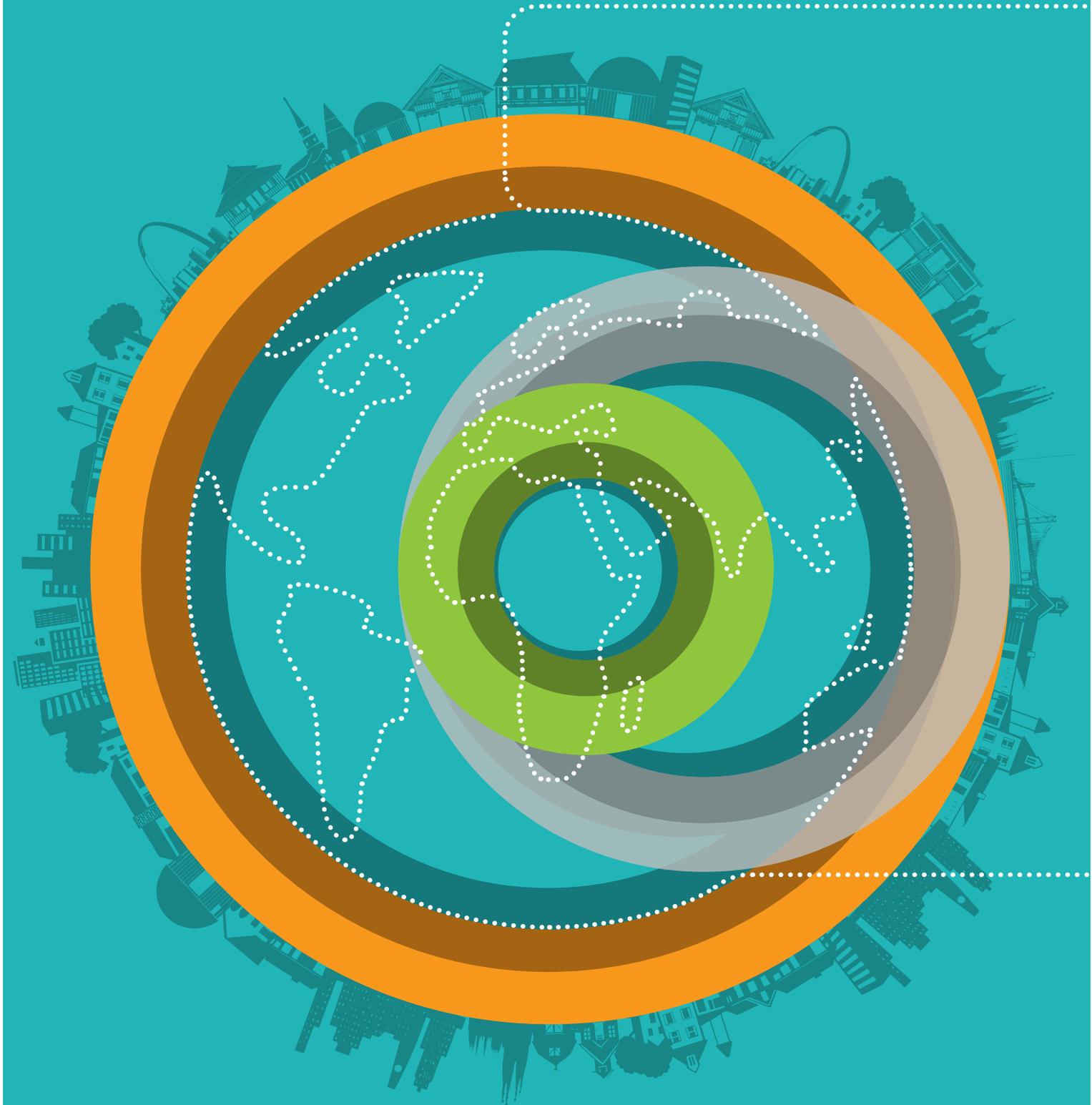# A4AI

**ALLIANCE FOR AFFORDABLE INTERNET**

AFFORDABILITY REPORT 2014

# WELCOME

**Welcome to the Affordability Report** – an in-depth annual research initiative produced by the Alliance for Affordable Internet, the world's broadest technology sector coalition. The report is part of our ongoing efforts to understand why some countries have succeeded in making Internet access more affordable, accessible and universal, and what others can do to catch up quickly. A4AI's over 70 members believe that affordability remains the biggest barrier to universal access, and that reforming policy and regulation is critical to driving down the cost to connect and bring billions more online.

This year's study covers 51 developing and emerging countries. It also contains a roadmap for achieving affordable Internet, with more than 30 detailed policy recommendations for governments, businesses and not-for-profits. We believe it will prove an invaluable resource for all those working in this arena.

We also encourage you to check out our dedicated online portal at www.a4ai.org/affordability-report, where you'll find an interactive data explorer covering all 51 countries.

We hope this report proves valuable to your work, and helps to bring the life-changing benefit of affordable Internet access to billions more around the globe.

Sonia N Jorge

# CONTENTS

# EXECUTIVE SUMMARY

Almost 60% of the world's population – most of whom live in developing countries – are offline. Close to 70% of households in the developing world do not have Internet access, and while Internet penetration rates have increased dramatically in recent years, the pace of change seems to be slowing.

Most of those who are not connected simply cannot afford to be. While many studies note that access prices are falling around the world, we find that the cost of fixed broadband remains about 40% of an average citizen's monthly income across the 51 countries covered in this study, while the price for an entry-level mobile broadband package hovers at just above 10% of monthly incomes. Other issues, such as lack of relevant content, and limited digital and language literacy, combine to entrench this divide even further.

The Alliance For Affordable Internet's 2014 Affordability Report is an effort to identify and quantify some of these challenges, and to identify what policy and regulatory drivers can lead to enhanced affordability. We aim to understand why

some countries have succeeded in making Internet access more affordable, accessible and universal, and what others can do to catch up quickly.

| Emerging Economies | Developing Economies |
|---|---|
| Costa Rica | Rwanda |
| Colombia | Nigeria |
| Turkey | Morocco |
| Malaysia | Uganda |
| Peru | Kenya |

At the heart of the report is the "Affordability Index". This unique composite Index scores each of the 51 countries included in the report on a scale of 0 – 100, based on both current penetration and usage rates, and the policy and regulatory environment in

## EXECUTIVE SUMMARY

place that could lead to further progress. A statistical analysis proves that high scores on the Affordability Index are strongly correlated with lower broadband prices. To help assess drivers in more detail, the overall Affordability Index is broken down into two sub-indices – (1) the infrastructure sub-index and (2) the access sub-index.

This year, Costa Rica tops the overall rankings, followed by Colombia, Turkey, Malaysia and Peru — all middle-income countries. Rwanda secures the top spot among developing countries, followed by Nigeria, Morocco, Uganda and Kenya.

In this year's report, we also note that certain groups are far less likely to be able to connect to the Internet affordably. Specifically, our research finds that:

• In the 51 countries that we surveyed, there are approximately two billion people earning less than $2 a day ($60 per month), according to World Bank data. Depending on the country in which they live, these individuals have to spend anywhere between 5.5% and 114.5% of their average monthly income in order to access an entry-level broadband package. At present, not a single emerging or developing country can claim to meet the affordability benchmark set by the United Nations (UN) Broadband Commission of broadband priced at less than 5% of monthly income for those potential users surviving on less than $2 a day.

• Across the board, women are far less likely to be able to access the Internet affordably than men. Research has shown that women, on average, earn 30% – 50% less than men. This income disparity diminishes the ability of women to afford to access, adopt, and benefit from a broadband connection. The Internet access gender gap is apparent throughout the world, although the extent of the gap varies from region to region.

• Those living in rural areas are often unable to secure affordable access to the Internet. This is for two primary reasons: (1) incomes tend to be lower in rural areas, resulting in a higher real cost to connect; and (2) challenges associated with infrastructure deployment in rural areas result

in limited opportunities for access – particularly under current regulatory environments – or in access prices that are significantly more expensive than those in urban areas.

Using statistical tools, we have analysed the relationships between policies and regulations, and the affordability environment in each country. We have identified five common success factors. These are:

I. **Effective broadband strategies**
Clear and comprehensive national broadband plans, which allow for increased private investment, remove barriers to infrastructure deployment, and encourage public-private partnerships.

II. **Enhanced competition**
A level playing field that encourages innovation and gives consumers a range of choices as to their service provider; a unified licencing framework is of particular value here.

III. **Efficient spectrum allocation**
Spectrum allocated in a fair and competitive way, with innovative spectrum tools considered.

IV. **Infrastructure sharing models**
Laws and partnerships designed to embed open access methods and reduce sunk infrastructure costs.

V. **Universal access to affordable Internet services**
Development of shared services, available at community centres, schools, libraries and other anchor institutions; especially important in rural areas.

Given the transformative potential that affordable access to the Internet holds, we recommend that affordable access to broadband Internet is enshrined as a sustainable development goal (SDG) by the United Nations General Assembly when it meets later this year. Close collaboration between key players – including government decision makers, international development partners, private sector, academia and civil society – on the five areas identified above will be essential to make this a reality.

# 1

# AFFORDABILITY:
# A GLOBAL PICTURE

## 1.1   INTRODUCTION

In 2014, almost 60% of global households remained unconnected to the Internet. In developing countries, fewer than one in three people are online; in the world's 49 least developed countries, that figure plummets to just 5%.

There are also ominous signs that progress may be decelerating. According to a recent study by McKinsey & Company, the worldwide growth in Internet users has slowed from a three-year compound annual growth rate (CAGR) of 15.1% from 2005–2008, to 10.4% from 2009–2013.

Clearly, significant barriers to online access persist. The most pernicious is the high cost to connect. In 2011, the UN Broadband Commission set a target for entry-level mobile or fixed broadband to cost no more than 5% of average monthly incomes (Gross National Income (GNI) per capita), by 2015. We will fall woefully short of that target. According to the International Telecoms Union (ITU), at the end of 2013, the average price for an entry-level fixed broadband connection in the developing world represented more than a quarter of an average citizen's monthly income. Meanwhile, the price for an entry-level mobile broadband package hovers between 8% and 11.5% (depending on the plan chosen) in developing countries. By contrast, the cost to connect in many developed countries is near negligible. Citizens of rich nations pay on average just 1-2% of their monthly income to connect. Other issues, such as lack of relevant content, and limited digital and language literacy, further entrench this divide.

These access challenges are felt more acutely among certain populations as a result of geographic, economic, gender and socio-cultural factors, with marginalised or vulnerable groups often the hardest hit. Rural Internet users have reduced access when compared with their urban counterparts; low-income populations are disproportionately underrepresented online; and persistent income gaps, coupled with engrained social and cultural norms, keep women and other marginalised populations both from being able to afford Internet services and from being able to use the Internet freely.

The Internet has the potential to improve the quality of life – particularly for poor and marginalised communities – in myriad ways. By increasing access to information and making communication more efficient, we can observe beneficial economic and social impacts in areas like entrepreneurship, health, education, and more. There have been multiple studies looking at the benefits of enhanced access, but perhaps one recent statistic from the Copenhagen Consensus Centre is the most telling: increasing mobile broadband penetration levels threefold across the developing world would provide a return of $17 for each dollar spent. This considers both the economic growth that would be stimulated by increased access, as well as the cost savings that governments could achieve as a result.

### BEYOND ACCESS:
### IMPROVING THE QUALITY OF AFFORDABLE BROADBAND

Access alone is not enough to reap the full extent of benefits that the Internet can bring. The broadband services available must also be of a high quality. There are several proposals for increasing access to broadband that is both high speed and affordable. For example, the ITU broadband "Goal 20-20" initiative sets a target of broadband Internet speeds of 20 megabits per second (Mbps) for $20 a month, accessible to everyone in the world by 2020.

Developed countries have led the way in translating this vision into reality. In September 2012, the European Commission (EC) published its Broadband Strategy, which sets out specific broadband targets for the European Union (EU) through 2020. The strategy sets out to achieve: (1) basic broadband (2 Mbps) for all EU citizens by 2013; (2) full EU coverage by broadband with speeds of at least 30 Mbps by 2020; and (3) 50% subscription rates among EU citizens to services offering broadband speeds of 100 Mbps, or higher, by 2020.

The United States has launched a similar initiative. The US National Broadband Plan proposes that by 2015, 100 million homes should have download speeds of 50 Mbps and actual upload speeds of 20 Mbps. It also suggests *"every American community should have affordable access to at least 1 gigabit per second (Gbps) broadband service to anchor institutions such as schools, hospitals and government buildings."* The United States sees institutional access as critical for innovation and growth – an issue often overlooked in the broadband access debate across many developing countries.

## 1.1   INTRODUCTION CONTINUED

The unprecedented potential of the Internet to empower marginalised groups and deliver social and economic benefit has not gone unnoticed by policy makers. Indeed, many are advocating that affordable access should be at the heart of the UN's forthcoming sustainable development goals (SDGs), which will set the global development agenda for the next fifteen years. At a country level, governments are stepping up efforts to improve access to and affordability of broadband Internet. Increasingly, governments are recognising that connecting the unconnected requires a well-rounded approach to address barriers to access, including investment in new technologies, policy and regulatory reforms that reduce industry cost structures, and sustained efforts to bring affordable access to households, small enterprises, and communities. However, while technology advances at a breakneck pace, the process of updating policy and regulatory frameworks remains slow. All too often, innovative technologies with the power to reduce the cost to connect are held back by poor or out-dated policies. The policy development environment varies widely across countries, and often does not take advantage of the private sector's ability to create competitive and innovative edges, if given the right incentives.

## 1.2   ABOUT THE A4AI AFFORDABILITY REPORT

The Affordability Report represents an ongoing effort to understand why some countries have succeeded in making Internet access more affordable, accessible and universal, and what others can do to catch up quickly. The report assesses the policy and regulatory environments in 51 countries, and analyses the effectiveness of government programmes in addressing the divides and barriers that prevent affordable access to the Internet. At the heart of the report is the Affordability Index, a unique composite Index that assigns countries a score of between 0-100 based upon the drivers of affordability observed in the country.

