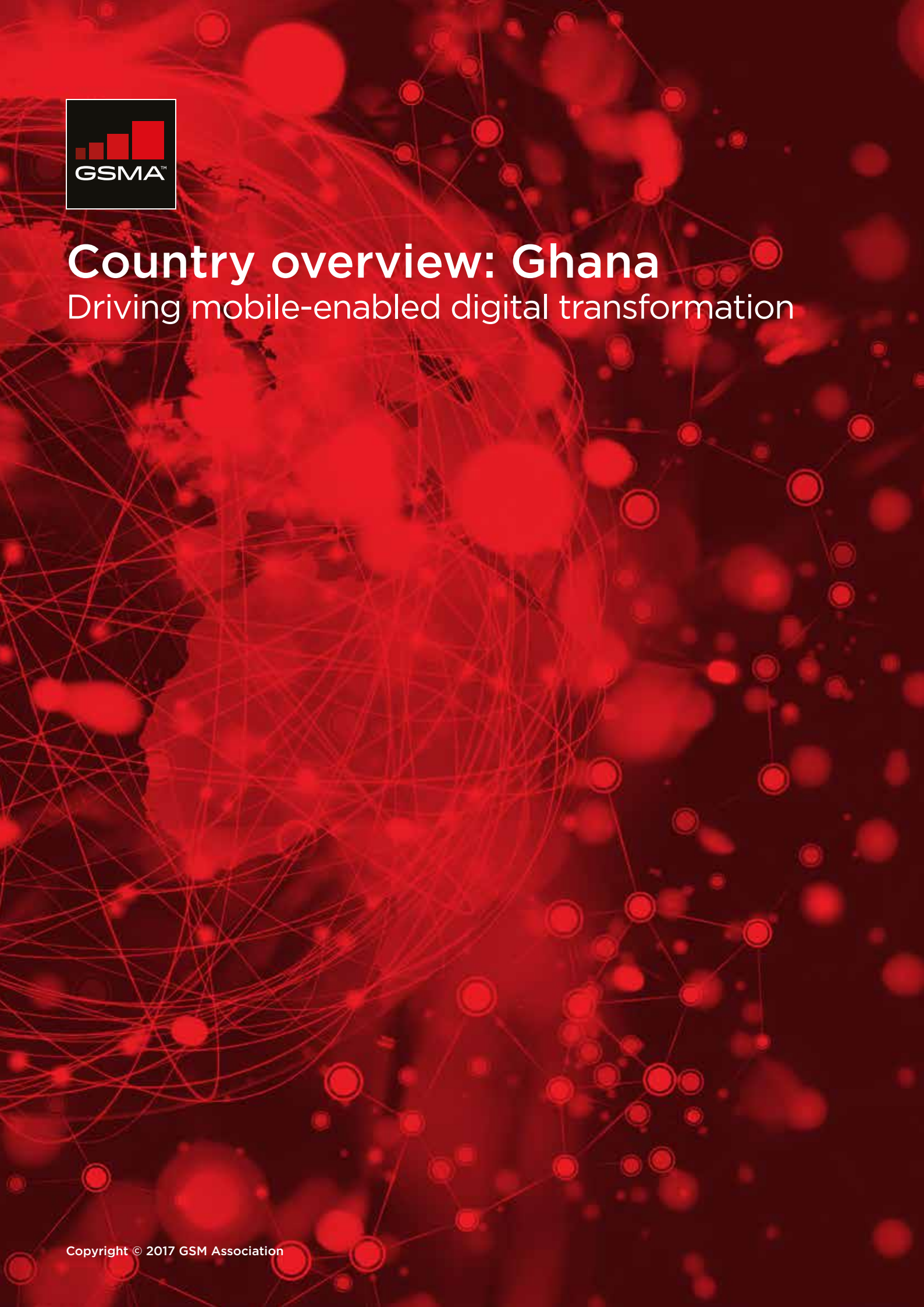

Country overview: Ghana

Driving mobile-enabled digital transformation

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with almost 300 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series of conferences.

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This report was authored by:
Tim Hatt, Research Director
Henry James, Mobile Ecosystem Specialist
Barbara Arese Lucini, Senior Analyst

Mobile for Development

Mobile for Development brings together our mobile operator members, the wider mobile industry and the development community to drive commercial mobile services for underserved people in emerging markets. We identify opportunities for social and economic impact and stimulate the development of scalable, life-enhancing mobile services.

This material has been funded by UK aid from the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

Contents

Executive summary

Mobile industry and government together supporting social and economic progress

Ghana has played a proactive role in the UN's Sustainable Development Goals (SDGs) which aim to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. Internationally, the country is a member of the Open Working Group (OWG) tasked with proposing a set of goals for approval by the United Nations General Assembly (UNGA). Nationally, the government incorporated the SDGs into the country's national development agenda as of 2016, with progress tracked by a committee overseen by the President.

Government commitment to the SDGs reflects the fact that, while Ghana is a fast growing economy (GDP growth has been an impressive 7% per year over the last 10 years), development challenges and gaps in access to basic services persist. Income inequality continues to increase, with the bottom 20% income segment of the population controlling only 5% of national wealth. Poverty levels remain high, with 25% of the population below the national line, and regional rates are significantly higher. Some 85% lack access to clean sanitation and 22% lack access to electricity. Moderate or severe food insecurity affects half the population and, although maternal mortalities have reduced over the last five years, they are still five times the SDG target.[1]

Mobile – as a technology and as an industry – is uniquely placed to support the SDGs and development outcomes through the multiplier effect that comes from providing connectivity. In the 25 years since mobile was established in Ghana, the industry has connected 67% of the population, which amounts to 19 million individuals. To date, it has connected nearly half the population to the internet through their mobile phone.[2]

Beyond core connectivity to a network, mobile operators in Ghana have also created the means for citizens to access other core services, including the following:

- Providing **financial services** via a mobile platform, particularly mobile money, which is relevant to 11 of the SDGs. Mobile money is one of the most dynamic innovations in the industry and has provided significant social and economic benefits for users. At the end of 2016, there were more than 8 million active mobile money accounts in Ghana.[3]
- Facilitating the provision of **digital forms of identity**. The ability to prove identity is critical to accessing a wide range of services such as healthcare, education, employment, financial services and voting. In Ghana, birth registration is approaching 70%,[4] having risen somewhat since the introduction of Tigo's mBirth programme in May 2016.
- Improving **productivity for farmers**. Mobile platforms provide farmers and agricultural firms with up-to-date information on market prices, production techniques and weather forecasts through services such as the Vodafone Farmers' Club.
- Expanding **healthcare access**. Programmes such as the Mobile Technology for Community Health (MOTECH) have helped demonstrate the potential of mobile to increase demand for and access to health information and services among rural communities, while also providing data on health service delivery and outcomes to the Ghana Health Service.
- Increasing **water and energy efficiency** through the Internet of Things (IoT) and machine-to-machine (M2M) solutions. M2M and IoT solutions have the potential to impact many of the SDGs: for example, by monitoring air quality, climate change and water & energy efficiency; by improving the productivity of manufacturing and industrial processes; and by monitoring marine, coastal and forest ecosystems.

1 World Bank
2 GSMA Intelligence
3 Bank of Ghana (active users on a 90 day basis)
4 World Bank

Accelerating impact through closer collaboration

Despite the progress made, significant challenges remain to realising the potential of mobile to support socio-economic development. Many of these require collaboration between the public and private sectors. We highlight several areas in this report that would benefit from such interaction between mobile operators and government departments.

Closing infrastructure gaps: Mobile network coverage is weakest in rural areas, which have challenging rollout economics, especially in areas where towers are at risk of vandalism or 'galamsey' (illegal mining). Industry-specific taxes exacerbate the problem by reducing the capital available for network investment. Mobile network operators can continue to engage in voluntary network sharing, which the government can support by establishing a regulatory framework for active infrastructure sharing.

Another area of opportunity is the Universal Access Fund regime operated by the Ghana Investment Fund for Electronic Communications (GIFEC), set up to address the gap between commercially viable areas of the country and unserved, rural parts. The sustainability of GIFEC's projects can only be secured when there is an incentive for the private sector to go into the unserved markets, via tax rebates or holidays, coupled with new models for universal service funds. Greater collaboration in this area has the potential to significantly increase investment by the mobile operators, driving improved coverage. Ecosystem partnerships for alternative connectivity (such as satellite) also offer opportunities for greater coverage and therefore greater digital inclusion.

Increasing financial inclusion: Increasing the number of mobile money users is of course vital, but the real gains in the future will come from expanding the range of services on the platform. Mobile-centric savings products, digitised bill payments, person-to-government (P2G) or government-to-person (G2P) payments and mobile-enabled international remittances all offer significant commercial and social opportunities. Focussing on payments in specific sectors such as agriculture provides operators with inclusive business opportunities and government with a means to increase efficiencies.

In Ghana, it is estimated that 16% of total annual production is sold through formal procurement channels. Some 3.5 million new mobile money accounts could be added by 2020 from digitising business-to-person (B2P) and G2P payments, depending on the number of farmers engaged in formal value chains. Mobile operators could derive an estimated $13 million for B2P payments and $1.1 million for G2P payments in 2020.[5]

Digitising agricultural payments not only benefits mobile operators, but government too – for example, by lowering the cost of distributing payments, by facilitating real-time and scalable payments to smallholder farmers across multiple locations and by mitigating cash-handling risks, such as theft and fraud, and enabling transparent and traceable transactions.

Closing the mobile gender gap: There is a gender gap in Ghana of approximately 16% in mobile phone ownership[6] and 17% in the use of mobile money services.[7] The gap is much higher, at 56%, in the use of the internet, with 2.5 million fewer women online than men.[8] This is the lesser told story of an otherwise encouraging rise in ICT use across the country. Given that mobile and the internet are the two most basic building blocks of a digital society in countries lacking prevalent fixed line infrastructure, gender disparities merit urgent consideration and action to avoid the opportunity cost of lost female engagement, empowerment and productivity gains. Mobile operators can actively track and take action to close the gender gaps in their user bases, as MTN Ghana and Tigo Ghana have pledged in relation to their mobile money services by 2020. The root causes of gender disparities are many and complex, often going beyond the presence of network access and even affordability into issues of relevance, safety and cultural acceptance. This requires joined-up discussion and action between mobile operators, policymakers and the development community.

5 Market size and opportunity in digitising payments in agricultural value chains, GSMA Intelligence, 2016
6 Gallup
7 World Bank Findex
8 Gallup

Supporting start-ups and entrepreneurship: For a healthy start-up ecosystem to develop in the digital era, it is crucial that start-ups can incorporate mobile services such as SMS or mobile money into their products. Without access to mobile solutions such as inclusive payment mechanisms, start-ups serving the masses struggle to scale. Key action areas for operators to consider include the following:

OPEN UP Depending on their in-house capabilities and market coverage, operators have three main options for their API go-to-market and sales approach:

1. In-house API programmes
2. Partnerships with a third-party API management software provider such as Apigee or WSO2
3. Wholesale models with an API aggregator (local/regional, such as Africa's Talking, or global such as Twilio). This last option is probably more relevant for operators with smaller market shares and limited in-house resources to drive an API programme.

HARMONISE The heterogeneity of APIs remains a key pain-point for start-ups and developers. Mobile operators can harmonise at a group or industry level by adopting a common platform or standards for specific APIs (e.g. mobile money).

COLLABORATE APIs should not be seen as end products but as enablers of innovation. The competitive differentiation between mobile operators should not be the APIs themselves, but rather their efforts to engage with start-ups and support them.

OUTREACH TO DEVELOPERS This is crucial to a successful API programme: developers will only use APIs if they know they are there and they are willing and able to use them.

