 2012 survey by ITU, more than a quarter of responding countries did not have a national broadband plan; the majority of these countries were in Africa or Latin America.[218] The same survey found that 18 percent of the world's countries did not have a separate telecom or ICT regulator.[219] ITU asserts that the absence of an independent and effective regulator can hamper efforts to ensure universal access and resource management, including spectrum and interoperability provisions.[220]

### *Under-resourced infrastructure development*

In rural areas, construction costs such as power supplies and access roads constitute a significant percentage of the total site build costs for network operators. The security of build sites is also an important concern. Furthermore, an e-commerce ecosystem depends on roads, bridges, and other infrastructure to support logistics and distribution. When it comes to both logistics and electricity, the responsibility for constructing the needed infrastructure is typically under the domain of the government instead of network operators.[221]

FDI can help mitigate some of the barriers to the construction of adjacent infrastructure. However, despite worldwide trends toward liberalization, some governments still restrict inward FDI, particularly in Asia and the Middle East.[222] Concerns usually focus on the risks in allowing multinational corporations a controlling stake in domestic affairs. These concerns have become even more acute in light of recent disclosures about government agencies spying via telecommunications infrastructure. Relaxing restrictions on FDI could help stimulate ICT growth; multinational corporations would be free to invest, and local entrepreneurs could better access the venture capital needed to start businesses.

Other restrictions can also hamper the build-out of a robust Internet infrastructure; for example, the construction of cell towers can be limited by land restrictions and health concerns.

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217 *Barriers to mobile Internet adoption and usage,* GSMA, April 2014.
218 ICT-Eye database, ITU, www.itu.int/net4/itu-d/icteye, accessed 2014.
219 Ibid.
220 *The Role of ICT in advancing growth in least developed countries,* ITU, 2011.
221 *Barriers to mobile Internet adoption and usage,* GSMA, April 2014.
222 *Measuring restrictions on inward FDI in the service sector for developing countries and transition economies,* United Nations Conference on Trade and Development (UNCTAD), 2006.

# 5. A country-level view of barriers

A country-level lens on the aforementioned barriers is valuable for several reasons: stakeholders such as network operators develop strategy on a country basis, in part because of the variation in challenges and opportunities across borders; national governments play a vital role in implementing policies and would need to collaborate closely with industry and nonprofits to address the barriers identified in this report; and because some barriers are country-specific, their resolution will likely require a custom approach.

## *Internet Barriers Index*

The Internet Barriers Index (Exhibit 17) offers an empirical country ranking along and across all four categories of barriers to Internet adoption: incentives, low incomes and affordability, user capability, and infrastructure (see the Appendix for further detail). It compares the performance of 25 countries, including developed and developing nations, on key metrics associated with the four categories of barriers. Countries with a high aggregate score have relatively low barriers to Internet adoption; conversely, nations that have a low aggregate score or perform poorly on an individual pillar face more acute challenges in expanding their online population. By monitoring progress against these barriers at a country level over time, the index can help determine whether investments or policies have had an impact in reducing particular barriers.

**Exhibit 17**

**Internet Barriers Index**

**Maximum score of 100**

*Low score indicates high barriers, high score indicates low barriers*

Top quartile | Second quartile | Third quartile | Bottom quartile

| Country | Incentives | Low incomes and affordability | User capability | Infrastructure | Internet Barriers Index score |
|---|---|---|---|---|---|
| United States | 100 | 93 | 99 | 85 | 94 |
| Germany | 72 | 100 | 99 | 100 | 93 |
| South Korea | 91 | 89 | 97 | 94 | 93 |
| Japan | 79 | 88 | 99 | 92 | 90 |
| Spain | 66 | 91 | 97 | 80 | 84 |
| Italy | 40 | 88 | 99 | 87 | 78 |
| Russia | 30 | 84 | 100 | 61 | 69 |
| Turkey | 40 | 67 | 91 | 57 | 64 |
| Thailand | 37 | 79 | 90 | 48 | 63 |
| Mexico | 49 | 67 | 90 | 41 | 62 |
| China | 28 | 81 | 92 | 43 | 61 |
| Sri Lanka | 38 | 74 | 86 | 45 | 61 |
| Brazil | 42 | 64 | 85 | 53 | 61 |
| South Africa | 38 | 62 | 89 | 49 | 59 |
| Colombia | 46 | 60 | 90 | 39 | 59 |
| Philippines | 35 | 65 | 93 | 35 | 57 |
| Indonesia | 29 | 79 | 89 | 30 | 57 |
| Vietnam | 29 | 69 | 90 | 34 | 55 |
| Egypt | 38 | 79 | 57 | 35 | 52 |
| India | 38 | 65 | 39 | 19 | 40 |
| Nigeria | 33 | 49 | 37 | 5 | 31 |
| Pakistan | 21 | 63 | 29 | 10 | 30 |
| Bangladesh | 29 | 45 | 31 | 5 | 28 |
| Tanzania | 13 | 27 | 47 | 0 | 22 |
| Ethiopia | 0 | 0 | 0 | 5 | 1 |

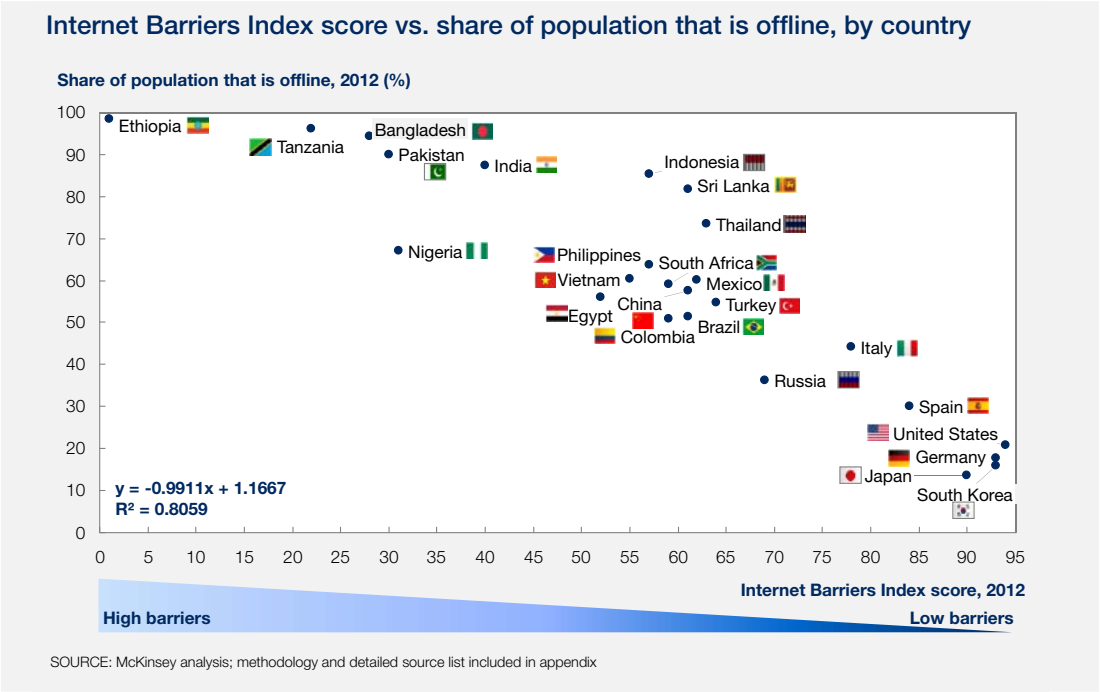
Low barriers

High barriers

The final index score for each country was calculated as an equally weighted average of the barriers' scores in all four categories for that country. Principal components analysis revealed that a single component with coefficients of 0.48 for incentives, 0.51 for low incomes and affordability, 0.49 for user capability, and 0.52 for infrastructure was able to explain approximately 82 percent of the variation in the data. Further, all factors correlate strongly and separately with Internet penetration. In addition, we found a systematically positive and, in many cases large, correlation between barriers categories. This implies that the factors are not totally independent, and that countries with low Internet penetration tend to have multi-dimensional bottlenecks when it comes to increasing their Internet adoption. It also means that addressing these barriers and boosting Internet penetration will require coordination across Internet ecosystem participants. The aggregate and individual barrier scores were segmented by quartile to help identify high- and low-performing countries and reveal trends within groupings.

Our analysis found a high correlation between a country's Internet penetration and its aggregate score on the Internet Barriers Index (Exhibit 18). The highest-performing countries all have well-developed infrastructure, indicating a mature market and extensive network coverage. They also have elevated Internet penetration rates. Countries on the lower end of the Index face several key barriers and have lower Internet penetration.

## Exhibit 18




SOURCE: McKinsey analysis; methodology and detailed source list included in appendix

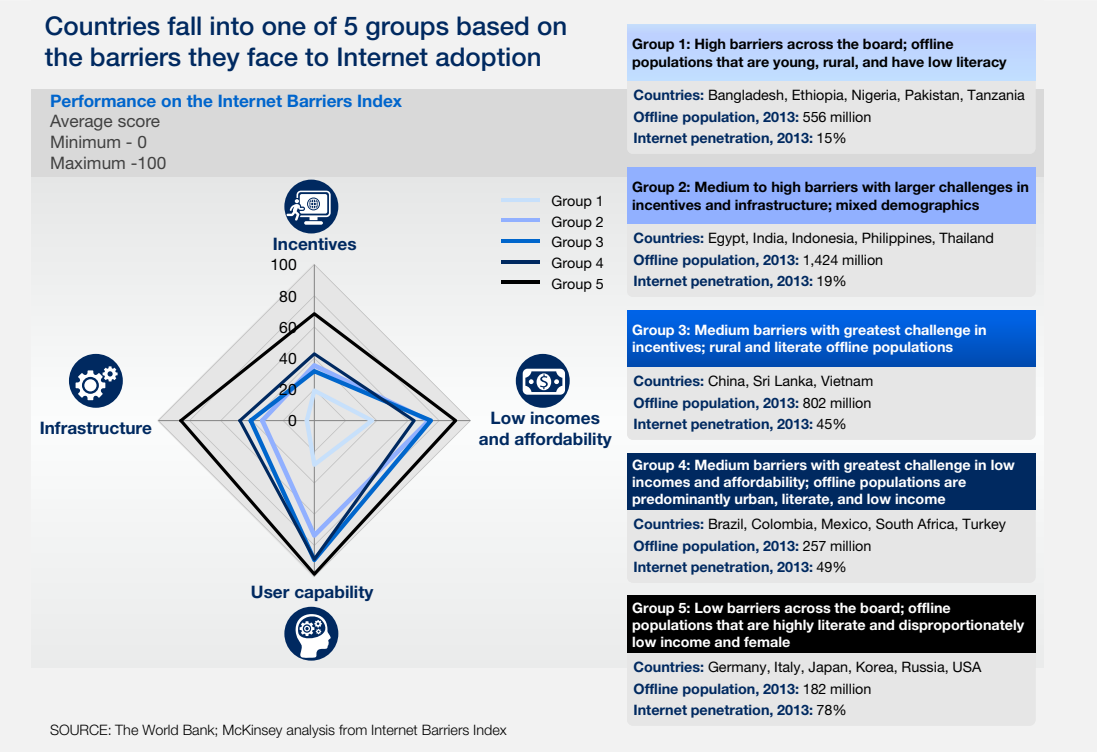
A few countries' Internet Barriers Index score diverges from their Internet penetration rate. Nigeria, for example, has been able to achieve Internet penetration of 38 percent in spite of the formidable obstacles it faces. In contrast, Sri Lanka performs well on all barriers except user capability but has a lower-than-expected penetration rate of 22 percent.

## *Country groupings*

We used complete-linkage clustering of the index metrics and demographic profile and context of the offline population to group countries. Five groups of countries emerged based on the barriers they face to Internet adoption and the profile and context of their offline populations (Exhibit 19). The five groups are:

- Group 1 – High barriers across the board: Bangladesh, Ethiopia, Nigeria, Pakistan, and Tanzania;
- Group 2 – Medium to high barriers: Egypt, India, Indonesia, the Philippines, and Thailand;
- Group 3 – Medium barriers, greatest challenge in incentives: China, Sri Lanka, and Vietnam;
- Group 4 – Medium barriers, greatest challenge in low incomes and affordability: Colombia, Mexico, Brazil, South Africa, and Turkey; and
- Group 5 – Low barriers across the board: Germany, Italy, Japan, Korea, Russia, and the United States.

### Exhibit 19




To the extent that the root causes behind barriers are the same, the mechanisms to address barriers across countries are also likely to be similar. In addition, such groupings present a useful framework for individual countries that seek to adopt a "best-in-class" approach and learn from one another's experience and successful strategies. We chose complete-linkage clusters over K-means clusters given the former's ability to allow the data to define the number of clusters needed, its visual presentation, and its reproducibility. For more on the methodology behind the clustering analysis, please see the Appendix.

## Group 1: High barriers across the board

- Countries: Bangladesh, Ethiopia, Nigeria, Pakistan, and Tanzania (profiles for Ethiopia and Nigeria are included in this report)

- Size of offline population, 2013: 556 million—13 percent of worldwide offline population

Countries in this cluster hail from Africa and South Asia and all have entrenched obstacles to achieving increased Internet penetration. With the exception of Nigeria on incentives, their scores in the individual pillars of the Internet Barriers Index fall in the bottom quartile. Internet penetration is very low, with an aggregate penetration rate of 15 percent across the group. Nigeria is the exception, with an Internet penetration rate of 38 percent in 2013. The offline populations in these countries are all predominantly young and rural and have low literacy rates. Despite significant challenges, these countries collectively represent a sizable opportunity to increase the global online population.

### *Incentives*

Most of the countries in this cluster lack sufficiently localized content and services. Mobile devices often don't support local languages. For example, Ethiopia, Nigeria, and Tanzania all have a large number of living languages, which present an obstacle for connectivity because devices with fonts and characters are rarely available for small populations that speak a unique language. Even when these individuals get online, the vast majority of website content will likely be in languages different from their native tongues.

Social connectivity is a key incentive for individuals in these countries to go online, and the use of social media in developing nations rivals that in industrialized countries. In Nigeria, 73 percent of the online population visits Facebook on a daily basis, making the site a primary driver of a Nigerian's decision to go online (see Nigeria's country profile).[223] However, this initial interest in social media has not deepened to include other online uses such as commerce, health, or education—all of which could have a significant impact on Internet adoption while improving quality of life. Still, there are reasons for optimism; despite lacking an online payments system, Nigeria has a nascent but growing e-commerce industry.

### *Low incomes and affordability*

While their absolute price of Internet access is low relative to other countries researched for this report, these five countries are characterized by large populations of people living at subsistence levels or in extreme poverty. For example, approximately 39 percent of Ethiopia's population has an income below the national poverty line (see Ethiopia's country profile).[224] By its own definition of poverty, in Nigeria this figure swells to 70 percent.[225]

In light of the extremely low incomes and poverty that characterize this group, prices of average retail smartphones and mobile data plans remain at levels that are challenging for large segments of the populations of these countries to afford. Retail smartphone prices as a percentage of GNI per capita range from 7 percent in Pakistan to 80 percent in Ethiopia.[226] Similarly, prices for a 500 Mb mobile data plan as a percentage of GNI per capita range from 2.5 percent in Pakistan to 24.3 percent in the Ethiopia.[227]

### *User capability*

For several countries in this group, basic language literacy is also a serious problem. Bangladesh's literacy rate is approximately 58 percent and Pakistan's is 55 percent, while just 39 percent of Ethiopians are able to read.[228] Apps for smartphones that enable illiterate farmers in India to share information on crop yields and farming methods offer just one example of how the Internet can reach this untapped population. However,

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223 "How Nigerians use social media," businessdayonline.com, August 1, 2013.
224 *The World Factbook,* CIA, accessed 2014.
225 Ibid.
226 Euromonitor, April 2014: average retail smartphone prices (modeled); World Bank, 2013 estimates: GNI per capita, Atlas method.
227 *Measuring the information society,* ITU, 2013: price for a 500 Mb mobile data plan; World Bank, 2013 estimates: GNI per capita, Atlas method.
228 "Adult literacy indicator (percent of people ages 15 and above)," World Bank, accessed 2014.

while such use cases are promising, individuals need basic language and technical proficiency to capture the full value of the Internet. Digital literacy is another significant challenge for this cluster of countries, given the overall lack of exposure and experience that their residents have with Internet technologies.

### *Infrastructure*

Individuals across these countries face a variety of infrastructure-related barriers to Internet adoption. Nigeria and Pakistan must overcome an underdeveloped adjacent infrastructure; one Nigerian operator estimated in 2011 that lack of power was responsible for 70 percent of its downtime.[229] International bandwidth can also be a serious issue: landlocked Ethiopia can only access submarine cable capacity via its neighbors, which makes international bandwidth capacity an ongoing issue.

## Group 2: Medium to high barriers

- Countries: Egypt, India, Indonesia, the Philippines, and Thailand (profiles for India and Indonesia are included in this report)

- Size of offline population, 2013: 1.4 billion—33 percent of worldwide offline population

Home to an offline population of more than 1.4 billion people, this group had an aggregate Internet penetration rate of 19 percent in 2013. The countries in this group rank in the bottom two quartiles in several categories in the Internet Barriers Index, with the greatest challenges in the incentives and infrastructure barrier categories.

229 Chidi Okoye, "Airtel base stations to be solar powered," *Daily Times NG,* December 7, 2011.

### *Incentives*

In this cluster of nations, online localized content and services are limited. While Egypt and the Philippines have relatively large English-speaking populations, the share of Indonesian and Thai consumers who are proficient in English is much smaller.[230] Unlike China, where a large population of non-English speakers provides the necessary market incentives to develop devices and font support in Chinese, countries such as Indonesia and Thailand, with smaller populations that speak unique languages, find it more difficult to generate similar market incentives.

Facebook continues to be the most-used social network across Southeast Asian markets; in fact, the region boasts three of Facebook's top 15 markets, as ranked by visitor penetration.[231] In contrast with China, Southeast Asian nations have embraced Western social media sites such as Facebook, LinkedIn, Twitter, and Zynga, alongside other "imports" such as South Korea's Cyworld.[232] In Indonesia, feature phones come with Facebook preinstalled.[233] The popularity of Western websites is partly due to the lack of social media sites in the local language of these countries.

### *Low incomes and affordability*

Of all of the barrier categories, low incomes and affordability represents the least challenge for this group of countries. Egypt, Indonesia, and Thailand scored in the second quartile on this pillar of the Internet Barriers Index, and India and the Philippines scored in the third quartile.

Despite these bright spots, prices of average retail smartphones and mobile data plans remain at levels that are challenging for large segments of the low-income populations of these countries to afford. Retail smartphone prices as a percentage of GNI per capita range from 6 percent in Thailand to 16 percent in India.[234] Similarly, prices for a 500 Mb mobile data plan as a percentage of GNI per capita range from 1.9 percent in Indonesia to 4.2 percent in the Philippines.[235] In India, we estimate nearly 1 billion people still cannot afford the cheapest mobile data plans at the current levels of consumption and communications spending (see India's country profile for more details).

### *User capability*

Low literacy rates contribute to low capability scores. Though Indonesia, the Philippines, and Thailand all have adult literacy rates above 90 percent, Egypt and India, at 74 percent and 63 percent, respectively, both struggle with adult literacy.[236]

Regarding digital literacy, children from low-income families in more developed countries often become familiar with computers and the Internet through schools, but many education systems in developing countries lack the resources to invest in technology. For example, in contrast with developed countries, some of which spend as much as 5–6 percent of GDP on education, Indonesia spends 2.8 percent and the Philippines spends 2.7 percent.[237] Individuals can also gain access to the Internet and technology in the workplace, so high rates of unemployment can be an impediment, especially for people just entering the workforce. In this cluster, joblessness among youth (aged 15–24) is a real challenge in the Philippines (16.3 percent of the youth population), Indonesia (22.2 percent), and Egypt (24.8 percent); however, youth unemployment rates are lower in India (10.7 percent) and Thailand (2.8 percent).[238]

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230 *The World Factbook,* CIA, accessed August 12, 2014.
231 *2013 Southeast Asia digital future in focus,* comScore, 2013.
232 Ibid.
233 Ibid.
234 Euromonitor, April 2014: average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
235 *Measuring the information society,* ITU, 2013: price for a 500 Mb mobile data plan; World Bank, 2013 estimates: GNI per capita, Atlas method.
236 "Adult literacy indicator (percent of people ages 15 and above)," World Bank.
237 Indonesia figure from 2011; Philippines figure from 2009. *The World Factbook,* CIA, accessed August 12, 2014.
238 India and Thailand figures from 2012; Philippines figure from 2011; Egypt figure from 2010; Indonesia figure from 2009. *The World Factbook,* CIA, accessed August 12, 2014.

### *Infrastructure*

The lack of network coverage and accompanying service issues in these countries have been recurring problems. The quality of overall infrastructure of these four nations are all rated between 3.3 and 4.5 on a scale of 1 to 7 by the World Economic Forum (WEF).[239] In the Internet Barriers Index, all countries except Thailand ranked in the third or fourth quartile in the infrastructure category. According to Akamai, each of these countries have mobile Internet networks that are plagued by slow service, with no country achieving higher than an average of 2 Mbps in the first quarter of 2014.[240] Though India reports 2G coverage of greater than 80 percent and 3G coverage is rapidly expanding, the quality of its mobile connections remains extremely poor, particularly during peak hours.

## Group 3: Medium barriers, greatest challenges in incentives

- Countries: China, Sri Lanka, and Vietnam (profile for China included in this report)
- Size of offline population, 2013: 802 million—18 percent of worldwide offline population

The offline populations of these countries are largely rural and literate and face medium barriers across all four pillars of the Internet Barriers Index, with particularly acute challenges in the incentives category, in which both China and Vietnam scored in the bottom quartile. In aggregate, this group has an Internet penetration rate of 45 percent.

The Internet Barriers Index measures incentives by the following: availability of and demand for Internet services (for example, e-government services, social networking, news, information); the extent to which the population attracts interest from brands, entrepreneurs, and foreign investors; and the portion of the population that achieves advanced education. All three countries in this group have relatively immature e-government services, a small number of secure Internet servers per capita, and limits on press freedom.[241] Additionally, they are characterized by relatively low online ad revenue per individual Internet user as well as low ARPU for mobile services.[242] Lastly, though they each have a moderate to high proportion of graduates in science and engineering (which could stimulate online consumption and development of local or localized content and services), they have a low overall tertiary education enrollment rate.[243]

However, the same measures for incentives may not apply in China that would for smaller countries that simply cannot sustain their own Internet ecosystem. China is home to the largest online population in the world and has relatively little language dispersion compared with many other developing nations. China also rivals the United States with regard to local Internet giants. These factors suggest that China is already benefits from a self-sustaining and thriving Internet ecosystem—setting it apart from smaller countries such as Vietnam and Sri Lanka. However, as observed in more developed countries, incentives do appear to be a real barrier for at least a portion of the offline population in China. In a recent survey, nearly 11 percent of Chinese non-Internet users cited a lack of interest as a primary reason, and more than 17 percent indicated they didn't have time to get online.[244]

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239 *The global competitiveness report 2013–2014,* WEF, September 2013.
240 Mobile Internet networks in the Philippines did not qualify for inclusion in the Akamai report. *Akamai's state of the Internet: Q1 2014 report,* volume 7, number 1, Akamai, June 2014.
241 World Economic Forum (WEF), Global information technology report 2013, April 2013: government e-services; World Bank, 2013 estimates: secure internet servers per capita; Cornell University, INSEAD, World Intellectual Property Organization, The Global Innovation Index 2013, July 2013: limits on press freedom.
242 MAGNA GLOBAL advertising research, 2013: ad revenue per Internet user; GSMA Intelligence, Q4 2013: ARPU per subscriber.
243 World Economic Forum (WEF), Global competitiveness report 2013-2014, September 2013: availability of scientists and engineers; World Economic Forum (WEF), *Global information technology report 2013,* April 2013: tertiary education enrollment rate.
244 *33rd Statistical report on Internet development in China,* CNNIC, January 2014.

### Group 4: Medium barriers, greatest challenges in low incomes and affordability

- Countries: Colombia, Mexico, Brazil, South Africa, and Turkey
- Size of offline population, 2013: 257 million—6 percent of worldwide offline population

While all five of these countries have seen growth in Internet penetration in recent years, many residents remain unconnected. The primary reason is that these countries have large populations of low-income individuals for whom Internet access remains out of reach for financial reasons. In aggregate, this group has an Internet penetration rate of 49 percent.

South Africa ranked in the bottom quartile on the low incomes and affordability pillar of the Internet Barriers Index. Three factors combine to make affordability a challenge. First, a relatively high proportion of South Africa's population is low income—its Gini coefficient of .63 is among the highest in the world.[245] Second, 31 percent of South Africans live in poverty and struggle to pay for basic needs.[246] Third, though smartphone and feature phone prices are below the average and median of the countries researched for this report, mobile Internet service prices (USD 21.90 for 500 Mb prepaid, equal to 3.7 percent of GNI per capita) are higher than those in most other countries examined for this report.[247] A report by InfoDev and the World Bank concluded that prepaid mobile prices are driven up by high interconnection charges that operators pass on to consumers.[248]

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245 *The World Factbook,* CIA, accessed 2014.
246 Ibid.
247 *Measuring the information society,* ITU, 2013: mobile data plan prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
248 *Mobile usage at the base of the pyramid in South Africa,* InfoDev and World Bank, December 2012.