This is the second edition of this annual study, which was first produced in 2013. This 2014 edition features five new countries (Myanmar, Mozambique, Dominican Republic, The Gambia and Haiti), and benefits from an improved research methodology, including streamlined and clearer survey questions based on feedback gathered last year.

# THE AFFORDABILITY INDEX

# 2.1 CALCULATING THE INDEX

To produce our country rankings, we blend secondary data, from reliable, established sources, with primary data and in-depth country research based on surveys conducted by country experts.

The Affordability Index is a composite index, composed of two sub-indices that measure the impact of two drivers critical to affordability: infrastructure and access.

- The **infrastructure sub-index** measures the current extent of infrastructure deployment and operations, alongside the policy and regulatory frameworks in place to incentivise and enable cost-effective investment in future infrastructure expansion.

- The **access sub-index** measures current broadband adoption rates and the policy and regulatory frameworks in place to encourage growth and ensure provision of affordable and equitable access.

The Index scores each country on a scale of 0 to 100. Higher scores indicate higher current penetration levels, combined with strong policy and regulatory conditions for advancing Internet affordability now and in the future.

The Index deliberately does not directly measure prices and affordability in each country; there are numerous stand-alone surveys and reports which do this – most notably, the annual ITU publication "*Measuring the Information Society*". Instead, the Affordability Index measures progress toward increased broadband adoption, and the policy and regulatory environments that lead to affordability. We then analyse the Affordability Index scores against prices as measured by the ITU. In fact, our regression analysis proves that there is a strong, statistically significant causal relationship between Index scores and broadband prices. Strong scores on the Index indicate better current levels of affordability and great potential for prices to fall further in the future. *(See Section 4 for a detailed regression analysis.)*

Why have we chosen to focus on both infrastructure and access measures? By combining these two broad components, the Affordability Index provides a measure of the impact that each of these drivers — both individually and combined – has on affordable access outcomes. Of course, there are some important areas (e.g., tax reduction) where it is currently impossible to source comparable indicators across countries. We continue to research these important areas and hope to include them in future reports.

Finally, in order to conduct fair comparisons among all 51 countries covered in the research, we have identified each nation as either an emerging or developing country – as defined by the World Bank and determined by income levels – and have provided a separate analysis for each group. Comparing countries with similar income levels allows us to analyse the timing and patterns of decision-making as they relate to the level of economic development of each country.

This year, to reflect the Alliance for Affordable Internet (A4AI) set of best practices, we asked our expert assessors in each country to pay close attention to five particular sub-areas:

- Overarching broadband policies and programmes;

- Policy and regulation for effective competition, including the level of transparency in, and effectiveness of, the licensing process;

- Spectrum policy and regulation;

- Infrastructure sharing and access to rights of way; and

- Government-led programmes to fund or subsidise universal Internet access.

## A NOTE ON METHODOLOGICAL CHANGES

The 2013 Affordability Index included the ITU-published indicators measuring broadband prices as a percentage of GNI per capita (both for fixed and mobile broadband services). In 2014, we decided that it was best to eliminate those indicators from the Index calculation, and to focus on data (secondary and primary) that measures the drivers that push prices down. As the 2014 Affordability Index scores measure these affordability drivers, an exact comparison between the 2013 and 2014 Index scores is not possible.

**EMERGING COUNTRIES**
**Upper-middle income** (as defined by the World Bank).

**DEVELOPING COUNTRIES**
**Low to lower-middle income countries** (as defined by the World Bank).

## A4AI POLICY & REGULATORY BEST PRACTICES

All of A4AI's 70+ members have committed to a set of best practices – based on evidence of successful experiences across the globe – in order to guide the Alliance's advocacy work. The best practices are designed to create a liberalised market with an open and competitive environment, where policy and regulation support effective investment focused on increasing affordable access outcomes.

### GUIDING PRINCIPLES

- Internet freedom and the fundamental rights of expression, assembly and association online must be protected

- Access to the Internet is a significant enabler of economic growth and human development

- Open and competitive markets are the most effective way to drive reduced delivery costs, affordable consumer pricing and new innovations.

### RECOMMENDATIONS

Liberalised market with an open, competitive environment.

- Nurture healthy market competition

- Regulator established as an effective and independent expert agency

- Promote evidence-based policy-making and regulatory processes that included meaningful public participation

Policies and practices to encourage lower cost structure for industry.

- Streamlined processes for infrastructure deployment and sharing

- Effective spectrum management

- Enable innovative usage through unlicensed spectrum and opportunistic reuse within rules that avoid harmful interference (e.g., harmful interference with spectrum assigned to mobile operators)

- Established local and/or regional Internet exchange point (IXP)

- No luxury taxation or excessive customs/tariffs on telecom goods and services required for Internet access

- Effective Universal Service Fund (USF) administration (if one exists)

- Reasonable effort to systematise data collection of key indicators to measure effectiveness

# 2.1 CALCULATING THE INDEX

Figure 1. Affordability
Index Structure

## 2014 Affordability Index Structure

| Infrastructure | | Access | |
|---|---|---|---|
| **Code** | Secondary Indicator Name | **Code** | Secondary Indicator Name |
| **ITU G** | % of population covered by mobile cellular network | **ITU B** | Broadband subscribers per 100 people |
| **ITU A** | International bandwidth (Mbps) per Internet User | **WI B** | Number of mobile subscribers per 100 people |
| **ITU O** | Broadband Speeds (average Mbps) | **WI C** | Number of mobile broadband connections per 100 population |
| **ITU L** | Investment per telecom subscriber | **WEF B** | Internet access in Schools |
| **WB A** | Secure Internet servers per million people | **ITU Eye** | Cluster of ITU indicators (bundled) [1] |
| **IEAA** | Electrification rate | **ITU N** | % of individuals using the Internet |
| **PCH** | Number of IXPs | **WI** | Market concentration (Herfindahl–Hirschman Index) |
| | | **ITU K** | Existence of National Broadband Plan |

## 2014 Affordability Index Structure

| Code | Primary Indicator [2] | Code | Primary Indicator [2] |
|---|---|---|---|
| **A1** | To what extent are ICT licensing frameworks flexible, simple, and technology and service neutral? | **A5** | To what extent does the national broadband Internet plan (or in some cases the national ICT policy and plans) set clear, time-bound targets and interventions for reducing broadband cost and increasing penetration? |
| **A3** | To what extent does the regulator and/or the competition commission enforce the country's ICT licensing requirements and regulations? | **A11** | To what extent have Universal Access/Service Funds (USFs) prioritised infrastructure investments that will reduce costs and increase access for under-served communities and market segments? |
| **A6** | To what extent are national-level policies or rules in place to facilitate efficient access to public rights of way and tower zoning permission? | **A12** | To what extent have USF funds been used to subsidise broadband access for end users in under-served and underprivileged populations? |
| **A7** | To what extent does the government facilitate resource sharing across telecommunications operators? | **A2** | To what extent does the government ICT regulator perform its functions according to published and transparent rules, with the ICT regulatory decisions influenced by public consultations? |
| **A8** | To what extent has the government defined specific, limited and well-justified guidelines for public infrastructure funding or subsidies in telecommunications? | **A4** | To what extent is ICT regulatory decision-making informed and influenced by adequate evidence? |
| **A9** | To what extent has government established an implementation plan with a time-bound target for making sufficient spectrum available for broadband within a reasonable period of time to meet the growing demand for high-speed data services? | **A13** | Are there specific policies to promote free or low-cost public Internet access, such as budget allocations for Internet access in public libraries, schools and community centres, or provisions for spectrum use by community WiFi options? |
| **A10** | To what extent are the government's plans for implementing more spectrum availability for broadband (both licensed and unlicensed) transparent, and are done through a competitive process via public auctions? | | |

# 2.1 CALCULATING THE INDEX CONTINUED

## WHAT DO WE MEAN BY POLICY & REGULATION? AND HOW DO WE ASSESS EFFECTIVENESS?

### POLICY

A policy framework provides a vision of the ICT sector with specific guidance for achieving that vision. Policies are established at the Ministerial level and generally establish principles and strategic objectives for the sector – for example, opening market structure, accelerating rollout of broadband networks, developing relevant applications and content, and facilitating adoption and use. Guidance is then provided on how to achieve the strategic objectives – this may include increasing competition, improving sector governance, reorganising state-owned operators, and extending service to under-served areas.

### REGULATION

Regulation involves the design and enforcement of legal instruments to establish the rules of the market and implement the strategic objectives established by the policy. For example, to ensure increased and effective competition, regulators need instruments that facilitate market entry (e.g., technology and service-neutral licensing regimes), as well as instruments that define a clear scope for intervention should anti-competitive behaviour be identified (e.g., regulations that require ongoing market analysis, and outline the regulatory intervention necessary if an operator is determined to have Significant Market Power).

### EFFECTIVENESS

Many countries adopt the right policies and regulations, but fail to implement and enforce them in a strategic and planned manner. Others are still far from achieving a policy and regulatory framework that is both forward-looking and coherent with the pace of development in the sector. This is often due to insufficient oversight or regulatory development. For example, while many countries have developed broadband or ICT policy and strategies, the implementation of such policies and plans has been slow at best. Our research attempts to assess not only the existence of such policies and plans, but also, and most importantly, the implementation and impact of such programmes.

# 2.2   2014 COUNTRY RANKINGS

Table 1. 2014 Affordability Index rankings

| Rank | Country | Sub-index: Communication Infrastructure | Sub-index: Access | Affordability Index: Overall Composite Score |
|---|---|---|---|---|
| 1 | Costa Rica | 48.1 | 77.5 | 63.4 |
| 2 | Colombia | 58.8 | 66.4 | 63.1 |
| 3 | Turkey | 56.3 | 67.5 | 62.4 |
| 4 | Malaysia | 53.6 | 68.5 | 61.5 |
| 5 | Peru | 58.0 | 60.2 | 59.6 |
| 6 | Brazil | 57.4 | 56.9 | 57.6 |
| 7 | Mauritius | 49.7 | 63.8 | 57.2 |
| 8 | Ecuador | 44.6 | 59.4 | 52.3 |
| 9 | Argentina | 47.3 | 55.6 | 51.8 |
| 10 | Rwanda | 49.0 | 53.6 | 51.6 |
| 11 | Nigeria | 45.3 | 56.6 | 51.2 |
| 12 | Morocco | 41.1 | 60.0 | 50.8 |
| 13 | Thailand | 44.3 | 54.9 | 49.8 |
| 14 | Mexico | 41.0 | 55.5 | 48.5 |
| 15 | Uganda | 40.1 | 55.4 | 48.0 |
| 16 | Jamaica | 34.6 | 59.5 | 47.3 |
| 17 | Tunisia | 44.7 | 45.2 | 45.1 |
| 18 | Dominican Republic | 39.3 | 49.1 | 44.3 |
| 19 | Kenya | 37.7 | 50.0 | 44.0 |
| 20 | South Africa | 33.4 | 53.2 | 43.4 |
| 21 | The Gambia | 40.3 | 46.3 | 43.4 |
| 22 | Vietnam | 30.7 | 55.7 | 43.3 |
| 23 | China | 39.5 | 46.2 | 43.0 |
| 24 | Botswana | 38.1 | 47.0 | 42.7 |
| 25 | Pakistan | 42.6 | 42.3 | 42.6 |
| 26 | Ghana | 37.3 | 45.6 | 41.5 |
| 27 | Indonesia | 36.9 | 44.5 | 40.8 |
| 28 | Tanzania | 38.1 | 43.2 | 40.7 |
| 29 | Philippines | 36.1 | 43.1 | 39.7 |
| 30 | India | 40.8 | 37.4 | 39.1 |
| 31 | Namibia | 31.7 | 44.7 | 38.2 |
| 32 | Egypt | 43.2 | 33.0 | 38.1 |
| 33 | Bangladesh | 42.5 | 31.8 | 37.1 |
| 34 | Zambia | 32.9 | 40.0 | 36.4 |
| 35 | Kazakhstan | 28.2 | 44.5 | 36.3 |
| 36 | Myanmar | 31.8 | 39.2 | 35.4 |
| 37 | Venezuela | 27.0 | 40.7 | 33.8 |
| 38 | Jordan | 21.9 | 45.4 | 33.5 |
| 39 | Senegal | 27.3 | 37.1 | 32.1 |
| 40 | Mali | 28.3 | 34.7 | 31.4 |
| 41 | Benin | 35.7 | 26.5 | 30.9 |
| 42 | Mozambique | 24.5 | 36.6 | 30.4 |
| 43 | Cameroon | 20.7 | 31.0 | 25.6 |
| 44 | Nepal | 23.0 | 27.1 | 24.7 |
| 45 | Zimbabwe | 17.8 | 32.1 | 24.7 |
| 46 | Burkina Faso | 14.2 | 27.4 | 20.5 |
| 47 | Malawi | 15.2 | 23.8 | 19.1 |
| 48 | Ethiopia | 0.0 | 27.9 | 13.4 |
| 49 | Sierra Leone | 11.0 | 16.5 | 13.2 |
| 50 | Haiti | 12.1 | 14.5 | 12.8 |
| 51 | Yemen | 1.6 | 0.0 | 0.0 |

# 2.2.1   THE FRONT RUNNERS

| **2014 Affordability Index Top Five** | | | | |
|---|---|---|---|---|
| Rank | Country | Sub-index: Communication Infrastructure | Sub-index: Access | Affordability Index: Overall Composite Score |
| 1 | Costa Rica | 48.1 | 77.5 | 63.4 |
| 2 | Colombia | 58.8 | 66.4 | 63.1 |
| 3 | Turkey | 56.3 | 67.5 | 62.4 |
| 4 | Malaysia | 53.6 | 68.5 | 61.5 |
| 5 | Peru | 58.0 | 60.2 | 59.6 |

For the purposes of this research, entry-level mobile broadband refers to 500MB of data accessed via a pre-paid, handset-based plan (as defined by the ITU), since this is the most popular offer selected by people in developing and emerging countries. However, we note that with increasing use of video and higher demand for capacity, a 500MB allowance may be limiting. Therefore, higher capacity packages, as well as fixed broadband or computer-based mobile broadband options should be considered in forward-looking policies.