Accelerating digital identity: Mobile is a powerful tool in enhancing people's lives by enabling them to access personalised, value-added services. As the Ghanaian government expands its National Identity rollout programme, an increasing number of people will be able to register their mobile SIM cards in their own names. This will also enable mobile operators to offer robust, digital identities that unlock several life-enhancing services while at the same complying with mandatory SIM registration requirements. Tigo's mBirth programme in Ghana is an example of a mobile-enabled digital identity service that highlights the potential benefits of the mobile industry and government collaborating to address the challenge of unlocking access to basic services for a significant number of Ghanaians.

The Ghanaian government's active engagement in the SDGs and proclaimed support for private sector initiatives clearly marks it as one open to enabling sustainable business that can progress development as well as commercial objectives. Mobile operators, coming together as the first industry to commit to the SDGs, have committed to continued advancement of social and economic development within communities where they operate. Closer collaboration between government and mobile operators offers substantial opportunities to unlock digital transformation for millions of Ghanaians.

1

Laying the foundations for an inclusive digital society

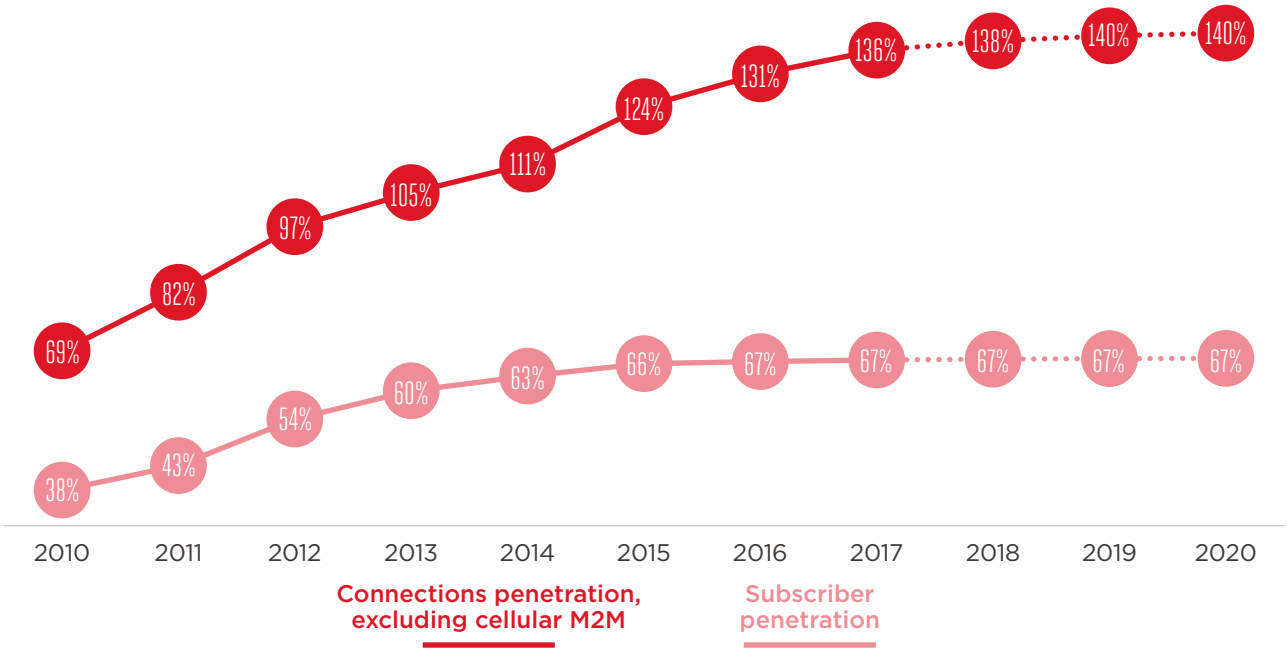
Advances in digital and mobile technology have delivered far-reaching economic and social benefits. Digitisation furthers economic growth, citizen participation and job creation; it enables businesses to access new markets and customers and to operate more efficiently, bringing new products and further innovations to consumers. Digital economies improve lives and bring more people and more businesses into the economic mainstream. Digital technologies connect government and citizens. New technologies are also delivering more services that are essential to more people every day, from allowing remote diagnosis of illness to helping farmers increase crop yields, to providing safe, swift and secure financial transactions. In an increasingly connected world, digitisation is vital to development.

The flipside is less talked about but equally valid: digitisation presents risks and has the potential for unintended consequences such as loss of employment to automation. These are outside the scope of this report, but have been examined extensively in a report published by the GSMA and BCG in February 2017. [9]

Ghana has a vibrant digital technology ecosystem that is evolving rapidly. Telecoms infrastructure has laid the foundations for an environment in which entrepreneurship and creativity have begun to flourish, thus contributing to improving people's lives. In 2005, only one in 10 people in Ghana subscribed to a mobile service. Today, Ghana has close to 19 million unique mobile subscribers – equivalent to 67% of population, which is above the average of 44% in Sub-Saharan Africa.[10] Over the same period, access to the internet via mobile has increased from negligible levels (less than 2%) to 45% of the population.

Source: GSMA Intelligence

1 Mobile subscriber and connections penetration in Ghana



9 Embracing the Digital Revolution Policies for Building the Digital Economy, GSMA, 2017

10 Unique subscribers reflect our estimate for the number of individuals who subscribe to at least one paid mobile service. This figure adjusts for multiple SIM ownership and subscriber inactivity, and is therefore lower than the more commonly cited mobile connections penetration

The growth of the telecoms industry in Ghana is having a measurable impact on the economic development of the country. In 2015, Information and Communications contributed GHS3.1 billion to Ghana's total GDP. Although this is still a fraction (2.2%) of the country's GHS139 billion total GDP, it shows strong growth from 2006, when it contributed just GHS483 million.[11] This excludes the value of the improvements to efficiency across other industries that come from these services.

The technology ecosystem is also a major employment growth area, with an estimated 39,506 employed across the information and communication services sector.[12] Unemployment is a pressing concern in Ghana at 11.9%.[13] Technology is increasingly seen as part of the solution, through employment in the sector, more effective recruitment channels and the additional growth and improvements to productivity it enables in adjacent industries.

In Sub-Saharan Africa, mobile money adoption is being driven by West Africa. In Ghana there were more than 8 million active mobile money accounts (40% of the population) at the end of 2016 based on figures from the Bank of Ghana. This has provided a vital increase in financial inclusion that would otherwise not have happened, or only over a prolonged period, given the underutilisation and lack of individual eligibility for accounts from traditional banks.

Mobile technology is also revolutionising the delivery of healthcare and agricultural services. Programmes such as Mobile Technology for Community Health (MOTECH) have helped demonstrate the potential of mobile to increase access to and demand for health information and services among rural communities, while also providing data on health service delivery and outcomes to the Ghana Health Service. In addition, there has been some early success in utilising mobile platforms to provide farmers and agricultural firms with up-to-date information on market prices, production techniques and weather forecasts through programmes such as the Vodafone Farmers' Club.

Ghana has a vibrant, emerging tech start-up scene, although not yet on a par with Nigeria or Kenya. In Africa, although 50% of the tech hubs are concentrated in five countries (South Africa, Kenya, Nigeria, Egypt and Morocco), most other African countries have at least one or two active tech hubs. Along with Nigeria and Senegal, Ghana is among the more prominent countries in the sub-region of West Africa. Mobile has a key role to play in supporting this ecosystem, particularly through opening APIs and the provision of mobile money services.

The government of Ghana is committed to continuing the country's development and improving the lives of its citizens. This is especially true in the context of the SDGs, in which it is actively engaged. This report examines the central role the mobile industry plays in driving digital transformation in Ghana and how this transformation is contributing to Ghana achieving the SDGs.