Turkey ranked in the third quartile on the low incomes and affordability pillar of the Internet Barriers Index. Though the obstacles are less severe than those faced in South Africa, Turkey also struggles with a large low income population (Gini coefficient of .40) and poverty (17 percent of the population lives below the national poverty line).[249] Research by Deloitte and GSMA found that Turkey also has the highest tax rate for mobile consumption in the world.[250] Although the prices may be relatively high for individual access, group access may be more affordable. For instance, consumers, particularly youth, frequent Internet cafés for the hourly rates and inexpensive access.

### Group 5: Low barriers across the board

- Countries: Germany, Italy, Japan, Russia, South Korea, Spain, United States (profile for United States included in this report)

- Size of offline population, 2013: 182 million—4 percent of the worldwide offline population

The seven countries in this group, six of which are developed nations, face no significant barriers to Internet penetration relative to the other countries studied for this report. The entirety of the top quartile of Internet Barriers Index scores reside in this group. These low barriers have resulted in bringing 79 percent of the aggregate population of these countries online. Despite low barriers, Italy, Russia, and Spain are outliers, with Internet penetration rates of 59, 61, and 72 percent, respectively. The remaining countries in this group—Germany, Japan, South Korea, and the United States—each have Internet penetration rates between 84 and 86 percent. Despite high scores on the Internet Barriers Index, these countries have offline populations that face the same barriers as their peers in other countries. However, none of the barriers presents an insurmountable hurdle to Internet adoption, suggesting that targeted efforts in these nations could further increase Internet penetration.

Two socioeconomic trends—aging populations and large low income segments—are contributing factors to the offline populations of all seven countries. Developed countries tend to have a larger senior population; as people age, research finds that they are less likely to spend time online. In the United States, for example, Internet use and broadband adoption each fall significantly after age 75—from 68 percent to 47 percent.[251] The Japanese population exhibits a similar pattern, with Internet use among consumers aged 70 and older at just half the rate of the 40-49 age group.[252] One cause for this decline could be a lack of technical know-how in the face of rapid advancements. A Pew Research Center survey found that 77 percent of U.S. seniors expressed the need for someone to walk them through how to use a new device or technology.[253] The same survey reported that approximately two-fifths of seniors stated they have a physical condition that limits their daily participation in activities such as reading.[254] Thus, efforts to raise individuals' technical literacy and the accessibility of content among older generations could help to address this barrier.

Just as observed in the developing world, low incomes create a challenge for many individuals in developed countries to go online. A recent Pew Research Center study on Internet usage in the United States found that while 99 percent of adults in households with an income greater than USD 75,000 per year access the Internet, only 77 percent of adults in households with an income less than USD 30,000 per year go online.[255] For some countries in this group, the proportion of the population with low incomes is relatively large. In particular, the United States and Russia, which combined account for 67 percent of the offline population in this group of countries, have relatively high Gini coefficients of .45 and .42, respectively.[256] (In comparison, Germany and Japan have Gini coefficients of .27 and .38, respectively.[257])

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249 *The World Factbook,* CIA, accessed 2014.
250 *Mobile taxes and fees: A toolkit of principles and evidence,* Deloitte and GSMA, February 2014.
251 *Older adults and technology use,* Pew Research Center, April 3, 2014.
252 *Statistical handbook of Japan 2013,* Statistics Japan.
253 *Older adults and technology use,* Pew Research Center, April 3, 2014.
254 Ibid.
255 "Part 1: How the internet has woven itself into American life," The Web at 25 in the U*.S., Pew Research Internet Project,* February 27, 2014.
256 *The World Factbook,* CIA, accessed 2014.
257 Ibid.

# 6. Country profiles

Although the countries in the three groups discussed in section five share similar challenges, each nation has its own strengths and must conquer a unique set of barriers to increase Internet penetration. To gain a better understanding of these challenges, we developed six in-depth country profiles focusing on China, Ethiopia, India, Indonesia, Nigeria, and the United States. For each country, we track the impact of five trends, offer detailed analysis of its performance on the Internet Barriers Index, and examine the specific barriers that it needs to overcome to expand its online population.

## *China*

### Fast facts

- Total population, 2013: 1.36 billion
- Internet penetration, 2013: 45.8 percent
- Offline population, 2013: 736 million

**China's rapidly shrinking offline population offers evidence that considerable barriers can be overcome with sufficient scale and focus.**

The world's largest country by population, China added almost 511 million new Internet users from 2008 to 2013 to reach an estimated online population of 622 million—the largest online population in the world.[258] Within the country, Internet penetration stands at approximately 46 percent; when children and the elderly are excluded, this figure increases to 58 percent.[259]

### Profile and context of China's offline population

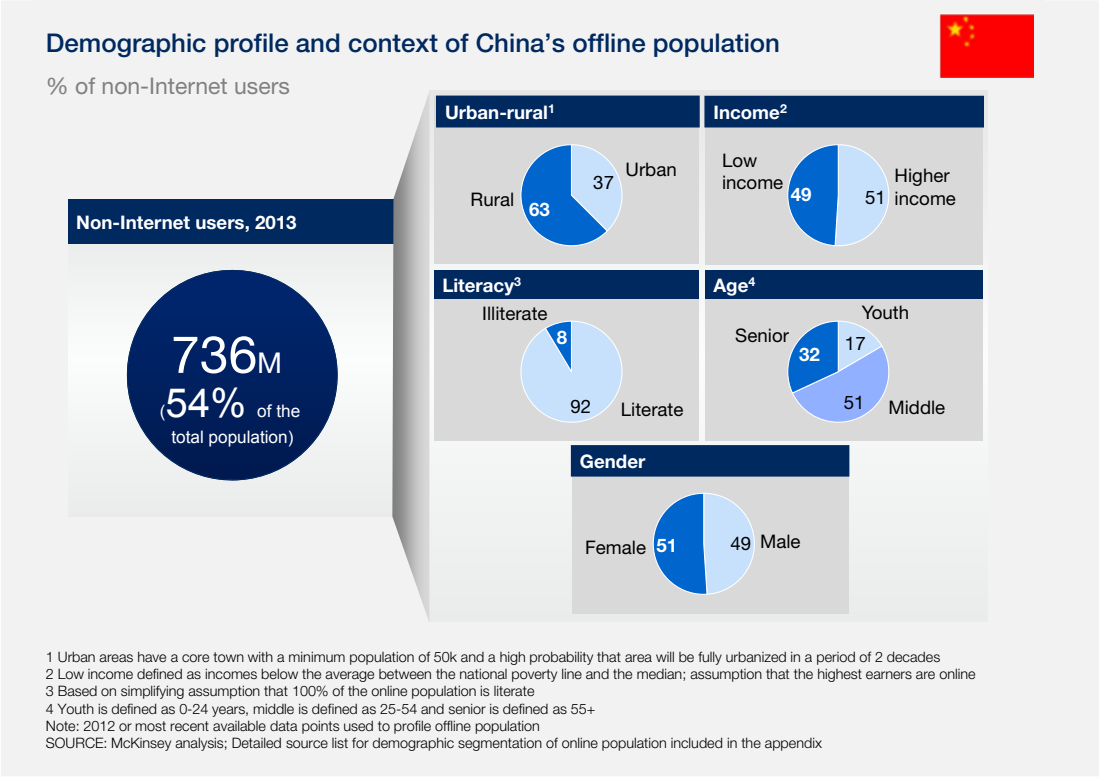
China has an offline population of approximately 736 million, the second largest in the world after India. The demographic profile and context of the offline population supports an optimistic outlook for continued growth of Internet penetration in China (Exhibit 20). Our analysis indicates this population is largely rural (63 percent) and skewed heavily toward the middle-aged segment (51 percent) compared with youth (17 percent) and seniors (32 percent). Low-income individuals account for 49 percent of the offline population. Unlike countries such as India and Nigeria, China's non-Internet users are largely literate.

### Key trends driving China's rapid growth in Internet penetration

Internet penetration in China has risen rapidly. From 2008 to 2013, the online population in China has increased at a healthy CAGR of 16 percent. Consistent with other developing nations, five trends have driven this growth.

258 McKinsey analysis of World Bank longitudinal data.
259 McKinsey analysis of CNNIC's 2014 internet user by age and China NBS yearly number on total population and the 2010 China population census data on population distribution.

Exhibit 20




1 Urban areas have a core town with a minimum population of 50k and a high probability that area will be fully urbanized in a period of 2 decades
2 Low income defined as incomes below the average between the national poverty line and the median; assumption that the highest earners are online
3 Based on simplifying assumption that 100% of the online population is literate
4 Youth is defined as 0-24 years, middle is defined as 25-54 and senior is defined as 55+
Note: 2012 or most recent available data points used to profile offline population
SOURCE: McKinsey analysis; Detailed source list for demographic segmentation of online population included in the appendix

### *Trend #1: Expansion of mobile network coverage and increasing mobile Internet adoption*

The GSMA reports that as of late 2012, China had reasonable 2G coverage of approximately 78 percent of the population.[260] Although 3G network coverage is less extensive, Chinese consumers are rapidly adopting this technology—the 3G subscriber base has grown at an astonishing rate, from just over 47 million in December 2010 to more than 417 million at the end of 2013.[261]

### *Trend #2: Urbanization*

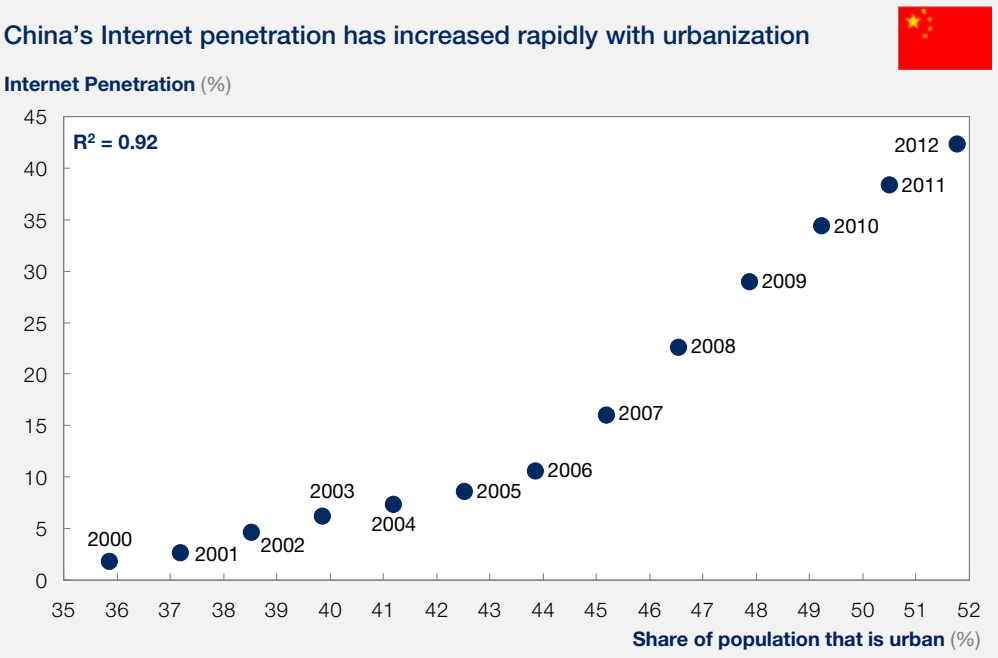
In 1950, just 13 percent of China's population lived in cities.[262] Since that time, China has more than tripled its number of urban dwellers, to more than 50 percent of the population.[263] Furthermore, over the past decade, China has seen a fivefold expansion in its number of large cities.[264] Internet penetration has also increased rapidly, rising from around 20 percent in 2007 to 46 percent in 2013 (Exhibit 21).[265]

### *Trend #3: Shrinking device and data plan prices*

While incomes were rising, prices for devices and Internet connections were also falling. From 2008 to 2013, the average retail price of a smartphone in China dropped by approximately 39 percent, to USD 244 (equal to 3.7 percent of GNI per capita)—among the lowest absolute prices of the countries researched in this report.[266] The declining prices helped fuel smartphone adoption; by 2013, Chinese consumers owned more than 500 million smartphones.[267] China is the manufacturing location of choice for several

260 GSMA Intelligence, 2012 estimates.
261 Steven Millward, "China ends 2013 with a total of 417 million 3G subscribers," techinasia.com, January 29, 2014.
262 *McKinsey Insights China: Macroeconomic model update,* McKinsey & Company, March 2011.
263 Ibid.
264 Ibid.
265 The World Bank.
266 Euromonitor, April 2014 : average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
267 Strategy Analytics, January 2014.

Exhibit 21




SOURCE: International Telecommunication Union; The World Bank

device manufacturers, a factor that contributes to the drop in device prices—not just in China, but also in other countries as well (for example, India). In a promising move, China's telecom regulator recently began liberalizing the country's telecommunications pricing. In late 2013, the Chinese government issued mobile virtual network operator licenses to 11 companies, allowing them to rebrand and market mobile services to consumers.[268] This action resulted in a more competitive market for operators and an increase in price-based competition. China Mobile, for example, announced price cuts as large as 50 percent for mobile services.[269] China Unicom also announced promotions to attract new customers.[270]

### *Trend #4: Growing middle class*

The growth of China's middle class and its increasing consumption have been significant drivers of Internet adoption and use. From 1990 to 2008, real GDP per capita in China increased more than fivefold; what's more, from 2000 to 2009, China's real per capita disposable household income nearly doubled.[271]

### *Trend #5: Increasing utility of the Internet.*

China's emergence as an Internet powerhouse is well documented. Two reports by MGI, *China's e tail revolution: Online shopping as a catalyst for growth* (March 2013) and *China's digital transformation: The Internet's impact on productivity and growth* (July 2014), explore the tremendous impact the Internet has had on China's consumers and businesses.

The Alibaba group and other leading companies such as JD.com, Tencent, and Taobao have led the way in driving the development and adoption of e-commerce. In 2013, China became the largest e-commerce market in the world by recording USD 300 billion in sales.[272] The country's e-commerce now reaches beyond China's borders, as small and midsize enterprises have used platforms such as Alibaba.com

268 Shen Jignting and Meng Jing, "Licenses for mobile virtual network operators issues," *China Daily,* December 26, 2013.
269 Chen Yang, "China Mobile cuts prices for 4G services," *Global Times,* May 15, 2014.
270 Lorraine Luk, "China mobile plans to cut prices," *Wall Street Journal,* May 22, 2014.
271 *If you've got it, spend it: Unleashing the Chinese consumer,* MGI, August 2009.
272 *2014 China online shopping report,* iResearch, May 2014.

and GlobalSources.com to reach new markets. In 2012, total exports through e-commerce reached approximately 2.3 trillion RMB (USD 373 billion).[273]

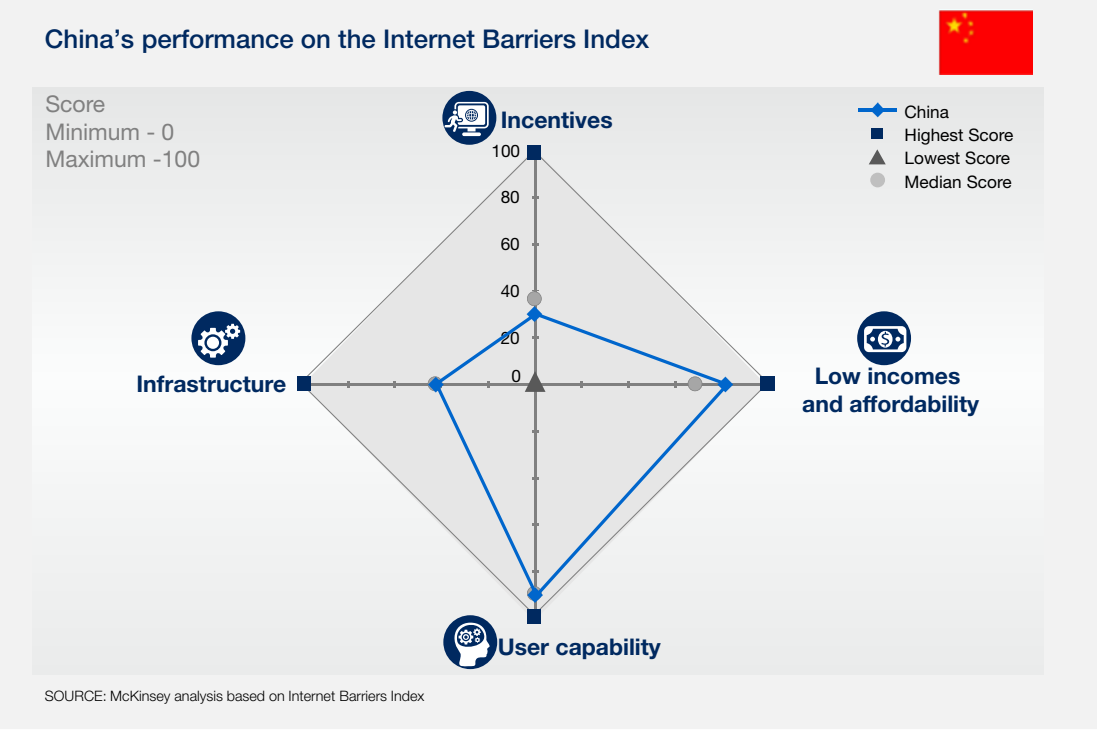
The boom of Chinese e-commerce has also spurred the adoption of online payments systems. China's Alipay, a third-party payments platform and the business segment of Alibaba, claims 300 million registered users and 100 million mobile users.[274] The Internet now extends into core financial services. In July 2013, Alipay launched a financial service called Yu'e Bao, which automatically put Alipay deposits into a money market fund to generate earnings for consumers beyond the rates that banks currently offer.[275] By February 2014, Yu'e Bao had attracted 400 billion RMB in deposits.[276] Internet offerings that recently expanded to the service sector have also seen explosive growth. The taxi app Didi Dache, for example, now covers 900,000 drivers and 100 million users, who place more than 5 million daily orders.[277]

For local Internet search, Baidu launched in 2000 and experienced tremendous growth in the ensuing years. Social media began to boom with the founding of Kaixin001 (2008) and continued to grow thanks to Weibo (2009) and WeChat (2011). By Q1 2014, for example, WeChat had approximately 396 million active users.[278] Online video in China has followed a similar trajectory thanks to the emergence of companies such as Youku Tudou, Tencent, and Sohu. These players license the most popular overseas TV programming for streaming, which Chinese consumers have embraced; in total, 450 million viewers watch 5.7 billion of hours of programming each month.[279]

## Barriers to Internet adoption in China

To increase the number of Chinese Internet users beyond current growth projections, the country would need to address gaps in the online ecosystem. Based on the Internet Barriers Index analysis, incentives and infrastructure represent the greatest challenges (Exhibit 22).

**Exhibit 22**




SOURCE: McKinsey analysis based on Internet Barriers Index

273 "China cross-border commerce tops 2.3 trillion yuan in 2012," iresearchchina.com, September 10, 2013.
274 John Heggestuen, "Alipay overtakes PayPal as the largest mobile payments platform in the world," *Business Insider,* February 11, 2014.
275 Meng Jing, "Yu'E Bao deposits exceed 400 billion yuan," *China Daily,* February 18, 2014.
276 Ibid.
277 Josh Horwitz, "Chinese taxi-hailing app Didi Dache now books 5 million rides a day, and it spent $225 million to get there," techinasia.com, April 3, 2014.
278 Steven Millward, "WeChat grows to 396 million active users," techinasia.com, May 14, 2014
279 Steven Millward, "China's 450 million online video viewers watch 5.7 billion hours of vids every month," techinasia.com, January 7, 2014.

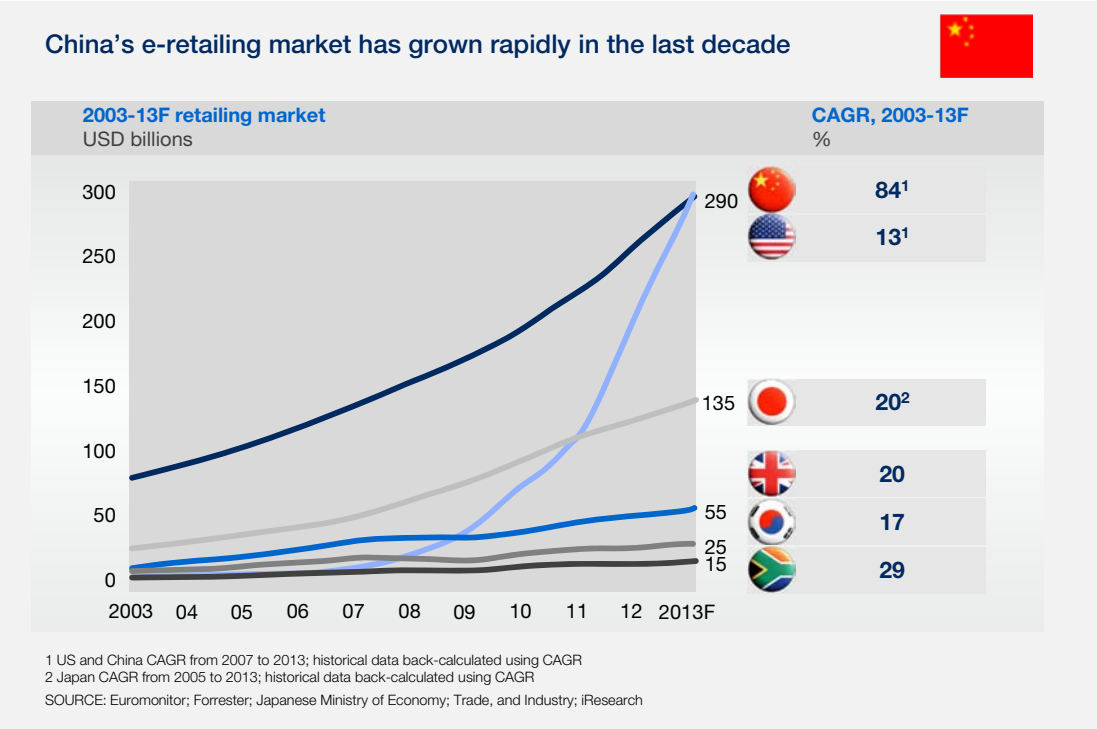
### *Incentives*

China's lowest score on the Internet Barriers Index was in incentives, where it ranked in the bottom quartile. This score highlights an apparent contradiction: China is home to the largest online population, has relatively little language dispersion compared with many other developing nations, and rivals the United States in the number of local Internet giants. It is unclear whether the same measures of incentives for smaller countries that cannot sustain their own Internet ecosystem would also apply to China. However, as observed in more developed countries, incentives do appear to be a real barrier for at least a portion of China's offline population. In a recent survey, nearly 11 percent of Chinese non-Internet users cited a lack of interest as a primary reason for not getting online, and more than 17 percent indicated they didn't have the time.[280]

More recently, Chinese online consumers have begun deepening their online interactions to include entertainment, social networks, and a greater volume of shopping. According to the CNNIC 2014 survey, providers now view Internet growth as having shifted from "quantity of use" to "quality of use."[281] As in developed markets, Chinese consumers are starting to rely on the Internet as a source for private information—not just on product sites, but also through social media and online forums.