So why is **Costa Rica** atop this year's Affordability Index rankings? The country has embraced broadband as a catalyst for economic growth and social inclusion and, as a result, has invested significant resources in improving infrastructure and expanding access and affordability. Costa Rica has a relatively modern telecommunications infrastructure. An estimated 88% of Costa Rica's population can already access the Internet and declining mobile broadband access prices will enable more of the population to come online. The government has created a National Telecommunications Fund (FONATEL), which has focused on providing broadband Internet to under-served schools, public healthcare institutions, and other public entities. The government has been using FONATEL to expand fibre optic Internet service to rural towns and to install cell towers where fibre cannot reach, in order to provide access to wireless broadband services. These efforts are reflected in Costa Rica's 8th place ranking (with a score of 48) on the infrastructure sub-index.

Where Costa Rica really shines, however, is on measures of access and affordability. The country's score of 77.5 on the access sub-index is nearly 10 points higher than the next highest ranked country. This high score is underpinned by the nation's National Broadband Strategy, which was launched in 2012 and outlines a strategy for increasing broadband penetration through

2016. **Mobile broadband prices were about 1% of the GDP in 2014** – one of the lowest in the Latin American region. In fact, the price of an entry-level monthly mobile broadband package halved over the past year, from US$17.8 in 2013 to just US$8.79 in 2014.

Despite all of this recent progress, the country is not resting on its laurels – the government is further committed to using connectivity as a catalyst for growth and development, and is focusing both on increasing broadband penetration and Internet access, and on narrowing the access, adoption and use divide among its entire population.

**Colombia** (see box out) has also made concerted efforts to advance policy, regulatory and infrastructure development, with a focus on improving Internet access at the household level. Colombia not only comes out on top of the infrastructure sub-index, but also scores well on the access sub-index, placing fourth among all 51 countries covered. **These scores reflect Colombia's combined efforts to push infrastructure investment to rural and under-served areas, and to increase ICT literacy and provide subsidies to households that cannot otherwise afford Internet access.** This approach has resulted in substantial increases in Internet adoption, with about 51% of Colombians using the Internet. Strong government leadership,

# 2.2.1  THE FRONT RUNNERS

comprehensive broadband policy and plans, increased competition, and shared infrastructure to lower costs have all proven to be key ingredients in Columbia's successful recipe for achieving affordable universal access.

With a relatively urban, young and technically literate population, **Turkey** has witnessed a dramatic increase in Internet users. Almost half of the Turkish population (46%) are currently Internet users. More recent initiatives – including the Prime Minister's National Broadband Vision, sector policies in education and e-government, and community ICT projects – have further extended access to broadband Internet. Mobile broadband is widely used by Turkey's Internet-savvy population and the country is emerging as a noticeable front-runner in the nascent mobile payments sector, supported by high rates of credit card adoption and use.

Turkey's mobile broadband prices are among the most affordable found in emerging countries – a 500MB prepaid handset-based mobile broadband plan costs the average citizen just over one percent of their annual income.

Despite this strong affordability environment, many have raised concerns about the Turkish government's propensity to use the Web for surveillance and censorship. The country ranked 52nd out of 86 countries on the "Free and Open" measure of the Web Foundation's 2014-15 Web Index, and Freedom House's 2014 "Freedom on the Net" Report noted the country's frequent violations of user rights.

**Malaysia** – which topped the Affordability Index in 2013 – remains the top performing Asian nation, and is continuing its efforts to bring affordable Internet access to under-served areas. Mobile broadband prices have decreased even further over the past year, falling to 1.39% of GNI per capita from 3.2% in 2013.

Malaysia continues to do well when it comes to promoting affordable Internet, pursuing many of the policies that earned the country the top spot

on last year's Affordability Index. (Malaysia's lower score on this year's Index results primarily from the more recent nature of ICT sector investment and development in Colombia and Costa Rica, which allowed these two countries to score higher than Malaysia in the infrastructure sub-index.) Malaysia's government recognises the importance of broadband networks and has continued to improve access in under-served areas. The High Speed Broadband Network (HSBB1) project that launched in 2010 and connected 1.5 million users was upgraded in 2014, and is expected to connect 4.8 million broadband fibre subscribers – a development that would make the country's high-speed broadband connection rate one of the highest in Asia.

# 2.2.1  THE FRONT RUNNERS CONTINUED

**Peru** has also seen a steady increase in broadband penetration. Approximately 40% of the Peruvian population used the Internet in 2014 – a rate that is lower than those found in Colombia and Costa Rica, but one that is growing fast. Peru has adopted a progressive policy framework and has undertaken concerted initiatives to bridge the rural-urban Internet access gap. An ambitious National Broadband Plan, drafted in 2011, calls for an 11,000km open access fibre backbone network, delivered through public-private partnerships.

Peru has introduced a unified licensing regime for the provision of all telecom services – including fixed-line and mobile broadband, pay TV, and Internet – under one license. The single concession regime includes a national register of telecom services under which

each operator must notify the regulator of each new service it intends to offer. Unified concessions are no longer area-specific, but automatically cover the whole country. This streamlined licensing regime enables a wide range of players, providing a variety of applications and services to users, to enter into the market, increasing competition and eventually enabling a reduction in the cost of access and usage. Peru's mobile broadband prices are stubbornly high but the government expects that recent policy and regulatory developments will result in further price reductions.

## A COMPREHENSIVE APPROACH TO INTERNET   DEVELOPMENT IN COLOMBIA

Colombia's progress exemplifies the critical role that government leadership and investment can play in fostering access to affordable Internet. With about half of the population using the Internet and about 25% mobile broadband penetration, the country's government is working hard to increase adoption and productive use of the Internet.

**COMPETITION:** The country's 2009 ICT law lowered the barriers for new broadband market entrants, and created instruments for curbing market power in fixed and mobile services. The mobile market is very competitive, with five network operators and six virtual network operators competing against each other in both the voice and 3G/4G broadband spaces. DirecTV began offering mobile service in 2014, while Uff! Móvil entered the mobile market at the end of 2010 as a mobile virtual network operator (MNVO) using Tigo's network. This increased competition has led to substantial

price decreases for consumers. Colombia's entry-level mobile broadband prices dropped from 5.8% of GNI per capita in 2013 to just 3.31% in 2014.

The country has also made progress in providing access to competitive, fair and open broadband spectrum. A spectrum auction in June 2013 awarded five 4G spectrum licenses – four to established companies Claro, Movistar, Tigo, and Avantel, and one to new market entrant DirecTV.

**BROADBAND PLAN:** The national programme *"Plan Vive Digital"* was launched in 2010 to promote widespread Internet access and use across all strata of the population, with a particular focus on bringing Internet connection points to under-served, rural and remote areas of the country. The National Optical Fibre Backbone Project, which plans to connect the country's 1,078 municipalities to broadband infrastructure, has already linked up over half of the proposed entities. Close to 60% of the Colombian population now has access to

broadband Internet services.

**PROMOTING ACCESS IN UNDER-SERVED AREAS:** The government also promotes *"Vive Digital Points"* – newly established centres where local communities can connect to the Internet, access the Colombian State Web portal, and receive training in the use of different technologies. In addition, the government has taken the Internet to rural and remote areas through Vive Digital Kiosks – smaller Internet access centres located in national parks and places with more than 100 inhabitants. The Colombian government is also working to improve Internet access in schools, including those in rural areas, and is offering subsidies and financial assistance to families unable to afford ICT equipment or access to the Internet. Around 1,000,000 families are expected to benefit from broadband Internet subsidies.

# 2.2.1 THE FRONT RUNNERS

## WHY IS LATIN AMERICA LEADING THE WAY? PLANS, FINANCING MODELS AND REGULATORY INTERVENTIONS

Six of the ten top-ranked countries in this year's Affordability Index are from Latin America. The high ranking of the Latin American countries is not a coincidence. The region has been leading policy and regulatory innovation in the telecom sector, developing regional research and education networks, and deploying broadband infrastructure – moves that have been inspirational to other countries and regions. Entry-level broadband prices in the Latin American region – with Brazil, Colombia, Costa Rica, Mexico and Peru leading the way – are generally cheaper than those found throughout Africa and Asia.

**BROADBAND PLANS:** Latin America has seen an increase in affordable broadband access over the last decade, underpinned by the development of clear and comprehensive broadband plans by many countries in the region. This has resulted in considerable investments by regional governments in broadband infrastructure and enhanced efforts to create the enabling environment required for private sector participation. Brazil alone committed about US$3.2 billion in 2014 (0.13% of its GDP) to a plan that combines the development of a national fibre backbone, tax exemptions, investments in research and development, and training in broadband and related technologies. Argentina, for its part, has committed $1.8 billion (0.4% of its GDP) to a similar plan through 2015. Colombia's Vive Digital plan encompasses initiatives to migrate government services online, provide broadband subsidies and training to poor households, and build a national fibre backbone in remote areas. The estimated price tag through 2014 is $2.25 billion, or 0.62% of its current GDP. Chile too launched a plan – *"Todo Chile Comunicando"* – that is focused on improving broadband access in educational establishments and rural areas. The Chilean public-private partnership project, launched in 2010, invested US$110 million to connect 3 million inhabitants across 1,474 rural localities to broadband with speeds of at least 1 Mbps, at an affordable cost of US$30 per month.

**COVERAGE AND COST**: These experiences point to a trend apparent across Latin American broadband initiatives: an initial focus on improving coverage and reducing regional imbalances in access to affordable Internet. Most countries did so with modest broadband speed targets (e.g. 1 Mbps), before moving on to the deployment of high-speed services. The initiatives also focused on encouraging competition across the backbone segment, particularly in areas where there was little, if any, private investment. Public investment in the deployment of network infrastructure has varied from US$2.60 per capita in Chile to US$21 per capita in Argentina.

**DEPLOYMENT MODELS**: Deployment models for broadband varied considerably across countries in Latin America. Argentina and Brazil, for example, opted for backbone network deployment, spearheaded by the incumbent state-controlled operators. In this model, the government was responsible for laying the fibre, and the private sector for connecting the "last mile" customers. By providing soft loans, training, and facilities interconnection, both Argentina and Brazil promoted small- and medium-sized operators. Chile, Colombia and Mexico, on the other hand, adopted public-private partnership models. In these models, the split between public and private investment was well defined, enabling the state to reduce its initial commitment for infrastructure as well as its future expense for network maintenance and operation. Public financing ranged from 38% of the estimated total investment in Colombia to 45% in Chile.

**LESSONS**: The flexibility of state-owned operators in Latin America encouraged creative approaches to affordable broadband and, overall, appeared to enable great progress in increasing Internet access and use. State-owned operators were mandated to operate only in wholesale access markets in the areas where private investment had been insufficient or non-existent. At the same time, incumbent operators coordinated with private sector operators to deliver last mile connections under non-discriminatory conditions. The public-private partnership model used throughout the region ensured complementarity between public funding and private operations, enabling the countries to make further progress toward expanding affordable access.

# 2.2.2 THE FOOT OF THE TABLE

The five countries at the bottom of the table – Yemen, Ethiopia, Haiti, Sierra Leone, and Malawi – are all politically or economically fragile nations. Our analysis indicates that policy choices by these governments have acted as a primary contributor to their low ranking in the Affordability Index.

**Yemen's** ICT infrastructure is one of the poorest in the Arab region. While political, developmental, and domestic security challenges have contributed to the Internet's local under-development, the country's policy and regulatory environment is also hampering the growth of broadband. Yemen's mobile phone sector has been liberalised (i.e., new entrants are, in principle, allowed to enter the market), yet the government's continued control of the sector has prevented the positive effects of increased competition and deregulation that generally accompany sector liberalisation. Until recently, state-owned Yemen Mobile was the only operator allowed to provide mobile broadband services. Similarly, state-controlled companies PTC and TeleYemen are the only providers of fixed Internet service in Yemen, and a significant portion of the subscriptions are still for dial-up services. Yemen's Ministry of Telecommunications and Information Technology (MoTIT) acts as the de facto regulatory authority for the sector, responsible for the issuance of licenses, management of radio frequencies, and deployment and operations of telecommunications infrastructure. This has resulted in an unpredictable regulatory environment, with limited incentives for private investment.

As a consequence, Internet and mobile broadband prices in Yemen are some of the highest in the world and remain unaffordable for the vast majority of Yemen's 24.5 million people. This is particularly the case for the 38% of the population that lives under the $2/day poverty line, who would have to spend 22-24% of their average monthly incomes to purchase entry-level broadband Internet access.

Despite significant ICT sector investment in recent years, **Ethiopia** (see box out) remains far behind other countries in the region when it comes to providing its citizens with access to quality Internet services.

The country has yet to introduce any competition in its ICT sector. The Ministry of Communication and Information Technology makes policy, regulates the sector, and owns the incumbent provider, Ethio Telecom. This means that both fixed and mobile telephone and Internet services are tightly controlled under a government monopoly.

## MONOPOLY A BLOCK TO AFFORDABLE INTERNET IN ETHIOPIA

**RANKING:** Ethiopia's score in the Affordability Index improved marginally in 2014, but the advances of other nations resulted in the country dropping to second to last place. Despite significant ICT sector investment in recent years ($3.1 billion between 2007-2014), it remains one of the least connected countries in the world, with an Internet penetration rate of just 1.5%.