11 Ghana Statistical Service
12 National Employment Report 2015
13 Ghana Statistical Service

Source: World Bank, UN, GSMA Intelligence

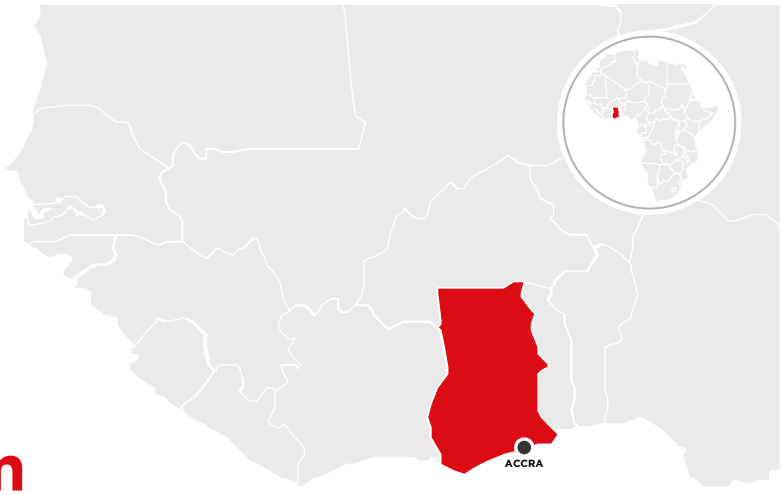
2 Ghana: key facts

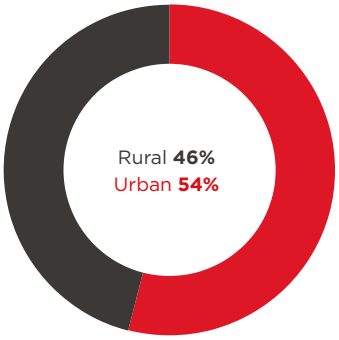
Total population
28,206,728

Capital
Accra

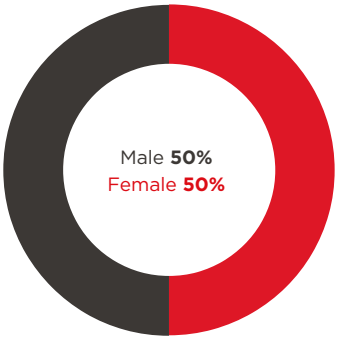
Official language
English

Land area
238,535 sq km

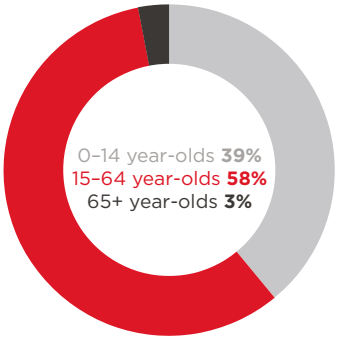




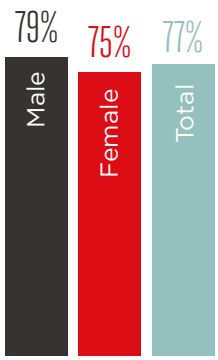
URBAN / RURAL



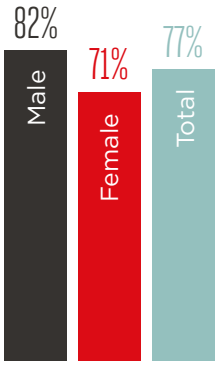
GENDER SPLIT



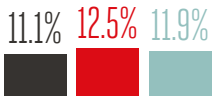
AGE DEMOGRAPHIC



Labour force participation rate

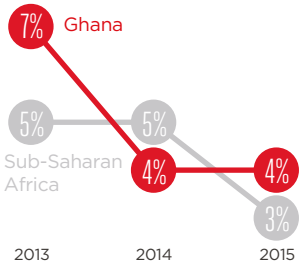


Literacy rates

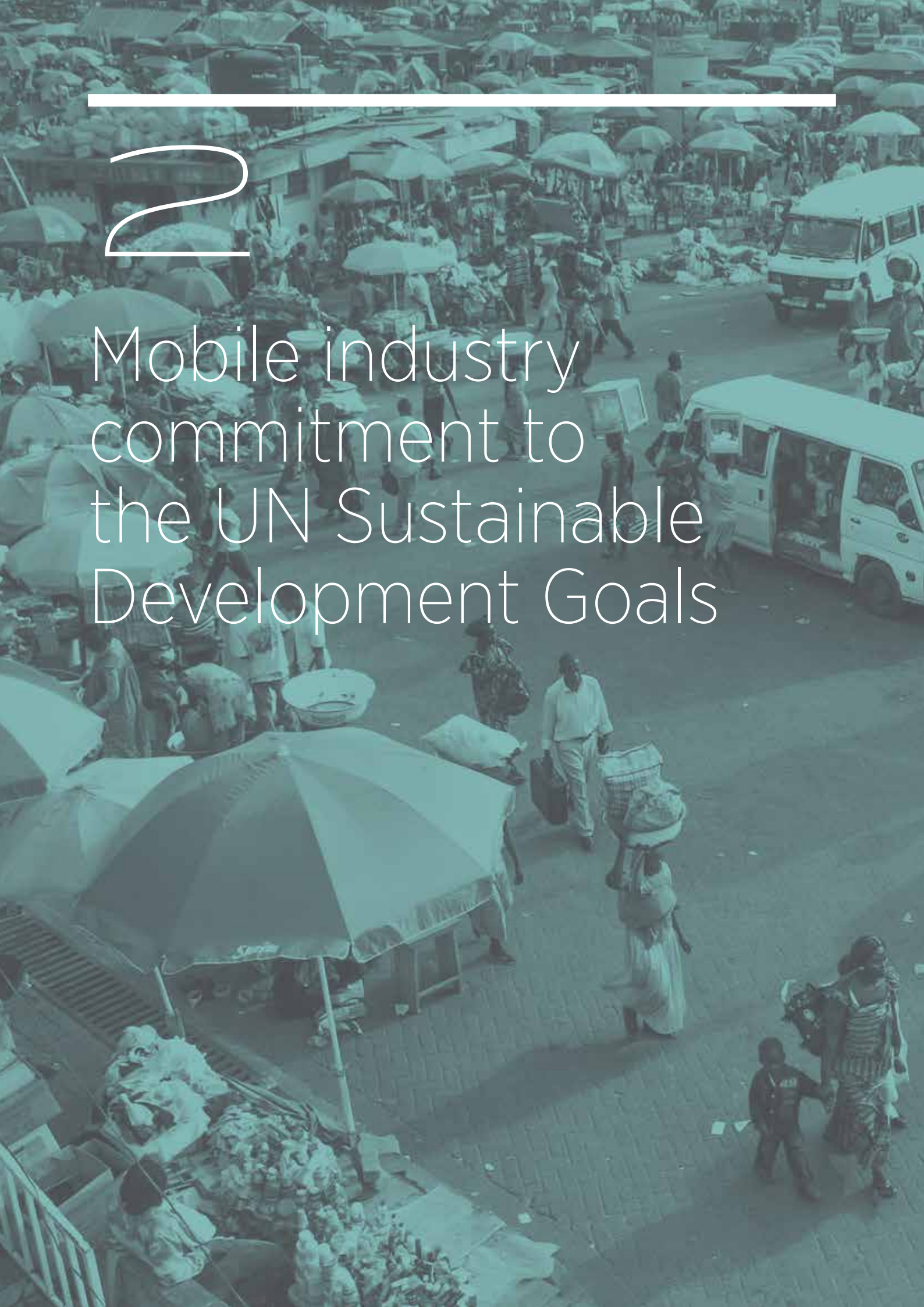


Unemployment

GDP GROWTH



GDP PER CAPITA PPP
$4,294
SSA average $3,711
Lower middle income



2

Mobile industry commitment to the UN Sustainable Development Goals

On 25 September 2015, Ghana joined the other 192 UN member states in adopting the 17 Sustainable Development Goals (SDGs) seeking to end poverty, protect the planet and ensure prosperity for all. This high-level ambition is made specific by the 169 targets that sit behind the SDGs and provide greater direction, quantification and timing for each goal. The intention is to meet all the targets by 2030, with some requiring earlier attainment.

Source: UN

3 The UN Sustainable Development Goals

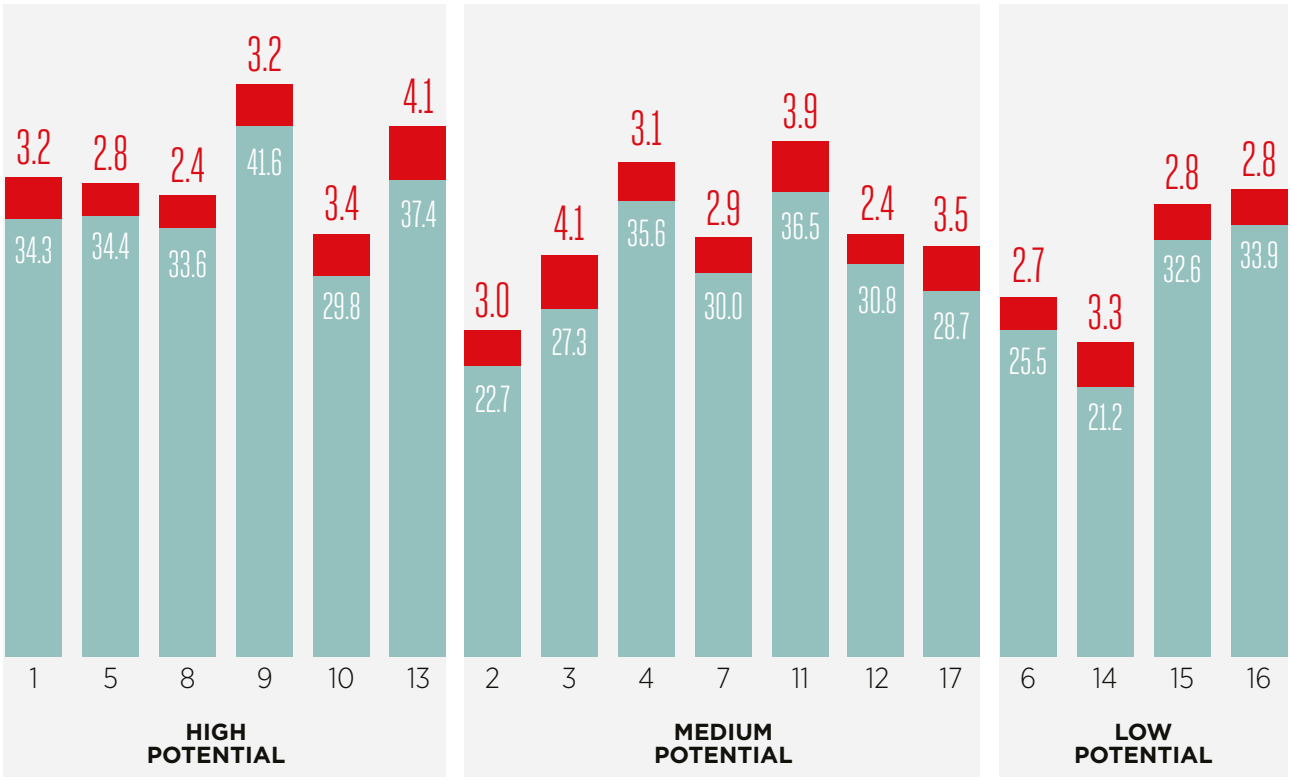
As part of this commitment, in September 2016, the GSMA published its first Mobile Industry Impact Report, which provided a framework to assess the industry's impact on the SDGs.[14] At the UN General Assembly in September 2017, a second report was published assessing the progress the industry has made.[15]

14 2016 Mobile Industry Impact Report: Sustainable Development Goals, GSMA, 2016
15 2017 Mobile Industry Impact Report: Sustainable Development Goals, GSMA, 2017

Source: GSMA Intelligence

4 SDG impact scores

Normalised score (out of 100)



All SDGs are impacted by the mobile industry to varying degrees. Basic voice connectivity creates many societal, economic and environmental benefits, and upgrading to mobile broadband, to smartphones, and further to M2M and IoT, together with rapid digital transformation, creates a significant opportunity for the industry to support governments in meeting their SDG commitments.

We set out how the mobile industry's activities and services impact the SDGs at a global level. We split the impacts into four distinct categories:

mobile connectivity
(voice, SMS and internet)

mobile financial services
(particularly mobile money)

digital identity

M2M and IoT.

Table 1 shows which SDGs are impacted by each category.[16]

Source: GSMA intelligence

1 Mobile industry services and activities: impact on the SDGs

Sustainable Development Goal	Mobile connectivity	Mobile financial services	Digital identity	M2M and IoT
1 No poverty	●	●	●	●
2 Zero hunger	●	●	●	●
3 Good health and well-being	●	●	●	●
4 Quality education	●	●	●	
5 Gender equality	●	●	●	
6 Clean water and sanitation	●	●	●	●
7 Affordable and clean energy	●	●	●	●
8 Decent work and economic growth	●	●	●	●
9 Industry, innovation and infrastructure	●	●	●	●
10 Reduced inequalities	●	●	●	
11 Sustainable cities and communities	●		●	●
12 Responsible consumption and production	●			●
13 Climate action	●			●
14 Life below water	●		●	●
15 Life on land	●		●	●
16 Peace, justice and strong institutions	●		●	
17 Partnerships for the goals	●	●	●	●

Figure 5 shows the SDGs most impacted by the mobile industry in Sub-Saharan Africa. Each SDG has a score out of 100, with a higher score representing increased impact. A score of 0 means the industry is having no impact at all while a score of 100 means the industry is doing everything possible to influence that SDG. Based on these scores the SDGs have been ranked from 1–17, with 1 representing the SDG most impacted by the mobile industry, in this case SDG 9.

16 A full assessment of the mobile industry's contribution to the SDGs can be found in 2017 Mobile Industry Impact Report: Sustainable Development Goals, GSMA, 2017

Source: GSMA Intelligence

5 SDG impact scores for Sub-Saharan Africa

Note: see Appendix A for more detail on scoring methodology


solutions
growth

3

Ghana's commitment to the SDGs

Ghana has been a proactive advocate of the SDG programme, with Nana Akufo-Addo, President of Ghana, currently serving as co-chair of the Secretary-General's Sustainable Development Goals Advocates. The SDGs were officially launched in Ghana at an event held in February 2016 by President Mahama. Prior to this, Ghana took a proactive role in the development of the SDG programme as a member of the Open Working Group (OWG) tasked with proposing a set of SDGs for approval by the United Nations General Assembly (UNGA). In addition, Ghana participated in two UN-led national level consultations, which aimed to stimulate broad national debate on the proposed SDG priorities and provide opportunities for marginalised sections of society to participate in the global debate and policy processes connected with the post-2015 Development Agenda.

The SDGs have been incorporated into Ghana's new national development agenda and are overseen by the President, who heads a High-Level Committee on the implementation of the SDGs, supported by the National Development Planning Commission, which is the lead agency for coordination and reporting on the SDG implementation.