E-commerce in China is booming; from 2003 to 2013, it grew at a CAGR of 84 percent. As a result, China has actually eclipsed more established, developed nations (Exhibit 23).[282] Furthermore, the Chinese e-commerce market is forecast to continue growing at a dizzying pace, from USD 210 billion in 2012 to USD 650 billion in 2020.[283]

**Exhibit 23**




1 US and China CAGR from 2007 to 2013; historical data back-calculated using CAGR
2 Japan CAGR from 2005 to 2013; historical data back-calculated using CAGR
SOURCE: Euromonitor; Forrester; Japanese Ministry of Economy; Trade, and Industry; iResearch

One of the primary factors stimulating e-commerce in China is the adoption of online payments systems to augment or replace traditional payment methods such as cash on delivery. Tencent's WeChat, for example, used the Chinese New Year, when family members celebrate the holiday by sending cash in a traditional red envelope, to promote its online system. As a result, 8 million WeChat users sent or received 40 million online

280 *33rd statistical report on Internet development in China,* CNNIC, January 2014.
281 Ibid.
282 *2014 China online shopping report,* iResearch, May 2014.
283 *China's e-tail revolution: Online shopping as a catalyst for growth,* MGI, March 2013.

red envelopes in just nine days.[284] The majority of online shoppers on Taobao and Tmall use Alipay, an online payment service, instead of cash. However, the success of online payment companies (along with the subsequent increase in risk of fraud and lack of transparency) has caused China's central bank to impose new restrictions that limit the types and scale of services that online financial companies can offer.[285]

For Chinese consumers who are still hesitant to get online, e-commerce platforms with the potential for increased income have proved compelling. Farmers, for example, are rapidly adopting TaoBao's e-commerce site, which enables them to sell to urban consumers and command higher prices for their goods. More than 20 "Taobao villages" have sprung up, each averaging USD 1.6 million annually in online revenues.[286]

### *Low incomes and affordability*

China scored in the second quartile in the Internet Barriers Index on affordability. Average retail smartphone prices are USD 244 (equal to 3.7 percent of GNI per capita), among the lowest absolute prices of the countries researched for this report.[287] Even more important, the trend of rapidly declining device costs, especially smartphones, is poised to continue. Several carriers provide the device for free if customers sign up for a data and voice plan for a period of time (usually two years) and at a contracted monthly rate.[288] Mobile virtual network operators (MVNOs), which are launching in 2014, could lower the pricing barrier even more.[289]

However, as is the case in most countries, per capita monthly expenditures differ significantly among urban and rural areas. Urban dwellers spend approximately 1400 RMB a month, three times the level of rural per capita monthly expenses.[290] Mobile devices and data plans are well within the reach of the average urban consumer but are less affordable for the rural population. Given the lack of fixed-broadband in rural areas (the Broadband China plan aimed for fixed-line penetration of 20 percent for rural households in 2013),[291] the cost of using mobile data is higher than in urban areas. Wi-Fi is rarely available (if at all), and all usage will come through the cellular network and be metered against mobile data plans. In contrast, mobile activity in urban areas can be offloaded to fixed broadband through Wi-Fi.

### *User capability*

With a literacy rate of approximately 95 percent, China's citizens demonstrate relatively high language literacy, and the Chinese language is supported by mobile devices and fonts.[292] However, digital literacy presents a larger challenge; in a CNNIC report, approximately 60 percent of the offline population surveyed cited a lack of knowledge of how to use a computer as the primary reason for not accessing the Internet.[293]

### *Infrastructure*

Overall, China's population benefits from good electric grid infrastructure and reasonable fixed-broadband penetration. The World Economic Forum (WEF) gave China a score of 5 (above the average score of 4) for electricity and telephone infrastructure.[294] While fixed-broadband penetration is at around 40 percent of Chinese households, it lags behind the rates of developed nations such as Germany (61 percent) and the

284 Chen Tian, "WeChat challenges Alipay," *Global Times,* February 11, 2014.
285 Michael Sainsbury, "Chinese state-owned banks strike back at online challenges," *Nikkei Asian Review,* asia.nikkei.com, April 25, 2014.
286 *Economist,* "Cash cow, Taobao," May 24, 2014.
287 Euromonitor, April 2014: average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
288 Helena, "Plans & prices in China with China mobile," onbile.com, April 15, 2013.
289 Shen Jignting and Meng Jing, "Licenses for mobile virtual network operators issued," *China Daily,* December 26, 2013.
290 *China Statistical Yearbook 2013,* China Statistics Press.
291 "China to boost domestic demand by facilitating information consumption," *China Briefing,* August 19, 2013.
292 "Adult literacy indicator (percent of people ages 15 and above)," World Bank, accessed 2014.
293 *33rd statistical report on Internet development in China,* CNNIC, January 2014.
294 *The global competitiveness report 2012-2013,* WEF, April 2013.

United States (70 percent).[295] The government's stated goal is to achieve 50 percent household broadband penetration by the end of 2015.[296]

Urban centers account for approximately 71 percent of all Internet users, with just 29 percent residing in rural areas.[297] As in other countries, speeds are lower in rural areas, and network infrastructure provides lower bandwidth in remote provinces than in core regions. Recently, however, significant progress has been made in developing Internet infrastructure. By the fourth quarter of 2013, China's average connection speed had jumped 33 percent over the previous year, to 3.45 Mbps.[298] In the next five years, the government expects the national broadband plan will be a key driver in improving Internet infrastructure, which will increase speeds and expand fiber capacity. If successful, Internet speeds in rural areas will reach 12 Mbps by 2020, while urban speeds will reach 50 Mbps.[299] LTE deployment is already widespread in coastal regions, and the government has set a goal of reaching 32.5 percent 3G/LTE penetration by the end of 2015.[300]

## Conclusion

China has seen explosive growth in smartphone penetration and online commerce. High literacy rates, a growing middle class, and continued potential for urbanization all offer reasons to be optimistic that Internet adoption will continue to increase. A rapidly expanding e-commerce market and new services, such as the "Taobao villages" that are gaining traction with the rural population, are providing added incentives for consumers to get online. Moreover, the government's national broadband plan seeks to invest in infrastructure and extend Internet access to underserved rural areas. The government has been and is supporting Internet development, especially e-commerce.

295 *Household broadband penetration data,* Pyramid Research, September 2013.
296 *Broadband China,* State Council of China, August 2013.
297 *33rd statistical report on Internet development in China,* CNNIC, January 2014.
298 Josh Horwitz, "China's average Internet speed jumped 33 percent in 2013, but it's still pretty slow," techinasia.com, February 12, 2014.
299 *Broadband China,* State Council of China, August 2013.
300 Ibid.

## *Ethiopia*

### Fast facts

- Total population, 2013: 94 million
- Internet penetration, 2013: 1.9 percent
- Offline population, 2013: 92 million

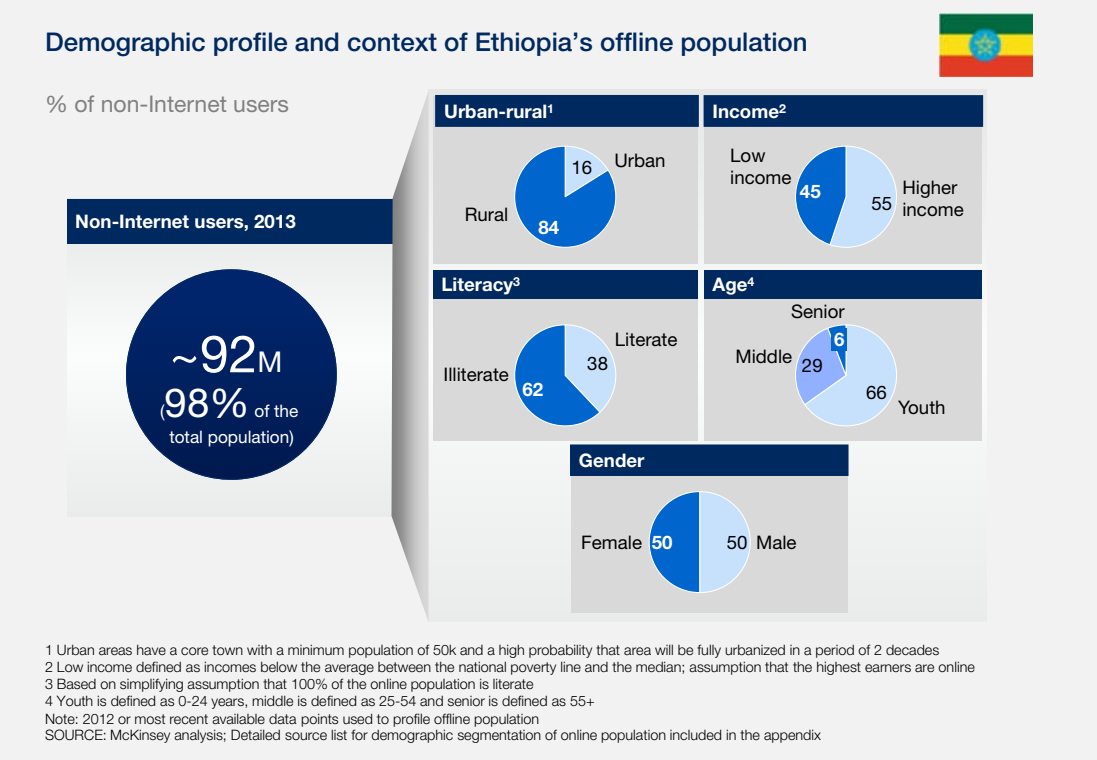
**An extremely low Internet penetration rate in Ethiopia can be attributed to high barriers across every pillar of the Internet Barriers Index.**

Ethiopia, a fast-growing nation, is the largest landlocked country in Africa by population and second only to Nigeria by population on the continent.[301] However, it has the lowest Internet penetration of all the countries examined in this report. In the *2013 Web Index* by the World Wide Web Foundation, Ethiopia placed 80 out of 81 countries by the Internet's contribution to development and human rights.[302] The limited adoption rate of both fixed and mobile broadband, if left unaddressed, may hold the country back. To increase Internet penetration, Ethiopia would need to build infrastructure that could provide more reliable connections as well as address low incomes and affordability and improve the online user experience.

### Profile and context of Ethiopia's offline population

Ethiopia's 92 million non-Internet users account for about half of the total offline population in East Africa.[303] A demographic characterization of the offline population brings the challenges into sharp focus (Exhibit 24); non-Internet users reside predominantly in rural areas (84 percent) and are largely illiterate (62 percent). This population also skews heavily toward younger people—66 percent are under the age of 25.

**Exhibit 24**




301 *The World Factbook,* CIA, accessed 2014.
302 *2013 Web index report,* World Wide Web Foundation, November 2013.
303 Michael Ouma, "Ethiopia to overtake Kenya in mobile subscriptions numbers," *East African,* May 5, 2012.

## Key trends driving Ethiopia's growth in Internet penetration

While five trends have driven Internet penetration around the world, their impact has been less pronounced in Ethiopia given the formidable challenges the country faces in regard to extreme poverty and lack of economic opportunity.

### *Trend #1: Expansion of mobile network coverage and increasing mobile Internet adoption*

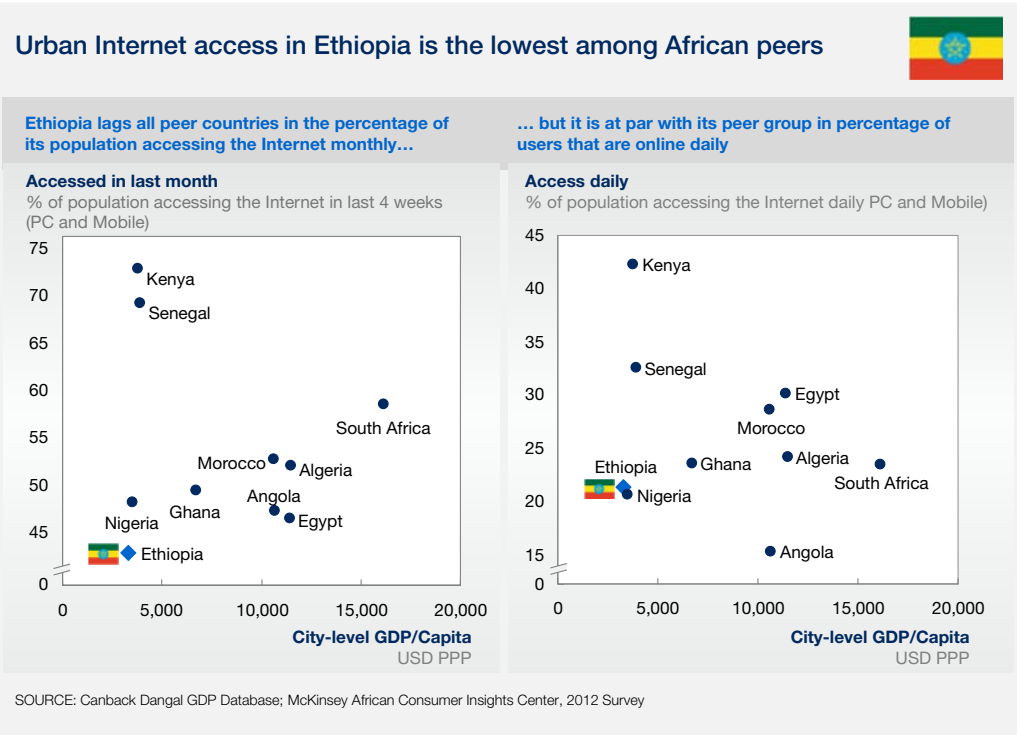
From 2008 to 2013, mobile connections grew at a CAGR of 50 percent, to 22 million.[304] 3G build-out started in 2009 and grew to almost 9 million connections by the end of 2013.[305] However, 3G coverage is concentrated in Addis Ababa and is very inconsistent, while international carriers that could provide 3G service are almost nonexistent in Ethiopia.

### *Trend #2: Urbanization*

Ethiopia is largely rural, with about 82 percent of the country's total population residing in rural areas.[306] From 2008 to 2012, the country's urban population grew at a CAGR of approximately 4 percent, reaching 15.8 million.[307] Among the countries in this report, only Nigeria's urban population grew at a faster rate (4.3 percent).[308] By 2020, the United Nations projects that Ethiopia's urban centers will account for an estimated 20 million people, approximately 20 percent of the population.[309] With the Internet penetration rate in Addis Ababa (47 percent) far exceeding the country's overall penetration rate of 1.9 percent, it is clear that urbanization could drive significant gains in Internet penetration.[310] Indeed, 55 percent of Ethiopians living in Addis Ababa have Internet-capable mobile phones, and 10 percent have smartphones—rates far higher than those seen in rural areas.[311] However, urban access to the Internet in Ethiopia is the lowest among its African peers (Exhibit 25).

**Exhibit 25**

**Urban Internet access in Ethiopia is the lowest among African peers**




SOURCE: Canback Dangal GDP Database; McKinsey African Consumer Insights Center, 2012 Survey

304 GSMA Intelligence, 2014 extract.
305 Ibid.
306 "Urban population (% of total)," World Bank, 2013 estimates.
307 Ibid.
308 Ibid.
309 "On-line data: Urban and rural population," UNDESA/Population Division, esa.un.org, accessed 2014.
310 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.
311 Ibid.

### *Trend #3: Shrinking device and data plan prices*

Ethiopia has not benefited from the same large drops in device prices that most other countries in this report have experienced. The average retail price of a smartphone in Ethiopia has fallen by 5 percent from 2008 to 2013, to USD 377.[312] This price is equivalent to more than 80 percent of GNI per capita, highlighting Ethiopia's challenge in addressing low incomes and affordability.[313] Similarly, while prices are falling, mobile Internet service prices (USD 9.50 for 500 Mb, equal to 24.3 percent of GNI per capita a month) are out of reach for all but a few.[314] Two developments are contributing to falling prices. First, manufacturing and device assembly are both increasing, as companies such as Tecno Mobile Ethiopia invest in Ethiopian plants for both feature phones and smartphones. Second, Ethiopia has forged strong ties with China, which is helping to build out infrastructure across the country, including transmission lines, access points, and data centers.

### *Trend #4: Growing middle class*

Since 2004, Ethiopia's economy has grown at 10.6 percent a year, far exceeding the regional average of 4.9 percent.[315] Due to this increased economic activity, Ethiopia has significantly improved its population's prospects; the extreme poverty rate declined from 62 percent in 1990 to 30 percent in 2010.[316] However, despite halving the number of people living in poverty, nearly one-third of the population still lacks access to basic amenities.[317] Indeed, Ethiopia remains one of the world's poorest countries, with a per capita income of USD 470.[318] As a result, it still has a long way to go to replicate the booming middle class of other developing countries such as China and India.

### *Trend #5: Increasing utility of the Internet*

Ethiopian consumers have yet to see the Internet deliver on its potential. In the category of "relevant content," the country ranked in the bottom three out of 81 countries in the *2013 Web Index*.[319] Online retail penetration is 0.4 percent, and 20 percent of government departments are online.[320] The lack of Internet use is evident in its low impact on Ethiopia's GDP—just 0.6 percent, the second-lowest contribution among all African countries.[321] However, the Internet has proved useful for some segments; the Ethiopia Commodity Exchange (ECX) provides a virtual marketplace that provides transparency to farmers and other users.[322] With more than 1 million information requests per month—80 percent from rural areas—the ECX allows users to make more informed decisions about agricultural production.[323] Social media also presents a relevant use case for some Ethiopians. A majority of Ethiopian Internet users have a Facebook profile, and many individuals use technology to keep in contact with their far-flung diaspora.[324]

## Barriers to Internet adoption in Ethiopia

Despite recent gains, Ethiopia's Internet penetration of 1.9 percent still lags far behind other African countries such as Egypt (50 percent), South Africa (49 percent), and Nigeria (38 percent).[325] The country would need to overcome serious challenges across all four barrier categories to bring a substantial segment of its population online (Exhibit 26).

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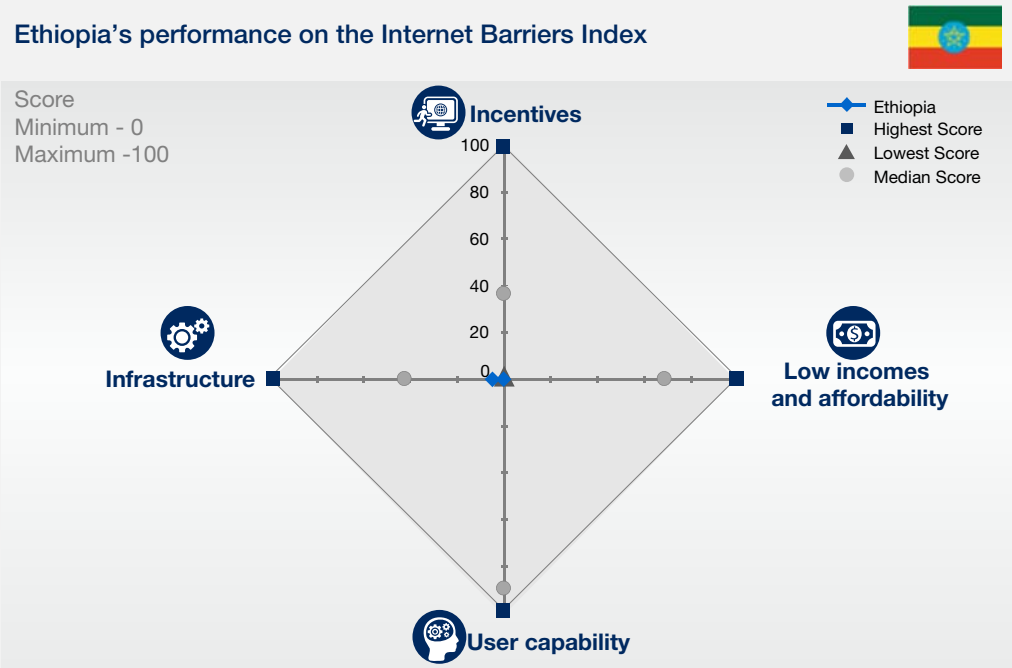
312 Euromonitor, April 2014.
313 Euromonitor, April 2014: average retail smartphone prices (modeled); World Bank, 2013 estimates: GNI per capita, Atlas method.
314 *Measuring the information society,* ITU, 2013: mobile data plan prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
315 World Bank.
316 "Urbanization: Challenge for some, opportunity for others?" The World Bank, May 21, 2013.
317 Ibid.
318 World Bank, 2013 estimates.
319 *2013 Web Index report,* World Wide Web Foundation, November 2013.
320 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.
321 Ibid.
322 Ibid.
323 Ibid.
324 Ibid.
325 The World Bank, 2013 estimates.

Exhibit 26




SOURCE: McKinsey analysis based on Internet Barriers Index

## *Incentives*

Ethiopia's high language dispersion (almost 90 languages are spoken) poses a challenge for consumers who are seeking devices that support their specific language.[326] However, Tecno Mobile Ethiopia started to address this challenge in 2012 by launching the first smartphone manufactured in the country and designed specifically for Ethiopian consumers. The device supports only Amharic, the Ethiopian national language.[327] Since English is the most widely spoken foreign language in Ethiopia—it is often the language of instruction in secondary schools and universities—educated Ethiopians can benefit from English content on the Web.[328]

As in many other developing nations, social media sites are one of the top online attractions in Ethiopia; 53 percent of mobile broadband users identified social networking as their top online activity, while e-mail was a distant second at 31 percent.[329] In 2012, more than 900,000 Ethiopian Internet users—a majority of the online population at the time—were on Facebook.[330] E-commerce has yet to catch on with the masses, although IBEXMall, an online commerce platform, was introduced in 2012.[331] While Ethiopian Internet users spend approximately 10 hours per week online, just short of the African average of 11 hours, they generate an ARPU per month that is just one-third that of the average African telecom consumer.[332] Banking services are notably underdeveloped in Ethiopia.[333] In January 2013 the government mandated that banks offer mobile banking services, a move that could provide more incentives for consumers to get online.[334] The Ethiopian government has also undertaken a five-year strategy to develop and promote e-services. By 2018, it hopes to implement 219 e-services that it will administer through four channels, including mobile devices.[335]

326 M. Paul Lewis, Gary F. Simons, and Charles D. Fennig, *Ethnologue: Languages of the world,* 17th ed., 2014.
327 "Ethiopia to launch its first indigenous smartphone," Communicationsafrica.com, June 26, 2012.
328 M. Paul Lewis, Gary F. Simons, and Charles D. Fennig, *Ethnologue: Languages of the world,* 17th ed., 2014.
329 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.
330 Ibid.
331 Ibexmall.com, accessed 2014.
332 McKinsey ACIC survey 2012.
333 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.
334 Elissa Jobson, "The mobile-banking game-changer in Ethiopia," *Africa Report,* June 10, 2013.
335 *E-government strategy for Ethiopia,* UNCTAD, 2013.

### *Low incomes and affordability*

Ethiopia's low per capita income and high poverty rates compound the affordability issue, but bright spots exist. Absolute prices of mobile Internet service at USD 9.50 per month for a 500 Mb plan is low relative to other countries in our sample.[336] Further, although electricity is not widely available, it is relatively inexpensive; subsidies from the Ethiopian government result in real rates of USD 3 cents per Kwh versus USD 5.3 in Tanzania and USD 21.4 in Kenya.[337] Even at these prices, the devices, plans, and associated expenses remain out of the reach of large population segments. Shared access among consumers could bring down costs, and government subsidies to provide access in public places such as schools could also put the Internet within reach of underserved population segments.

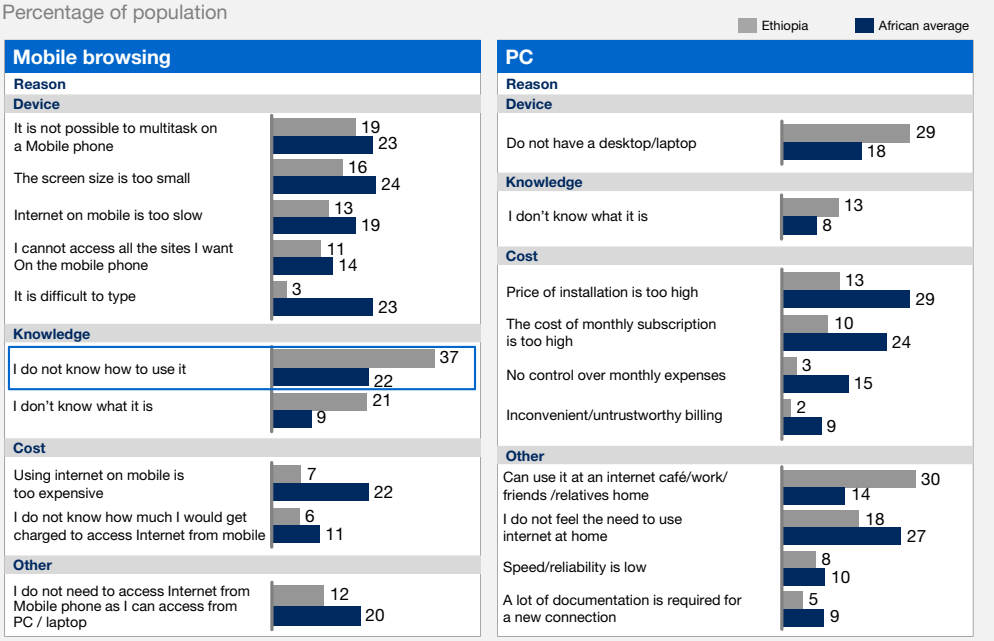
### *User capability*

Ethiopia's literacy rate of 39 percent, the lowest level of any country in this report, presents a significant hurdle in increasing Internet penetration.[338] The country's performance in the *2013 Web Index* points to several additional challenges. Out of 81 countries included in the index, Ethiopia scored in the bottom 5 in the "impact and empowerment" category and last in the "universal access" category.[339] The lack of exposure to mobile devices and technology is one of the key reasons that Ethiopians are offline. A 2011 survey of Ethiopian consumers in Addis Ababa, Ethiopia's largest urban center, revealed that 37 percent of those surveyed struggle with digital literacy (Exhibit 27).[340] As a result, even if Ethiopia overcomes the low incomes and affordability and infrastructure barriers, language and digital literacy barriers would remain to be addressed.