**POLICY ENVIRONMENT:** The Ethiopian government's decision to preserve a monopoly in the fixed and mobile broadband sectors has been the key contributor to the lack of affordable access in the country. The absence of competition has resulted in Internet tariffs that are not set to market value – while the incumbent telecom operator, Ethio Telecom, has lowered prices several times, costs still remain far beyond the reach of most Ethiopians. Entry-level mobile broadband service (1 Gb, postpaid, computer-based) costs 41% of GNI; with over 72% of Ethiopia's population earning less than $2 a day (US$61/month), it is clear that the majority of the population cannot afford to access and benefit from the Internet.

**QUALITY OF SERVICE CHALLENGES:** Ethiopia's communications infrastructure is one of the least developed in terms of quality of broadband services. Affordability Index researchers report that the broadband network operates very much below its advertised speed and is often plagued by connection problems. This low quality of broadband service acts as a brake on the investment, economic growth, education, and entrepreneurship needed for the country's progress.

**Sierra Leone** faces considerable economic hardships. These hardships, combined with inadequate regulatory environments, have hampered the provision of affordable Internet. Sierra Leone's entry-level mobile broadband price represents about 25% of GNI per capita, among the highest in West Africa.

## 2.2.2 THE FOOT OF THE TABLE CONTINUED

Like Sierra Leone, **Haiti** has experienced political and economic difficulties. As a result, economic and social indicators remain far below the averages found in the other countries of Latin America and the Caribbean. Recent natural disasters and years of political and economic turmoil have stifled most sectors of Haiti's economy, including the telecom sector. Entry-level mobile broadband prices spiked from US$23 in 2013 to US$39 in 2014, making access unaffordable for many citizens – particularly for the 77% of the country's population earning less than $2 a day, for whom entry-level mobile broadband represents about 38% of GNI per capita. Haiti's low score on the Affordability Index reflects the country's inadequate legal and regulatory environment, limited international connectivity, and the absence of an effectively regulated wholesale broadband regime.

While infrastructure in **Malawi** has improved in recent years due to its access to submarine cables via Mozambique and Tanzania, prices remain very high. As of early 2013, the monthly price of fixed-line Internet access was around US$16.50, while a monthly mobile 3G data plan cost about US$24 for 1.5GB of data. The ITU estimates that entry-level mobile broadband prices are equivalent to about 28% of GNI per capita, one of the highest prices found in southern Africa.

The high cost to connect in Malawi is also caused by the country's significant power crisis —costs associated with the need for mobile operators to power base stations are passed on to consumers and increase the cost for them to access the Internet. The country has one of the lowest electrification rates in the world, with only about 9% of the population having access to electricity. Half of the formal sector enterprises in Malawi have backup generators – twice the rate found in other low-income African countries. Malawi's experience further indicates the crucial importance of a stable and reliable electricity supply for increasing affordability of and access to the Internet.

## 2.2.3 EMERGING ECONOMIES AND DEVELOPING COUNTRIES

The 2014 Affordability Index also ranks countries based on economic development levels Unsurprisingly, countries classified as *"emerging economies"* by the World Bank top the Index. Our analysis shows that the emerging economies that score higher in the Affordability Index have not only been pursuing policy and regulatory frameworks that promote healthy and competitive markets for infrastructure expansion, but have also been creating incentives to stimulate the demand for broadband services for quite a long time (at least two to three decades). Developing economies, such as Rwanda and Nigeria, are following suit, but their efforts are more recent.

## 2.2.3 EMERGING ECONOMIES AND DEVELOPING COUNTRIES CONTINUED

| Top Emerging Economies | | | | | |
|---|---|---|---|---|---|
| Rank | Country | Sub-index: Infrastructure | Sub-index: Access | Affordability Index: Overall Composite Score | Mobile broadband (pre-paid hand-set-based 500 MB) as % GNI (2013) |
| 1 | Costa Rica | 48.1 | 77.5 | 63.4 | 1.1 |
| 2 | Colombia | 58.8 | 66.4 | 63.1 | 3.3 |
| 3 | Turkey | 56.3 | 67.5 | 62.4 | 1.1 |
| 4 | Malaysia | 53.6 | 68.5 | 61.5 | 1.4 |
| 5 | Peru | 58.0 | 60.2 | 59.6 | 2.8 |
| Top Developing Economies | | | | | |
| 11 | Rwanda | 49.0 | 53.6 | 51.6 | 15.0 |
| 12 | Nigeria | 45.3 | 56.6 | 51.2 | 5.6 |
| 13 | Morocco | 41.1 | 60.0 | 50.8 | 4.7 |
| 16 | Uganda | 40.1 | 55.4 | 48.0 | 18.2 |
| 20 | Kenya | 37.7 | 50.0 | 44.0 | 7.5 |

**Rwanda** is the top-ranked developing country in the Affordability Index, reflecting the success of its progressive policies, which have been designed to leverage the ICT sector as an engine for economic and social development. The Rwanda ICT Policy and Master Plan – also called the National Information and Communication Infrastructure (NICI) Plan and lately referred to as the SMART Rwanda ICT Master Plan – is divided into five phases of five years each. Phase III of the NICI plan (2011-2015) saw the government roll out a national high-speed fibre optic backbone (2565 Km of four-ring cable) that is shared with the private sector. The Rwandan government exclusively owns the infrastructure and uses one of the four ducts; the remaining three are available for the private sector on open access terms.

The Rwandan government also plans to expand ICT infrastructure to rural and under-served areas where fibre cannot reach. In March 2013, the government announced an agreement with Korea Telecom Corporation, under which the latter will invest US$140 million to deploy a Long-Term Evolution (LTE) access network over a period of three years. It is expected that this will lead to 95% of the population being within range of a high-speed mobile broadband network. However, many have expressed concern regarding this type of deployment model and the possibility that it may deter competition at the retail level. The long-term impact remains to be seen.

On the demand side, the Rwandan government has launched several ICT e-Government applications for services including e-immigration and e-health, and has also encouraged the use of mobile applications to deliver agricultural information. The new Smart Rwanda ICT Master Plan (2015-2018) aims to build on these gains.

**Nigeria** comes second in the Affordability Index's ranking of developing economies – scoring higher than other African developing economies like Kenya, Morocco and Uganda, and higher even than some emerging economies, including Mexico, South Africa, Thailand and Tunisia. The backbone infrastructure in Nigeria has improved significantly over the last decade, with multiple players, including Phase 3, Glo 1, Suburban Telecom, Multilink and MTN, building fibre networks that crisscross the country. Nigeria's regulator, the Nigerian Communication Commission, plans to award seven licenses to regional infrastructure companies to extend broadband infrastructure nationally. The first two of these were awarded in early 2015 to MainOne and IHS Communications to provide services in Lagos and North Central states, respectively. The government is also working to improve infrastructure sharing among these operators, who have traditionally built overlapping fibre networks.

The nascent *"Smart States"* initiative, which sees states committing to reduce the cost of broadband access by reducing taxation and simplifying regulation, is also a

## 2.2.3 EMERGING ECONOMIES AND DEVELOPING COUNTRIES CONTINUED

positive step. Nigeria's mobile broadband penetration rate stands at just 10% – despite the fact that close to 40% of Nigerians use the Internet – and the government has put in place policies to increase this penetration level to 30% by 2018. To increase the ability of mobile operators to serve more Nigerians, plans were recently announced to auction spectrum in the 2.6 GHz band.

**Morocco** – the third-highest ranked developing country overall – has the top score among all developing countries in the infrastructure sub-index. Ongoing reforms in the communications sector and growing investment in fibre optic national backbone networks have had a dramatic impact on prices. The price of a monthly entry-level mobile broadband package dropped fourfold from US$49.4 in 2013 to US$11.9 in 2014, and mobile broadband penetration currently stands at 15%, while fixed broadband penetration remains at 10%. According to the regulatory agency, 88% of the country's 8.5 million mobile users are also mobile Internet subscribers, but the majority of Internet users are in urban areas.

**Uganda** has seen improvement in Internet access in recent years due to increased competition in the telecom sector, a reduction of international bandwidth prices, and the availability of wireless and mobile technologies, such as WiMAX, EV-DO, HSPA and LTE, throughout the country. Though high entry-level mobile prices (18% of GNI per capita) have caused the Internet penetration rate to remain at a low 8.6% for mobile broadband and 7.4% for fixed broadband, prices continue to drop due to fierce competition and

mobile market consolidation, which ultimately may result in increased access and adoption.

Uganda's ranking as one of the top five developing countries is a result of the nation's high score on the access sub-index. This score is due, in part, to the consistent support of Uganda's government in promoting universal access, including shared access to Internet in rural and under-served areas through its Rural Communications Development Fund (RCDF). The project connects rural counties by subsidising small commercial Internet services at the district level, and providing resources for Internet access at schools, post offices, hospitals, libraries, community centres and health facilities.

**Kenya's** ranking is driven by its vibrant ICT sector. The country has one of the fastest growing ICT markets in Africa, and the use of mobile services to access the Internet and complete financial transactions has grown significantly in recent years. Two-thirds of Kenya's 22 million Internet users have access to broadband wireless Internet. Kenya's mobile broadband prices have been falling in recent years – standing at around 7.5% of GNI per capita – due to competition between key players like Safaricom, Telekom (Orange), Essar (Yu) and Airtel.

Kenya has also seen a surge in Internet bandwidth due to enhanced access to undersea cable capacity, and an improved national backbone that has resulted in increased availability of high-speed broadband. The quality of broadband services is steadily improving, with speeds of over 10 Mbps now available to many citizens.

## TAXATION

Taxation contributes significantly to the high cost of Internet access. Equipment, devices and services are often subject to a range of taxes. These can range from Value Added Tax (VAT) – which applies to most goods and services – to special communications services taxes on Internet data, surtaxes on international traffic, and customs duties on smartphone and network equipment. In addition, taxes can apply at the local, state and national levels, often creating confusion or extra cost.

What impact does this have? Based on a study of 19 economies, the GSMA estimates that mobile operators contribute up to 40% of their revenues in taxes and fees, and that taxes account for up to 25% of the total cost of mobile ownership by subscribers.

Taxes are almost always passed on to the end user in the form of higher prices, so it is the average citizen who suffers. Heavy taxation increases prices and slows down Internet adoption. Although hard for many governments to accept in the short term, the reality is that a reduction of taxation on broadband devices, equipment and services can have a significant socio-economic benefit, and ultimately increase overall tax revenues in the medium term. Policy makers need to play a major role in increasing affordability by reducing taxes on services and devices, enhancing transparency and certainty over future taxes, and encouraging targeted tax reliefs (e.g., low tax computer purchase programme for students).

# WHO'S HIT THE HARDEST?

3

# 3    WHO'S HIT THE HARDEST?

# 3.1    THOSE LIVING IN POVERTY CONTINUED

Our analysis suggests that three groups are the least likely to be able to access affordable Internet:

THOSE LIVING IN
EXTREME POVERTY

WOMEN

THOSE LIVING IN
RURAL AREAS

## 3.1    THOSE LIVING IN POVERTY

It will come as no surprise that those living in poverty are the least likely to be able to access the Internet affordably. Yet the scale and scope of the challenge is staggering. In the 51 countries that we surveyed, there are approximately two billion people earning less than $2 a day ($60 per month), according to World Bank data. Depending on the country in which they live, these individuals have to spend anywhere between 5.5% and 114.5% of their average monthly income in order to access an entry-level broadband package.

The UN Broadband Commission has set a target of entry-level Internet access priced at less than 5% of GNI per capita. While 23 out of the 51 countries have met this target on an aggregate basis, **at present, not a single emerging or developing country can**

**claim to meet this benchmark for those two billion potential users that survive on less than $2 a day.**

While many countries – including Botswana, China, Dominican Republic, Namibia and Zimbabwe – made headway in their efforts to reduce Internet access prices between 2013 and 2014, prices in many other countries remained relatively constant. Some countries – including India, Jamaica and Peru – even saw small increases in their broadband access costs. Clearly, policy and regulatory action is urgently needed if governments are serious about using ICT and access to the Internet as a vehicle for poverty reduction and delivery of government services.