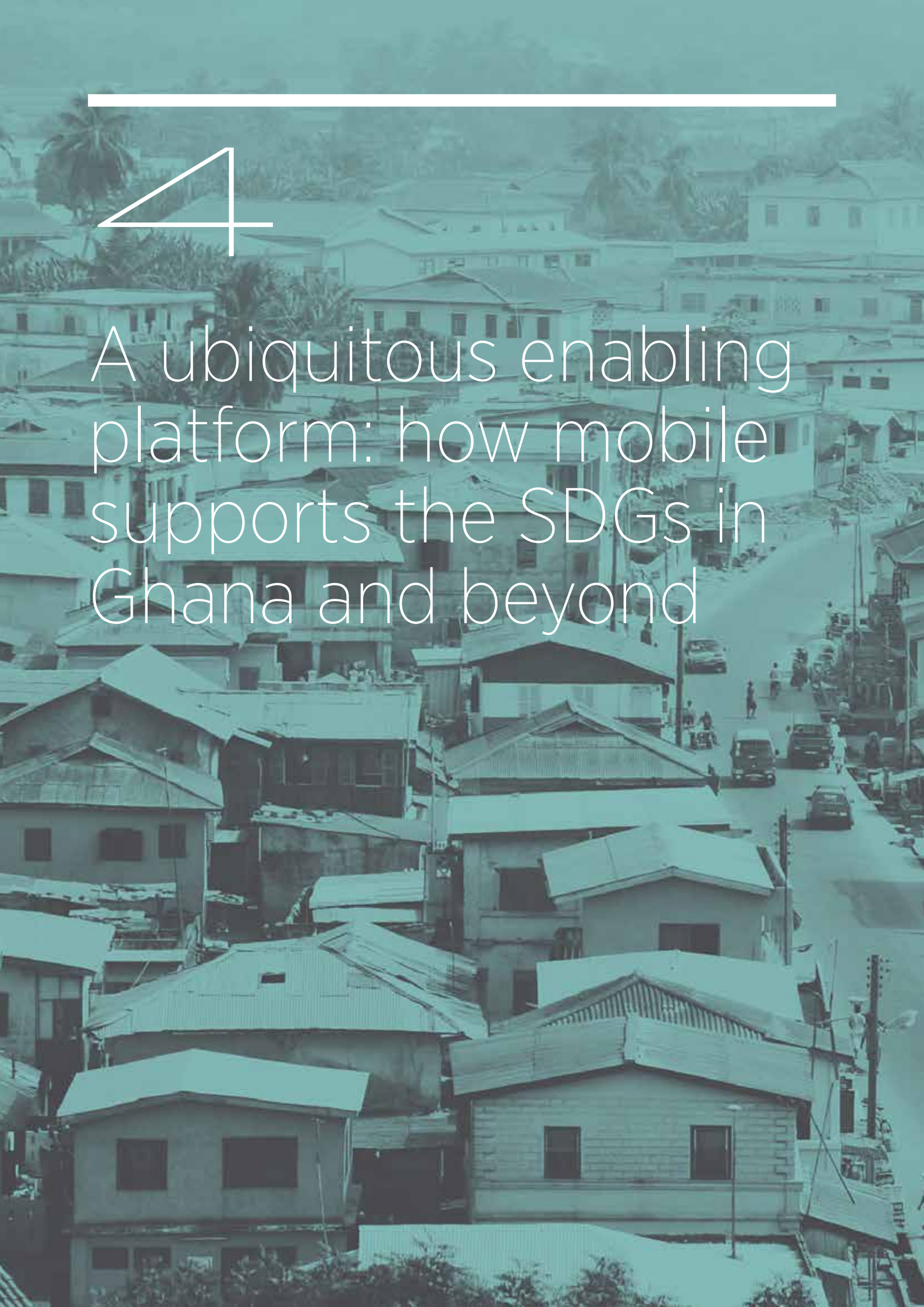
To help measure success, the government of Ghana has developed a framework for the SDGs that is built around five national Strategic Development Goals. Together these goals incorporate all the SDGs. We have outlined Ghana's national Strategic Development Goals in Table 2 and show how these map against the comparable international development frameworks from the UN and African Union (AU). A full description of the UN SDGs is provided in 2017 Mobile Industry Impact Report, while the AU 2063 framework can be accessed on the AU website (au.int/en/agenda2063).

Source: Ghana Statistical Service

2 Ghana Strategic Development Goals

	Relationship to related international frameworks	
	UN SDGs	**AU Agenda 2063**
Goal 1 Build an industrialised, inclusive and resilient economy	Goals: 1, 2, 8, 9, 12, 14	Goals: 4, 5, 6, 7, 20
Goal 2 Create an equitable, healthy and disciplined society	Goals 1, 2, 3, 4, 5, 10, 16	Goals: 1, 2, 3, 16, 17, 18
Goal 3 Build safe and well planned housing while protecting the natural environment	Goals: 1, 2, 8, 9, 12, 14	Goals: 7, 10
Goal 4 Build effective, efficient and dynamic institutions for national development	Goals: 1, 6, 7, 9, 11, 12, 13, 14, 15	Goals: 11, 12, 13, 20
Goal 5 Strengthen Ghana's role in international affairs	Goals: 1, 10	Goals: 8, 9, 14, 15, 16, 19

Note: see Appendix B for an assessment of Ghana's progress towards achieving the SDGs.



4

A ubiquitous enabling platform: how mobile supports the SDGs in Ghana and beyond

For each of the categories, or 'drivers', through which the mobile industry impacts the SDGs – mobile connectivity, mobile financial services, digital identity and M2M & IoT – we describe how mobile technology can contribute to achieving the SDGs through examples of what has already been implemented, as well as the status of that driver in Ghana.

Mobile connectivity

Mobile connectivity impact on the SDGs

The mobile industry's core service is to provide connectivity that enables communications, service access and empowerment. The provision of voice, SMS and data connectivity impacts all 17 SDGs. For example, mobile connectivity reduces the costs of accessing information and can create or expand markets by enabling the mechanisms for buyers and sellers to discover each other and conduct transactions, driving growth that is more inclusive. This is particularly relevant to SDGs 1: No Poverty, 5: Gender Equality, 8: Decent Work and Economic Growth, 9: Industry, Innovation and Infrastructure, and 10: Reduced Inequalities.

Another example is the use of mobile for emergency calls and broadcasting, which can play a critical role in the response to and management of natural and man-made disasters, relevant to SDGs 1: No Poverty, 2: Zero Hunger, 3: Good Health and Well-being, 11: Sustainable Cities and Communities, and 13: Climate Action.

Additionally, mobile services are enabling users to access essential information such as health advice and educational tools, which is key for SDGs 3: Good Health and Well-being and 4: Quality Education.

Across the Sub-Saharan African region as a whole, there are now 436 million unique mobile subscribers, equating to 44% of the population (note this strips out the impact from individuals having multiple SIM cards). Mobile internet penetration has reached 28% of the total population, which accounts for 63% of the existing mobile subscriber base, bringing the latent demand and opportunity for mobile internet access into sharp relief.

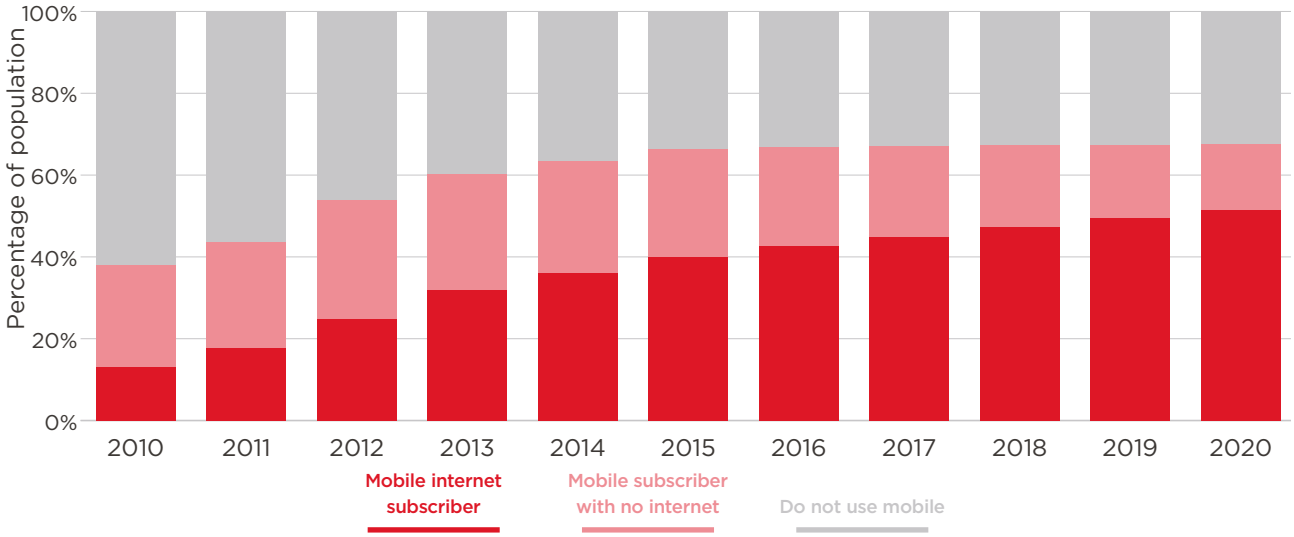
Mobile connectivity in Ghana

Core connectivity to mobile networks is a foundational element for socio-economic development – particularly in the absence of prevalent fibre infrastructure – by enabling mass-market communications and a platform for services via the internet and APIs. Over the 25 years since the original GSM launches, mobile operators have connected 19 million unique mobile subscribers, equivalent to a population penetration of 67%. This means Ghana strongly outperforms relative to Sub-Saharan Africa as a whole (44%) and is more on a par with several European countries.

The majority of connections are still slower speed 2G (53%), while smartphone adoption stands at just 27%. Mobile internet penetration in Ghana is higher than would be anticipated at around 45%, the second highest in West Africa (Cabo Verde is at 47%) and compares to an SSA average of 28%. This is a result of consumers accessing the internet through feature phones to use services such as Facebook Messenger SMS and underlines the latent demand in the consumer base. Operators have responded to the demand for mobile internet with aggressive rollout of 3G and 4G services, achieving 85% and 40% coverage respectively.

Source: GSMA Intelligence

6 Technology evolution



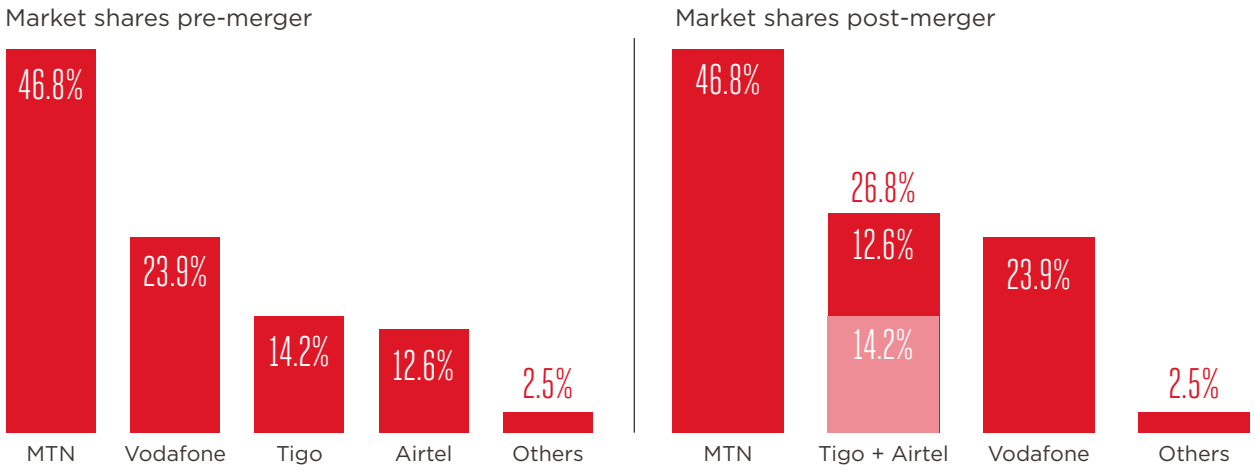
There are nine telecoms operators active in Ghana, though only four have appreciable market shares: Airtel Ghana, MTN Ghana, Tigo Ghana and Vodafone Ghana. All four major operators offer 2G and 3G services, while only MTN offers LTE. In June 2016, Vodafone announced it did not intend to launch LTE, citing poor 4G device penetration as the primary barrier. In February 2017, Tigo launched dual carrier (DC) HSPA+ as an alternative to LTE.

In 2016, Tigo (Millicom) and Airtel (Bharti Airtel) announced plans to combine their subsidiaries, Tigo Ghana and Airtel Ghana, into a single entity. The deal is subject to approvals from the relevant Ghanaian authorities; if completed, the new entity will become the second largest mobile operator in the country.

A great deal has been done to encourage passive tower sharing, which is reflected in the prominence of tower companies in the country. Three of the major international players, Eaton Towers, American Tower Corporation and Helios Towers, all hold significant stakes in the country's infrastructure.