**Exhibit 27**

**Lack of knowledge and device constraints are the primary deterrents to use of an Internet platform in Ethiopia**

Percentage of population




SOURCE: McKinsey African Consumer Insights Center, 2011 Survey

336 *Measuring the information society,* ITU, 2013.
337 World Bank.
338 "Adult literacy indicator (percent of people ages 15 and above)," World Bank.
339 *2013 Web Index report,* World Wide Web Foundation, November 2013.
340 McKinsey ACIC, 2011.

### *Infrastructure*

Ethiopia has neither the mature mobile networks nor adjacent infrastructure to expand Internet coverage. As one of 16 landlocked countries in Africa, it lacks direct access to submarine cables and the international content they transport. As recently as 2009, Ethiopia was forced to rely on satellite for international connectivity, a technology that delivers lower-quality access.[341] Ethiopia now gets international bandwidth through terrestrial cables to Djibouti and Sudan and microwave radio relays to Djibouti and Kenya.[342] While the Ethiopian government has made developing a national ICT strategy a priority, the telecommunications industry remains closed to foreign investment.[343]

Ethiopia's adjacent infrastructure is unable to support its population's daily needs. The country's installed generating capacity is currently just over 2,000 megawatts, and large commercial and industrial customers as well as residents suffer from routine power outages.[344] As of 2011, slightly more than 23 percent of the Ethiopian population had access to electricity, making tasks such as charging mobile phones exceedingly difficult.[345] With domestic demand for electricity forecast to rise 25 percent a year and the government seeking to extend coverage to 75 percent of towns and villages, several developments hold particular promise.[346] Over the next decade, the Ethiopian government plans to invest USD 12 billion in power projects with the goal of increasing the country's capacity by 20,000 MW.[347] Efforts are already underway to complete a new Grand Ethiopian Renaissance Dam, a 6,000 MW plant, by 2015.[348] The World Bank has committed USD 1.3 billion to create a transmission line between Ethiopia and Kenya, with the goal of reducing energy costs and improving power delivery.[349] Projections show that these collective efforts could make Ethiopia a net exporter of energy.[350]

## Conclusion

Ethiopia faces daunting challenges in driving Internet penetration: a dearth of compelling services and relevant content to draw users online, a high poverty rate, a lack of language and digital literacy, and an underdeveloped infrastructure. Significant investments in infrastructure are a promising development, but the country will likely need to do more if it wants to provide its population with the means and skills to get online. Growth in online exchanges and e-commerce will require development of and expanded access to banking services, which is currently quite low.[351] If the country manages to overcome these challenges, the Internet has great potential to help transform Ethiopia in the coming years.

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341 *The Internet Society: Lifting barriers to Internet development in Africa: Suggestions for improving connectivity,* Analysys Mason, May 2013.
342 *The World Factbook,* CIA, accessed 2014.
343 *Measuring restrictions on inward FDI in the service sector for developing countries and transition economies,* UNCTAD, 2006.
344 William Davidson, "Ethiopia sees output at Africa's biggest power plant by 2015," Bloomberg, March 20, 2014.
345 World Bank.
346 "Ethiopia to unlock geothermal," Infrastructurene.ws, June 6, 2014.
347 John Muchira, "Ethiopia unveils new plan for hydropower project," *Engineering News,* engineeringnews.co.za, August 9, 2013.
348 William Davidson, "Ethiopia sees output at Africa's biggest power plant by 2015," Bloomberg, March 20, 2014.
349 "World Bank funds Kenya-Ethiopia power transmission line to boost electricity supply in EAC," todayfinancialnews.com, n.d.
350 John Muchira, "Ethiopia unveils new plan for hydropower project," *Engineering News,* engineeringnews.co.za, August 9, 2013.
351 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.

## *India*

### Fast facts

- Total population, 2013: 1.25 billion
- Internet penetration, 2013: 15 percent
- Offline population, 2013: 1.06 billion

**India's impressive growth rate of Internet penetration coupled with its large non-Internet user population presents a tremendous opportunity.**

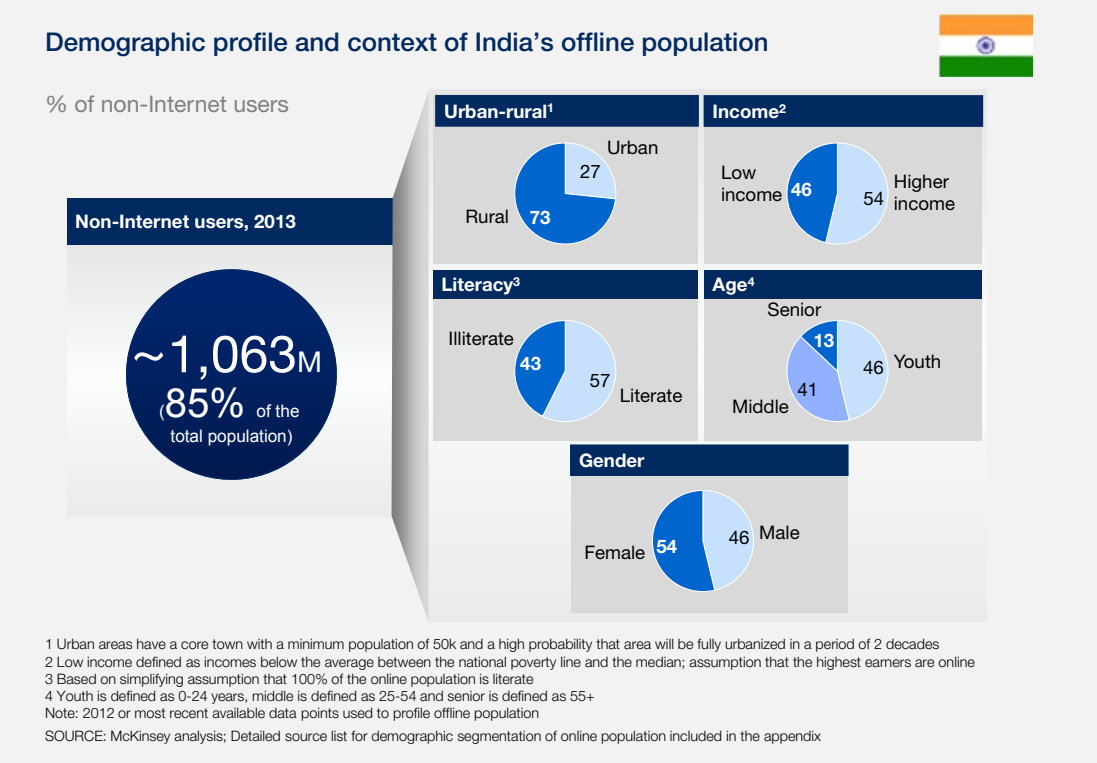
Over the past decade, Internet adoption has grown steadily in India, and its pace has accelerated in recent years. From 2008 to 2013, India's online population increased at a CAGR of 30 percent; by 2013, approximately 189 million Indian consumers were online, placing the country third in the world (behind China and the United States) by number of Internet users.

However, India's current Internet penetration rate is only 15 percent. Given the country's population of approximately 1.3 billion people, the relatively low penetration rate means that the country is home to almost 1.1 billion offline individuals, the largest non-Internet user population in the world. Despite the country's challenges, the sheer size of its offline population represents tremendous potential.

### Profile and context of India's offline population

The profile and context of India's offline population (Exhibit 28) offers a telling snapshot of the country's progress in extending the Internet to different segments. India's non-Internet user population is overwhelmingly rural (73 percent), and a high proportion is illiterate (43 percent) and female (54 percent). This demographic profile highlights some of the key differences between the population that has rapidly embraced the Internet (predominantly urban, higher income, literate, and male) and the next billion who have yet to come online.

**Exhibit 28**




1 Urban areas have a core town with a minimum population of 50k and a high probability that area will be fully urbanized in a period of 2 decades
2 Low income defined as incomes below the average between the national poverty line and the median; assumption that the highest earners are online
3 Based on simplifying assumption that 100% of the online population is literate
4 Youth is defined as 0-24 years, middle is defined as 25-54 and senior is defined as 55+
Note: 2012 or most recent available data points used to profile offline population

SOURCE: McKinsey analysis; Detailed source list for demographic segmentation of online population included in the appendix

Approximately 46 percent of India's offline population are youth—a demographic that is typically an early adopter of technology. Because the ITU's definition of Internet users includes only the population above 6 years of age, India's future Internet user population could grow rapidly (as of 2012, its median age was the lowest in the world, with 58 percent of the total population under the age of 30).[352] This demographic dividend will be a key driver of Internet growth in India.

Growth projections for India's online population vary widely, ranging from approximately 150 million to 500 million new users by 2018.[353] At the current trajectory, India would add approximately 300 million Internet users by 2018 to achieve an online population of just under 500 million people. While this increase is almost 200 percent, the number of additional users is only about a third of the total current non-Internet user population.

A more aggressive estimate of 500 million new Internet users by 2018 assumes that India would be able to address its current lack of rural infrastructure development. This optimistic scenario could also be the result of increased affordability. For example, industry observers expect Reliance Jio to enter the telecom market and drastically expand 4G service throughout the country.[354] This expansion could happen by May 2015 or sooner as the company works to fulfill the license agreement for its 2010 purchase of spectrum bands capable of sending high-speed data at lower costs.[355] As part of the rollout, the telecom company is constructing new infrastructure, securing deals for shared infrastructure, and conducting trials on affordable handsets starting at USD 150—a substantial price drop from current handsets that support 4G.[356] If this development occurs, it will likely shake up the market, spur competitors into action, and possibly accelerate price declines and produce a larger-than-expected increase in Internet users.[357]

## Key trends driving India's growth in Internet penetration

As in other developing nations, the growth in Internet penetration in India has been driven in large part by five underlying trends. We expect these same trends to play an important role in bringing the next several hundred million people online.

### *Trend #1: Expansion of mobile network coverage and increasing mobile Internet adoption*

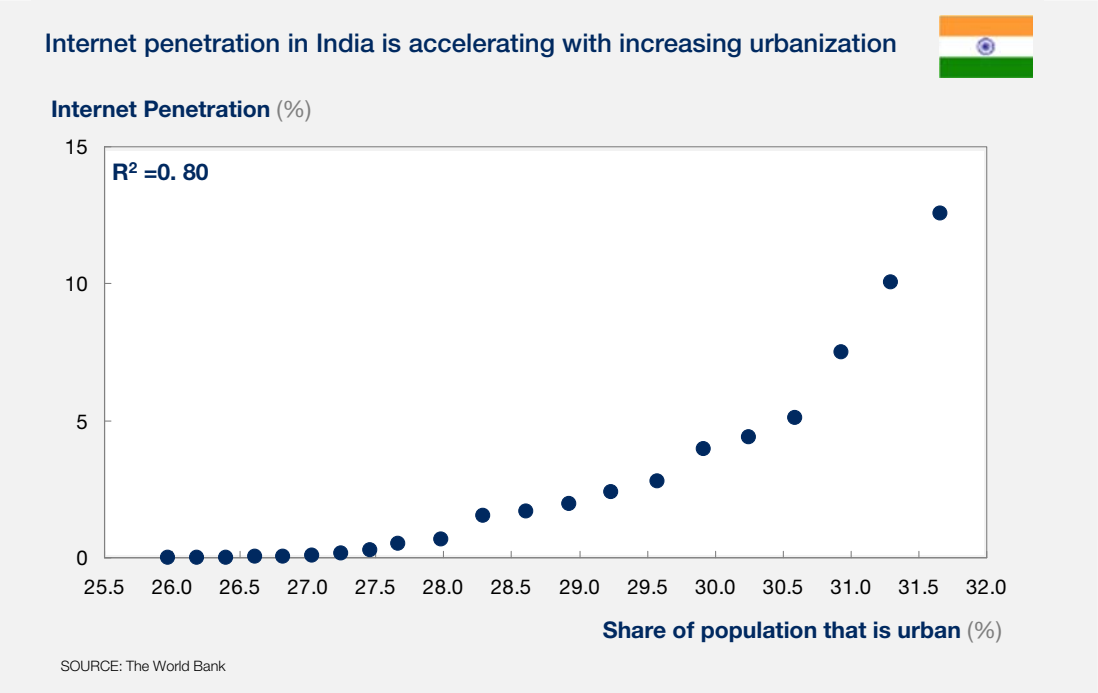
2G coverage in India is reported at around 90 percent, and 3G coverage is rapidly expanding.[358] From 2008 to 2013, mobile connections in India grew at a CAGR of 21 percent to reach 886 million.[359] 3G build-out began in 2009 but had already grown to more than 75 million connections at the end of 2013.[360]

### *Trend #2: Urbanization*

Urbanization in India is accelerating drastically. MGI reported that, while it took India's urban population nearly 40 years (from 1971 to 2008) to increase by 230 million, it will take only half that time to add another 250 million.[361] Furthermore, while direct migration contributed approximately 20 percent to India's urbanization between 1961 and 2001, the vast majority was been due to organic growth in city populations, the reclassification of rural areas, and the expansion of city boundaries.[362] Our analysis indicates a concomitant relationship between Internet penetration and urbanization in India (Exhibit 29).

352 *Online and upcoming: The Internet's impact on India,* McKinsey & Company, January 2012.
353 Projections from Boston Consulting Group (BCG), Cisco, eMarketer, Federation of Indian Chambers of Commerce and Industry (FICCI), and ITU.
354 Deepali Gupta and Anandita Singh Mankotia, "Reliance Jio may use Indore, Coimbatore as launch sites for its 4G service," *The Economic Times,* June 5, 2014.
355 Ibid.
356 Ibid.
357 Priyanka Sahay, "Will Reliance Jio's entry to hurt profits of telcos?" dnaindia.com, May 2, 2014.
358 GSMA Intelligence, 2012 estimates.
359 GSMA Intelligence, 2014 extract.
360 Ibid.
361 *India's urban awakening: Building inclusive cities, sustaining economic growth,* MGI, April 2010.
362 MGI CityScope 2.0; World Bank, UN Population; MGI analysis.

Exhibit 29




### *Trend #3: Shrinking device and data plan prices*

From 2008 to 2013, the average retail price for a smartphone in India decreased by 29 percent to USD 248, the third-lowest absolute price among the countries researched for this report.[363] This price is equivalent to more than 16 percent of GNI per capita, highlighting India's challenge in addressing low incomes and affordability.[364] Due in part to falling prices, the smartphone user base in India exploded, increasing from just under 5 million units in 2008 to almost 76 million units in 2013.[365] Mobile data plans in India are also among the lowest cost of the countries we researched for this report; a 500 Mb prepaid plan cost USD 3.40 per month in 2013 (equal to 2.6 percent of GNI per capita a month).[366] While falling prices have made a significant contribution to Internet penetration to date, the impact of this trend may be more muted going forward because the absolute prices of devices and data plans in India are already relatively low.

### *Trend #4: Growing middle class*

The growing middle class in India will likely bring more individuals online in the next decade than it did in the past ten years. However, a large portion of the population still lives in poverty.

India's middle class expanded from 150 million in 1990 to 265 million in 2005.[367] Today, approximately one-quarter of India's population is considered middle class, a small portion compared with other developing countries such as China (63 percent) and Pakistan (40 percent).[368] Approximately 80 percent of this middle class is in the lowest bracket of spending power, meaning they are able to spend USD 2 to USD 4 a day.[369] Their position in the middle class is also tenuous; many of them are not well educated and are employed in unstable positions in the informal sector.

363 Euromonitor, April 2014.
364 Euromonitor, April 2014: average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
365 Strategy Analytics, January 2014.
366 *Measuring the information society,* ITU, 2013: mobile data plan prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
367 *Hitting the sweet spot: The growth of the middle class in emerging markets,* Ernst & Young, 2013.
368 Sambuddha Mitra Mustafi, "India's middle class: Growth engine or loose wheel?," *New York Times,* May 13, 2013.
369 Ibid.

Despite these sobering realities, the outlook for India's middle class is optimistic, though forecasts vary. Ernst & Young predicts that India's "global middle class" (people earning USD 10 to USD 100 a day) will grow from 50 million in 2013 to 200 million by 2020 and more than double to 475 million by 2030.[370] MGI estimates that India's middle class (by a different definition) will be approximately 580 million strong by 2025.[371] Ejaz Ghani, a World Bank economist, projects that India will have more than 1 billion middle-class citizens—approximately two-thirds of India's forecast population—by that time.[372]

### *Trend #5: Increasing utility of the Internet*

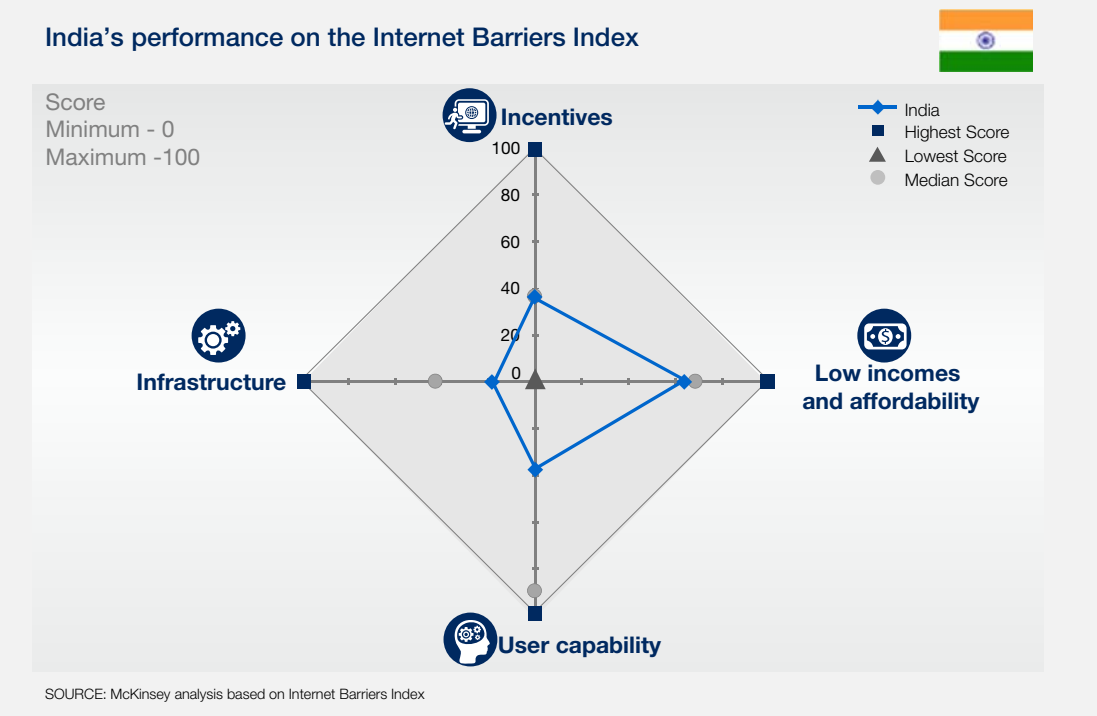
The utility of the Internet, as measured by local content, came to India quite recently. In the World Wide Web Foundation's 2013 Web Index, India placed 63 out of 81 in the category of "relevant content."[373] Google local search wasn't available until 2007. India's first taste of social media came with Orkut in 2005; since then, Facebook has become the social media platform of choice. However, many Indian consumers have taken an innovative path to connectivity that doesn't require the Internet (see "Incentives," below, for examples).

The e-commerce market has experienced the most growth in the past decade; while local retailers such as NewIndiaPlaza had an online presence as early as 1999, local online retail saw growth only after Flipkart launched in 2007. With the anticipated entry of foreign players such as Amazon in 2014, e-commerce is set to grow tremendously. The impact could be felt more in urban than rural areas; 50 percent of urban online Indian consumers cited online shopping as a main use of the Internet, a higher rate than that of India's rural population.[374]

## Barriers to Internet adoption in India

To accelerate the growth of the online population above current estimates, India would need to address crucial gaps in the Internet ecosystem. The Internet Barriers Index indicates that, relative to the other pillars, India performs well on affordability; indeed, the average absolute price for data downloads and smartphones are among the lowest of the countries researched in this report. However, a closer look at India's consumer economic profile uncovers tremendous challenges due to low incomes. Beyond this

**Exhibit 30**




SOURCE: McKinsey analysis based on Internet Barriers Index

370 *Hitting the sweet spot: The growth of the middle class in emerging markets,* Ernst & Young, 2013.
371 Sambuddha Mitra Mustafi, "India's middle class: Growth engine or loose wheel?," *New York Times,* May 13, 2013.
372 Ibid.
373 *2013 Web Index report,* World Wide Web Foundation, November 2013.
374 *Internet in India 2013,* IAMAI and IMRB International, June 2013.

barrier, however, it is clear that India would also need to overcome entrenched issues in incentives, user capabilities, and infrastructure (Exhibit 30).

### *Incentives*

Despite the relatively high barriers that Indian consumers face, they have demonstrated a strong motivation to use mobile phones. The phenomenon of the missed call—a common practice where one person will call another but hang up, sending a signal of readiness or some other previously agreed message—points to the ingenuity in using technology to communicate even when the mobile subscriber is not able to pay for the voice minutes.[375]

Social connectivity is a big driver of Internet usage. In urban India, 89 percent of the online population uses the Internet for online communication, 75 percent for social networking, 69 percent for entertainment, and 50 percent for online shopping.[376] Rural Internet users cited entertainment as their number one use (87 percent), reflecting the widespread appeal of Bollywood productions and other movies and the popularity of sports such as cricket. Online services and social networking came in second and third, with 62 and 52 percent, respectively.[377]

India's e-commerce market has been growing slowly for a number of reasons. While urban Indians show a willingness to spend online, overall e-commerce transactions, even through SMS, have trailed demand. Only 0.25 percent of Indian retail sales occur online, compared with 6 percent in China and 9 percent in the United States.[378] A poor e-payment system in India hampers e-commerce and the commercialization of online activities; cash on delivery is still the preferred method of payment. Businesses such as PayTM are trying to create a successful system by getting more merchants online, providing an e-payment platform, and customizing it to enable Indian consumers to bargain with merchants. Two other factors could change this situation significantly. First, India could allow foreign companies to invest directly in the e-commerce market.[379] Under current regulations, companies such as Alibaba or Amazon cannot sell their own inventory directly to consumers.[380] Second, growth in smartphone penetration could trigger extreme growth. Credit Lyonnais Securities Asia estimates that in such a scenario, e-commerce could increase from USD 3 billion in 2014 to USD 22 billion in just five years.[381]

E-commerce is likely to be more of a driver of Internet usage for the urban online population, especially the higher-income segment. Mass e-commerce in India will likely follow the same path as China, where messaging platforms such as Tencent's WeChat are becoming the de facto connection, transaction, and payment platforms. While WhatsApp is being informally used in India for such purposes, integration with payment systems is still lacking. The development of a good payments platform and the rapid adoption of mobile messaging in India could accelerate the growth of e-commerce activity.

For those who can't afford a data plan, text messaging has been increasing in popularity. The low cost of text-messaging platforms makes them a natural fit for the lower-income and rural population segments. Several mobile, text-based apps that provide information (for example, market prices and weather forecasts) have gained traction among the rural population segment, since they have the potential to affect income.[382] Apps such as WhatsApp are extremely popular even among retailers, which use the free platform to communicate with customers.

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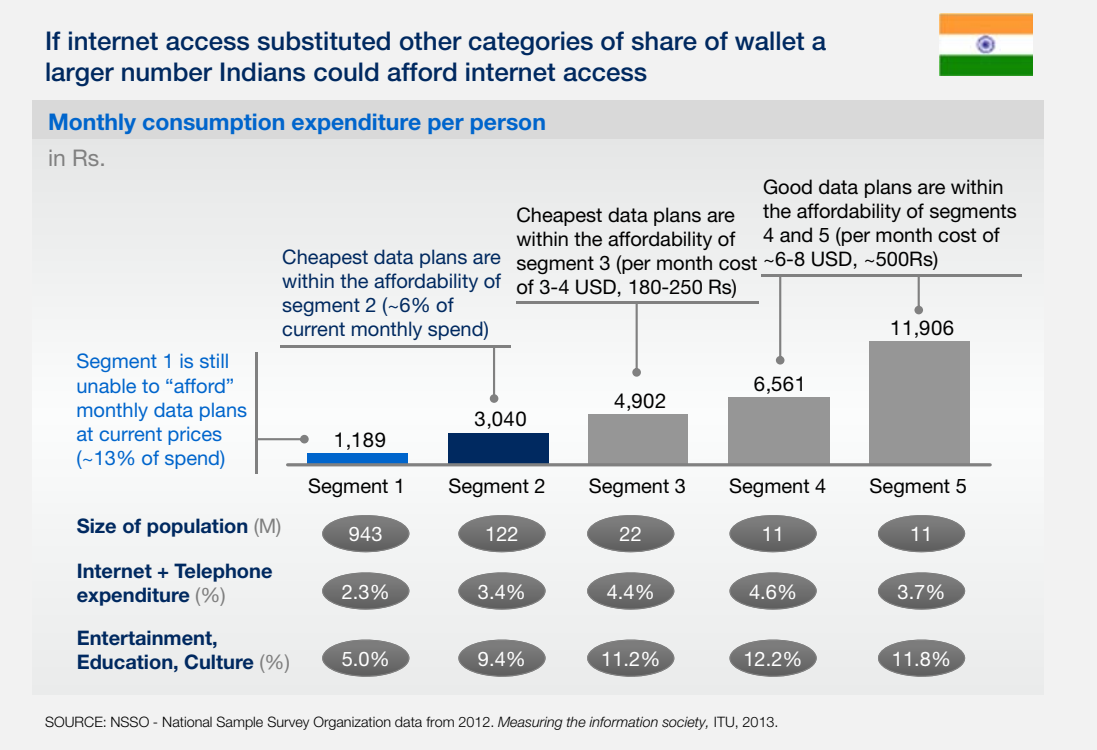
375 Tushar Banerjee, "Five unusual ways in which Indians use mobile phones," *BBC News India,* bbc.com, February 11, 2014.
376 *Internet in India 2013,* IAMAI and IMRB International, June 2013.
377 Ibid.
378 "Reuters: India likely to allow foreign e-commerce investment," Seekingalpha.com, June 4, 2014.
379 Pankaj Mishra, "India may relax e-commerce rules, opening the door further for Amazon and other global giants," techcrunch.com, January 3, 2014.
380 "Consolidated FDI policy (effective from April 5, 2013)," Government of India, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion, n.d.
381 "E-commerce firm Myntra raises USD 50 mn from Azim Premji, other investors," India.com, February 24, 2014.
382 Debasish Roy, "Mobile applications for rural India: A review," *International Journal of Green Computing,* volume 3, issue, 1-13, July-December 2012.