| Country | Poverty headcount ratio at $2 a day (PPP) (% of population) (World Bank) | Total population living at less than $2/day (monthly income $61) | Cost of mobile broadband prepaid handset-based (500MB)/income level $2 | Cost of mobile broadband postpaid computer-based (1GB)/income level $2 | Cost of fixed broadband/ income level $2 |
|---|---|---|---|---|---|
| Argentina | 2.9 | 1,201,941.13 | - | 33.0 | 59.8 |
| Bangladesh | 76.54 | 119,857,783.91 | – | 14.5 | 7.7 |
| Benin | 74.27 | 7,667,244.14 | – | 49.8 | 86.9 |
| Botswana | 27.83 | 562,484.38 | – | 97.6 | 93.9 |
| Brazil | 6.79 | 13,604,574.71 | – | 51.6 | 29.2 |
| Burkina Faso | 72.44 | 12,267,597.37 | – | 33.2 | 76.4 |
| Cameroon | 53.15 | 11,827,979.21 | 83.0 | .. | 100.8 |
| China | 18.61 | 252,608,418.00 | 75.1 | 26.5 | 38.0 |
| Colombia | 12 | 5,798,568.60 | 52.2 | 26.2 | 30.7 |
| Costa Rica | 3.11 | 151,524.36 | 40.4 | 22.6 | 25.9 |
| Dominican Republic | 8.76 | 911,369.46 | 38.4 | 30.3 | 38.2 |
| Ecuador | 8.44 | 1,328,276.90 | 37.8 | 34.9 | 33.1 |
| Egypt | 15.43 | 12,661,299.13 | 34.2 | 5.5 | 12.5 |
| Ethiopia | 72.2 | 67,940,745.83 | 32.8 | 26.6 | 38.9 |
| Gambia, The | 55.93 | 1,034,305.10 | 32.7 | 114.5 | – |
| Ghana | 51.84 | 13,428,943.60 | 32.5 | 16.8 | 70.5 |
| Haiti | 77.51 | 7,997,064.02 | 31.9 | 37.8 | 78.4 |
| India | 60.57 | 758,420,953.30 | 28.6 | 26.6 | 9.8 |
| Indonesia | 43.3 | 108,191,818.22 | 27.0 | 8.6 | 36.4 |
| Jamaica | 5.85 | 158,827.50 | 24.9 | 40.9 | 47.9 |
| Jordan | 1.17 | 75,570.30 | 24.3 | 23.1 | 30.7 |
| Kazakhstan | 0.8 | 136,300.06 | 23.6 | 10.7 | 21.6 |
| Kenya | 67.21 | 29,810,115.72 | 23.3 | 19.0 | 55.2 |
| Malawi | 88.14 | 14,421,966.55 | 22.6 | – | 78.9 |
| Malaysia | 2.27 | 674,575.11 | 22.1 | 25.0 | 35.4 |
| Mali | 78.78 | 12,054,639.87 | 21.1 | 24.9 | 82.0 |
| Mauritius | 1.85 | 23,981.61 | 19.8 | 10.7 | 20.0 |
| Mexico | 4.12 | 5,040,094.84 | 19.5 | 32.0 | 28.9 |
| Morocco | 14.22 | 4,693,758.93 | 19.3 | 19.3 | 20.0 |
| Mozambique | 82.49 | 21,310,262.02 | 18.6 | 32.7 | 95.9 |
| Myanmar | | – | 17.1 | – | – |
| Namibia | 43.15 | 993,880.42 | 16.6 | 25.3 | 112.6 |
| Nepal | 55.95 | 15,552,677.19 | 16.4 | 13.8 | 13.1 |
| Nigeria | 82.2 | 142,711,813.59 | 15.6 | 37.0 | 63.9 |
| Pakistan | 50.67 | 92,291,652.38 | 15.0 | 23.1 | 23.8 |
| Peru | 7.99 | 2,427,010.68 | 14.4 | 35.8 | 29.5 |
| Philippines | 41.72 | 41,049,799.07 | 13.9 | 38.4 | 37.5 |
| Rwanda | 82.28 | 9,689,722.30 | 13.5 | .. | 177.2 |
| Senegal | 60.31 | 8,523,781.17 | 12.8 | .. | 62.5 |
| Sierra Leone | 82.51 | 5,026,571.08 | 12.8 | .. | .. |
| South Africa | 26.19 | 13,875,983.44 | 12.7 | 42.3 | 46.1 |
| Tanzania | 73 | 35,954,781.98 | 12.1 | 17.6 | 31.3 |
| Thailand | 3.5 | 2,345,367.57 | 11.9 | 22.8 | 33.9 |
| Tunisia | 4.46 | 485,537.90 | 10.7 | .. | 11.5 |
| Turkey | 2.56 | 1,918,275.61 | 10.4 | 17.1 | 20.5 |
| Uganda | 64.65 | 24,294,743.33 | 9.5 | 23.8 | 23.0 |
| Venezuela | 12.91 | 3,925,312.22 | 7.9 | 33.9 | 25.2 |
| Vietnam | 12.45 | 11,168,758.05 | 5.5 | .. | 19.3 |

Table 3. Cost of broadband for populations earning ess than $2/day

# 3.2 WOMEN

**Women are far less likely to be able to access the Internet affordably than men.** Research has shown that women on average earn 30% – 50% less than men – a disparity which diminishes the ability of women to afford, adopt, and benefit from broadband access. The Internet access gender gap is apparent throughout the world, although the extent of the gap varies from region to region – in parts of Europe and Central Asia, research has found that 30% fewer women than men access the Internet; in Sub-Saharan Africa, this figure jumps to 45%. The gap widens in rural areas – in some rural and remote areas of Asia, for example, it was found that men's access to the Internet outnumbers women's access by 50%.

A simple analysis of the gender pay gap and its impact on women's ability to afford Internet services clearly illustrates that the price of entry-level mobile broadband service is significantly higher for women worldwide. **For example, entry-level mobile broadband costs at least 8% of women's GNI per capita, compared with 5.6% for the average Nigerian.** In Malawi, entry-level mobile broadband is at least 40% of women's GNI per capita, compared with 28% of the income of the average Malawian. (See table below for additional details.)

| Mobile Broadband is far more expensive for women | | |
|---|---|---|
| *Mobile Broadband (prepaid handset based, 500 MB)* | | |
| **Country** | **as % of GNI p.c.** | **as % of GNI p.c. adjusted for gender gap at 30% lower incomes** |
| Peru | 2.8% | 4.0% |
| Colombia | 3.3% | 4.7% |
| Morocco | 4.7% | 6.7% |
| Nigeria | 5.6% | 8.0% |
| Kenya | 7.5% | 10.7% |
| Rwanda | 15.1% | 21.5% |
| Uganda | 18.2% | 26.0% |
| Sierra Leone | 25.1% | 35.8% |
| Malawi | 28.1% | 40.2% |
| Haiti | 34.1% | 48.8% |
| Mozambique | 40.5% | 57.9% |
| Senegal | 56.8% | 81.1% |
| Niger | 88.9% | 126.9% |
| Liberia | 113.8% | 162.5% |
| S. Tomé&Principe | 138.3% | 197.5% |

A Research ICT Africa Network survey also found that women "generally have less access to ICTs than men and this increases as the technologies and services become more sophisticated and expensive, requiring greater levels of income and education to access and to operate."

The implications of women's limited ICT access are significant – both for women, as well as for society at large. Limiting women's access denies them the tools, resources and opportunities available through the Internet, which in turn slows economic growth and social development opportunities. More than 70 % of Internet users surveyed for Intel's 2013 Women and the Web study consider the Internet *"liberating"*, and 85 % believe that it *"provides more freedom"*. Access to the Internet has been shown to have personal, social and market benefits – from improving education and digital literacy levels, to increasing individual productivity and earning power, household resources and social capital.

Despite the fact that the United Nations has repeatedly underscored the Internet's transformative potential, only 21% of women and girls in developing countries have access to the Internet. The possibilities for women's empowerment via access to affordable Internet demonstrate the need for evidence-based research based on how women currently access and use the Internet. The Alliance for Affordable Internet is working closely with the World Wide Web Foundation's gender gap research programme to understand better the nature of the gender digital divide. We hope that next year's Affordability Report will shed more light on the extent of differential access to and use of the Internet by women and men.

# 3.3 RURAL DWELLERS

Those living in rural areas are often unable to secure affordable access to the Internet. This is for two primary reasons. First, incomes tend to be lower in rural areas, making the real cost to connect higher. Second, the challenges of infrastructure deployment in rural areas can result in access being impossible, or significantly more expensive than in urban areas.

A 2012 research study by Research ICT Africa covering 12 countries in Africa found that the urban and rural divide is quite significant among Internet users. Of the 23.8% of the population found to be Internet users (defined as individuals that had used the Internet at least once in the preceding 3 months) in Uganda, 17.3% were based in urban areas, compared with just 6.5% in rural areas. In Mozambique, only 3.2% of the rural population was found to use the Internet, compared to 26% in urban areas.
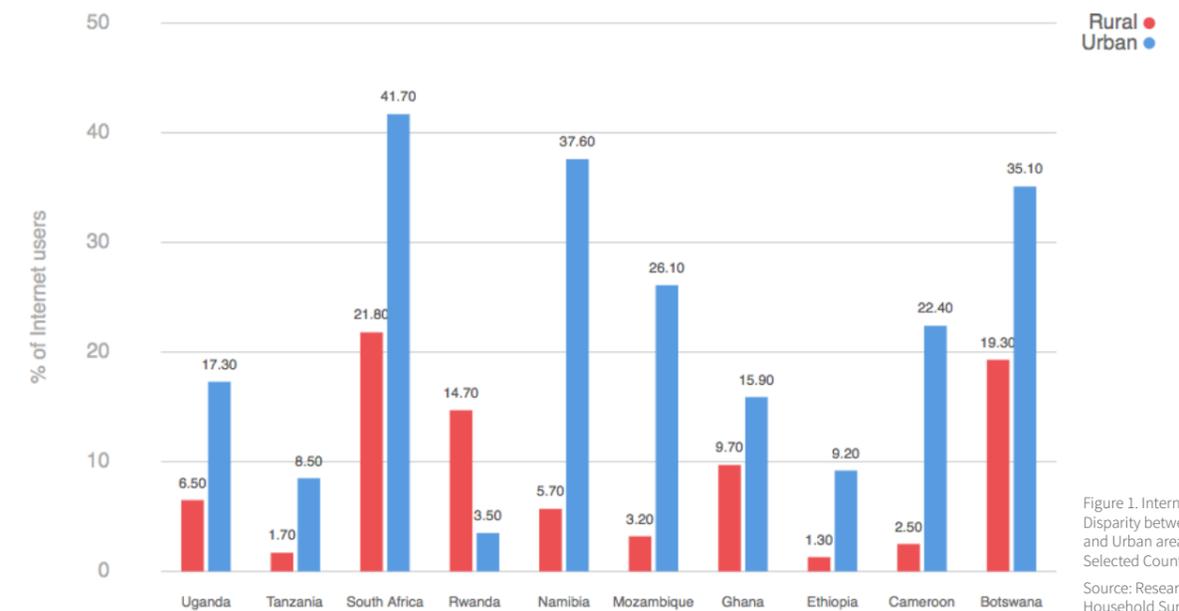


**Rural** ● **Urban** ●

Figure 1. Internet Users Disparity between Rural and Urban areas in Selected Countries

Source: Research ICT Africa Household Survey Data, 2012

## DEVICE COSTS

While these figures consider the cost of getting online and using data, they do not tell the full story. To use the Internet, a device such as a PC or smartphone is needed, and the cost of purchasing or renting and maintaining such a device can be significant.

The cost of smartphones – the primary means of access for many in the developing world – has fallen significantly, with prices 30% below their 2008 levels in Asia, 25% lower in Latin America, and 20% lower in Africa. But there is still a long way to go to make these devices truly affordable, both for many current users as well as for the unconnected, for whom the cost of a smartphone or computing device remains a major barrier to ownership and getting online. A recent McKinsey & Company analysis notes that in a number of developing countries, the average cost of a smartphone is more than 20% of GNI per capita. In Bangladesh, for example, the average cost of a smartphone is 24.1% of GNI per capita; in Tanzania, this cost jumps to 62% of GNI per capita, and a smartphone in Ethiopia costs a startling 80.3% of GNI per capita.

Many companies are now focused on producing more affordable devices. According to the GSMA, the key price point for achieving widespread smartphone penetration in developing countries is between $25 and $50. There have been some notable successes, like the Intex Cloud FX Firefox OS smartphone, which went on sale in India for 1,999 rupees, equivalent to about US$33. The use of such phones often involves some trade-offs, like a shorter battery life and a limited selection of operating systems. Despite these trade-offs, the availability of these phones must be encouraged by those focused on increasing affordability and access. The fact remains that the "majority of smartphones in the developing world are priced above the $100 mark" – a price point that will continue to be a barrier to broadband use. Indeed, for those living on $2 per day, such a cost would represent more than 13% of annual income, making it unaffordable for many, and a medium- to long-term aspiration for others.

# 4 POLICIES, REGULATIONS & PROGRAMMES FOR STIMULATING AFFORDABLE ACCESS

As noted in Section 2, the Affordability Index does not directly measure cost, instead focusing on those areas broadly agreed to be the drivers of affordability. However, there is a strong relationship between Index scores and broadband affordability. A regression analysis (below) shows that high scores on the Affordability Index are strongly correlated with lower broadband prices as a percentage of GNI per capita. Therefore, we can conclude that rising scores on the Affordability Index are associated with lower broadband costs in that particular country.

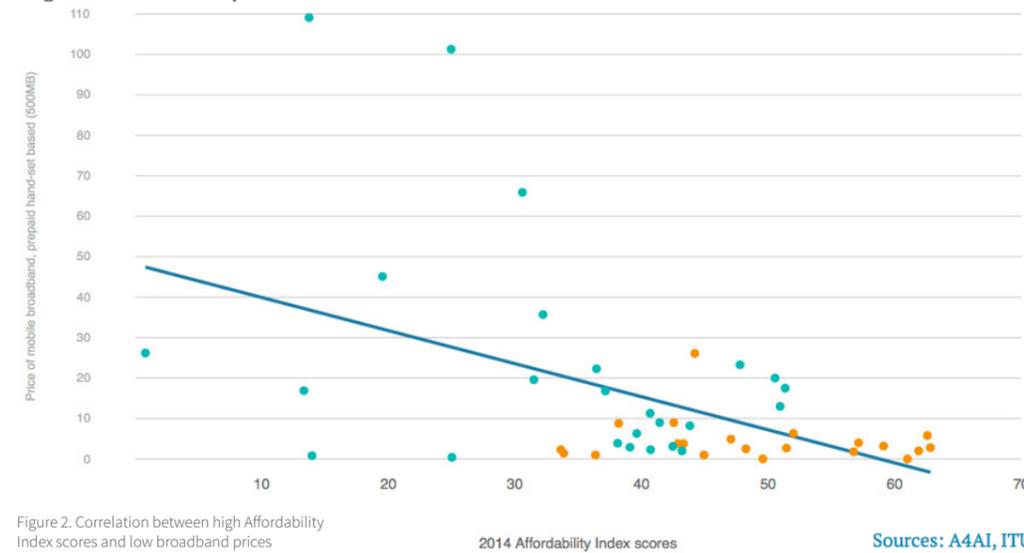Figure 2. Affordability Index scores and Broadband Prices



Figure 2. Correlation between high Affordability Index scores and low broadband prices

2014 Affordability Index scores

Sources: A4AI, ITU

So what factors are really driving higher scores on the Affordability Index, and therefore progress toward affordable Internet across the globe? While each country is different, we have been able to identify a number of common success factors.