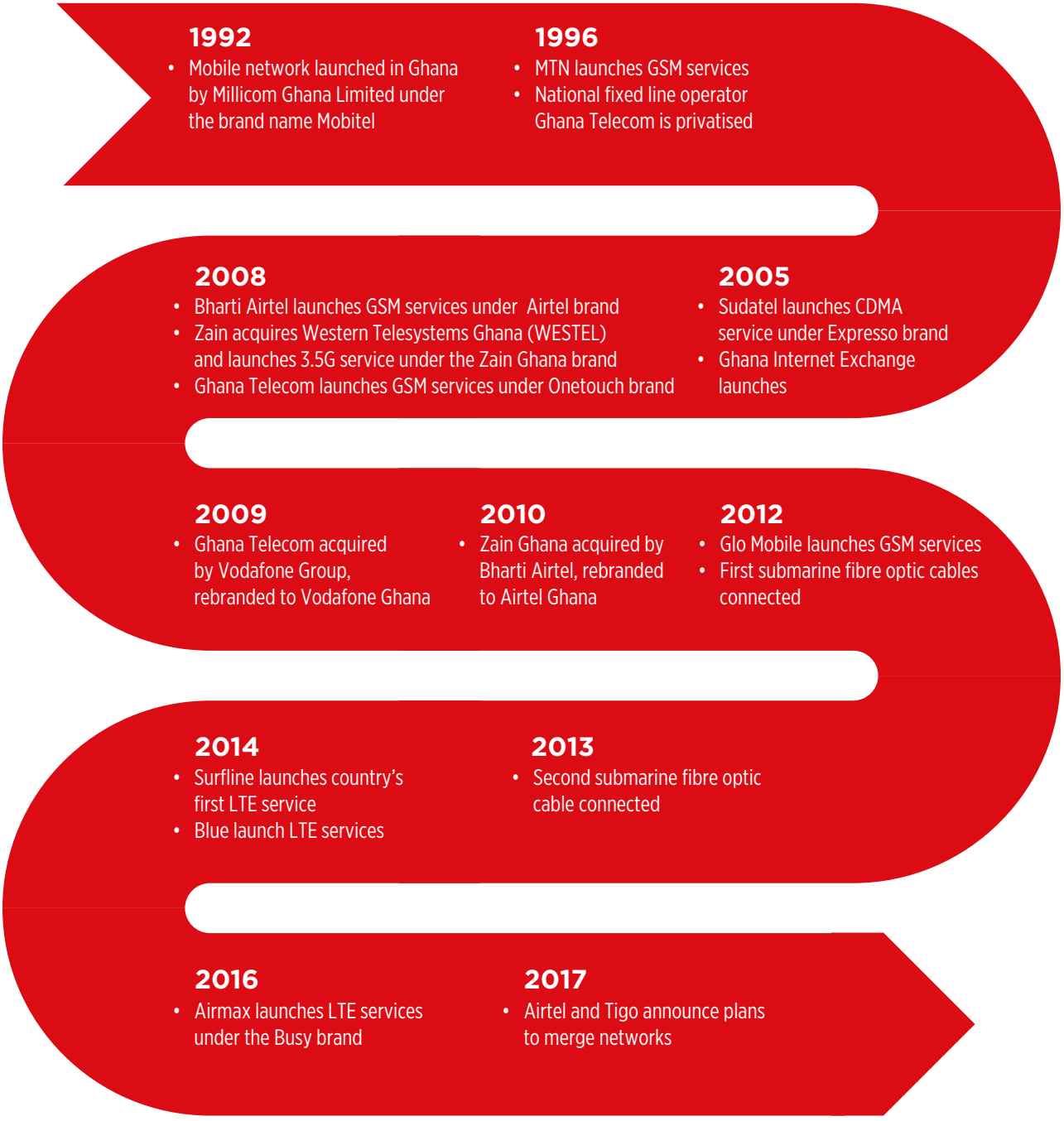
Source: GSMA Intelligence

7 Market shares by mobile operator, Q1 2017



Source: Operator websites, news reports, GSMA Intelligence

8 Major milestones for the Ghana mobile market



Mobile connectivity: case studies in Ghana

mHealth

Airtel Mobile Health Consultation

In Ghana, the Millennium Village Project (MVP) and Airtel have implemented a programme of mobile health consultation. Health professionals at the district hospital can provide diagnostic and treatment support to midwives, nurses and community health workers via a call centre. Airtel provides 750 MB of data per month for every community health worker as well as +149 numbers, which are used to send data to a central database. The project now covers the whole of the Amansie West District, including 30 communities with 35,000 people and 7,500 households.

Vodafone's Healthline 255

In 2013, Vodafone launched Healthline 255, a call centre that puts Ghanaians directly in touch with doctors and nurses. The qualified professionals assess callers' needs, offer them advice and direct them to the most appropriate form of care available. The service receives on average 200 calls per day.

Ghana Mobile Technology for Community Health (MOTECH)

In 2010, Grameen Foundation worked with the Ghana Health Service and Columbia University's Mailman School of Public Health to launch the Ghana Mobile Technology for Community Health (MOTECH) initiative. The project focused on using mobile phones to increase the quantity and quality of prenatal and neonatal care in rural Ghana. To do this, the Grameen Foundation launched the Mobile Midwife. The service enables women to receive SMS and/or voice messages every week and in their own language. By using interactive voice response (IVR) to deliver the information, Mobile Midwife is also able to reach women with low literacy levels. Topics include hygiene, nutrition, immunisation, malaria and warning signs. Following the success of the project in Ghana the Grameen Foundation has launched the programme in Nigeria. The project has been popular with women: in phone surveys of Mobile Midwife users, 75% of female respondents said they were likely to continue to use the service (Grameen had projected only 60%). The majority (84%) also said they liked the service, 87% thought they had learned something new, and 90% said it added value to their lives.

MTN's Teledokta

In June 2017, MTN introduced Teledokta – a telemedicine platform that allows subscribers to consult certified doctors by video via laptops or mobile devices with internet access. The services provided on the platform run 24×7, enabling real-time access to physicians and other health stakeholders such as pharmacies, medical laboratories and insurance providers.

Mobile connectivity: case studies in Ghana

continued

mEducation

MTN Ghana Foundation's ICT Centres

MTN Ghana Foundation, in partnership with the UN Development Programme, has set up 10 ICT centres in each region of Ghana, specifically situated in underserved communities and close to schools. The centres are located in Ningo, Adidome, Esiama, Komenda, Nyinahin, Techimantia, Tolon, Pwalugu, Hamile and Kpong. It has set up ICT centres in nine basic schools to promote digital literacy for pupils as part of its School Connect programme. Through a partnership with the British Council in Ghana, MTN Ghana has also made available online supplementary reading and soft-skills teaching materials for teachers in selected schools across the country.

Tigo Ghana's E-Library on Wheels

This mobile digital library initiative is a partnership between Tigo Ghana and Street Library Ghana. It was launched to assist children in rural Ghana to acquire reading and basic ICT skills. It also aims to help bridge the digital divide between pupils in rural communities and their counterparts in urban centres. All the books are digitised to enable the children to have hands-on digital experience with electronic devices such as computers. The initiative is the first of its kind in Ghana and came from Tigo's Digital Changemakers. One year after launch, E-Library on Wheels has benefited more than 20,000 children in deprived communities across the country.

mAgri

Vodafone Farmers' Club

Vodafone Farmers' Club is an agricultural value-added service with a free call bundle launched by Vodafone Ghana and partner Esoko in June 2015. Farmers' Club was conceived as a product to improve the lives of farmers. The package offers farming advice, weather updates, market prices and free calls between members with a dedicated Farmers' Club SIM. By December 2016, over 200,000 users had registered for the service. Power users (active repeat service users) are 1.7 times more likely than non-users to report a change to their land management practices.

MTN's mAgric

mAgric is an MTN IoT solution allowing subscribers to receive timely weather information for farming purposes (covering areas such as soil moisture, humidity, rain levels, solar radiation, leaf wetness and UV index).

Farmerline

Farmerline was launched in 2013 and works with more than 5,000 farmers across seven regions in Ghana. Every week, farmers in the network receive technical advice on topics such as how much fertiliser to apply to their fields or how much feed to drop into their fish ponds, as well as location-specific weather forecasts, directly to their mobile phones. Farmerline relies on voice capabilities and is available in 12 local languages, which is important as more than 75% of the population in the rural savannah are illiterate. In addition, Farmline hosts workshops in farming communities covering topics such as market conditions and distribution channels, and offers financial training. Smallholders in the Farmerline network, most of whom are women, have increased their incomes by an average of 55.6%.

Mobile financial services

Mobile financial services impact on the SDGs

The provision of financial services via a mobile platform, particularly mobile money, is one of the most dynamic innovations in the industry and has led to significant social and economic benefits for users. The use of mobile money as a financial instrument is relevant to 11 of the SDGs. For example, the immediacy, security and low cost of sending remittances through mobile money results in higher volumes of remittance, which overwhelmingly benefit the poorer populations that are more reliant on them and build the resilience of those in vulnerable situations (e.g. by helping to mitigate against socio-economic, health and environmental shocks). This is relevant to SDGs 1: No Poverty, 3: Good Health and Well-being, 5: Gender Equality and 10: Reduced Inequalities. Mobile money providers are also well placed to replace inefficient cash payments to farmers and provide formal financial services for SMEs, which is relevant to SDGs 2: Zero Hunger, 5: Gender Equality, 8: Decent Work and Economic Growth, 9: Industry, Innovation and Infrastructure, 10: Reduced Inequalities and 17: Partnerships for the Goals.

Mobile financial services – SDG case studies in Africa

Mobile-enabled credit

Access to credit is crucial for financial inclusion as it allows citizens to expand their options for managing and storing funds, gaining direct access to licensed deposit-taking institutions. Mobile credit services are particularly prevalent in Sub-Saharan Africa, where the mobile money industry is relatively more mature. The Commercial Bank of Africa disbursed KES40 billion ($495 million) in loans in Kenya in 2015 through M-Shwari, with a non-performing loan ratio of 2.0% (compared to 4.3% globally and 5.4% for Sub-Saharan Africa). In Tanzania, a similar product – M-Pawa – was launched in 2014. As of May 2016, M-Pawa recorded 4.8 million accounts, with TZS39 billion ($17.9 million) disbursed to entrepreneurs, most of whom were women or youths.[17]

Public utility payments in Tanzania

Over the past decade, mobile money has helped to make public utility payments vastly more efficient and cost-effective. In Tanzania, the Dar Es Salaam Water and Sewerage Corporation enabled water payments via mobile money in 2009. By 2013, mobile money payments had increased utility revenues by $45,000 per month.[18] Mobile payments for water services have improved revenue collection, reduced losses and disrupted the monthly billing and payment paradigm, allowing households to pay when and how they want.

Agriculture and Climate Risk Enterprise (ACRE)

ACRE offers micro-insurance focused on the agricultural sector in Kenya, Rwanda and Tanzania. It offers affordable, index-based and indemnity-based micro-insurance products for smallholder farmers. Farmers are able to access finance on more favourable terms and secure their financing needs for the following planting season in the event that their crop yield is less than expected. In addition, training offered to farmers by ACRE on agricultural micro-insurance enables them to gain a better understanding of agronomic and rural dynamics, which in turn helps them make better choices on crops and sales, and thus earn more income from farming. Mobile payments can be made to and from farmers via their mobile phones, making the service accessible for the unbanked. Cumulatively, by 2016, over 1 million farmers in Kenya, Rwanda and Tanzania had insured more than $56 million of assets against a variety of weather risks. Projections for growth are

17 State of the Industry Report on Mobile Money, GSMA, 2017
18 State of the Industry Report on Mobile Money, GSMA, 2017

Mobile financial services – SDG case studies in Africa continued

Paying school fees with mobile money in Côte d'Ivoire

This is a strong example of successful collaboration between mobile operators and government. In 2011, the Ministry of National and Technical Education (MENET) launched a pilot project to digitise school registration fees in collaboration with CelPaid (a local online payments provider with field agents) and MTN. Following a successful pilot, MENET expanded the programme and worked with other mobile money providers to ensure universal coverage of the programme. Orange joined the initiative in 2012 and Moov joined in 2013. When the initiative was launched in 2011, 60% of school registration fees were made digitally, but only 3% via mobile money. This increased significantly by 2015, when 99% of school registration fee payments were made digitally, 94% of which were via mobile money.