Language dispersion in India presents a significant obstacle; as of 2009, the government recognized 22 official ones.[383] Even with a large population such as India's, the need to segment devices and services by language lowers the incentive for providers to develop content. In contrast, China's languages are more concentrated, making it easier for providers to cater to the online population. Even one of India's most-used scripts, Devanagari, is not well suited for mobile devices; instead, many Indian consumers compose written communications in English.

### *Low incomes and affordability*

Many Indians struggle to meet their basic needs and are unable to afford Internet services. Our consumption basket analysis revealed that even with the low absolute prices of devices and data plans compared with the rest of the world, Internet access in India remains beyond the grasp of close to 950 million people (Exhibit 31, segment 1). Even the cheapest data plans are simply too expensive, equal to 13 percent of this segment's spending.[384] Accelerating the trend of rising income levels could change this picture significantly. After the elections in May 2014 led to the formation of a stable majority government, most economists are predicting higher economic growth and increased job creation—developments that will likely accelerate the transition of people from the lower rung of the economic ladder.

**Exhibit 31**




SOURCE: NSSO - National Sample Survey Organization data from 2012. *Measuring the information society,* ITU, 2013.

Another development—substituting the phone for other income spending categories—could also affect the Internet adoption rate. The share of wallet at the bottom of the pyramid is generally inelastic, meaning that this population segment is spending almost all of its income on basic necessities such as food and shelter. It is unlikely that the percentage of total expenditures on communications in segments 1 and 2 will increase much beyond the 6 to 13 percent this population group currently spends. However, it is likely that consumers in segment 2 already view the Internet as a substitute for other spending categories such as entertainment; this perspective could help increase the Internet's affordability for 100 million to 200 million people. The most populous, lowest income segment of just under 950 million Indians (segment 1) could still not afford a phone and data plan even when accounting for spending that would otherwise go to entertainment. The substitution would have to extend to other categories that this segment spends on (for

383 "Learning with the Times: India doesn't have any 'national language,'" *Times of India,* November 16, 2009.
384 National Sample Survey Organization (NSSO), 2012: Indian consumption segmentation. *Measuring the information society,* ITU, 2013: mobile data plan prices.

example, the education of their children). It is worth noting that segments 4 and 5 are essentially urban; the rural population constitutes 0 percent of these segments. This distribution reinforces the fact that even if Internet access were available in rural areas, a large segment of the Indian population still wouldn't be able to afford it. Alternatively, device and data prices will need to continue to fall at a rapid rate, a development that is not out of the question.

### *Capability*

At 62 percent, India's literacy rate is among the lowest in the countries researched in this report.[385] In fact, India's illiterate adult population accounts for 37 percent of the global total.[386] Of India's 1.1 billion offline population (all ages), we estimate that 43 percent are illiterate. Given that literacy is a prerequisite for being able to participate fully in society—including the action of getting online—a low literacy rate is a major impediment to increasing Internet penetration. For example, illiterate farmers are unable to benefit from myriad existing services that provide weather forecasts and market prices through text messages or other digital means.

Furthermore, in a recent survey 69 percent of respondents weren't aware of the Internet, while 33 percent lacked the digital literacy (defined as the ability to operate a computer) to get online.[387] Even if India's rural and illiterate population were to gain access to sufficient coverage, they would still need to obtain basic literacy and digital skills before they could navigate the Web.

### *Infrastructure*

A lack of sufficient network coverage and adjacent infrastructure plagues India and is a major impediment to Internet adoption, particularly in rural areas. In a survey of India's rural population, roughly one-third of respondents pointed to the lack of a connection, device, or electricity as an obstacle.[388] The absence of last-mile connectivity in many regions is a serious handicap, but fiber would also need to be increased for India to reach its full potential. Among India's major Internet service providers, for example, none has fiber lines that serve small or midsize villages. Spectrum licensing policy has been controversial in the past; India would need to consider moving to a predictable, transparent, and fair spectrum-licensing policy that encourages provider investment in telecom infrastructure and ensures a level playing field.[389]

In addition, access to electricity would also need to be improved; according to the 2011 Census of India, only 55 percent of rural Indian households had access to electricity.[390] A 2009–10 survey reveals the percentage of rural households depending on firewood remained at 76 percent in 2009–2010—a drop of only two percentage points since 1993–1994.[391]

While 2G coverage in the nation is reported at around 90 percent, most of it is not Internet enabled.[392] 3G coverage is rapidly expanding, but currently the quality of mobile connections is low—dropped signals and an inability to meet demand during peak hours are common problems.

To combat the infrastructure roadblock, the Indian government has developed an ambitious plan to bring better connectivity to India. In 2010, the Telecom Regulatory Authority of India (TRAI) introduced the National Broadband Plan, which will devote Rs 600 billion (USD 9.8 billion) to build the optical fiber network throughout the country.[393] The National Broadband Plan aspires to provide affordable and reliable broadband to 600 million subscribers by 2020.[394]

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385 "Adult literacy indicator (percent of people ages 15 and above)," World Bank, accessed 2014.
386 "India tops in adult illiteracy: U.N. report," *The Hindu,* January 29, 2014.
387 *Internet in India 2013,* Internet and Mobile Association of India (IAMAI) and IMRB International, June 2013.
388 Ibid.
389 "4G auction: Supreme Court notice to Centre, Reliance Jio, Trai," *The Times of India,* May 10, 2014.
390 *Energy Statistics 2013,* Government of India, Central Statistics Office, March 2013.
391 Ibid.
392 GSMA Intelligence, 2012 estimates.
393 Nikhil Subramaniam, "India's 'fantastic' broadband project that you should know about," tech.firstpost.com, March 22, 2013.
394 Ibid.

## Conclusion

Just a few years ago, Internet access was considered a luxury in India. Today, the country is home to the third-largest online population in the world (behind China and the United States), and Internet penetration is poised to continue growing at a rapid pace, particularly due to the rapid uptake of mobile Internet. Indeed, India's large offline population and its GDP growth represent a tremendous opportunity to bring new Internet users online. For India's Internet user growth to be more inclusive, significant challenges—including the lack of basic infrastructure, low quality of coverage, uneven distribution of wealth, and lagging human capital development—will need to be overcome. However, progress is being made in each of these areas, and India also stands to benefit from its relatively young median age, penchant for going mobile, urbanization, and rising income levels.

## *Indonesia*

### Fast facts

- Total population, 2013: 250 million
- Internet penetration, 2013: 16 percent[395]
- Offline population, 2013: 210 million

**The demographic profile of Indonesia's non-Internet user population—it has a relatively high literacy rate, and just 36 percent are low-income individuals—offers a solid foundation for accelerating the growth of Internet adoption.**

As in other developing countries, Internet adoption in Indonesia has been increasing rapidly, with a CAGR of approximately 16 percent from 2008 to 2013.[396] However, the country's Internet penetration rate—just 16 percent in 2013, as reported by the World Bank—places it in the bottom quartile in Internet adoption among this report's countries, underscoring the enormous potential for Internet adoption and usage in Indonesia going forward.

### Wide range of reported figures for Indonesia's Internet penetration rate

In completing this research, we found a wide range of estimates for Indonesia's Internet penetration rate. The following illustrate the range of estimates for 2013 Internet penetration:

- Badan Pusat Statistik Indonesia: 13.6 percent (2012 figures)[1]
- Internet Live Stats: 15.5 percent[2]
- World Bank: 15.8 percent[3]
- The Economist Intelligence Unit: 18.3 percent[4]
- Association of Indonesian Internet Providers: 28.4 percent (71 million Internet users)[5]
- eMarketer: 29 percent (72.7 million Internet users)[6]
- MarkPlus Insight Netizen Survey: 29.9 percent (74.6 million Internet users)[7]

For the purposes of the analysis in this report and to be consistent with the sources used for key comparisons, we have used estimates from the World Bank.

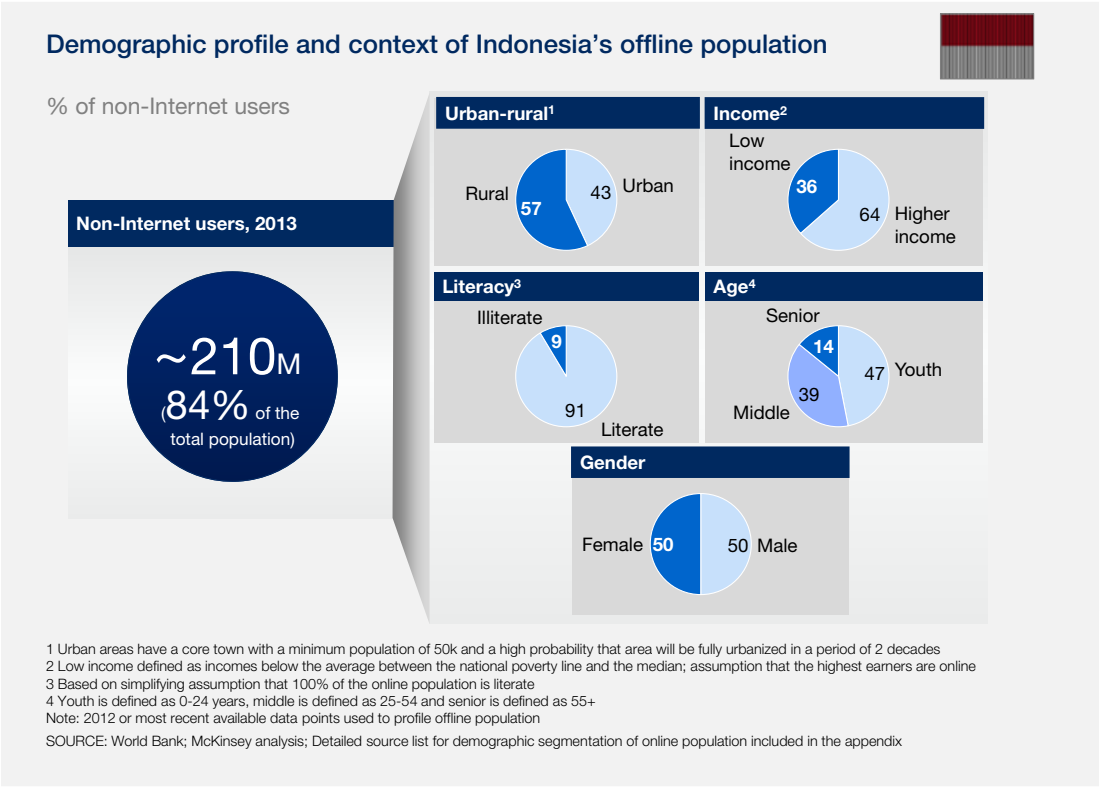
1 Badan Pusat Statistik Indonesia, adapted from the Hasil Survei Sosial Ekonomi Nasional (Susenas), 2012.
2 Internet Live Stats, www.internetlivestats.com/internet-users/indonesia/, accessed 2014.
3 "World Development Indicators," World Bank, 2013 estimates, accessed 2014.
4 "World Data," The Economist Intelligence Unit, 2013 estimates, accessed 2014.
5 "Number of RI Internet users increases to 71.19 million in 2013: APJII," Jakarta Post, January 15, 2014.
6 "In Indonesia, a New Digital Class Emerges," eMarketer, March 12, 2013.
7 Enricko Lukman, "Report: Indonesia now has 74.6 million internet users; this is what they do online," techinasia.com, October 30, 2013.

395 "World Development Indicators," World Bank, 2013 estimates, accessed 2014.
396 McKinsey analysis based on World Bank longitudinal data.

## Profile and context of Indonesia's offline population

The demographics of Indonesia's offline population position the country for substantial growth in Internet adoption in the coming years (Exhibit 32). Only 36 percent of Indonesia's 210 million non-Internet users are characterized as low income. Youth make up about 47 percent of the offline population, while seniors account for only 14 percent. A large majority of the offline population—approximately 91 percent—is literate.

**Exhibit 32**




1 Urban areas have a core town with a minimum population of 50k and a high probability that area will be fully urbanized in a period of 2 decades
2 Low income defined as incomes below the average between the national poverty line and the median; assumption that the highest earners are online
3 Based on simplifying assumption that 100% of the online population is literate
4 Youth is defined as 0-24 years, middle is defined as 25-54 and senior is defined as 55+
Note: 2012 or most recent available data points used to profile offline population

SOURCE: World Bank; McKinsey analysis; Detailed source list for demographic segmentation of online population included in the appendix

## Key trends driving Indonesia's growth in Internet penetration

The total number of Internet users in Indonesia climbed from 19 million in 2008 to 40 million in 2013.[397] Five key trends drove adoption and may hold the key to boosting growth in Internet penetration rates beyond current estimates.

### *Trend #1: Expansion of mobile network coverage and increasing mobile Internet adoption*

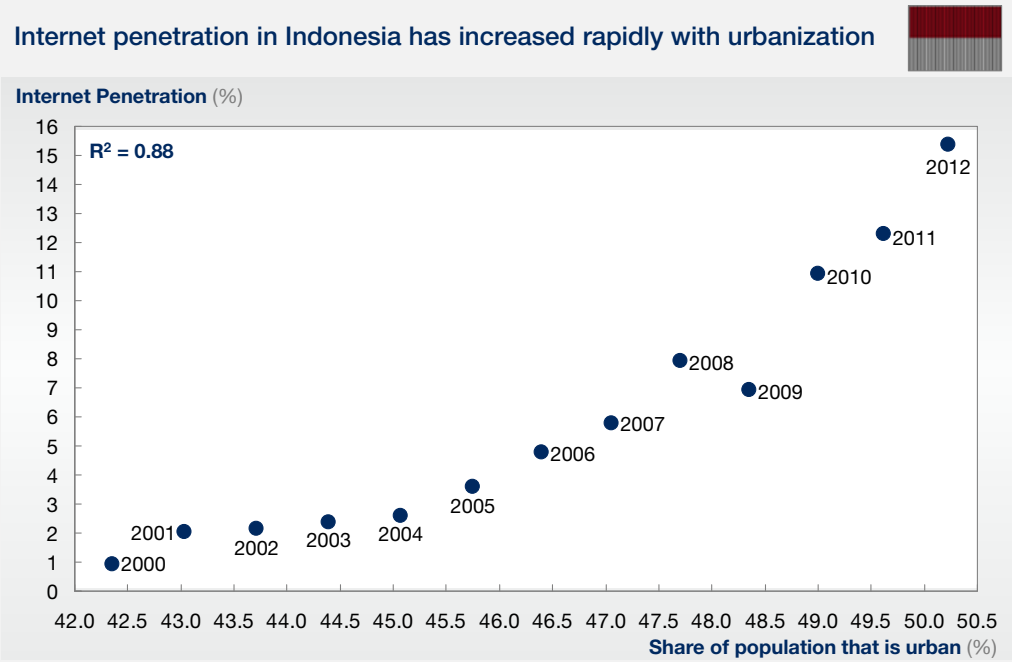
From 2008 to 2013, mobile connections in Indonesia grew at a CAGR of 18 percent, to 315 million, while 3G connections rose at a CAGR of 79 percent, to 91 million.[398] The expansion of 3G coverage played an important role in mobile Internet adoption. For instance, Telkomsel, Indonesia's largest mobile network operator, increased its 3G population coverage from 50 percent in 2010 to 80 percent by 2013.[399] The emergence of new players in the mobile data space will further spur mobile Internet adoption in Indonesia. For example, Bolt is a new data-only player offering download speeds of up to 75Mbps.[400]

397 "World Development Indicators," World Bank, accessed 2014.
398 GSMA Intelligence, 2014 extract.
399 "Indonesia wireless report," TeleGeography, telegeography.com, accessed August 8, 2014.
400 Enricko Lukman, "Indonesia finally gets a taste of 4G," techinasia.com, November 15, 2013.

### *Trend #2: Urbanization*

In 2005, when Indonesia's urban residents accounted for approximately 45 percent of the total population, the nation reached a "tipping point," and Internet penetration accelerated rapidly. It grew from 3.6 percent that year to nearly 8 percent by 2008.[401] By 2012, when slightly more than half of Indonesia's population—127 million people—lived in cities, more than 15 percent of Indonesians, nearly 38 million residents, were online (Exhibit 33). [402]

**Exhibit 33**




SOURCE: International Telecommunication Union; The World Bank

### *Trend #3: Shrinking device and data plan prices*

From 2008 to 2013, the average retail price of a smartphone in Indonesia fell by 21 percent, from USD 579 to USD 458 (equal to 13 percent of GNI per capita).[403] Local brands now offer Android smartphones for less than USD 70.[404] In part due to declining prices, the install base of new smartphones in Indonesia exploded from just under 7 million units in 2008 to more than 34 million units in 2013.[405] Analyst estimates of smartphone connections vary widely, in part due to a thriving grey market. Ovum estimates the number of smartphone connections to be 64 million in 2014, up from 46 million in 2013.[406] Analysys Mason estimates this figure at 85 million in 2014 and 68 million in 2013.[407] Mobile data plans in Indonesia are relatively inexpensive; a 500 Mb prepaid plan cost USD 5.70 per month in 2013 (equal to 1.9 percent of GNI per capita).[408] Plan prices have continued to decline with some operators now offering 600MB plans for IDR 20,000, or roughly USD 1.7 per month.[409]

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401 *Measuring the information society,* ITU, 2013.
402 "World Development Indicators," World Bank, 2012 estimates, accessed 2014.
403 Euromonitor, April 2014: average retail smartphone prices (modeled); World Bank, 2013 estimates: GNI per capita, Atlas method.
404 Evercoss and Mito online price lists (http://www.rajahape.com/2013/03/harga-hp-cross.html; http://mitomobile.com/product/category/smart-phones)
405 Strategy Analytics, January 2014.
406 Ovum, "Smartphone connections forecast: 2014-2019," July 2014.
407 Analysys Mason, "Emerging Asia Pacific telecoms market: trends and forecast 2014-2019," June 2014.
408 *Measuring the information society,* ITU, 2013: mobile data plan prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
409 Operator websites, accessed September 2014.

### *Trend #4: Growing middle class*

According to the World Bank, Indonesia's middle class totaled 131 million in 2010, a jump of 50 million people in the span of just seven years, to account for nearly 57 percent of the population.[410] Although these high-level numbers are cause for optimism, a closer look at the middle class reveals that nearly 90 percent of this segment could be characterized as lower middle class (spending USD 2 to USD 6 a day).[411]

### *Trend #5: Increasing utility of the Internet*

Arguably, Indonesians are as well acquainted with the Internet's utility as anyone in the world. The country became known as "BlackBerry Nation" due to its population's mass adoption of BlackBerry mobile phones beginning in 2007.[412] Despite the late arrival of some social media sites—Facebook wasn't introduced there until 2008—Indonesians have been quick adopters. As of June 2013, Indonesia had 64 million Facebook users who access their accounts on a monthly basis, placing the country among Facebook's top five largest markets (in addition to suggesting a potentially large discrepancy in the estimated number of Internet users in Indonesia by world organizations).[413] In June 2012, more tweets originated in Jakarta than in any other city.[414] Mobile instant messaging has also caught on rapidly; in addition to the ubiquitous WhatsApp, other social-messaging apps from China and South Korea are also popular in Indonesia. Line has more than 20 million users in Indonesia, and Tencent's WeChat is gaining in popularity.[415] Indonesia's online retailers established a presence early, with local electronics dealer Bhinneka launching its first online store in 1999.[416] As the online retail market matured, multinational retailers have also begun to establish a presence in the Indonesian market; for example, Rakuten opened its Indonesian online store in 2011.[417] Online gaming has also proved to be hugely popular, with many local developers launching online games tailored to the local context. As a result, the number of online gamers in Indonesia increased from 4 million in 2007 to 7.5 million in 2009.[418] Last, mobile banking is starting to make some inroads.[419]

## Barriers to Internet adoption in Indonesia

Indonesia is characterized by medium to high barriers across all four pillars of the Internet Barriers Index. To increase the number of Indonesian Internet users beyond the current trajectory, the country would need to address critical gaps, particularly in incentives and infrastructure (Exhibit 34).

### *Incentives*

Television has long dominated the media landscape in Indonesia, but the Internet is gaining traction. In 2012, the Internet overtook both newspaper and radio to become the second most widely viewed medium.[420] As users are increasingly exposed to the Internet, they typically spend more time using digital media (for example, PCs, tablets, and non-voice mobile phones) instead of traditional media (for example, landline phones and television); first-year Indonesian Internet users spend an average of 122 minutes a day on digital media and 142 minutes on traditional media.[421] Each year thereafter, the proportion skews toward digital; by year six, the digital usage of Indonesian Internet users has grown 146 percent, compared with a 36 percent increase in traditional media usage.[422]

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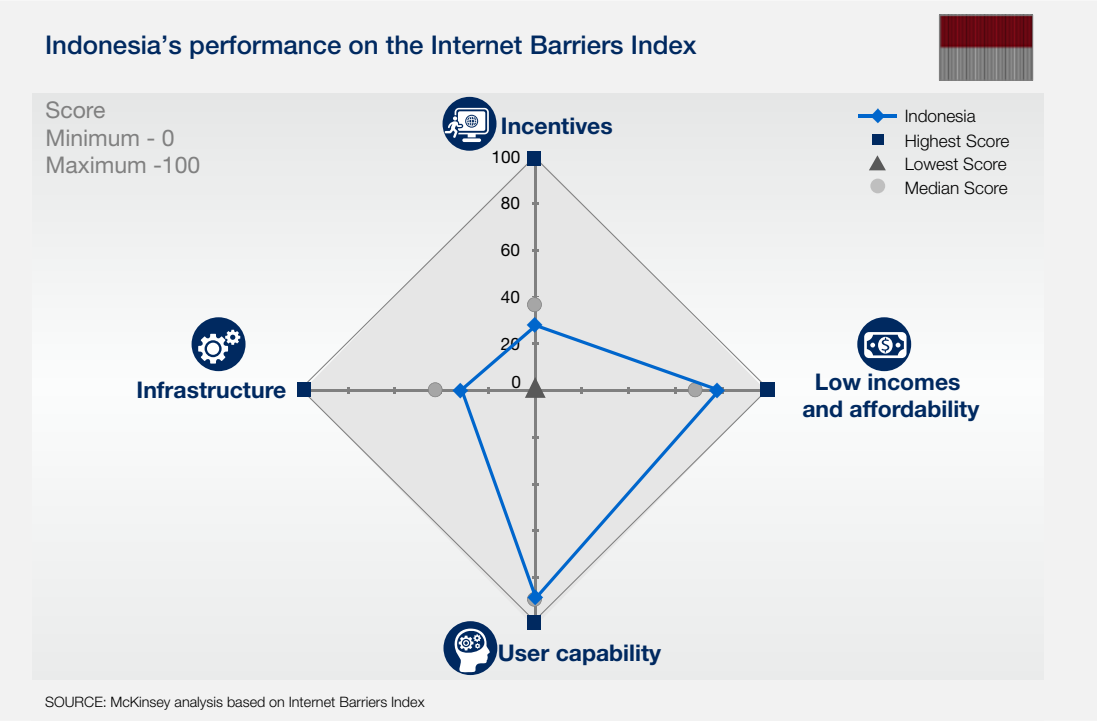
410 *Indonesia economic quarterly: 2008 again?,* World Bank, March 2011.
411 Ibid.
412 Jeremy Wagstaff and Kanupriya Kapoor, "BlackBuried: Indonesia failings offer lessons for Apple, Samsung," Reuters, September 25, 2013.
413 Mariel Grazella, "Facebook users rise to 64m in Indonesia," *Jakarta Post,* June 18, 2013.
414 "Indonesia: The social media capital of the world," OnDevice Research, December 10, 2013.
415 Willis Wee, "With 350 million registered users, Line looks at mobile commerce for future growth," techinasia.com, February 14, 2014; Winnie Nelson, "WeChat downloads grow 30 times in Indonesia after TV campaign," e27.com, March 11, 2013.
416 Enricko Lukman, "Battling against rocket Internet's Lazada, Bhinneka wants to be Indonesia's Amazon," techinasia.com, June 27, 2013.
417 "Online shopping mulai marak di Indonesia," Techno.okezone.com, March 3, 2011.
418 Andryan Gouw, "inGAME company profile and Indonesia gaming market statistics," slideshare.net, February 25, 2014.
419 Sebastian Partogi, "Banks getting online, with e-banking services," *Jakarta Post,* July 14, 2014.
420 Indonesia market data, Redwing Asia, 2012.
421 McKinsey iConsumer Global Research Initiative.
422 Ibid.