- Effective broadband strategies;
- Healthy competition;
- Non-discriminatory access to spectrum;
- Infrastructure sharing; and
- Strategies to deliver universal access to rural and under-served populations.

These factors are the mutually reinforcing pillars that drive affordability. As the figure below illustrates, these pillars need to work in harmony since they cannot support and nurture universal affordable access on their own.
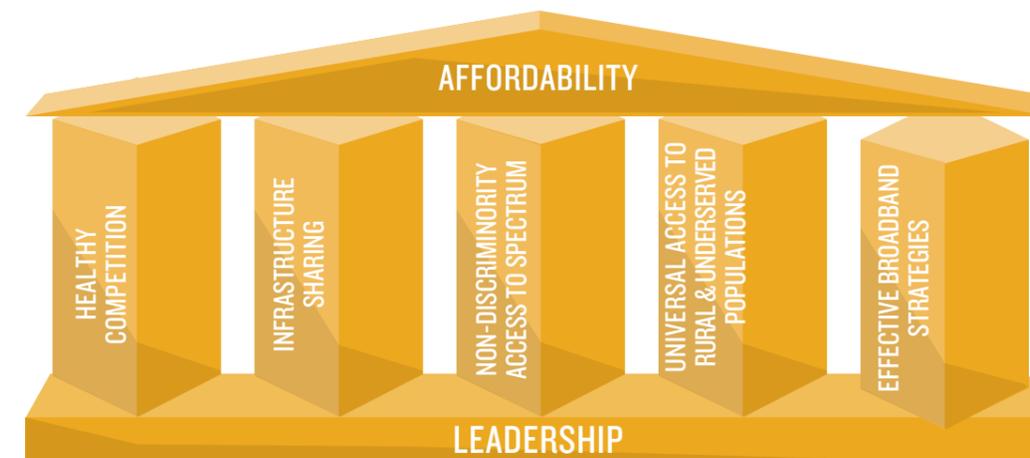


Figure 3. Foundations of Internet Affordability

# 4. POLICIES, REGULATIONS & PROGRAMMES FOR STIMULATING AFFORDABLE ACCESS CONTINUED

All of the countries that top the Affordability Index have prioritised at least four of these five key drivers of affordability. Of course, these actions cannot take place in a vacuum and their efficacy is enhanced by progress made in other areas, such as regulatory capacity, regulatory independence and increasingly transparent policy-making processes.

A closer look at the scores (with 1 being the lowest and 10 the highest) received by the top five emerging and developing countries reveals that policymakers in Index-leading countries are indeed making concerted efforts to push forward the policy and regulatory areas that will have a significant impact on affordability outcomes (see table below).

In addition to these specific policy areas, our experiences and observations across this year's Affordability Index research have reinforced the critically important role of strong political leadership to ensure that these affordability pillars work in harmony. Leadership is the foundation of affordability, essential to achieving the ultimate objective of reduced broadband connection prices and affordable access for all. The experiences of Costa Rica, Colombia, Malaysia, Rwanda and Nigeria all demonstrate the importance of leadership – it not only encourages the telecom sector to carve a path toward broadband expansion, adoption and use, but

Table 9. Primary research scores (per thematic cluster) for top 5 emerging and developing countries

| Top Emerging Economies | | | | | |
|---|---|---|---|---|---|
| Country | Effective Broadband Strategy | Healthy competition | Non-discriminatory access to spectrum | Infrastructure sharing | Strategies to deliver universal access torural & under-served populations |
| Costa Rica | 7.2 | 6.2 | 6.7 | 4.8 | 7.2 |
| Colombia | 7.7 | 5.9 | 7.8 | 6.2 | 7.7 |
| Turkey | 6.7 | 7.0 | 5.7 | 7.5 | 6.3 |
| Malaysia | 7.5 | 4.7 | 6.2 | 7.5 | 7.4 |
| Peru | 7.5 | 7.2 | 6.3 | 6.7 | 4.5 |
| Top Developing Economies | | | | | |
| Rwanda | 7.5 | 5.8 | 4.7 | 6.3 | 6.5 |
| Nigeria | 6 | 6.2 | 6.5 | 5.2 | 5.8 |
| Morocco | 4.7 | 7.5 | 5.2 | 4.2 | 6.3 |
| Uganda | 6.3 | 5.9 | 4.7 | 4.8 | 7.5 |
| Kenya | 5.3 | 6.4 | 4.3 | 4.7 | 3.2 |

## A NOTE ON SCORES IN FIGURE 5

These scores relate to primary data only. They are calculated by averaging individual question scores (provided by the expert researchers), combining these questions into thematic clusters, and then averaging the scores again. In general, a score of five or above indicates a clear and favourable policy environment, while scores of seven or above indicate that policies have started to be implemented successfully and with significant positive impacts. All data is available for review and reuse by researchers and analysts; the codebook for assigning scores is available online.

also provides certainty in the market by pushing for and supporting the forward-looking legal and regulatory systems that will support the vision of ICT and the Internet as engines for economic growth. It further promotes competition by supporting the development of incentives for new market entrants and, at the same time, clarifies the role of government and other players as partners working toward the same objectives.

Comprehensive broadband strategies that consider both the supply of and demand for broadband services, and that reflect a partnership-based approach to decision-making and implementation, are more likely be successful in increasing universal access to and use of affordable Internet. Notably, the mere presence of ICT infrastructure in a country does not guarantee affordability.

For example, though Argentina, Indonesia and South Africa all rank highly on the Internet infrastructure sub-index, their rankings on the overall Affordability Index are much lower as a result of stubborn obstacles to increased affordable access. These countries have recently attempted to develop new and comprehensive broadband plans, which, once implemented, could have the kind of impact that has been seen in higher scoring countries.

A regression analysis shows that there is a direct and significant relationship between the cost of fixed and mobile broadband access and the existence of government-led national broadband plans that provide guidance regarding best practices for the implementation of infrastructure expansion strategies. In other words, the extent to which national broadband Internet plans set clear, time-bound targets and interventions for

# 4.1 EFFECTIVE BROADBAND STRATEGIES

Figure 4. Broadband Strategies and Prices



Sources: A4AI, ITU
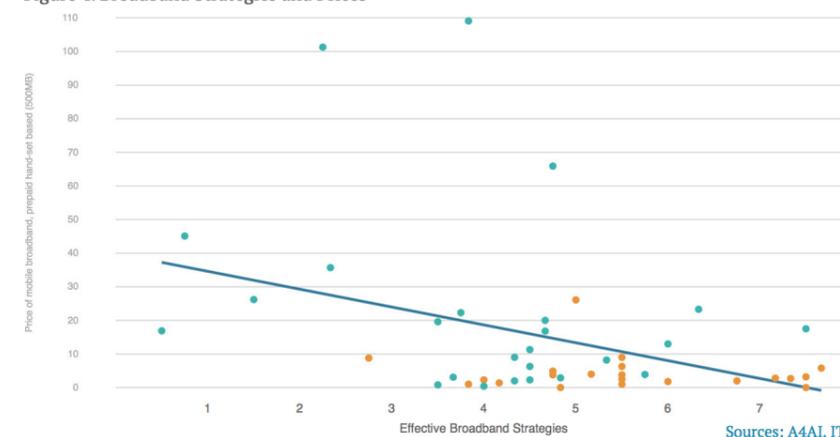
increasing penetration has significant implications for the reduction of fixed and mobile broadband costs. Currently, about 12 of the 51 countries covered in the study do not have any form of ICT or broadband plan or policy; many others have an plan in place, but one which has not been updated to reflect the broadband era.

The figure below shows, for example, the relationship between mobile broadband prices and the presence of a broadband plan or strategy.

For broadband plans to be truly effective, they must enhance supply, stimulate investment and create sustained user demand. Efficient broadband infrastructure is a necessary condition for access to affordable Internet, but it needs to be deployed within a framework where incentives to make investment cost effective are in place. Demand stimulation can be tackled by enhancing user awareness of the benefits of affordable Internet access, driving digital literacy programmes, supporting content developers as new entrepreneurs in the digital economy, and promoting the electronic provision of government services. When these factors work in combination, countries can develop a sustainable ecosystem rooted in affordable access.

Within this framework, it has also become clear that broadband expansion strategies must be coordinated with developments in the energy sector. In fact, several of the governments of the top Affordability Index countries are now collaborating with their respective energy ministries, and stakeholders within the energy sector, to coordinate infrastructure expansion plans with a view of reducing unnecessary costs

and increasing shared infrastructure options across the sectors. Our analysis shows that electricity is an essential infrastructure variable in the path toward affordability – the lower the electrification rate, the higher mobile broadband prices are, and vice versa (see figure below). This is especially the case in sub-Saharan Africa, where operators are compelled to install independent generators that power base stations and other elements of the network. According to GSMA research, by 2012, there were around 165,000 base stations across sub-Saharan Africa lacking a reliable electricity supply and powered with diesel generators. This amounts to approximately 79% of all base stations in the sub-Saharan region. This situation is quite concerning and again, requires urgent collaboration between energy and communications ministries to coordinate infrastructure development policy and efforts that will lead to increased and reliable electricity supply across the countries.

Figure 5. Electrification Rates and Broadband Prices



Figure 5. Primary research scores (per thematic cluster) for top 5 emerging and developing countries
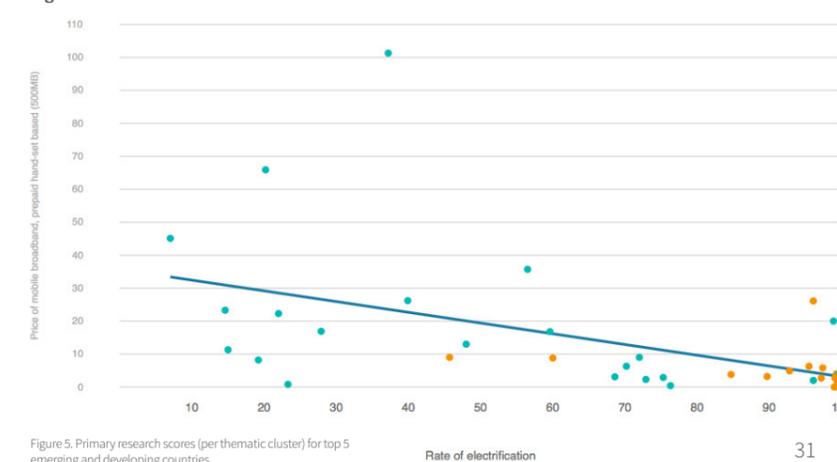
# 4.2 HEALTHY COMPETITION

It is well documented that a liberalised market with an open, competitive environment leads to better prices and service options for users. As seen in Ghana, Brazil, India and many other countries across the globe, competition has the power to fuel the growth of affordable mobile voice services. Competition also fuels the growth of affordable access to the Internet, but, as pointed out above, competition alone is not a sufficient condition to ensure affordable access. It is therefore necessary to have the right policy and regulatory framework in place to ensure that competition is indeed effective (i.e., results in better choices and lower prices for users), and that any anti-competitive behaviours or actions are addressed by regulators with the capacity to enforce clear and transparent rules, based on robust market analysis and established within the existing framework.

One of several elements that contributes to an effectively competitive market is the establishment of a licensing regime that provides clear rules for market entry while also allowing businesses the flexibility

to make the most appropriate and cost-effective decisions about the technology used and the type of services offered (i.e., allowing for technology and service-neutral licenses). Such licensing regimes are based on the concept of unified licensing frameworks (ULFs), which minimise the administrative and formal requirements to enter into the market, generally providing technology and service-neutral licenses as a way to encourage and enhance competition at all service levels.

Our primary research indicates that those countries that have adopted ULFs, and those that have independent regulators with the capacity to enforce rules, have made better progress toward market growth and affordability (e.g., Kenya and Turkey). By contrast, countries with vertical market structures, weak regulatory institutions, and anti-competitive environments tend to suffer from high prices and low connection rates, leading them to languish at the foot of the Affordability Index (e.g., Ethiopia and Yemen).

## IMPLICATIONS OF A UNIFIED LICENSING REGIME FOR AFFORDABLE INTERNET ACCESS

The unified licensing regime is a regulatory framework that embraces technological and service convergence. Under this regime, service providers are allowed to use any technology to deliver data, voice and content services. There is no distinction between mobile or fixed services, satellite or terrestrial services, or data or voice services. A unified licensing regime paves the way for a reduction in the administrative and formal requirements necessary to enter the market. Australia, Finland, Japan, Korea, Mauritius, Malaysia, Peru, Sweden and South Africa are among the countries that have adopted unified licensing regimes to simplify market entry, create a level playing field, and enable operators to take advantage of new technologies to deliver advanced services to users without regulatory constraints or delays.

From a licensing standpoint, the regime facilitates the move from vertical (technology-based) licenses to horizontal (services-based) licenses. There are two variants of the unified licensing regime:

- Multi-service: Authorises service providers to offer any of the designated services that fall within the relevant category, using any type of communications infrastructure and technology capable of delivering the services in question. A multi-service licensing regime

may include authorisations for network operators, public telecommunications services (including fixed and mobile voice services), and value-added services (e.g., Internet access services). Under this regime, a cable television operator intending to provide television, telephone and Internet services using cable infrastructure generally would require three different licenses – one for each service.

- General authorisation: Allows services providers to offer multiple services, and consolidates the many authorisations that service providers are required to hold into a few or even a single authorisation. For example, the general authorisation may involve a license to deliver services and operate facilities. Spectrum rights may be allocated separately.

Service and technological neutrality leads to reduced barriers to market entry by allowing new service providers to select the most cost-effective technology to deliver an array of services while reducing administrative costs. By leaving technical and business decisions to providers, regulators can focus on establishing quality of service regulations to ensure that users receive the most reliable service for their needs. With increased market competition, users can benefit from more affordable prices and increased quality of service.