Mobile financial services in Ghana

Four operators have so far launched mobile money services in Ghana. MTN was the first mobile operator to launch in 2009, followed by Tigo and Airtel in 2012, and Vodafone in 2015. Since the launch of mobile money, Ghana has experienced significant growth. At the end of 2016, there were more than 8 million active mobile money accounts (90 days), or 40% of the population, up from 350,000 in 2012.[19]

As well as an increase in the number of users, the volume and value of transactions have also increased significantly, with more than 550 million transactions performed in 2016 for a total value of GHS78.5 billion (approximately $18 billion).

Source: Bank of Ghana

3 Mobile money in Ghana

	2012	2013	2014	2015	2016
Active mobile money users (90 days)	345,434	991,780	2,526,588	4,868,569	8,313,283
Registered agents	860	17,492	26,889	79,747	136,769
Total value of transactions (GHS million)	594	2,652	12,124	35,444	78,509

19 Bank of Ghana

In 2015, Ghana introduced the Guidelines for E-Money, updating the Guidelines for Branchless Banking issued in 2008. Drafted by the Bank of Ghana, these introduced favourable changes to the way mobile money providers can operate, including simpler registration processes for customers and simplified rules on the business model. At that stage, MTN mobile money agent stalls alone outnumbered bank branches in the country by a factor of almost 20:1. Under the current guidelines, accumulated interest can be paid to customers under a formula approved by the regulator. Customers do not receive the payment as interest per se, but as a single-payment windfall.[20] So far, just one other country, Tanzania, allows this. In Tanzania, three mobile money providers offer interest dividends on customer accounts.

There is great potential in the mobile financial services space in Ghana. When asking Ghanaians how they save money, one survey found that only 7% of active mobile financial services customers use their mobile phone to save, despite 86% saving using other means.[21] As a result, there is immense opportunity for banks to work with mobile money providers to offer mobile-centric savings products. Similarly, only 2% of subscribers use their mobile phones to receive payments from the government or their employers; just 5% use their phones to pay bills; and just 0.1% subscribe to insurance services through their mobile.[22]

International remittances are a strong use case for mobile money services as they are often cheaper than alternatives. Recent World Bank data and GSMA research show that mobile-enabled international remittances reduce costs to between 2.7% and 3.3%, helping achieve SDG 10.c, which is aimed at reducing remittance costs to less than 3%. There is strong potential for future growth in this area.

Focussing on payments in specific sectors provides operators with inclusive business opportunities and government with a means to increase efficiencies. For example, in Ghana, agriculture accounts for about 20% of GDP and employs more than half of the workforce, mainly small landholders.[23] However, only 16% of total agricultural annual production is sold through formal procurement channels. The digitisation of formal procurement by agribusinesses and of agricultural subsidy disbursement by governments can serve as the entry point to financial inclusion and improve access to the formal economy for farmers. Additionally, it can benefit the government by lowering the cost of distributing payments, by facilitating real-time and scalable payments to smallholder farmers across multiple locations and by mitigating cash-handling risks, such as theft and fraud, and enabling transparent and traceable transactions.[24]

Mobile financial services – SDG case studies in Ghana

MTN Ghana

In 2009 MTN Ghana was the first telecoms company to introduce a mobile payment system in Ghana to help drive a 'cash-lite' economy. The service has approximately 10.2 million customers with more than 60,000 merchant outlets nationwide and 422 ATMs activated for cash withdrawals. MTN's active subscribers total 5.6 million. In 2016, the business recorded 485 million transactions.

MTN Mobile Money services include local and international remittances, salary payments, school fee payments, utility payments, bulk payments, micro-loans, cardless withdrawals from ATMs and links to subscribers' bank accounts. Savings and insurance products are also available: MTN Y'ello Save offers 12% per annum interest on accounts; mi-Life insurance is an affordable life insurance service; and through the aYo Send with Care service, MTN customers can insure regular payments to others so they continue to receive payments even if the sender is unable to send money themselves.

Payments to caterers as part of the national school feeding programme are made through the MTN Mobile Money platform. This helps with efficiency, transparency and accountability in the management of public funds.

20 "Let's Go Cashless With Mobile Money", Modern Ghana, 2016
21 Financial Inclusion Insights 2015, Intermedia
22 Ghana's Mobile Payments Revolution, Developing Markets Associates
23 CIA Factbook
24 Market size and opportunity in digitising payments in agricultural value chains, GSMA Intelligence, 2016

Mobile financial services – SDG case studies in Ghana continued

Tigo Cash

Tigo Cash was launched in 2012 and enables users to send and receive cash, buy airtime and pay bills. There are more than 3 million registered users today. Tigo also offers an insurance service in partnership with Bima, a licensed corporate insurance agent responsible for distribution and customer experience, and Prudential Life, a licensed life insurance company that underwrites the products.

Tigo subscribers can register themselves for health and life insurance by quickly and easily enrolling through their mobile phone. Subscribers between 18 and 65 years old are charged a single "flat" premium. Enrolment is paperless, and subscribers can pay with Tigo Cash or with cash at any Tigo customer-service centre.

Tigo launched the product in 2010. Initially it was offered for free as a loyalty product, providing free life insurance cover to prepaid airtime customers based on their airtime usage. In 2013, the model evolved to one whereby customers pay for their insurance cover using their prepaid airtime. To date, the service has accrued more than 1.8 million subscribers across Ghana.

Airtel Money

Airtel's flagship mobile money product in Ghana has evolved to augment traditional peer-to-peer transactions with complementary services such as bank account linking, bill payments, merchant payments and international remittance. Subscribers are able to send monies to friends and family in remote areas of the country to any network, given national interoperability. The company also runs a payments aggregator (Zeepay), which helps reduce the cost of receiving funds from abroad. Both products help improve financial inclusion and participation in the formal economic sectors.

Vodafone Cash

Vodafone launched mobile money services in Ghana in 2015. The mobile money platform was built on the back of mPesa, and is currently available on USSD and through third-party aggregators. It has 2 million registered subscribers, of which 85% are active. Vodafone is planning to launch remittance and insurance services, as an extension of the mobile money services.

PEG Ghana

PEG has established itself as the largest PAYG financing company in Ghana, providing loans for solar home systems and other useful assets to off-grid households. PEG has partnerships with MTN Money, Airtel Money and Tigo Cash. The company focuses on off-grid customers, often rural and considered high risk by banks and microfinance firms, offering PAYG technology that allows it to control assets remotely in the field while customers are repaying. The benefits to households of using the solar home systems include saving on money spent on kerosene and batteries, health benefits in the form of clean energy, and access to a more reliable source of energy with the associated benefits in terms of education and safety. PAYG solar providers such as PEG, offering lease-to-own products that can be paid for via mobile money, are becoming some of the largest mobile money bill pay recipients in Ghana. PEG has become the biggest biller for MTN Mobile Money outside of key government services and urban utilities. Through its new licensing partner, PEG anticipates reaching 500,000 households (2.5 million people) by 2018.

Digital identity

Digital identity impact on the SDGs

A particularly important way mobile is helping the achievement of almost all the SDGs is by facilitating the provision of digital forms of identity. The ability to prove identity is critical to accessing a wide range of services such as healthcare, education, employment, financial services and voting. This is especially true for those who normally face more barriers to accessing identity documents such as children, women, rural populations, refugees and the very poor.

Addressing the digital identity gap in Ghana affects a number of SDGs, the most obvious being SDG 16.9, which calls for a "legal identity for all" by 2030. Other relevant SDGs include SDG 3: Good Health and Well-being, 4: Quality Education, 5: Gender Equality, 6: Clean Water and Sanitation, 7: Affordable and Clean Energy, 8: Decent Work and Economic Growth, and 10: Reduced Inequalities. Additionally, through these services and using operators' reach, scale and network of agents, mobile-enabled digital identity can facilitate the delivery of social services and safety nets, improve access to financial services, and protect against exploitation. This is relevant to SDGs 1: No Poverty, 2: Zero Hunger and 16: Peace, Justice and Strong Institutions.

Digital identity – SDG case studies in Africa

Bamba Chakula

This initiative was launched by Safaricom and the World Food Programme (WFP) in Kenya in 2015, with the aim of creating a more effective solution for distributing food in refugee camps. The WFP had previously been distributing in-kind rations, creating a grey market as refugees were forced to trade goods between themselves (an inefficient solution). To address this challenge, Safaricom and the WFP launched a closed loop platform that allows the WFP to send electronic food vouchers directly to single-function SIM cards. The system uses Safaricom's M-Pesa mobile money platform to provide monthly cash grants to refugees via special PIN-protected SIM cards. Approved vendors in shops within the camp can redeem the vouchers. Safaricom helped traders open accounts and register merchant tills. It also trained merchants on how to process Bamba Chakula payments and transfer funds from their tills to their personal accounts.

The Bamba Chakula platform was found to be 15% more efficient than alternative solutions when implemented in the Dadaab refugee camp. By 2016, the programme had injected a total of $2.8 million into local markets that support the Dadaab refugee camp and $1.7 million into those that support the Kakuma refugee camp. Safaricom and WFP are looking to expand the initiative to more camps.

Digital identity – SDG case studies in Africa

continued

Mobile birth registration

The digitisation of birth registration via mobile-enabled platforms has emerged as a key digital identity use case for mobile in Africa, with programmes launched in a number of countries.

Tanzania has one of the lowest birth registration rates in the world; as of 2012, World Bank figures suggested only 16% of children under five were registered at birth, with only half of those registered receiving a birth certificate.[25] Tanzania's Registration Insolvency and Trusteeship Agency (RITA) and UNICEF partnered with Tigo Tanzania to develop a mobile app to collect birth registration data and remotely upload it to a secure centralised government platform. The platform was designed to protect users' privacy, with data transferred directly to the government servers, inaccessible to anyone else, including Tigo itself.

When the new mobile registration system was introduced in the pilot area of Mbeya, more than 127,000 children were registered in six months. This increased local registration rates from just 9% to 30%. Since then, more than 1.4 million children have been registered in seven regions throughout Tanzania, as of the end of April 2017. It is estimated that by 2019, 90% of new-borns and 70% of children under the age of five will be registered.

In Uganda, the Mobile Vital Records System (VRS) is using mobile technology to overcome the barriers of birth registration by enabling village registration agents to send details of new-borns via mobile to local hospitals connected to a 3G web-based application.

In 2014 Orange Côte d'Ivoire, working closely with local authorities, launched a pilot mobile birth registration service to allow people to register the birth of a child from isolated villages. Each village leader was given a mobile phone to securely input a newborn's data onto a central government server. This produces a permanent electronic record that can be called upon at any time to procure a birth certificate.

25 World Bank 2012

Digital identity in Ghana

In Ghana, birth registration is approaching 70% of population, compared to the Sub-Saharan Africa average of 48%.[26] Birth registration has risen since the introduction of Tigo's mBirth programme in May 2016. In addition, the government is implementing a comprehensive national identification project, with a mandate to complete the project by the end of 2017. The project will establish an integrated data warehouse of databases from key public institutions such as the Police, National Health Insurance Scheme, Passport Office, Immigration Authority, Courts, Ghana Revenue Authority, and the Driver and Vehicle Licensing Authority (DVLA). The single national ID will be used for multiple purposes, including tracking the immunisation of children, issuing driving licences and passports, registering for mobile SIM cards and eliminating so-called "ghost names" from the civil service payroll. The scheme also aims to reduce the cost of maintaining multiple identity databases in Ghana.