Exhibit 34




SOURCE: McKinsey analysis based on Internet Barriers Index

Indonesians use the Internet heavily for social networking: 85 percent of Internet users in Indonesia access social-networking sites.[423] In fact, in June 2012, more tweets were sent from Jakarta than from Tokyo, London, or New York.[424] Approximately 90 percent of Internet users in Indonesia have a Facebook account.[425] Beyond entertainment, the incentive for Internet use is rooted in its communication value; McKinsey research found that 51 percent of mobile social-network users in Indonesia have decreased their usage of international calls since they started to use social networking.[426] The Internet's growing popularity both as a substitute for other media channels and as a communication gateway could influence non-Internet users to get online in the coming years.

Recent studies also suggest Indonesian Internet users are getting comfortable with e-commerce. A 2013 survey conducted on behalf of Visa indicated that 76 percent of respondents, primarily younger, more affluent Internet users residing in urban centers, shopped online in the past year.[427] Taking into account the entire online population in Indonesia, eMarketer estimates that 9.5 percent of Internet users made at least one purchase via any digital channel in 2013.[428] Further development of Indonesia's e-commerce system could provide additional incentives for the higher-income offline population to get on the Internet.

423 "Global digital communication: Text, social networking popular worldwide," Pew Research Global Attitudes Project, December 20, 2011.
424 "Twitter reaches a half billion accounts; more than 140 million in U.S.," Semiocast, July 2012.
425 Enricko Lukman, "Finally, Facebook opens an office in Indonesia," techinasia.com, March 21, 2014.
426 McKinsey iConsumer Global Research Initiative.
427 Farid Firdaus, "Indonesians spend Rp 5.5 million annually on online shopping: Visa," *Jakarta Globe,* January 28, 2014.
428 "Huge Differences in digital buyer penetration across APAC," eMarketer, July 30, 2014.

### *Low incomes and affordability*

Although Indonesia faces a significant barrier in the affordability of fixed-broadband Internet access, mobile Internet access is a bright spot. Mobile data plan prices in Indonesia are quite low—at USD 5.70 in 2013, the price of a 500 Mb data plan in Indonesia translates to approximately 1.9 percent of GNI per capita, well below the average of the countries researched for this report.[429] As a result, Indonesian consumers rely on their mobile phones as their primary device to access the Internet.

The average retail price of a smartphone in Indonesia remains relatively high, at USD 458, the fifth highest absolute price among the countries we researched.[430] This price is equivalent to just under 13 percent of GNI per capita.[431] However, there is a thriving market for low-cost smartphones, with multiple local brands offering Android smartphones for less than USD 70.[432] The low prices of these devices have made them increasingly popular in Indonesia and other markets. This trend will likely continue and escalate, especially as international device manufacturers turn their eye toward Indonesia's sizable and growing market.

### *User capability*

Indonesia has a fairly high language literacy rate of 91 percent.[433] Bahasa Indonesia, the country's official and most widely spoken language, is written in the Roman alphabet, making it easily adaptable for Internet content.

### *Infrastructure*

The lack of strong telecommunications and adjacent infrastructure is a barrier to Internet adoption in Indonesia. Indonesia's rate of electrification in 2012 was 73 percent, meaning that some 66 million people still did not have access to electricity.[434] The country has set the goal of extending electricity to 86 percent of the population by 2016.[435]

Given Indonesia's archipelagic landscape with thousands of islands, deploying a full telecommunications network has been challenging. In 2010, fewer than 10 percent of households in Indonesia had fixed-line broadband connections.[436] As of the first quarter of 2014, the average speed of these connections was only 2.4 Mbps.[437] Despite year-over-year growth of more than 50 percent, Indonesia's sluggish connection speed places it among the slowest countries by this metric in the Asia-Pacific region.[438]

The limited reach and speed of Indonesia's fixed-line network has altered the usual path individuals take to the Internet; while consumers in developed markets go from no connection to landline and then to mobile, consumers in most developing countries typically leapfrog straight from no connection to Internet connectivity through mobile devices. This trend is especially true for Indonesia; 43 percent of surveyed users in Indonesia rely on mobile phones as the primary device to access the Internet.[439] Mobile network operators have moved aggressively to deploy 2.5G, 3G, and now 4G coverage. Telkomsel, for example, reported 3G population coverage in 2013 of 80% and 2.5G population coverage of more than 98 percent.[440]

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429 *Measuring the information society,* ITU, 2013: mobile data plan prices; World Bank, 2013 estimates: GNI per capita, Atlas method.World Bank, 2013 estimates.
430 Euromonitor, April 2014.
431 Euromonitor, April 2014: average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
432 Evercoss and Mito online price lists (http://www.rajahape.com/2013/03/harga-hp-cross.html; http://mitomobile.com/product/category/smart-phones)
433 "Adult literacy indicator (percent of people ages 15 and above)," World Bank, accessed 2014.
434 *World energy outlook 2013,* IEA, November 2013.
435 I Made Ro Sakya, "Electricity power development in Indonesia," PT PLN (Persero), presentation, Indonesia International Infrastructure Conference and Exhibition 2012, August 28–30, 2012.
436 *Consumer fixed voice, Internet and broadband services, worldwide, 2008–2015,* 2Q11 update, Gartner, June 2011.
437 *Akamai's state of the Internet: Q1 2014 report,* volume 7, number 1, Akamai, June 2014.
438 Ibid.
439 McKinsey iConsumer Global Research Initiative, 2012.
440 "Indonesia wireless report," TeleGeography, telegeography.com, accessed August 8, 2014.

Experts view this pattern as a major reason why the growth of landlines and fixed-broadband connections in Indonesia has remained flat over the years.[441] In 2012, fixed-broadband penetration stood at 3 percent, a figure that is below Indonesia's regional peers.[442] However, as prices decline, fixed broadband could become a more attractive option in the future and open the market to new consumers. Indeed, providers including Biznet, Indosat, and XL Axiata have announced plans to deploy fixed broadband, possibly on fiber, which will inevitably increase average speeds.[443] Fixed-line incumbent PT Telkom has gone one step further and announced its vision for an end-to-end expansion of broadband infrastructure. The Indonesia Digital Network (IDN) megaproject is aiming to provide at least 30 percent of households (approximately 20 million customers) with high-speed broadband access by 2015 by harnessing fiber optic technology.[444]

As discussed earlier, Indonesia currently lags behind much of the world by measure of fixed-line Internet connection speeds. However, this pattern is set to change, as the Indonesian government is improving its Internet infrastructure through investments in high-bandwidth optical-fiber submarine cables. A line to Malaysia has already been completed, and a new Australia-Indonesia-Singapore cable has been announced.[445] These developments could further increase the quality of Internet access in the future.

## Conclusion

Although Internet penetration in Indonesia has a long climb ahead, the population's demographics bode well for increased adoption. The nation's offline population demonstrates a high literacy rate, and slightly more than one-third is low-income based on the definition used for this report. The low cost of data and relatively affordable entry-level smartphones are also positive signs.

To accelerate penetration among the country's 210 million offline consumers, the government and operators would need to address needs for adjacent infrastructure, namely electricity in rural areas, as well as telecommunications infrastructure. The ongoing trend of growth in smartphone users could be an important step, as the Indonesian consumer base has already demonstrated a preference for mobile Internet. The development of Indonesia's e-commerce sector could also help drive Internet adoption, particularly among higher-income non-Internet users.

441 "Mobile phone penetration in Indonesia triples in five years," Nielsen, February 23, 2011.
442 Mariel Grazella, "Broadband market to double, but penetration remains low," *Jakarta Post,* January 7, 2013.
443 "Operators on their way to developing broadband," *Jakarta Post,* April 15, 2014.
444 "IT and gadgets: Broadband available for all," *Jakarta Post,* April 8, 2014.
445 "Submarine cable landing directory," TeleGeography, telegeography.com, accessed August 8, 2014.

## *Nigeria*

### Fast facts

- Total population, 2013: 174 million
- Internet penetration, 2013: 38 percent
- Offline population, 2013: 108 million

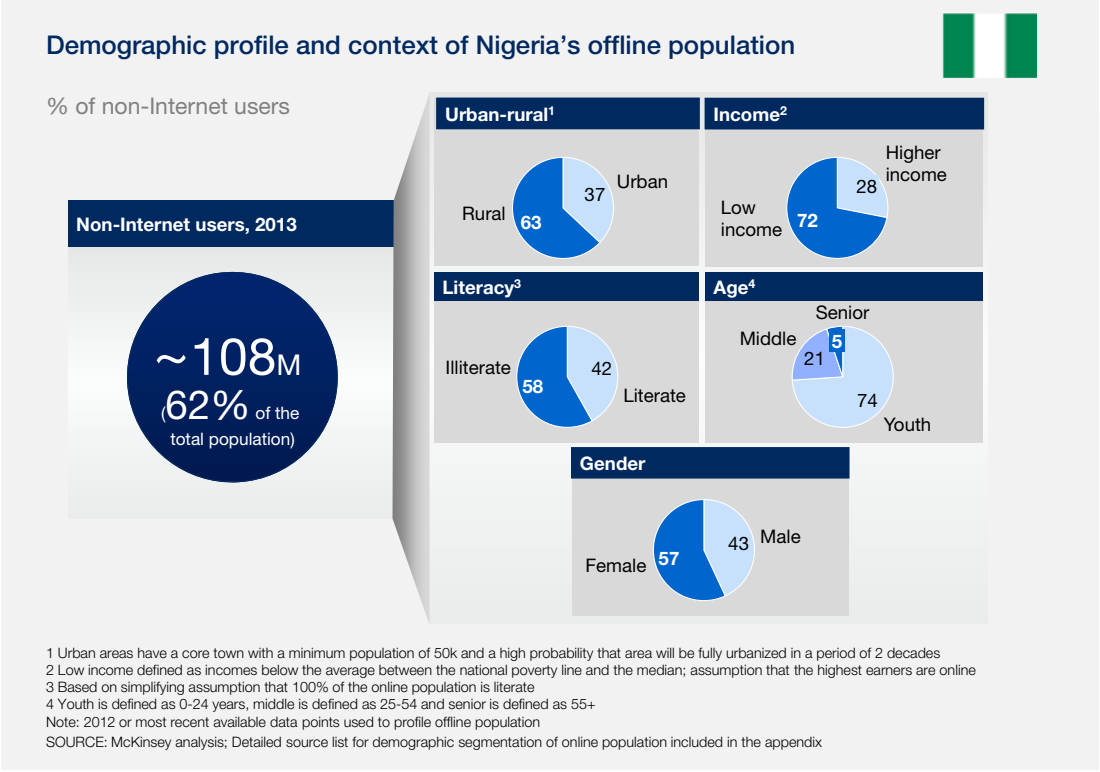
**Nigeria's large, young offline population and the country's willingness to embrace the mobile phone and the Internet present a considerable opportunity.**

Nigeria has long been Africa's largest country by population. A member of the high-barrier group as indicated by the Internet Barriers Index, Nigeria is an outlier with regard to Internet penetration: while the group's average Internet penetration rate was just 15 percent in 2013, 38 percent of Nigeria's population was online. Though several significant obstacles must be addressed, the nation's urbanization rate, young median age, and increasing mobile network coverage and smartphone penetration bode well for increasing Internet penetration in the years to come.

### Profile and context of Nigeria's offline population

Nigeria's offline population of 108 million has some characteristics that position the country well for future Internet adoption (Exhibit 35). Young people are typically early adopters of technology, and Nigeria's median age is among the lowest in the world at just over 18 years.[446] We estimate nearly 74 percent of the nation's non-Internet users are under 24 years of age, which could be a key driver of Internet growth. However, other attributes of the non-Internet user population—such as the fact that it is overwhelmingly rural (63 percent) and heavily skewed toward the low-income and illiterate segments—presents significant challenges. Increasing Internet adoption within these segments will require Nigeria to overcome several obstacles.

**Exhibit 35**




1 Urban areas have a core town with a minimum population of 50k and a high probability that area will be fully urbanized in a period of 2 decades
2 Low income defined as incomes below the average between the national poverty line and the median; assumption that the highest earners are online
3 Based on simplifying assumption that 100% of the online population is literate
4 Youth is defined as 0-24 years, middle is defined as 25-54 and senior is defined as 55+
Note: 2012 or most recent available data points used to profile offline population
SOURCE: McKinsey analysis; Detailed source list for demographic segmentation of online population included in the appendix

446 *The World Factbook,* CIA, accessed 2014.

## Key trends driving Nigeria's growth in Internet penetration

The number of Internet users in Nigeria has been steadily rising, from about 24 million in 2008 to nearly 66 million in 2013, a CAGR of 22 percent.[447] Nigeria's Internet penetration rate of 38 percent ranks higher than all other sub-Saharan African countries in this report except South Africa. Despite this progress, Nigeria still lags behind the continent's leaders (Kenya and Senegal) in urban Internet penetration and ranks in the bottom quartile on the Internet Barriers Index among the countries researched for this report.[448]

As in other developing nations, Internet adoption in Nigeria has been driven in large part by five underlying trends.

### *Trend #1: Expansion of mobile network coverage and increasing mobile Internet adoption*

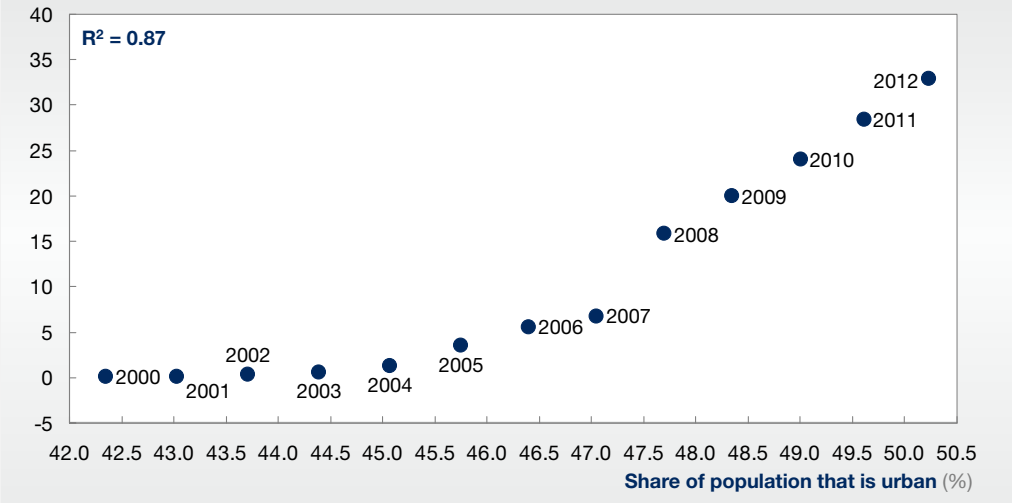
GSMA estimated that in 2012, Nigeria's 2G network covered 72 percent of the population, but 3G coverage reached less than 10 percent.[449] From 2008 to 2013, mobile connections grew at a CAGR of 15 percent, to 127 million, while 3G connections grew at 41 percent, to 16 million.[450]

### *Trend #2: Urbanization*

Nigeria's current urbanization rate of more than 50 percent is far above that in many other developing countries (for example, Bangladesh, India, and Pakistan, which have urbanization rates below 40 percent).[451] This relatively high level of urbanization could partially explain Nigeria's higher-than-expected Internet penetration relative to its Internet Barriers Index score. After the country reached the critical mass of approximately 45 percent urbanization, Internet penetration increased rapidly (Exhibit 36). However, Nigeria's urban Internet penetration still lags behind other leading African countries. In urban Kenya, for example, 78 percent of consumers have access to the Internet, and 95 percent of mobile phone users own an Internet-enabled device.[452] Across Africa, 56 percent of urban consumers own Internet-ready devices, and a third of this number use their phones to access the Internet every day.[453]

**Exhibit 36**

**Internet penetration in Nigeria is achieving further scale with increasing urbanization**




SOURCE: International Telecommunication Union; The World Bank

447 World Bank.
448 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.
449 GSMA Intelligence, 2012 estimates.
450 GSMA Intelligence, 2014 extract.
451 Helen Chapin Metz, "Urbanization," *Nigeria: A Country Study,* US Library of Congress, 1991.
452 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.
453 *Inside mobile Africa,* M&C Saatchi Mobile, June 2013.

### *Trend #3: Shrinking device and data plan prices*

From 2008 to 2013, the average retail price of a smartphone in Nigeria decreased by 33 percent, from USD 475 to USD 319.[454] This price is equivalent to just under 12 percent of GNI per capita, highlighting Nigeria's challenge in addressing low incomes and affordability.[455] Looking ahead, the number of smartphone owners in Kenya, Nigeria, and Tanzania is predicted to grow from 4 million today to 25 million by 2017.[456] Since the vast majority of Nigerian consumers who regularly access the Internet use mobile devices to do so, smartphone penetration will continue to be an important metric to gauge progress going forward. Nigeria's mobile Internet service costs an average of USD 13 for a 500 Mb prepaid plan (equal to 5.7 percent of GNI per capita), an absolute price that falls in the middle of the countries researched for this report.[457]

### *Trend #4: Growing middle class*

Nigeria's middle class is still emerging. Despite a decade of stable economic growth, the number of Nigerians living in poverty has not declined significantly.[458] In rural areas, 53 percent of the population lives below the national poverty line due to low farm output, poor access to markets, and rising population numbers that are leading to the cultivation of smaller plots.[459] In Nigeria's cities, where the majority of the population now lives, very high rates of informal employment and underemployment contribute to a poverty rate of 34 percent.[460] Although more than 40 percent of the population falls below the national poverty line, the number of households in the consuming class is growing rapidly.[461] By 2030, some 160 million Nigerians (out of a projected population of 273 million) could live in households with sufficient incomes for discretionary spending.[462]

### *Trend #5: Increasing utility of the Internet*

Currently, Nigeria leads other African nations in the use of online commercial activities such as shopping, banking, and arranging travel.[463] However, social networking is still Nigerians' top use of the Internet.[464] Since its launch in 2006, Facebook has been widely embraced by Nigerian consumers, who use social networking and news websites more heavily than the average urban African consumer.[465] In addition, online-shopping platforms such as Jumia and Konga were launched in 2012, with each now boasting 100,000 unique daily visitors.[466]

## Barriers to Internet adoption in Nigeria

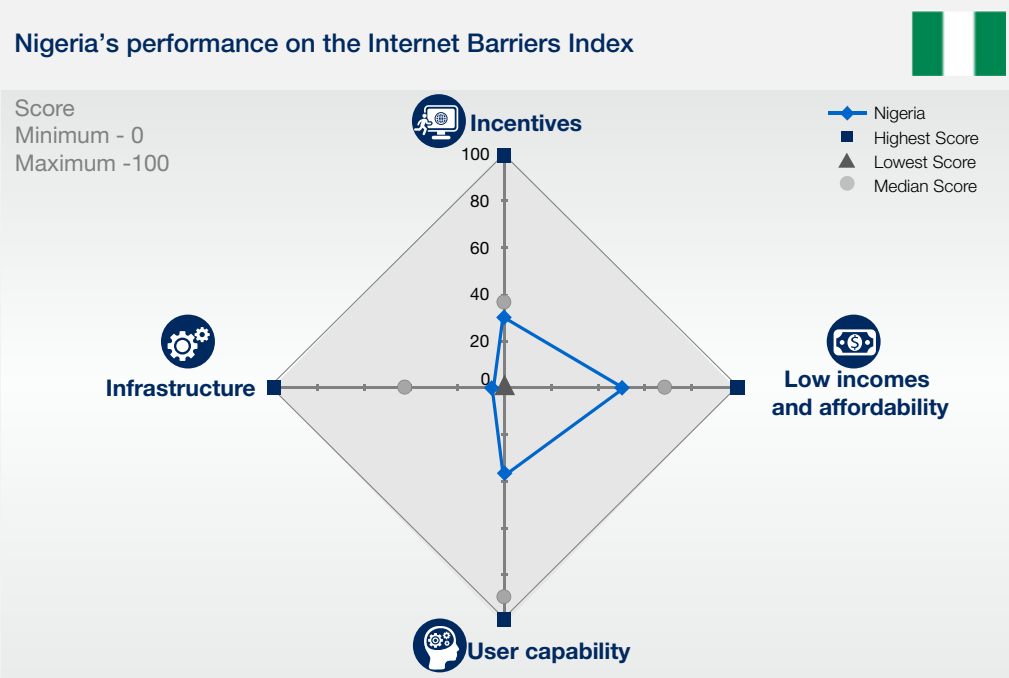
To increase the number of Nigerian Internet users above current estimates, the country would need to address crucial gaps in its Internet ecosystem. Nigeria faces significant barriers to Internet adoption across all pillars of the Internet Barriers Index (Exhibit 37).

### *Incentives*

Nigeria's online consumers are heavy users of social media. In a recent survey of online consumers, 73 percent of Nigerian participants reported accessing Facebook daily.[467] For survey participants who use

454 Euromonitor, April 2014.
455 Euromonitor, April 2014: average retail smartphone prices (modeled); World Bank, 2013 estimates: GNI per capita, Atlas method.
456 Dayo Oketola, "25 percent of Nigerian mobile subscribers use smartphones–TNS," punchng.com, January 8, 2013.
457 *Measuring the information society,* ITU, 2013: mobile data plan prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
458 *Nigeria's renewal: Delivering inclusive growth in Africa's largest economy,* MGI, July 2014.
459 Ibid.
460 Ibid.
461 Poverty as of 2010, calculated by the National Bureau of Statistics was 46 percent.
462 *Nigeria's renewal: Delivering inclusive growth in Africa's largest economy,* MGI, July 2014.
463 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.
464 Ibid.
465 McKinsey ACIC, 2011.
466 Ben Ezeamalu, "Nigeria's foremost online retailers Jumia, Konga, at war," *Premium Times,* premiumtimesng.com, February 15, 2014.
467 "How Nigerians use social media," businessdayonline.com, August 1, 2013.

Exhibit 37




SOURCE: McKinsey analysis based on Internet Barriers Index

their phone to get online, Facebook, Google, and Yahoo were the top websites.[468] Another recent report found that 72 percent of Nigerian online users visited social-networking sites in 2013, up slightly over the 2009 rate of 70 percent, indicating that social media is still a primary driver of Internet activity.[469] However, while 54 percent of online Nigerians were using the Internet for entertainment in 2009, this number dropped to 46 percent in 2013.[470] In addition to social media sites, mobile chat apps have seen a rapid surge due to their low cost compared with text as well as their high performance on feature phones using less bandwidth.

The Nigerian government has also begun to move some of its information and services online, which could increase Internet use and improve the transparency into and efficiency of the provision of government services.[471] In just five years, Galaxy Backbone, a government-owned technology provider, created a unified platform to support e-government programs in Nigeria.[472]

### *Low incomes and affordability*

Nigeria's top affordability challenge is the extreme poverty of its population. More than 40 percent of the Nigerian population falls below the national poverty line.[473] Meanwhile, MGI estimates that approximately 130 million Nigerians, or about 74 percent of the country's population, live below the Empowerment Line.[474]

468 "How Nigerians use social media," businessdayonline.com, August 1, 2013.
469 *The social media landscape in Nigeria,* Africapractice, 2014.
470 Ibid.
471 *Lions go digital: The Internet's transformative potential in Africa,* McKinsey & Company, November 2013.
472 Isaac Aimirie, "Nigeria: Galaxy Backbone wins UN Public Service award," allafrica.com, June 17, 2013.
473 Using the definition of poverty from Nigeria's National Bureau of Statistics, which is based on an estimate of what it takes to support daily adult consumption of 3,000 calories plus other necessary expenditures. *Nigeria's renewal: Delivering inclusive growth in Africa's largest economy,* MGI, July 2014.
474 The MGI Empowerment Line was created to define a meaningful, economically empowered standard of living. The Empowerment Line is the income required to fulfill eight basic household needs: food, energy, housing, drinking water, sanitation, health care, education, and social security. For further details on the methodology, see *From poverty to empowerment: India's imperative for jobs, growth, and effective basic services,* MGI, February 2014. Nigerian figures from *Nigeria's renewal: Delivering inclusive growth in Africa's largest economy,* MGI, July 2014.