# 4.3 SPECTRUM FOR AFFORDABLE INTERNET

There are 2.3 billion mobile broadband users around the globe – with only 21% of global mobile broadband subscriptions belonging to users in developing countries. As the demand for mobile and wireless broadband continues to rise, especially in developing countries, there is increasing competition for spectrum (especially in the digital dividend band of 700 MHz, the Advanced Wireless Services (AWS) band of 1710-1755/2110-2155 MHz, and the 2.5 G band (2500-2570/2620-2690 MHz)). TV White Spaces in the Ultra High Frequency (UHF) band have also been identified as an option to increase affordable access to broadband services, especially in rural areas.

Countries that top the Affordability Index have made spectrum available on a competitive and non-discriminatory basis (see case of Peru below). Radio frequency spectrum is fundamental to expand networks to last mile areas and to provide higher data throughputs for wireless broadband services. Making licensed spectrum available to operators on a competitive market basis will bring down the cost to access wireless networks, while offering more license-exempt spectrum bands to users will foster innovation.

Regulators in developing countries need to develop spectrum policies that are responsive to the high demand for mobile broadband spectrum. Not only should they focus on making the Digital Dividend bands (i.e., 700 MHz and 800 MHz bands) available as soon as possible, in addition to other possible options referred above, but they should commit to implementing transparent and non-discriminatory assignment procedures, while at the same time aiming to lower spectrum prices. Columbia and Peru provide useful experiences in this area.

There is emerging evidence to suggest that making mobile broadband spectrum available to operators and users will speed up universal, affordable access to the Internet, thereby boosting jobs, productivity, and sustainable growth. A study by the GSMA in Latin America indicates that licensing the Advanced Wireless Service (AWS) band in Argentina, Ecuador, El Salvador, Nicaragua, Guatemala, Panama and

Paraguay will stimulate investment of about US$30 billion in the ICT sector, and will indirectly contribute US $23 billion across other industry sectors. The other major benefits of competitive allocation of the AWS spectrum include the creation of new jobs, increasing development-oriented mobile app and content. A similar study by the GSMA indicates that releasing the 700 MHz, 800 MHz and 2600 MHz bands in six countries in Africa (Ghana, Kenya, Nigeria, Senegal, South Africa and Tanzania) – in other words, the Digital Dividend and 2.6 GHz bands – would have a US$ 33.6 billion impact on the GDP of these nations between 2015 and 2020 and would lead to the creation of 14.9 million jobs. Policy makers and regulators must urgently implement measures to ensure that their countries can reap the benefits of increased mobile broadband spectrum availability.

## SPECTRUM ALLOCATION IN PERU

Peru is one of the Latin American countries that has promoted competitive access to spectrum for mobile broadband services. The timely release of sufficient spectrum to meet projected increases in demand is expected to increase access to the Internet. The government has allocated the essential bands for mobile 3G and LTE services, including for 700 MHz, for 1710-1755/2110-2155 MHz, and for 2500 MHz. The AWS band was auctioned in 2013 and the 700 MHz and 2.3 GHz bands were placed for auction in 2014. The competitive use of spectrum is expected to improve competitive options available in the Peruvian market and therefore bring down the cost of the Internet, especially in rural and under-served areas.

## 4.4 INFRASTRUCTURE SHARING FOR AFFORDABLE ACCESS

Infrastructure sharing mechanisms could cut broadband costs significantly – by up to 80% of current deployment costs, according to a forthcoming study by the Association for Progressive Communications. Infrastructure sharing reduces the capital costs of network deployment and therefore supports expansion and increased geographical coverage. It also reduces operating costs (e.g., tower maintenance and operation) by allowing operators to share these costs. If new market players can gain access to existing infrastructure at competitive rates, entry barriers will be minimised, promoting competition that can result in reduced prices.

Infrastructure sharing occurs at different levels – through opening up access to the existing copper network, through joint building and operation of shared backbone infrastructure, or through coordination among linear infrastructure providers, like power lines, gas pipelines, or roads. The participation of all market players in creating a special purpose vehicle for aggregating, building

and marketing backbone networks under open access principles has been gaining momentum in Africa in recent years and, as evidenced by the case of Burundi, has had a positive impact on network expansion and affordability.

Our research shows that countries that have instituted shared infrastructure in the backbone market fare better than those with limited initiatives for cooperation between operators. Countries that have implemented infrastructure sharing mechanisms have generally seen improved access at affordable prices (e.g., Kenya, Malaysia, Ghana and Nigeria). It is therefore important to promote commercially driven sharing, based on open access principles, and encourage collaboration among linear infrastructures providers, like power, gas and railway firms, to coordinate the building of broadband networks and leverage their rights of way and other assets to reduce access costs.

### THE IMPACT OF SHARED INFRASTRUCTURE ON NETWORK PRICES AND QUALITY IN BURUNDI

The Burundi Backbone System (BBS) is a partnership between different players with the intention to share a national backbone on an open access principle. It is a joint venture between the Government of Burundi, with initial financial support from the World Bank and four telecom operators (Ucom Burundi, Africell Tempo, Onatel and CBINET). The model separates the roles of the service provider and the network operator and provides services to operators on a fair and non-discriminatory basis.

The BBS is an independent infrastructure provider (Infraco) company that manages the Burundi backbone and ensures connection of the network to the landing stations of submarine fibre optic cables via Tanzania, through Rwanda, and onward to Kenya through Uganda. It operates and maintains the fibre optic communication network, and leases fibre optic connections to operators and companies, as well as to the government.

Based on interviews with BBS representatives, we learned that the completion of the backbone network and availability of relatively competitive access to international submarine cables has already reduced broadband prices from an average of US$1200 per Mbps/month to about US$300 per Mbps/month for end-users in Burundi. The government of Burundi is also one of the main beneficiaries of the initiative. It has negotiated a 10 year Indefeasible Right of Use (IRU) to deliver Internet connectivity for ministries and other government offices in the capital city of Bujumbura.

## 4.5 UNIVERSAL ACCESS TO AFFORDABLE AND QUALITY INTERNET

Successful experiences in Colombia, Malaysia, Pakistan and Nigeria demonstrate that governments in developing countries have a critical role in facilitating broadband infrastructure investment and Internet adoption in the digital age. These experiences further illustrate that universal access and service funds can be highly effective in expanding Internet access and use when they are updated and adapted to support national broadband strategies and targets. Our research shows that each of the top 15 countries has made a concerted effort to promote shared access at both the community and institutional level. They have carried out public investments to expand broadband networks (especially in rural areas), created community broadband access centres, encouraged enterprises to provide services through cybercafés, and extended Internet access through government offices and community anchor institutions like schools, libraries and hospitals. Such steps are vital in order to extend broadband access to very poor or marginalised communities.

In Thailand, for example, the government established the Broadcasting and Telecommunications Research and Development Fund to support universal service for broadcasting and telecommunications and promote community services. The fund was used to create public WiFi networks in over 30,000 centres with a total of 150,000 access points. The government plans to increase broadband wireless coverage to 80% of the population by 2016.

Peru provides another example of where a USF is being used to extend broadband networks to under-served communities. Peru's Fondo de Inversión en Telecomunicaciones (FITEL) is hailed as one of the most successful programmes to extend access to communication networks in rural areas using the competitive subsidy scheme. While the original plans focused on narrow band network and voice communications, FITEL has now begun promoting access to broadband by improving wireless broadband and the rollout of fibre networks in under-served areas of the country. Municipalities, educational institutions, and health centres have all been targeted, and communities in under-served areas are increasingly gaining access to broadband.

Mexico's Ministry of Communications and Transport (SCT) has launched a project dubbed "Mexico Conectado" ("Connected Mexico"), which seeks to boost broadband access across the country. The project covers the deployment of broadband lines in over 250,000 public spaces, including schools, government institutions, and hospitals, by 2018. The project has provided high-speed Internet access to over 11,000 schools and community centres and 9,000 public access spaces. The government plans to expand Internet penetration to 60% of the population by 2018.

# 5 A ROADMAP TO AFFORDABLE INTERNET

This report is being released six months before the UN General Assembly gathers to debate and agree the sustainable development goals (SDGs) that will guide the global development agenda for the next 15 years. Our research has clearly demonstrated both the beneficial developmental impact that affordable Internet can have, as well as the common, replicable success factors that can drive prices down.

Our key recommendation, therefore, is:

*"To enshrine affordable access to broadband Internet in the sustainable development goals, and require all stakeholders to work toward achieving affordable, universal access in the coming years through a blend of infrastructure investment and policy and regulatory reform."*

Of course, this will not be a simple task. It requires a multi-pronged strategy – one that depends on close collaboration among key players, including governments, policymakers, private sector, academia and civil society. Crucially, policies and regulations should address both the demand and supply side of Internet development.

In this final section, we present our key recommendations, grouped by the success factors we have identified and broken down into action points for governments, the private sector, and civil society.

## 5.1. DRIVE BROADBAND INFRASTRUCTURE EXPANSION THROUGH INCREASED PRIVATE INVESTMENT AND REMOVAL OF BARRIERS

If gaps in broadband infrastructure remain, the poor and those who live in remote areas will remain offline. In addition, as the demand for quality broadband increases, the need for robust in-country infrastructure and international connections surges. Addressing the infrastructure gap demands clear understanding of the gaps, increased private investment, and the development of public-private partnerships – all tied together under a clear and holistic plan.

| | |
|---|---|
| **Government** | For countries with no current broadband plan: Within two years, develop and implement comprehensive national broadband strategies and plans with input from all stakeholders. |
| | For countries with broadband plans in place: Commit to measure progress and update plans at least every three years, with input from all stakeholders. |
| | Plans must be time-bound and measurable. Open access, infrastructure sharing, and public-private partnerships should be explicitly considered. |
| | Tackle electricity supply deficits in parallel with the expansion of broadband networks. |
| **Private sector** | Accelerate the deployment of broadband infrastructure through sustainable business models that promote open access and infrastructure sharing. This includes embracing public-private partnerships. |
| | Commit to affordable Internet by contributing to universal access service funds and recognising the shared responsibility to invest in rural or marginalised areas. |
| **Civil society, academia, international organisations and foundations** | Serve as the voice of the disenfranchised – engage constructively with both the public and private sectors to ensure that the broadband infrastructure needs of under-served populations are taken into consideration in both planning and measurement. |
| | Add substance to the debate. Fund and/or participate in research on broadband and Internet deficits in order to facilitate evidence-based policy-making and infrastructure planning by policy makers and the private sector. Come together to create regional policy observatories to share knowledge and track progress. |

## 5.2. INTENSIFY COMPETITION AND LEVEL THE PLAYING FIELD TO INCREASE ACCESS, REDUCE COSTS AND STIMULATE DEMAND

Many challenges can be addressed by intensifying competition, in particular through the adoption of a unified licensing regime. Access to resources such as spectrum and right of way must take place in a market-based, non-discriminatory and transparent fashion. This also calls for enhancing the capacity of regulators and the adoption of evidence-based regulatory principles.

| Government | Adopt technology- and service-neutral unified licensing regulations that facilitate flexibility in market entry by operators. |
| --- | --- |
| | Increase transparency, fairness and evidence-based regulation so as to stimulate free competition, innovation, better service quality and low tariffs. |
| | Promote public consultation in order to increase the participation of consumers and commercial special interest groups in access and cost regulatory issues. |
| Private sector | Commit to participate and embrace infrastructure sharing mechanisms with other players. |
| | Respect regulatory rulings, do not abuse market power and engage in effective competition. |
| Civil society, academia, international organisations and foundations | Help to monitor the market by assessing and researching competitive trends. Model and analyse the impact of current or possible policies and regulation on access and cost. |
| | Make your voice heard by communicating research findings actively. Participate in consultations on the introduction of technology- and service-neutral regulatory frameworks |
| | Build capacity – help to train and inform regulators and decision makers in their process of updating regulatory frameworks, laws and guidelines. |

## 5.3. OPEN ACCESS & INFRASTRUCTURE SHARING

The Affordability Index data show few operators are sharing passive and active components of their networks or spectrum. Infrastructure sharing is an opportunity that can be tapped into to reduce the cost of Internet access; therefore, commercially driven sharing should be accelerated.

| Government | Establish infrastructure sharing regulations that provide clear incentives for commercially driven infrastructure sharing. |
| --- | --- |
| | Encourage public-private partnership models for broadband fibre rollout, where and when private investment is not feasible. |
| | Promote synergies and mandate or require coordination between communication, railway, pipeline, electricity and road companies during construction and maintenance of infrastructure. |
| | Lower the barriers associated with rights-of-way costs, by making rights-of-way readily available to network developers at a low cost, simplifying the legal process and limiting the fees that local authorities can charge for granting access to rights-of-way. |
| Private sector | Commit to commercially driven infrastructure sharing. |
| | Participate in public-private partnership models that facilitate building, operation and sharing of common infrastructure by all providers. |
| Civil society, academia, international organisations and foundations | Encourage the participation of high-demand users such as educational and research institutions in financing, operation and sharing of networks. |

## 5.4. ACCESS TO SPECTRUM

Wireless technologies provide cost effective means of Internet access in remote and rural areas, but their impact depends on the availability of spectrum on competitive, open and fair terms. In order to ensure their availability, policy makers, regulators and industry should agree to abide by transparent spectrum plans.

| Government | Develop spectrum management frameworks that respond to the high and increasing demand for broadband wireless services. |
| --- | --- |
| | Permit and encourage the re-farming of bands in order to increase spectrum availability for broadband wireless networks. |
| | Ensure sufficient broadband wireless spectrum is made available on competitive, open and fair terms. |
| | Assign additional spectrum to allow for new and existing companies to provide bandwidth-intensive broadband wireless services. |
| Private sector | Participate in spectrum review regimes in order to increase availability on competitive and transparent terms. |
| | Innovate in the use of unlicensed spectrum. |
| | Participate in spectrum sharing. |
| Civil society, academia, international organisations and foundations | Participate in government efforts to review spectrum policies and plans. |
| | Fund and research innovative spectrum uses – help to prove concepts that may be able to be rolled out more broadly. |

## 5.5. UNIVERSAL ACCESS TO QUALITY & AFFORDABLE INTERNET

Those users who cannot afford access to the Internet need targeted subsidies through universal access funds. These subsidies can be provided directly or through shared infrastructure. Demand-side initiatives, such as e-government services and national research and education networks, can have a significant impact on Internet usage. Governments need to commit resources to increase access at community centres and local public institution facilities, such as libraries and schools, and promote initiatives that stimulate the uptake of e-services.

| Government | Use Universal Service Funds to:<br>• Expand rural infrastructure and shared access, including the provision of free or subsidised access at community centres and key public institutions such as schools, libraries, post offices, hospitals.<br>• Invest in locally relevant content and applications, including making e-government services available to communities in order to facilitate the uptake of the Internet. |
| --- | --- |
| | Work toward publicly agreed targets for broadband services at institutional, community and household levels. |
| | Be transparent in the financing and operation of USFs, with detailed annual reports published in open data formats. |
| Private sector | Provide special rates for high-demand public benefit users, such as research and education networks. |
| | Actively participate in shared investment initiatives that expand access in rural areas or to under-served communities, including supporting and collaborating with universal access and service funds. |
| Civil society, academia, international organisations and foundations | Support digital literacy education programmes that empower citizens to strategically use ICTs for needs. |
| | Engage in and support community access programmes and projects that aim to connect schools, libraries and health centres. |

# ANNEXES

# ANNEX A: ACKNOWLEDGEMENTS

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Finally, we are grateful for the support of A4AI's global sponsors – Google, the UK Department for International Development and USAID – and that of the Alliance's entire membership.