Digital identity – SDG case study in Ghana

mBirth – automated birth registration

In recent years, Tigo Ghana has partnered with UNICEF and the Births and Deaths Registry of the Government of Ghana to develop a mobile-enabled birth registration system called mBirth.

In Ghana, more than 3 in 10 children are not registered at birth. Even when children are registered, 15% of those below the age of five do not have a birth certificate.[27] Children who are not registered at birth or without identification documents are at risk of being excluded from accessing education, healthcare and other basic services, including a basic mobile phone as mandatory SIM registration requirements are in place, which neither they nor their parents can meet.

Tigo and its partners aimed to digitise the registration process and make it more efficient and cost effective. In December 2015, a pilot was launched in 11 communities and four hospitals. Tigo supported by providing technical expertise, mobile-connected devices (tablets and laptops) and data bundles to allow birth registration attendants to digitally capture and transmit data.

Tigo designed an Android application that can work both online and offline. The baby's name, sex, date of birth and family details are sent via mobile to a central government database managed by the Births and Deaths Registry. Once received, an automated response allows the registrar to issue a birth certificate on the spot. Data collected through the paper-based system took up to six months to be registered in the central government database, whereas the mobile registration process achieves the same in less than two minutes.

During the three-month trial, Tigo helped facilitate the registration of nearly 8,000 new births. Following the success of the trial, the initiative has been expanded to include 300 additional communities in a larger pilot covering eight regions. It is expected that by the end of 2017, 670,000 new births will have been registered through the platform, increasing national registration to at least 70%.[28]

26 World Bank 2014
27 UNICEF
28 Birth Registration in Tanzania: Tigo's support of the new mobile birth registration system, GSMA, 2016

M2M and IoT

M2M and IoT impact on the SDGs

While M2M and IoT are recent developments, the technologies have the potential to impact many of the SDGs; for example by:

- monitoring air quality, climate change and water & energy efficiency (contributing to SDGs 6: Clean Water and Sanitation, 7: Affordable and Clean Energy, 11: Sustainable Cities and Communities, 12: Responsible Consumption and Production, and 13: Climate Action)
- improving productivity of manufacturing and industrial processes (contributing to SDGs 8: Decent Work and Economic Growth, and 9: Industry, Innovation and Infrastructure)
- monitoring marine, coastal and forest ecosystems (contributing to SDGs 14: Life below Water and 15: Life on Land).

M2M and IoT – SDG case studies in Africa

Rwanda Cellpump Project

In 2014 MTN, in partnership with Portland State University and SweetSense, launched the first operational scale deployment of remote sensors specifically designed for the global development sector. In partnership with Living Water International, 200+ sensors were installed in water pumps in remote Rwandan villages, serving an estimated 60,000 people. The project looks to address the fact that that as many as half the water pumps in low-income countries fail within the first couple of years, according to Evan Thomas, SweetSense CEO. Using mobile phone signals, the technology transmits pump performance data to the cloud, where it can be viewed on an online dashboard. It also sends text messages and emails to alert maintenance teams when there is a problem. This provides a cost-effective tool for NGOs, government and donors that want to know the status of water, energy and infrastructure projects in real-time, from anywhere in the world.

Lumos Nigeria

A large portion of the African population still relies on petrol generators and kerosene for electricity – 55% according to one customer survey in Nigeria. Powering a small generator for two or three hours per day cost can cost up to NGN7,000 ($23) per month, compared to NGN4,500 ($15) for solar, which provides double the run time. In addition, generators and kerosene are worse for the environment and dangerous to use. Lumos, established in 2013, designs and manufactures mobile-enabled solar home systems and partners with mobile operators to make PAYG solar available in markets with a large addressable off-grid populations and limited mobile money adoption. The devices are connected to Lumos and can be monitored and controlled remotely.

29 "Nigerians starved of electricity access turn to solar", Seattle Times, 2017

M2M and IoT in Ghana

Although there is significant potential for IoT in developing markets such as Ghana, the IoT ecosystem there is still nascent. However, operators are looking at opportunities and are in the early stages of launching products. In July 2016 Vodafone held an IoT workshop in Accra to examine potential opportunities and business models for IoT in the country. Meanwhile, Airtel has launched services to provide M2M connectivity across several areas such as fleet and asset management, remote metering and surveillance, and point of sale solutions. Companies such as PEG Ghana are also incorporating IoT devices into their services.

M2M and IoT – SDG case study in Ghana

Vodafone TAHMO

In 2016 Vodafone entered into a partnership with the Trans-African Hydro-Meteorological Observatory (TAHMO), which works with national agencies such as the Ghana Meteorological Agency (GMet) and others to provide accurate weather predictions. Through the partnership, Vodafone's IoT solution will power more than 20,000 TAHMO weather stations across Ghana, Nigeria, Côte d'Ivoire and other Sub-Saharan African countries by 2025, providing real-time data to help user agencies with their decision-making. It is expected that about 1,000 of these stations will be operational in the West Africa region by the end of 2017.

Airtel M2M and IoT services

Airtel is active in the M2M and IoT space across four main verticals:

Fleet and asset management – ensures companies can effectively track, monitor and utilise their vehicles and other logistics assets. This service also monitors driver and vehicle performance, improving road safety.

Remote metering – a solution for utility providers to collect consumption and diagnostic data from their meters. The service also provides solar power to rural, off-grid areas through a PAYG model, helping to provide electricity to those who would not otherwise have access. On the supply side, automation of meter readings greatly reduces labour costs.

Remote surveillance – a proactive approach to surveillance where crime can be detected and prevented by giving real-time notifications of alarm-triggering activities.

Point of sale – the service is used to provide terminals at retail locations for efficient inventory management and cash accounting. This allows salespeople to complete transactions on the go with customers.

MTN IoT solutions

MTN's solutions allow subscribers to access services over the internet in areas such as smart health, agriculture, transport and metering.

MTN Smart Cam – this allows a customer to monitor their home, office or store via their mobile phone or other device.

M2M vehicle tracking – launched in 2012, MTN's service allows subscribers to remotely track the location of their vehicles from any part of the country. MTN's vehicle tracker includes additional features such as geofencing, speed alerts, auto-route track, an immobiliser and fuel monitoring.

5

Opportunities for private-public collaboration to accelerate mobile-enabled progress towards the SDGs

The mobile industry has a significant role to play in supporting the Ghanaian government in meeting its national development goals and SDG commitments. While growth across the mobile ecosystem is necessary for Ghana to achieve its SDGs, there are certain areas that can be targeted to enhance the overall social and economic value. There is significant potential for the government and operators to work closely to realise the symbiotic benefits of greater mobile penetration.

Mobile connectivity

If the mobile industry is to further its contribution to the SDGs, it needs to increase coverage and uptake; however, operators face regulatory and cost challenges that hamper these efforts. As private enterprises, operators struggle to justify expansion into rural areas where rollout costs are significantly higher than the projected returns on investment. The problem is exacerbated by vandalism of telecoms infrastructure, particularly fibre cables, which are damaged during road construction and 'galamsey' (illegal mining). This has proved to be an unnecessary drain on investments that could otherwise be used to improve connectivity to other unserved areas.[30] [31]

The cost of spectrum and industry-specific taxes have made it increasingly challenging for mobile operators to expand service across Ghana. The Communications Service Tax and the Surtax on International Inbound Call Termination have proved particularly burdensome for the operators, limiting the amount they can invest in their networks.

One potential solution to these challenges is for the government to implement regulation that facilitates voluntary network sharing. Despite the prominence of passive infrastructure sharing in the country, the regulator does not yet have a framework that supports active infrastructure sharing. This is an area where suitable regulation could potentially help overcome some of the barriers to rural connectivity.

In addition, the government can enable low-frequency Digital Dividend spectrum to be used more widely for mobile broadband to support improved rural coverage. As countries move from analogue to digital television, some low-frequency spectrum previously used for analogue broadcasting is freed up – the Digital Dividend. For countries that want to connect more people to accelerate progress against the SDGs, making Digital Dividend spectrum available is key. The spectrum is ideal for reaching more people with mobile broadband, as the lower frequency bands can cover wider areas with fewer base stations than higher frequencies. This reduces deployment costs and allows operators to provide broader, more affordable coverage, especially in rural areas where connectivity can be a challenge. Digital Dividend spectrum also delivers benefits in urban areas, providing improved indoor coverage as these frequencies can more easily penetrate buildings, bringing the benefits of mobile connectivity to more people, more regularly.

In September 2017, the NCA granted permission to operators with existing 2G licences in the 900MHz band to deploy 3G technology on the same spectrum in selected areas and at no extra fee. This will allow operators to roll out mobile broadband services more efficiently with better in-building coverage, and also increase spectral efficiency in the designated areas. However, completely removing restrictions that limit the use of spectrum to particular services or technologies (beyond those needed to manage interference) will enable Ghana to maximise the benefits from its spectrum resources on an ongoing basis.

Finally, modifications to the operation of the Universal Access Fund regime operated by the Ghana Investment Fund for Electronic Communication (GIFEC) present an opportunity. The fund was set up to address the gap between commercially viable areas of the country and unserved, rural parts. Sustainability of GIFEC's projects can only be guaranteed if there is an incentive for the private sector to go into the unserved markets, via tax rebates or holidays, coupled with new models for USFs. Greater collaboration in this area has the potential to boost investment by the mobile operators, thereby increasing national coverage.

30 Ghana Chamber of Communications
31 GSMA has published the 2017 Mobile Connectivity Index to quantify the barriers to mobile internet access across four categories: infrastructure, affordability, consumer readiness and content. Data is available at country level, including Ghana, helping to focus the efforts and resources of the mobile industry, governments and wider international community to achieve universal internet access.

Mobile money

Ubiquitous mobile money solutions are crucial to Ghana achieving its SDG goals, and the recent changes in legislation will further help in this area. Ghana continues to experience significant growth in the mobile money sector, with a 70% increase in active mobile money users and a 125% rise in the total value of transactions between 2016 and 2017. Mobile money acts as a catalyst for the formal economy. It deepens formal financial inclusion by providing customers with a safe and efficient payment method for savings, borrowing, purchasing insurance or gaining access to PAYG solar.

Mobile money can also help digitise P2G and G2P payments, helping to make money flows more efficient and to reduce leakages. Common P2G mobile payments include taxes, school fees and payments for government services such as parking fees and business registration fees. Common G2P payments include social security disbursements, payments to guardians of orphans and vulnerable children, payments to refugees, and payments in fragile and conflict-affected states (e.g. to health workers in Ebola-prone countries).

The GSMA recently published a report analysing the success factors for mobile money services.[32] This found strong evidence that certain factors are associated with the success of mobile money:

- Operator-led mobile money deployments have been much more successful in delivering digital finance with broad outreach than non-operator-led mobile money deployments.
- Enabling regulation is an important predictor of success in mobile money services (for example, permitting non-banks to issue electronic money, imposing proportional capital requirements, and not prescribing the implementation of specific interoperability models without allowing for a market-led approach).
- The market share of mobile network operators is associated with greater success in mobile money operators.
- The probability that a mobile money service scales significantly is greater in countries with high levels of population density.
- Mobile money providers are able to capture a greater percentage of the addressable mobile money market in countries ranked higher in the World Bank's Ease of Doing Business Index.[33] In 2017, Ghana ranked 108 out of 190 countries and was 10th in Sub-Saharan Africa.