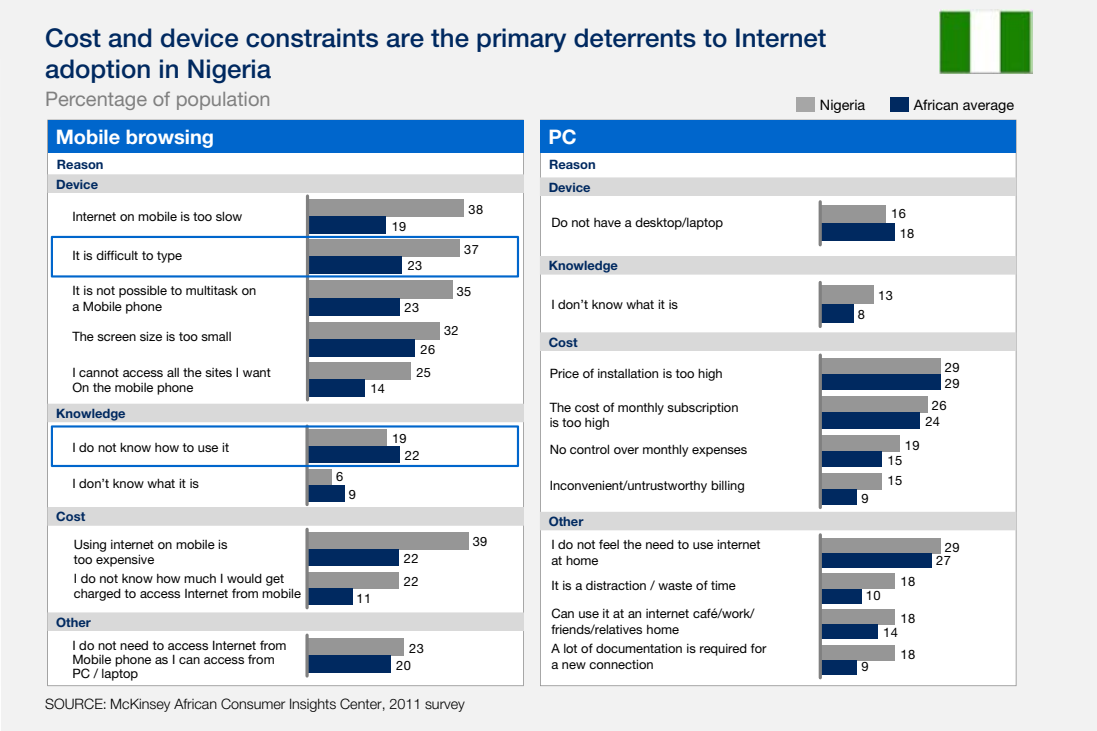
While absolute device and data plan prices in Nigeria are relatively low compared with other countries studied for this report, the cost of access remains a significant barrier to the large low-income segment of the population. In 2013, the average cost of a 500 Mb prepaid data plan for Nigerian consumers was about USD 13, on par with absolute prices in more developed economies such as Germany and Italy.[475] However, these prices require that the average Nigerian consumer spend 5.7 percent of GNI per capita to access the mobile Internet.[476] Similarly, in 2013 the average retail price of a smartphone was USD 348—11.6 percent of GNI per capita.[477]

Device manufacturers are trying to design smartphones that are affordable for Nigerian consumers; for example, Huawei has invested in the development of smartphones below USD 100.[478] While feature phones still play a prominent role in Nigeria's mobile market, declining smartphone prices have helped smartphone penetration in Nigeria reach 25 percent.[479] Owning more than one SIM card is a popular way of saving money, since it allows users to switch between networks and benefit from the most affordable voice and data plans from various carriers.

### *User capability*

As is the case in many of this report's countries, a large percentage of Nigeria's population—39 percent of adults—are illiterate.[480] The rates are even higher for the female population: 50 percent of adult women and 34 percent of girls in Nigeria are illiterate.[481] Digital literacy is also a challenge. A 2011 survey of urban Nigerian consumers revealed that 19 percent of those surveyed don't know how to browse the Internet and 37 percent find it difficult to type on their mobile device (Exhibit 38).[482] As a result, even if Nigeria overcomes the low incomes and affordability and infrastructure barriers, language and digital literacy barriers would remain to be addressed.

## Exhibit 38




SOURCE: McKinsey African Consumer Insights Center, 2011 survey

475 *Measuring the information society,* ITU, 2013.
476 *Measuring the information society,* ITU, 2013: mobile data plan prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
477 Euromonitor, April 2014: average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
478 Sharon Mai, "Smartphone adoption in Africa: The rising smartphone market," amgoo.com, April 4, 2014.
479 *Inside mobile Africa,* M&C Saatchi Mobile, June 2013.
480 *The World Factbook,* CIA, accessed 2014.
481 Index Mundi, indexmundi.com, accessed 2014.
482 McKinsey ACIC, 2011.

### *Infrastructure*

By some measures—including access to submarine communications cables—Nigeria's infrastructure fares well when compared with other African countries. In addition, several projects, including the West Africa Cable System (WACS), have improved network infrastructure and increased high-capacity connections.[483] To improve Internet connectivity in rural Nigeria, where terrestrial fiber is lacking, the government launched the NigComSat 1-R satellite in December 2011.[484] Satellite links have helped some providers roll out services quickly in rural areas—but technology drawbacks (such as signal delays) and cost still limit the Internet's use.[485]

The lack of a reliable electricity supply in Nigeria is one of the country's greatest weaknesses. According to Adam Smith International, 50 percent of Nigerians lack access to an electric grid, and residents in both rural and urban areas experience more frequent power outages than those in other African countries.[486] Compared with India, Nigeria has less than one-fifth the electricity generation capacity per person.[487] Some device manufacturers have already designed mobile phones that accommodate Nigeria's poor power grid. For example, Nokia's current handsets are already perceived to have a longer battery life, and Lenovo aims to introduce smartphones with longer-lasting batteries.[488]

The poor electric grid supply also poses a challenge to the supply side, which needs power for its infrastructure. Of the total 24,252 telecom sites in Nigeria, a GSMA report estimated that 52 percent are off grid, and 81 percent of these sites suffer power outages for up to six hours a day.[489] In fact, one Nigerian network operator estimated that lack of power is responsible for about 70 percent of its downtime.[490] This challenge can substantially increase the cost to provide Internet access. To address this shortfall, the power sector recently began a privatization process that is intended to improve the operations of both generation and distribution systems while increasing the energy supply and financial viability of the sector.[491]

## Conclusion

Nigeria's large offline population, when combined with a relatively high urbanization rate, young median age, and consumers' potential willingness to embrace online activities such as retail, presents a tremendous opportunity to bring new users online. However, high unemployment and poverty levels make affordability a barrier for the majority of Nigeria's offline population. In addition, the country also faces a significant challenge in its lack of language and digital literacy as well as telecommunications and adjacent infrastructure. If these barriers can be navigated and mitigated, Nigeria's current offline population of 108 million represents a significant opportunity to connect new users to the Internet.

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483 Jyoti Desai, "A year after WACS: Is faster, more affordable broadband becoming a reality?," *This Day Live,* thisdaylive.com, August 11, 2013.
484 Peter B. de Selding, "Nigcomsat-1R launched successfully by Long March," SpaceNews, spacenews.com, December 21, 2011.
485 *Via satellite digital: Middle East and Africa edition,* Access Intelligence, November 2013.
486 Adam Smith International, "The light is getting brighter in Nigeria," *Guardian,* theguardian.com, n.d.
487 *Nigeria's renewal: Delivering inclusive growth in Africa's largest economy,* MGI, July 2014.
488 Chris Kay and Chris Spillane, "Nigerian smartphone boom challenges Nokia Africa dominance," bloomberg.com, May 28, 2013.
489 *Powering telecoms: West Africa market analysis,* GSMA, March 2013.
490 Chidi Okoye, "Airtel base stations to be solar powered," *Daily Times NG,* December 7, 2011.
491 Adam Smith International, "Nigerian power breakthrough provides new hope for millions," *Guardian,* theguardian.com, n.d.

## *United States*

Fast facts

- Total population, 2013: 316 million
- Internet penetration, 2013: 84 percent
- Offline population, 2013: 50 million

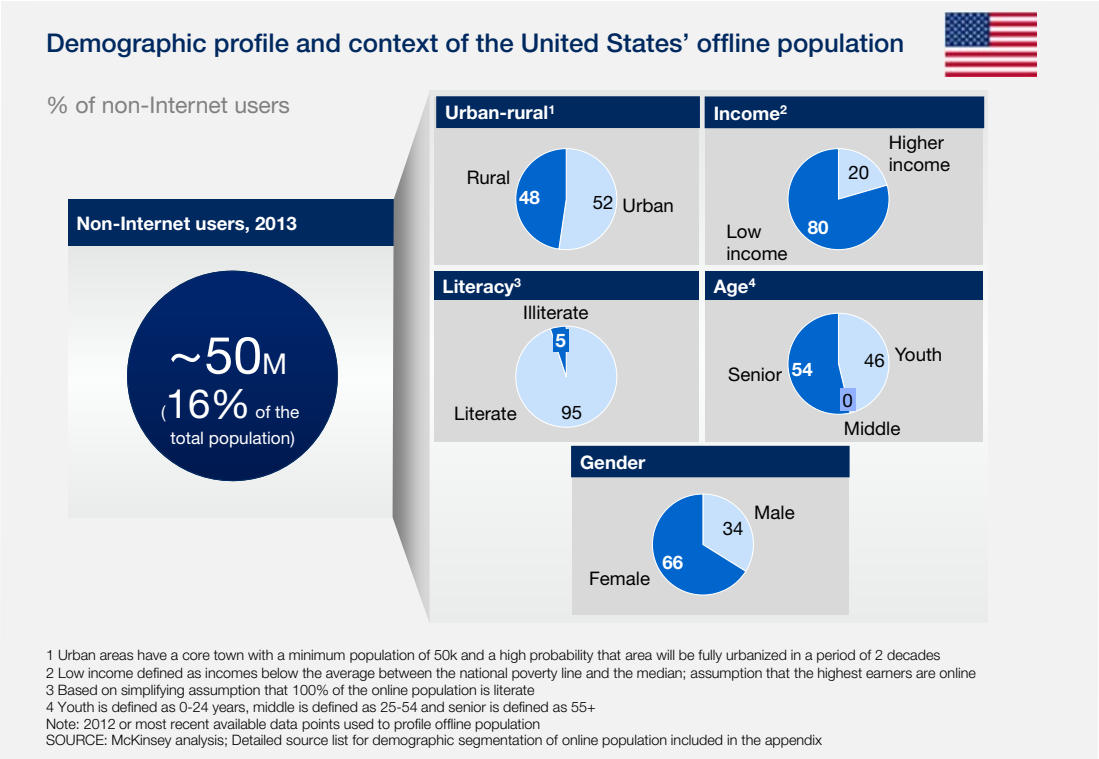
**At 84 percent, the United States has one of the highest levels of Internet penetration in the world—but it's also home to a large population of 50 million non-Internet users.**

The United States has an Internet penetration of 84 percent, one of the highest rates in the world. This level has been fueled by the rapid adoption of mobile technologies and the wealth of available content that helps to drive people online. Over the past four years, consumer use of mobile phones to access the Internet has increased by more than 30 percent, driven by significant growth in application downloads as well as e-mail and video streaming.[492] Average retail smartphone prices declined by 33 percent from 2008 to 2013 in the United States and are now among the lowest in the world due in large part to operators subsidizing the cost to the consumer.[493] These trends will likely drive moderate growth in the United States' Internet penetration rate in the near term.

### Profile and context of the U.S. offline population

Internet use in the United States grew at a CAGR of 3.4 percent from 2008 to 2013, a relatively slow pace when compared with developing nations.[494] However, the size of the prize by measure of non-Internet users is significant at 50 million people--a population that is overwhelmingly low income, mostly older, and primarily female (Exhibit 39).

**Exhibit 39**




1 Urban areas have a core town with a minimum population of 50k and a high probability that area will be fully urbanized in a period of 2 decades
2 Low income defined as incomes below the average between the national poverty line and the median; assumption that the highest earners are online
3 Based on simplifying assumption that 100% of the online population is literate
4 Youth is defined as 0-24 years, middle is defined as 25-54 and senior is defined as 55+
Note: 2012 or most recent available data points used to profile offline population
SOURCE: McKinsey analysis; Detailed source list for demographic segmentation of online population included in the appendix

492 "Part 1: How the internet has woven itself into American life," *The Web at 25 in the U.S.,* Pew Research Internet Project, February 27, 2014.
493 Euromonitor, April 2014.
494 World Bank.

Despite the fact that U.S. non-Internet users are better educated and more literate than their counterparts in many other countries, the U.S. offline population faces significant barriers to Internet adoption in the area of user capability. The Pew Research Internet Project found that a majority of potential Internet users feel that they would need guidance to get online if the Internet were made available to them.[495] In addition, the level of education in the United States is strongly correlated with Internet use; 94 percent of college graduates use the Internet compared with 66 percent of individuals with a high-school degree or less.[496]

## Key trends driving growth in Internet penetration in the United States

Unlike the other countries in this report, trends toward urbanization and rising affluence will not necessarily drive more people online in the United States. Instead, increased Internet penetration will depend primarily on the growth of mobile adoption and the continued flow of relevant and available content.

### *Trend #1: Expansion of mobile network coverage and increasing mobile Internet adoption*

Network operators in the United States have invested heavily to deploy 2G, 3G, and now 4G networks to all corners of the country. As of late 2012, 2G and 3G networks covered 99 and 95 percent, respectively, of the U.S. population, suggesting that robust infrastructure has afforded the vast majority of consumers a choice in service.[497] From 2008 to 2013, mobile connections grew at a CAGR of 5 percent, to 347 million, while 3G connections grew at 18 percent, to 193 million.[498] The portion of adult mobile phone owners who use their phone to access the Internet grew from 29 percent at the start of 2010 to 60 percent by the end of 2013.[499]

### *Trend #2: Urbanization*

Unlike the other countries profiled in this report, urbanization is unlikely to drive substantially more people online in the United States. Approximately 82 percent of the U.S. population already lives in urban areas, with analysts forecasting moderate growth in the coming years, so this trend will not have the same transformational impact as in developing countries.[500]

### *Trend #3: Shrinking device and data plan costs*

Average retail smartphone prices have declined steadily over the past several years; prices fell at a CAGR of 7.8 percent from 2008 to 2013, to USD 129.[501] Average smartphone prices at the point of sale in the United States are among the lowest in the world, largely due to operators subsidizing or financing the cost to the consumer. As a percentage of GNI per capita, U.S. average smartphone expenditure is roughly a quarter that of Spain, the next-closest country by this measure researched for this report.[502] Smartphone penetration increased from 35 percent in 2011 to 58 percent in 2014.[503] Prices on mobile data plans are also falling. In the last year, each of the four mobile network operators have dropped prices significantly, with two mobile operators now offering plans with unlimited data.[504]

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495 "Part 1: How the internet has woven itself into American life," *The Web at 25 in the U.S.,* Pew Research Internet Project, February 27, 2014.
496 Ibid.
497 GSMA Intelligence, 2012 estimates.
498 GSMA Intelligence, 2014 extract.
499 "Part 1: How the internet has woven itself into American life," *The Web at 25 in the U.S.,* Pew Research Internet Project, February 27, 2014.
500 "Degree of urbanization in the United States from 2002 to 2012," statista.com, accessed 2014.
501 Euromonitor, April 2014.
502 Euromonitor, April 2014: average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.
503 "Part 1: How the internet has woven itself into American life," *The Web at 25 in the U.S.,* Pew Research Internet Project, February 27, 2014.
504 Scott Moritz, "In Verizon's Price Battle with AT&T, Consumers Get the Spoils," bloomberg.com, April 4, 2014.

### *Trend #4: Growing middle class*

In contrast with the other countries profiled in this report, where most are seeing at least modest growth of their middle class, the United States has seen the gap between the rich and poor widen. The percentage of the U.S. population characterized as middle class fell from 61 percent in 1971 to 51 percent in 2011.[505] Further, in 2011, this segment's share of national household income fell to 45 percent, a 17-percentage point drop from 1971.[506] The wealth of U.S. families, which had risen every decade since World War II, also dropped from 2000 to 2010.[507]

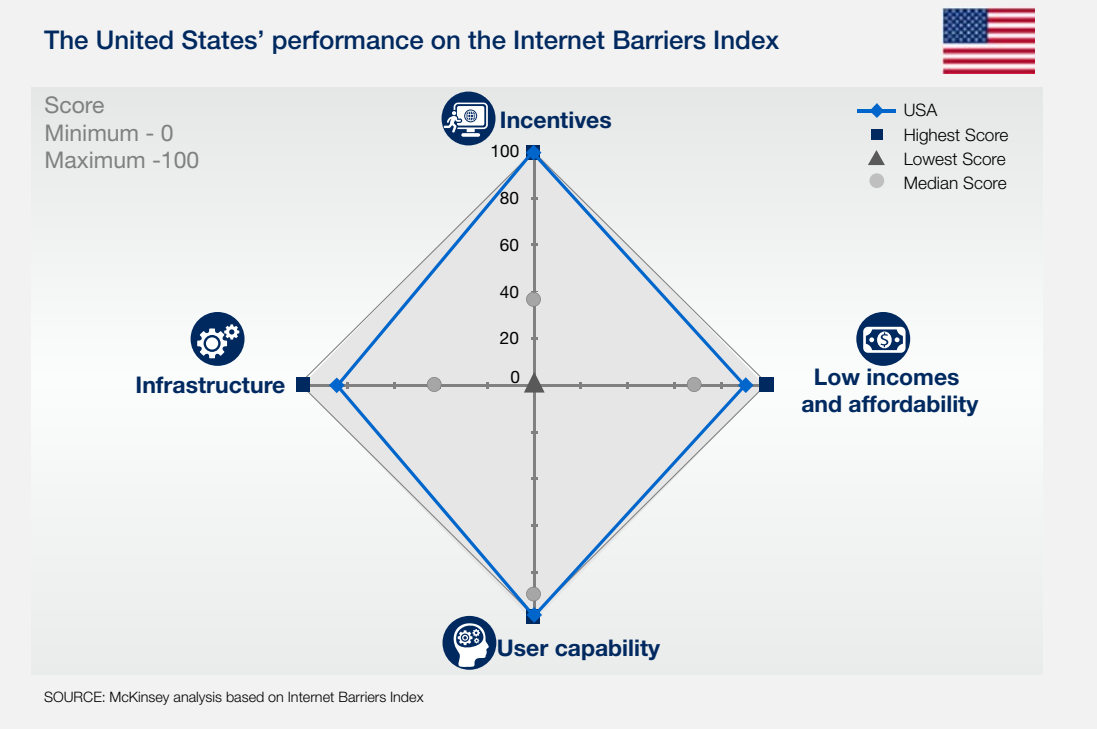
### *Trend #5: Increasing utility of the Internet*

Several of the world's largest Internet companies—including Amazon, Google, and Facebook—started in the United States. Retailers Amazon and eBay were online as early as 1995, with Google's first local search engine following shortly after in 1997. Americans were also among the first to embrace social media when Friendster launched in 2002. In short, U.S. residents were at the vanguard of the global population in encountering, understanding, and embracing the utility of the Internet.

## Barriers to Internet adoption in the United States

Compared with other countries in this report, the United States has some of the lowest barriers to Internet adoption (Exhibit 40). Its broadband infrastructure is highly developed, and mobile carriers are making significant investments to expand 3G and 4G coverage and accommodate increasing demand for the streaming of online content. These investments are justified by a population that has embraced mobile phones; 90 percent of U.S. adults own a cell phone, with two-thirds of this group using their phones to access the Internet.[508] Still, to drive adoption beyond current estimates, the United States would need to address some gaps in its Internet ecosystem.

**Exhibit 40**



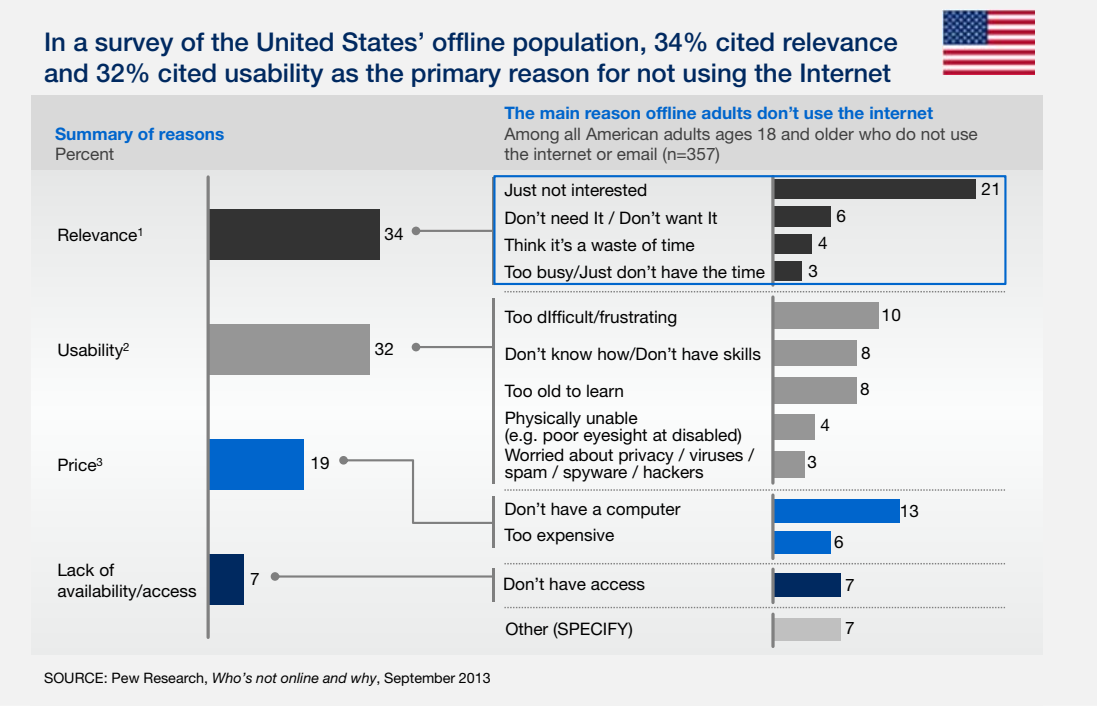

SOURCE: McKinsey analysis based on Internet Barriers Index

505 *The lost decade of the middle class, Pew Research Center,* August 22, 2012.
506 Ibid.
507 Ibid.
508 "Part 1: How the internet has woven itself into American life," *The Web at 25 in the U.S.,* Pew Research Internet Project, February 27, 2014.

## *Incentives*

Among the 50 million non-Internet users in the United States, the leading reason cited for not going online is a lack of interest (Exhibit 41). According to a Pew Research Center report, many Americans do not think that they would find content interesting or relevant to them, and others don't want to "waste" precious time.[509] As more government agencies integrate e-services into their offerings, these numbers could improve in the coming years.

**Exhibit 41**




## *Low incomes and affordability*

There is a clear correlation between income and Internet adoption in the United States. A recent Pew Research Internet Project study found that while 99 percent of U.S. adults in households with incomes greater than USD 75,000 per year access the Internet, only 77 percent of adults in households with income less than USD 30,000 per year go online.[510] Despite the country's relatively high GDP per capita, the high proportion of the population with low incomes and poverty remains a challenge in the United States; the U.S. Gini coefficient of .45 is high relative to most other developed nations, and 15 percent of the population lives below the national poverty line.[511]

Comparison of device and data plan prices with other countries is particularly difficult for the United States. In large part due to operator subsidies and financing, the United States claims the lowest average smartphone prices at the time of sale of the 25 countries researched for this report, both by measure of absolute prices and as a percentage of GNI per capita.[512] Instead of being sold à la carte, data plans are typically bundled with the device and voice plan. In addition, family plans are common, and two of the four major mobile network operators offer plans with unlimited data. As a result, à la carte comparisons of device and mobile data plan pricing against other countries can be misleading.

509 Kathryn Zickuhr, *Who's not online and why?,* Pew Research Internet Project, September 25, 2013.
510 "Part 1: How the internet has woven itself into American life," *The Web at 25 in the U.S.,* Pew Research Internet Project, February 27, 2014.
511 *The World Factbook,* CIA, accessed 2014.
512 Euromonitor, April 2014: average retail smartphone prices; World Bank, 2013 estimates: GNI per capita, Atlas method.