# ANNEX B: METHODOLOGY

The Affordability Index is a composite measure that summarises in a single (average) number an assessment of the drivers of Internet affordability in various countries. Benefiting from the research framework established by the Web Index, the Affordability Index covers 51 countries and focuses on two key aspects driving affordability: communications infrastructure and access.

## Methodology

Two types of data are used in the construction of the Index: existing data from other data providers ("secondary data"), and new data gathered via a multi-country expert researcher survey ("primary data"). The survey consists of a set of questions – scored on a scale of 0 – 10 – on issues regarding policy, regulation, and various other aspects around broadband and affordable access to the Internet. The questions were specifically designed by the Alliance for Affordable Internet, the Web Foundation, and its advisers. These primary data, based on and aligned with the A4AI Best Practices, attempt to assess the extent to which countries have achieved a policy and regulatory environment that reflects the best practice outcomes.

Survey questions were scored based on predetermined criteria by country experts. Three country experts were asked to provide evidence and justification that supports each score. The scores were checked and verified by a number of peer and regional reviewers.

## Data sources and data providers

The sources of the secondary data that we use are highly credible organizations that produce consistent and valuable data in various fields. We are grateful to those organizations for allowing us to use and reproduce their data. A complete list of data sources and the individual indicators used from each is available on the A4AI website (www.a4ai.org).

## Indicator inclusion criteria

We searched a very large number of international databases to find indicators that measure or proxy the dimensions under study.

Before an indicator is included in the Index, it needs to fulfil five basic criteria:

• Data providers have to be credible and reliable organisations, which are likely to continue to produce these data (e.g., theirs is not a one-off dataset being published).

• Data releases should be regular, with new data released at least every three years.

• There should be at least two data years for each indicator, so that basic statistical inference could be made.

• The latest data year should be no older than three years back from publication year.

• The data source should cover at least two-thirds of the sample of countries, so that possible bias – introduced by having a large number of indicators from one source that systematically does not cover one-third or more of the countries – is reduced.

## Index Computation

There are several steps in the process of constructing a composite Index. Some of those involve deciding which statistical method to use in the normalisation and aggregation processes. In arriving at that decision, we took into account several factors, including the purpose of the Index, the number of dimensions we were aggregating, and the ease of disseminating and communicating it in an understandable, replicable, and transparent way.

The following seven steps summarise the computation process of the Index:

1. Take the data for each indicator from the data source for the 88 countries covered by the Web Index for the 2007-2013 time period (or 2014, in the case of the expert assessment survey). Impute missing data for every secondary indicator for the sample of 88 countries over the period 2007-2013.

   Some indicators were not imputed, as it was not logical to do so. None of the primary data indicators were imputed. Hence, the 2014 Affordability Index is very different from the 2007-2013 Indexes that may be computed using secondary data only. Broadly, the imputation of missing data was done using two methods, in addition to extrapolation: country-mean substitution if the missing number is in the middle year (e.g., have data for 2009 and 2011, but not for 2010), or taking arithmetic average growth rates on a year-by-year basis. For the indicators that did not cover a particular country in any of the years, no imputation was done for that country/indicator.

2. Normalise the full (imputed) dataset using z-scores (z=(x-mean)/standard deviation), making sure that for all indicators, a high value is "good" and a low value is "bad".

3. Where applicable, cluster some of the variables (as per the scheme in the tree diagram), taking the average of the clustered indicators post-normalisation. For the clustered indicators, this clustered value is the one to be used in the computation of the Index components.

4. Compute the two sub-index scores using arithmetic means, using the clustered values where relevant.

5. Compute the min-max values for each z-score value of the sub-indices, as this is what will be shown in the visualisation tool and other publications containing the sub-index values (generally, it is easier to understand a min-max number in the range of 0 – 100 rather than a standard deviation-based number). The formula for this is: $[(x - min)/(max - min)]*100$.

6. Compute overall composite scores by averaging the sub-Indexes (at z-score level).

7. Compute the min-max values (on a scale of 0-100) for each z-score value of the overall composite scores, as this is what will be shown in the visualisation tool and other publications containing the composite scores.

## Choice of weights

This year, given the feedback and advice from various experts and the Working Group, we have assigned equal weights across all indicators and sub-indexes.

# ANNEXES

## ANNEX C: AFFORDABILITY INDEX – EMERGING COUNTRIES

| Rank | Country | Sub-index: Communication Infrastructure | Sub-index: Access and affordability | Affordability Index: Overall Composite Score |
|---|---|---|---|---|
| 1 | Costa Rica | 48.1 | 77.5 | 63.4 |
| 2 | Colombia | 58.8 | 66.4 | 63.1 |
| 3 | Turkey | 56.3 | 67.5 | 62.4 |
| 4 | Malaysia | 53.6 | 68.5 | 61.5 |
| 5 | Peru | 58.0 | 60.2 | 59.6 |
| 6 | Brazil | 57.4 | 56.9 | 57.6 |
| 7 | Mauritius | 49.7 | 63.8 | 57.2 |
| 8 | Ecuador | 44.6 | 59.4 | 52.3 |
| 9 | Argentina | 47.3 | 55.6 | 51.8 |
| 10 | Thailand | 44.3 | 54.9 | 49.8 |
| 11 | Mexico | 41.0 | 55.5 | 48.5 |
| 12 | Jamaica | 34.6 | 59.5 | 47.3 |
| 13 | Tunisia | 44.7 | 45.2 | 45.1 |
| 14 | Dominican Rep. | 39.3 | 49.1 | 44.3 |
| 15 | South Africa | 33.4 | 53.2 | 43.4 |
| 16 | China | 39.5 | 46.2 | 43.0 |
| 17 | Botswana | 38.1 | 47.0 | 42.7 |
| 18 | Namibia | 31.7 | 44.7 | 38.2 |
| 19 | Kazakhstan | 28.2 | 44.5 | 36.3 |
| 20 | Venezuela | 27.0 | 40.7 | 33.8 |
| 21 | Jordan | 21.9 | 45.4 | 33.5 |

## ANNEX D: AFFORDABILITY INDEX – DEVELOPING COUNTRIES

| Rank | Country | Sub-index: Communication Infrastructure | Sub-index: Access and affordability | Affordability Index: Overall Composite Score |
|---|---|---|---|---|
| 1 | Rwanda | 49.0 | 53.6 | 51.6 |
| 2 | Nigeria | 45.3 | 56.6 | 51.2 |
| 3 | Morocco | 41.1 | 60.0 | 50.8 |
| 4 | Uganda | 40.1 | 55.4 | 48.0 |
| 5 | Kenya | 37.7 | 50.0 | 44.0 |
| 6 | Gambia | 40.3 | 46.3 | 43.4 |
| 7 | Vietnam | 30.7 | 55.7 | 43.3 |
| 8 | Pakistan | 42.6 | 42.3 | 42.6 |
| 9 | Ghana | 37.3 | 45.6 | 41.5 |
| 10 | Indonesia | 36.9 | 44.5 | 40.8 |
| 11 | Tanzania | 38.1 | 43.2 | 40.7 |
| 12 | Philippines | 36.1 | 43.1 | 39.7 |
| 13 | India | 40.8 | 37.4 | 39.1 |
| 14 | Egypt | 43.2 | 33.0 | 38.1 |
| 15 | Bangladesh | 42.5 | 31.8 | 37.1 |
| 16 | Zambia | 32.9 | 40.0 | 36.4 |
| 17 | Myanmar | 31.8 | 39.2 | 35.4 |
| 18 | Senegal | 27.3 | 37.1 | 32.1 |
| 19 | Mali | 28.3 | 34.7 | 31.4 |
| 20 | Benin | 35.7 | 26.5 | 30.9 |
| 21 | Mozambique | 24.5 | 36.6 | 30.4 |
| 22 | Cameroon | 20.7 | 31.0 | 25.6 |
| 23 | Nepal | 23.0 | 27.1 | 24.7 |
| 24 | Zimbabwe | 17.8 | 32.1 | 24.7 |
| 25 | Burkina Faso | 14.2 | 27.4 | 20.5 |
| 26 | Malawi | 15.2 | 23.8 | 19.1 |
| 27 | Ethiopia | 0.0 | 27.9 | 13.4 |
| 28 | Sierra Leone | 11.0 | 16.5 | 13.2 |
| 29 | Haiti | 12.1 | 14.5 | 12.8 |
| 30 | Yemen | 1.6 | 0.0 | 0.0 |

# ANNEXES

## ANNEX E: PROGRESS TOWARD THE UN BROADBAND AFFORDABILITY TARGET

| Rank | Country | Affordability Index | Mobile broadband (prepaid, handset based, 500 MB) | Mobile broadband (postpaid, computer based, 1GB) |
|---|---|---|---|---|
| 35 | Kazakhstan | 36.3 | 0.69 | 0.69 |
| 27 | Indonesia | 40.8 | 0.80 | 1.76 |
| 17 | Tunisia | 45.1 | 0.85 | … |
| 3 | Turkey | 62.4 | 1.09 | 1.15 |
| 1 | Costa Rica | 63.4 | 1.10 | 1.73 |
| 25 | Pakistan | 42.6 | 1.28 | 12.26 |
| 23 | China | 43.0 | 1.32 | 2.95 |
| 4 | Malaysia | 61.5 | 1.39 | 4.11 |
| 6 | Brazil | 57.6 | 1.41 | 3.23 |
| 7 | Mauritius | 57.2 | 1.47 | 0.84 |
| 37 | Venezuela | 33.8 | 1.90 | 1.98 |
| 38 | Jordan | 33.5 | 2.05 | 3.41 |
| 13 | Thailand | 49.8 | 2.33 | 3.11 |
| 30 | India | 39.1 | 2.58 | 12.39 |
| 20 | South Africa | 43.4 | 2.75 | 4.30 |
| 32 | Egypt | 38.1 | 2.76 | 1.27 |
| 5 | Peru | 59.6 | 2.78 | 1.76 |
| 14 | Mexico | 48.5 | 2.83 | 2.35 |
| 31 | Namibia | 38.2 | 2.96 | 3.17 |
| 2 | Colombia | 63.1 | 3.31 | 2.54 |
| 16 | Jamaica | 47.3 | 4.01 | 5.73 |
| 29 | Philippines | 39.7 | 4.31 | 8.60 |
| 12 | Morocco | 50.8 | 4.71 | 4.66 |
| 8 | Ecuador | 52.3 | 5.36 | 4.63 |
| 11 | Nigeria | 51.2 | 5.60 | 9.80 |
| 26 | Ghana | 41.5 | 5.60 | 7.00 |
| 18 | Dominican Republic | 44.3 | 6.80 | 3.95 |
| 24 | Botswana | 42.7 | 7.12 | 9.24 |
| 19 | Kenya | 44.0 | 7.49 | 14.98 |
| 44 | Nepal | 24.7 | 7.92 | 13.87 |
| 33 | Bangladesh | 37.1 | 9.82 | 11.78 |
| 51 | Yemen | 0.0 | 12.18 | – |
| 28 | Tanzania | 40.7 | 14.88 | 20.47 |
| 10 | Rwanda | 51.6 | 15.07 | – |
| 41 | Benin | 30.9 | 15.37 | 46.12 |
| 34 | Zambia | 36.4 | 15.78 | 23.17 |
| 40 | Mali | 31.4 | 17.04 | 27.19 |
| 15 | Uganda | 48.0 | 18.18 | 34.09 |
| 49 | Sierra Leone | 13.2 | 25.05 | – |
| 46 | Burkina Faso | 20.5 | 27.19 | 36.25 |
| 47 | Malawi | 19.1 | 28.11 | – |
| 45 | Zimbabwe | 24.7 | 29.27 | 65.85 |
| 50 | Haiti | 12.8 | 34.13 | 34.13 |
| 42 | Mozambique | 30.4 | 40.54 | 40.54 |
| 39 | Senegal | 32.1 | 56.75 | – |
| 9 | Argentina | 51.8 | – | – |
| 21 | The Gambia | 43.4 | – | 164.28 |
| 22 | Vietnam | 43.3 | – | – |
| 36 | Myanmar | 35.4 | – | – |
| 43 | Cameroon | 25.6 | – | – |
| 48 | Ethiopia | 13.4 | – | 41.35 |

Table 2. Only 23 countries have achieved the UN 5% entry-level target (countries sorted by mobile broadband prices, ascending)