### *User capability*

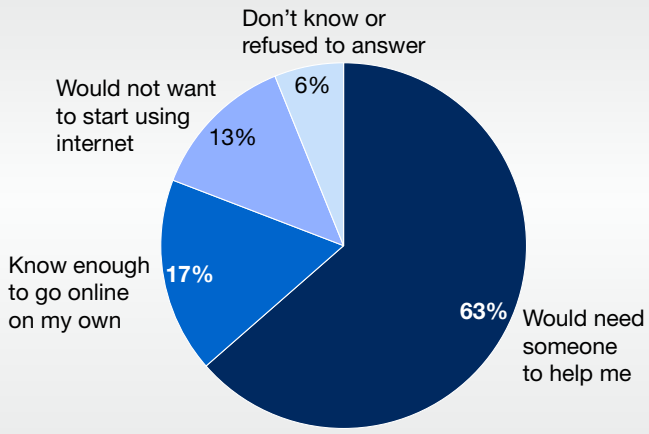
Despite a high language literacy rate (99 percent of the U.S. population can read and write) and education levels compared with other countries, 63 percent of Americans lack the digital literacy to use the Internet if it were made available to them (Exhibit 42).[513] This root cause is especially acute among the elderly; a Pew Research Center survey found that 77 percent of U.S. seniors expressed the need for someone to walk them through how to use a new device or technology.[514] Furthermore, approximately two-fifths of seniors state they have a physical condition that limits their daily participation in activities such as reading.[515] Thus, efforts to raise technical literacy and accessibility of content among older generations could help to address this barrier. For younger generations, the integration of online technologies into everyday life and their greater comfort with technology will likely expose increasing numbers to the Internet as a matter of course.

**Exhibit 42**

**More than half of the non-internet user population feel that they would need assistance in order to use the internet**

**If the internet was made available to you, would you be able to use it yourself?**

Percent of non-Internet users (n=357)




SOURCE: Pew Research, *Who's not online and why*, September 2013

### *Infrastructure*

According to a Pew Research Internet Project survey conducted in September 2013, about 70 percent of U.S. adults (aged 18 and over) enjoyed broadband access at home, up from 66 percent a year earlier.[516] At that same time, the Federal Communications Commission (FCC)'s national broadband map reported that more than 91 percent of all U.S. communities across the nation had access to an Internet connection with advertised download speeds of at least 10 Mbps, and more than 80 percent had access to advertised download speeds of greater than 50 Mbps.[517]

However, according to the World Economic Forum's *2013 Global Competitiveness* report, the United States is ranked only 34th in the world with regard to Internet bandwidth.[518] Akamai, a leading content delivery network, gave the United States a worldwide ranking of 17th in average peak connection speed in

513 *The World Factbook,* CIA, accessed 2014; Pew Research Internet Project survey, January 9–12, 2014.
514 *Older adults and technology use,* Pew Research Center, April 3, 2014.
515 Ibid.
516 "Broadband technology fact sheet," Pew Research Internet Project, n.d.
517 "National broadband map," broadbandmap.gov, accessed 2014.
518 *The global competitiveness report 2013–2014,* WEF, September 2013.

the first quarter of 2014.[519] A possible explanation for this discrepancy exists: analysts note that in assessing broadband, advertised speeds often far exceed actual speeds.[520]

Similarly, a nonpartisan think tank's February 2013 report concluded that the United States is indeed a global leader in broadband on several measures, including intermodal competition between cable and DSL fiber-based technologies, 4G/LTE mobile broadband, and entry-level pricing.[521] Notably, the report says that the United States effectively utilizes private competition and investment to drive broadband growth. For instance, in 2011, U.S. companies bought more fiber-optic cable than all of Europe.[522]

## Conclusion

Although the United States is a mature market experiencing modest growth in Internet penetration, pulling the right levers could convert a significant number of its current 50 million non-Internet users. Compared with the other countries examined, the United States has some of the lowest barriers to Internet adoption, and it should be possible to bring a high percentage of these non-users online in the coming years. The key trend of growing mobile adoption will likely be a main driver. To increase adoption faster than what current trends indicate, the offline population—many of whom are elderly, underprivileged, or both—need to be educated on both the benefits of the Internet and how to use it. Furthermore, addressing the widening gap between the rich and poor in the United States could help improve affordability of Internet access for those at the bottom of the pyramid.

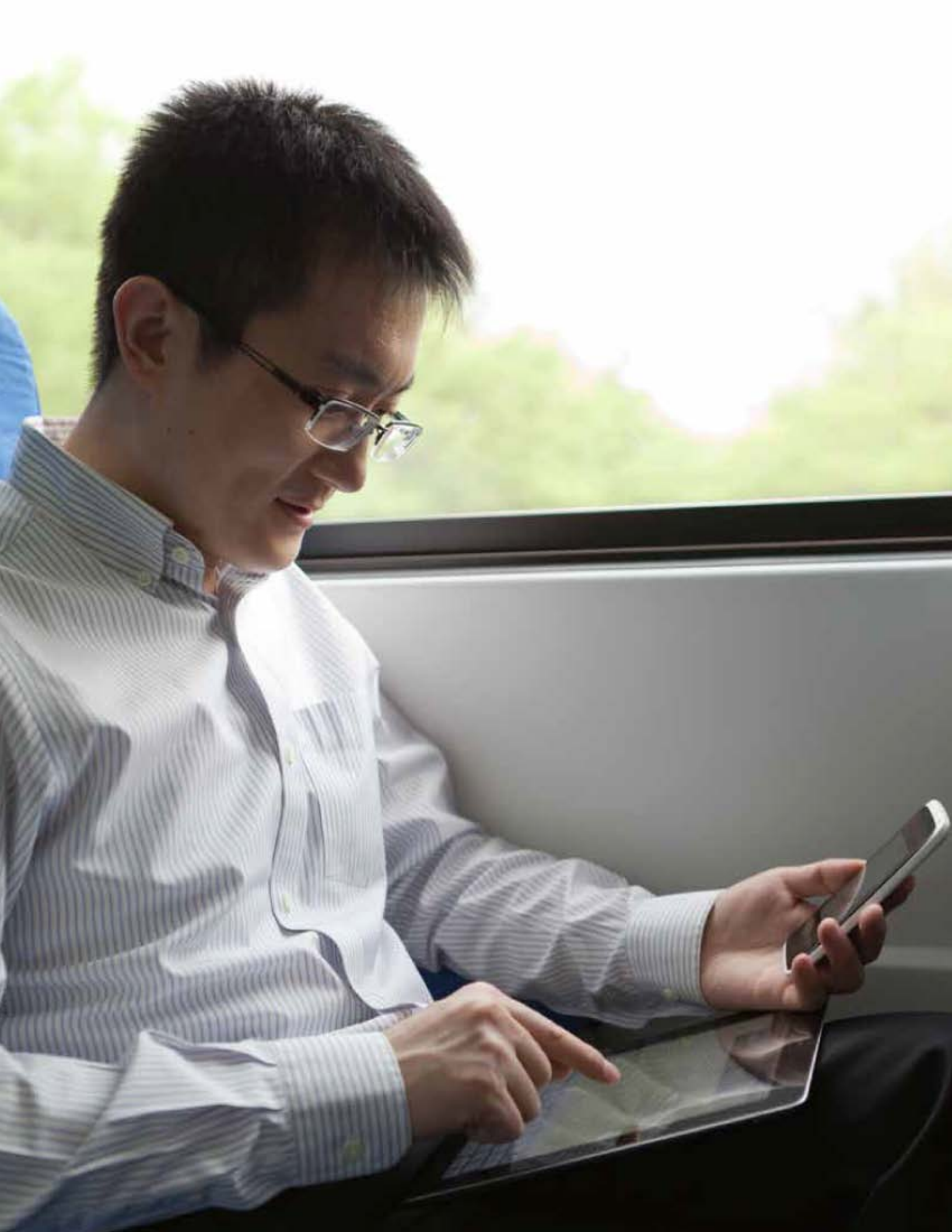
519 *Akamai's state of the Internet: Q1 2014 report,* volume 7, number 1, Akamai, June 2014.
520 Steven J. Markovich, "U.S. broadband policy and competitiveness," Council on Foreign Relations, May 13, 2013.
521 *The whole picture: Where America's broadband networks really stand,* Information Technology and Innovation Foundation, February 2013.
522 Steven J. Markovich, "U.S. broadband policy and competitiveness," Council on Foreign Relations, cfr.org, May 13, 2013.

# 7. Conclusion

The growth of the global online population over the past decade is cause for optimism. Since 2004, 1.8 billion people have joined the online ranks, gaining access to information and connections that have improved their quality of life and economic opportunities. Despite this progress, formidable challenges remain; even if recent trends continue at their current course and speed, 3.8 billion to 4.2 billion individuals will still lack access to the Internet in 2017. With the rapid pace of technological advances, those on the wrong side of the digital divide will find themselves falling further behind without the means to catch up—and the broader world community will miss out on their voices, ideas, and contributions.

Identifying the barriers to Internet adoption is a critical step to formulating effective solutions. This report has analyzed the performance of 25 countries in granular detail, and the resulting Internet Barriers Index facilitates the development of solutions by isolating the impact of individual barriers. Similarly, the five country groupings identified in this report highlight the common challenges faced by countries in similar situations as well as the progress some are making in driving Internet adoption. We believe these groupings offer a valuable point of reference and can support more effective collaboration between government and industry.

The global Internet landscape is constantly evolving, and in that sense, this report represents a snapshot. Indeed, countries around the world are making tremendous investments in initiatives to extend the Internet to all population segments. Over the next several years, we anticipate that developing countries will be transformed as new population segments gain access to the Internet. We look forward to monitoring these trends. It is our hope that this report advances the conversation and offers a useful benchmark to gauge progress.



# Appendix: Methodology

## *Methodology for the selection of countries*

As a first step, we used World Bank data to identify the top 20 countries as measured by size of offline population. Next, we compared this group to the top 20 as reported by Internet World Stats. We subsequently added South Africa as it was indicated by Internet World Stats as being in the top 20. To provide a sufficient group of countries for comparison, we added Colombia, Japan, Italy, Germany, South Korea, Spain, and Sri Lanka. Some of these countries also offer a valuable point of reference for the United States, which—despite high Internet penetration—is on the top 20 list due to its sizable offline population.

To support the demographic characterization, we searched for data on all 28 of these countries. For some segments, such as urban dwellers, we couldn't find data on the online population to complete the characterization. Given the lack of available data for Congo, Iran, and Myanmar, these countries were excluded. For the remainder of the analyses, including the index and clustering analysis, we looked at a total of 25 countries.

### Definition of developing countries

For the purposes of this report, we considered Germany, Italy, Japan, Spain, South Korea, and the United States as developed nations. The remaining 19 countries for which we completed the index clustering analysis were considered developing ones.

## *Methodology for demographic characterization*

Getting a clear picture of the offline population's demographic profile and context posed a particular challenge because little information was available on this segment—in part because they are not online. Even for the online population, there is only patchy information regarding characterizing individuals in a consistent way across countries.

Due to this lack of information, the team took a different approach to achieve a high-level, traditional demographic characterization of non-Internet users.

We started with traditional demographic categories for the overall population of each country. Next, we "subtracted" the demographic categories for Internet users in each country to calculate a demographic characterization of the non-Internet user population in that country. We augmented this analysis by conducting qualitative interviews with industry experts to corroborate our results.

### Key assumptions

For rate of urbanization and gender, we were able to find demographic information for Internet users. However, for age, literacy, and income, we had to make several assumptions.

#### *Age*

Countries used different ranges for age statistics and breakdowns for Internet users. We adopted a general range for what we considered "youth," "middle-aged," and "senior." All the data we found did not always fit exactly with these age ranges, but generally we thought of young as 0–24, middle-aged as 25–54, and senior as 55-plus. We used World Bank population and Internet penetration numbers to calculate the

non-Internet user population, understanding that each country has different age ranges in scope. To keep things simple and given the relatively rough sizing, we did not make different assumptions or adjustments per country. Overall age data for each country was sourced from the CIA's *World Factbook,* and age distributions for Internet users were identified from available public sources. Using this information, we calculated the percentage of the non-Internet user population falling into the "middle-aged" and "senior" bucket. The youth bucket was calculated as a plug so that youth, middle-aged, and senior would total to 100 percent.

### *Literacy*

Due to the very limited data available on the educational attainment of the online population, we focused solely on language literacy and assumed that the entire online population is literate. We used the most recently recorded adult (15-plus) literacy rates from the World Bank, defined as the percentage of the population age 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Generally, "literacy" also encompasses "numeracy," the ability to complete simple arithmetic calculations. This indicator is calculated by dividing the number of literates aged 15 years and older by the corresponding age group population and multiplying the result by 100. When not available from the World Bank, we sourced this information from the CIA's *World Factbook.*

### *Income*

Since data for the income of Internet users were limited, we made the simplifying assumption that all individuals below the average of the poverty line and the median could be classified as low-income non-Internet users. We used income information from the CIA's *World Factbook,* which, in most cases, provides the percentage of a country's population below the national poverty line but not the actual number used for the poverty line. The CIA's *World Factbook* reports that "national estimates of the percentage of the population falling below the poverty line are based on surveys of sub-groups, with the results weighted by the number of people in each group. Definitions of poverty vary considerably among nations. For example, rich nations generally employ more generous standards of poverty than poor nations."

## Proposed alternative definitions and metrics

Addressing the barriers to Internet adoption requires a granular view of the offline population segments within individual countries. Existing metrics and data sources present a unique challenge in getting an accurate view of connectivity.

### *Rural vs. urban*

The classification of urban and rural is inconsistent across countries. In addition, the population density can vary greatly in two areas classified as rural (such as sub-Saharan Africa and rural India, highlighted in the body of this report). Given that the "ease" and "quality" of fixed-line Internet access depends largely on an individual's proximity to a fiber line, a metric based on density of the population and its proximity to a fiber line may be a better characterization of the state of connectivity (Exhibit 43). Using available sources, we arrived at rough estimates of the offline population that could be classified as urban and rural, but it is not a perfect characterization.

### *Income*

Income level is not necessarily a predictor of consumption, especially in developing countries in which significant income or consumption happens outside of the formal economy. For this reason, it is important to examine consumer spending habits in more granular detail. As our analysis of consumption baskets in the India country profile demonstrated, certain low-income population segments must make trade-offs—spending less on other items or forgoing necessities such as food or health care in order to have access to the Internet or purchase a mobile phone.

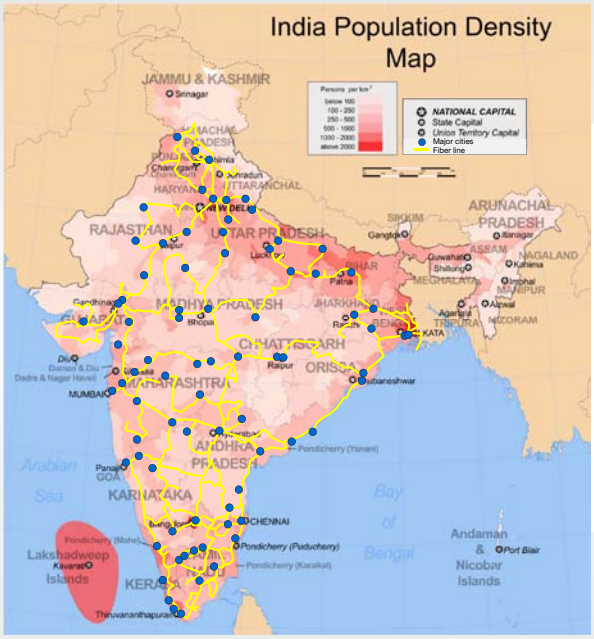
### *Literacy*

In the report, we drew the distinction between language literacy and digital literacy because we recognized that the skills needed to use technology can be nuanced. The intuitive nature of smartphones, for example, can enable those without basic language proficiency, such as young children and illiterate adults, to use the

Exhibit 43

RELIANCE GLOBALCOM EXAMPLE

## Fiber coverage limited to densely populated urban areas




- Less densely populated rural areas have poor fiber coverage as compared to the densely populated urban areas
- Largely rural states such as Orissa, Jharkhand, Chattisgarh and Rajasthan lack proper fiber infrastructure
- Northern India has better fiber coverage compared to other parts of the country

Internet. Conversely, for segments of the literate population—the elderly or people who have had little or no exposure to technology—digital literacy can present an impediment to Internet use. Therefore, we needed a measure that reflected digital literacy (the ability to use technology to access information, solve problems, and learn new skills).

## Data sources

To compile demographic profiles and context, we had to use data from several different sources.

### *Profile and context of the total population, by country*

The World Bank – Population, Internet users (per 100 people), % urban, % female

Central Intelligence Agency's *World Factbook* – Population, age, literacy rate, national poverty line, % urban, rate of urbanization, % below poverty line

GSMA – Number of unique mobile subscribers

International Telecommunication Union (ITU) – % Internet users

Internet World Stats – Population, Internet users, Facebook users

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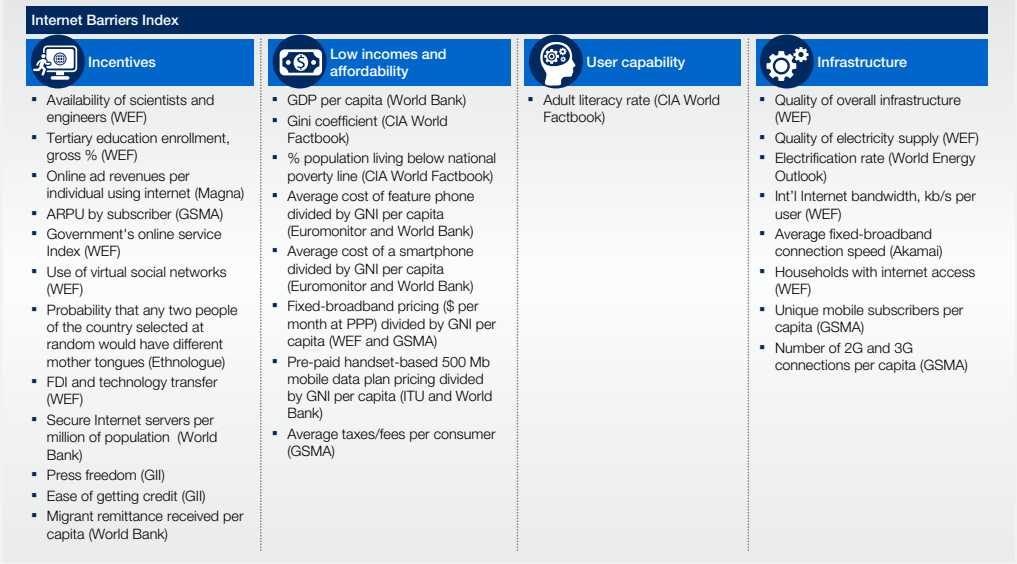
Note: Socialbakers Analytics was used either to determine or verify other sources on the age demographics of populations in every country assessed. For the complete list of sources and reference material that informed the development of this report, see the Bibliography.

## *Methodology for Internet Barriers Index*

Using the four major categories of barriers—incentives, low incomes and affordability, user capability, and infrastructure—we composed a list of metrics (Exhibit 44) that could quantify these barriers and provide for comparison across countries. Ultimately, we excluded metrics that were unavailable for the majority of the countries in the dataset.

### Exhibit 44

**The barriers index assesses countries on 4 categories: incentives, low incomes and affordability, user capability, and infrastructure**




SOURCE: Listed on page

To assign each country a category score, we normalized each metric to a score out of 100 and then calculated the average of all metrics within each category of the index (with equal weighting of metrics within categories). We then normalized these category averages to a score out of 100. We determined the final Internet Barriers Index score for each country by calculating the average of the category scores with equal weighting across categories.

Exhibit 45

## Each factor of the Internet Barriers Index is positively correlated with the other factors and Internet penetration

**Correlation matrix**

| | Incentives average score | Low incomes and affordability average score | User capability average score | Infrastructure average score | Internet barriers index score |
|---|---|---|---|---|---|
| Incentives average score | 1.00 | 0.71 | 0.60 | 0.82 | 0.86 |
| Low incomes and affordability average score | | 1.00 | 0.79 | 0.80 | 0.91 |
| User capability average score | | | 1.00 | 0.79 | 0.89 |
| Infrastructure average score | | | | 1.00 | 0.95 |
| Internet barriers index score | | | | | 1.00 |

SOURCE: Internet Barriers Index analysis

We conducted a sensitivity analysis in which we changed the weighting of the pillars (for example, increasing the weighting of infrastructure) to ensure that the quartiles wouldn't change significantly. Next, we checked that the final index score was highly correlated to Internet penetration across the list of countries. We found that all factors correlate strongly and separately with Internet penetration and there is a systematically positive and, in some cases large, correlation between barriers categories (Exhibit 45).

As a final step, the team ran a principal components analysis to verify that equal weighting of the individual scores (incentives, low incomes and affordability, user capability, and infrastructure) could be used to calculate a final Internet Barriers Index score. The inputs for this analysis were the four barrier index scores for all of the countries included in our research. One vector or principal component captured 82 percent of the variance in the data. For this vector, incentives, low incomes and affordability, user capability, and infrastructure had a coefficients of 0.48, .51, .49, and .52, respectively. Since these components were nearly equally weighted, we were comfortable having our final barriers index reflect an equal weighting of the four scores.

### *Methodology for complete-linkage clustering analysis*

To define the country groups, we ran a complete-linkage clustering across the normalized metrics used as inputs into the Internet Barriers Index and the demographic indicators derived for each country's offline population. First, we ran a pairwise correlation to check linear correlations among the variables. The pairs with high correlations were used to build clusters to ensure the maximum variation with the smallest number of variables. Next, we ran complete linkage clusters on the selected variables. We then visually checked the result using a dendrogram (Exhibit 46), which displays how dissimilar the estimated clusters are from one another. Finally, we chose the appropriate level of dissimilarity among the clusters in the dendrogram to identify clusters in the data.

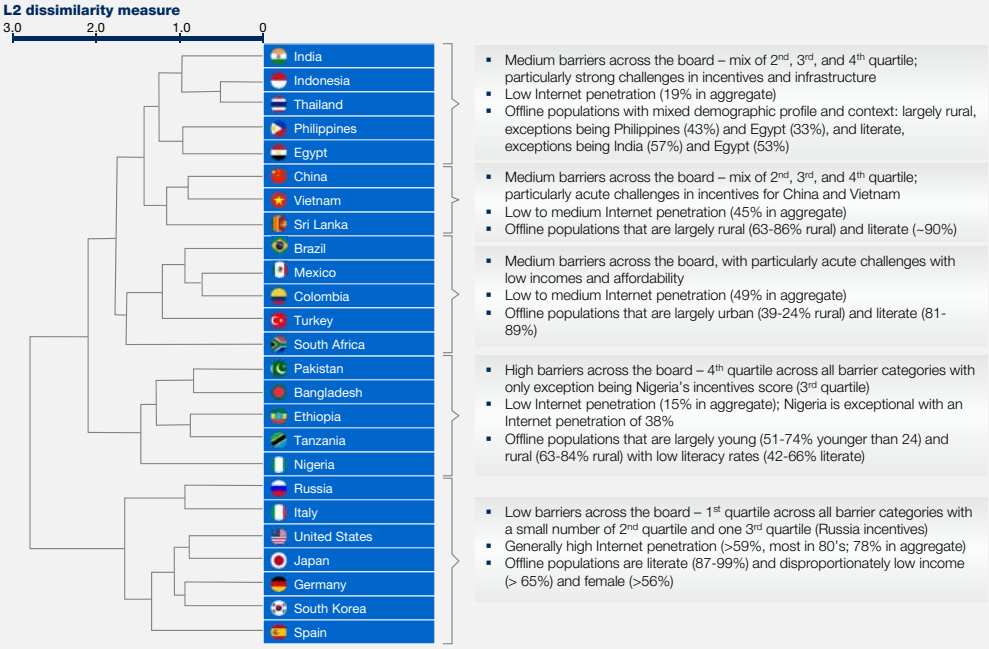
We chose complete-linkage clusters over K-means clusters, which is the most commonly used type of clustering technique, for three reasons:

First, complete-linkage clustering does not impose any assumptions on how many clusters there should be. It builds clusters starting with individual observations and continues until all the observations are grouped into one. In this study, we had no preconceived notion of how many clusters there would be. Thus, K-means clustering would not have been helpful in identifying an appropriate (that is, data-driven) number of clusters.

Second, complete-linkage clustering is presented visually, so we could decide how many clusters were appropriate. The visual representation of the result also helped us illustrate how different each cluster was

## Exhibit 46

### Dendrogram using all variables from Internet Barriers Index and demographic profile and context




from one another. Conversely, with K-mean clusters, we could not have identified clusters that were very different from one another except at the level of statistical properties. The small number of countries in the data allowed us to take full advantage of the visual representations of the complete-linkage clusters. If we had too large a sample of countries—for example, 50—it would have been difficult to use these visual identifications.

Third, the results of the complete-linkage clustering analysis are reproducible, but those of the K-means are not. This is because K-mean clusters depend heavily on the initial values that are chosen to build the clusters. In complete-linkage clusters, we could ensure consistency in individual observations.

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