Digitisation of value-chain payments

Focussing on payments in specific sectors provides operators with business opportunities and government with a means to increase efficiencies. For example, GSMA Intelligence has estimated the direct revenue opportunity for mobile money service providers in 69 countries from digitising business-to-person (B2P) payments and government-to-person (G2P) transfers in agriculture. The digitisation of formal procurement by agribusinesses and of agricultural subsidy disbursement by governments can serve as the entry point to financial inclusion. In Ghana, it is estimated that 16% of total annual production is sold through formal procurement channels. Some 3.5 million new mobile money accounts could be added by 2020 from digitising B2P and G2P payments, depending on the number of farmers engaged in formal value chains. Mobile operators could derive an estimated $13 million for B2P payments and $1.1 million for G2P payments in 2020.

Digitising agricultural payments not only benefits mobile operators, but government too – for example, by lowering the cost of distributing payments, by facilitating real-time and scalable payments to smallholder farmers across multiple locations and by mitigating cash-handling risks, such as theft and fraud, and enabling transparent and traceable transactions.

32 Success factors for mobile money services: A quantitative assessment of success factors, GSMA, 2016
33 doingbusiness.org/rankings

Accelerating gender equality

SDG 5: Gender Equality aims to achieve gender equality and empower all women and girls. Target 5b requires countries to enhance the use of enabling technology, in particular information and communications, to promote the empowerment of women. Continuing to ensure access to and use of mobile services for women and girls will be critical in achieving many of the targets for SDG 5. Gender equality and women empowerment will be key to achieving many of the other SDGs too. Efforts to help women access mobile help to catalyse broader gender equality across social, economic and political dimensions — benefiting not only women themselves, but also their communities, businesses and the broader economy.

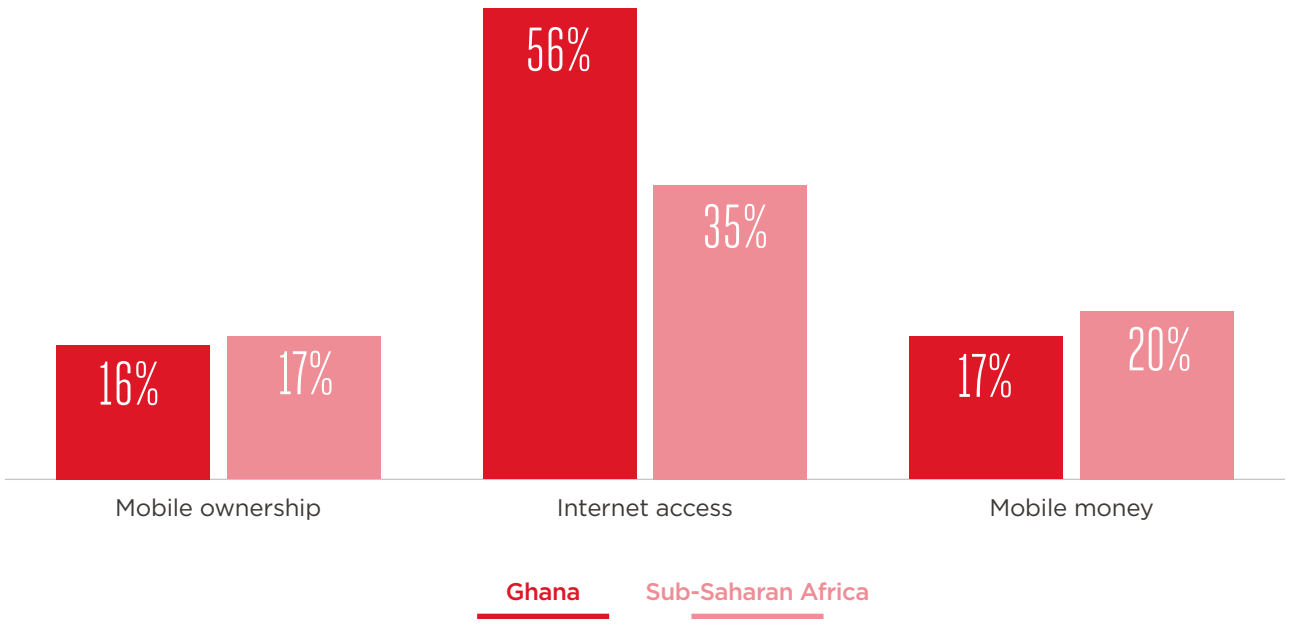
Ghana is ahead of its neighbours in terms of gender equality – for instance, in 2016 Ghana ranked 59th out or 144 countries in the Global Gender Gap index, above all countries in the region except Cabo Verde.

Additionally, Ghana has a gender parity index for literacy of 0.87 compared with the West Africa average of just 0.64.[34] However, socio-cultural practices, norms and societal attitudes that constrain the attainment of gender equality remain.

While mobile technology has been spreading quickly, it has not done so equally, with lower uptake of mobile among women. Even when women do own a mobile device, they are less likely to use it for more sophisticated services such as mobile internet and mobile money. In 2016, the gender gaps[35] in mobile phone adoption and mobile money uptake in Ghana were 16% and 17% respectively. The gender gap for internet access in Ghana in 2016 was 56%, with 2.5 million fewer women accessing the internet than men.[36] GSMA research highlights that women face many barriers to owning and using mobile phones including cost, network quality, safety and harassment issues, and digital skills.[37]

Source: Gallup and World Bank Findex

9 Gender gap in Ghana and Sub-Saharan Africa



34 A value of 1 indicates equality
35 GSMA Connected Women define the 'gender gap' as how less likely a female is to own a mobile phone than a male. Gender gap in ownership (%) = ((male take-up)) – (female take-up)) / (male take-up))
36 Source: GSMA Intelligence calculations using Gallup data
37 Bridging the gender gap: Mobile access and usage in low and middle-income countries, GSMA, 2015

President Akufo-Addo is committed to closing the gender gap; this was highlighted when he received the African Union Gender Champion award in recognition of his role in championing the empowerment of women. To continue building on the momentum to close the gender gap and digital gender gap, targeted intervention is needed from a range of stakeholders.

Mobile operators across Africa are driving the effort to accelerate digital and financial inclusion for women through the GSMA Connected Women Commitment Initiative, which supports mobile operators in low- and middle-income countries in reducing the gender gap in mobile internet and mobile money by 2020. So far, 25 operators have made a formal Connected Women Commitment, of which 11 are in Africa. Two mobile operators in Ghana – MTN and Tigo – have made a commitment to close the mobile money gender gap.

Approaches that operators can use include bringing lower-cost handsets to customers; introducing more creative and transparent pricing to appeal to women's price sensitivity, call patterns and daily routines; and investing in consumer insights research to better deliver services that meet the needs of women. Operators can also integrate user-centric design principles into handsets and services, and conduct user testing, pilot testing and product iteration with women. In addition, it would be helpful to target men in marketing campaigns to reach women in settings where men commonly make decisions about women's access to mobile.[38]

The Broadband Commission Working Group on the Digital Gender Divide has recommended for government to work at addressing this issue by compiling detailed evidence. This involves collecting, analysing and tracking sex-disaggregated data to inform policy, particularly at a national and sub-national level; and integrating gender equality targets and key performance indicators into strategies, policies, plans and budgets, involving women and relevant local communities from the onset.

Government can also address the barriers women face that impede gender equality online, including affordable access; issues around safety; digital literacy and confidence; and the availability of relevant content, applications and services. Governments can also support multi-stakeholder cooperation: developing tools and policies to support national and international efforts, and effective sharing of best practices to address the digital gender gap.

Supporting start-ups and entrepreneurship

For a healthy start-up ecosystem to develop in the digital era, it is crucial that start-ups can incorporate mobile services such as SMS and mobile money into their products. Without access to mobile solutions such as inclusive payment mechanisms, start-ups serving the masses struggle to scale. In emerging markets, application programming interfaces (APIs) are bridges between mobile operators and start-ups that launch mobile services. Mobile operators do not open APIs in general, whether for mobile money or other functions. This makes it difficult for start-ups wanting to build a mobile-enabled service to scale easily. Key action areas for operators to consider include the following:

Open up – Mobile operators in emerging markets are increasingly looking for ways to unlock the API economy and expose their assets. This is a positive trend that can benefit both operators and start-ups. Depending on their in-house capabilities and market coverage, operators have three main options for their API go to-market and sales approach:

- In-house API programmes
- Partnerships with a third-party API management software provider such as Apigee or WSO2
- Wholesale models with an API aggregator (local/regional, such as Africa's Talking or global, such as Twilio). This last option is probably more relevant for operators with smaller market shares and limited in-house resources to drive an API programme.

38 Bridging the gender gap: Mobile access and usage in low and middle-income countries, GSMA, 2015

Harmonise – The heterogeneity of APIs remains a key pain-point for start-ups and developers. Operators can harmonise at a group or industry level by adopting a common platform or standards for specific APIs (e.g. for mobile money).

Collaborate – APIs should not be seen as end products but as enablers of innovation. The competitive differentiation between mobile operators should not be the APIs themselves but rather their efforts to engage with start-ups and support them.

Outreach to developers – This is crucial to a successful API programme: developers will only use APIs if they know they are there and are willing and able to use them.

Digital identity

Mobile has a central role to play in establishing a robust identity structure across Ghana. Proof of identity is a key driver of socio-economic development, enabling individuals to access vital services such as healthcare, education, mobile and financial products, and a range of government subsidies. Without an official identity, Ghanians risk being excluded from society. It is often the most at-risk people in a country (such as children and migrants) who are least likely to have an official identity, compounding the challenge of helping these populations. Mobile is a powerful tool in reaching such demographics. Tigo's mBirth programme highlights the potential benefits of mobile operators and government working together to address a common challenge in a way that could unlock access to basic services for a significant number of Ghanaians.

The Ghanaian government's active engagement in the SDGs and proclaimed support for private sector initiatives clearly mark it as one open to enabling sustainable business that can progress development as well as commercial objectives. Mobile operators, coming together as the first industry to commit to the SDGs, have committed to continuing to advance social and economic development in the communities where they operate. Closer collaboration between government and mobile operators offers substantial opportunities to unlock digital transformation in Ghana for the benefit of all citizens.

Appendix A
Impact of the mobile industry on the SDGs

SDG impact scoring methodology overview

Driver identification – for each SDG, a number of drivers have been identified. A driver describes an activity that is performed or supported by the mobile industry and contributes to the achievement of the SDG. For example, two of the drivers for SDG 1: No Poverty are:

- the provision and use of communication services to stimulate local businesses and economic growth in poor communities
- generating employment opportunities in the mobile ecosystem for people living in poverty.

Driver importance – each driver is given an importance score of 'high', 'medium' or 'low' to reflect the potential impact the industry has on delivering or enabling the SDG.

For example, the provision of communication services to poor communities has a high potential impact because everyone can access mobile services, and there is strong evidence showing mobile connectivity can drive economic growth and reduce poverty (source: *World Development Report 2016: Digital Dividends*, World Bank).

In the case of generating employment opportunities, the industry's impact is low because the mobile ecosystem cannot employ a substantial proportion of those living in poverty.

Driver measurement – the industry's performance for each driver is quantified using appropriate metrics at a country level. Each metric is then normalised such that it takes a value between 0 and 100, with a higher score representing better performance.

For example, providing communication services to poor communities is measured using network coverage (including 2G, 3G and 4G technologies) and mobile penetration among the poorest 40% of the population in each country. A score of 100 for this driver in a given country would mean there is 100% network coverage for all technologies and the poorest 40% of the population are all using mobile.

SDG impact scores – for each SDG, the driver scores are aggregated to produce an overall score between 0 and 100 for each country. A score of 100 means the mobile industry has achieved everything possible to contribute to that Goal. Global SDG scores are then calculated as a population-weighted average of the country-level scores (a similar approach is used to calculate scores by region and development status). For example, SDG 1 currently scores 37.5, meaning the industry is doing 37.5% of what it could potentially contribute to that SDG. To achieve a score of 100, each country (especially developing countries) would need to achieve 100% coverage and mobile voice and internet penetration among the poorest populations in each country. It would also require them to utilise mobile-enabled services that are capable of alleviating poverty – for example, financial services (such as mobile money), digital commerce and digital identity services.

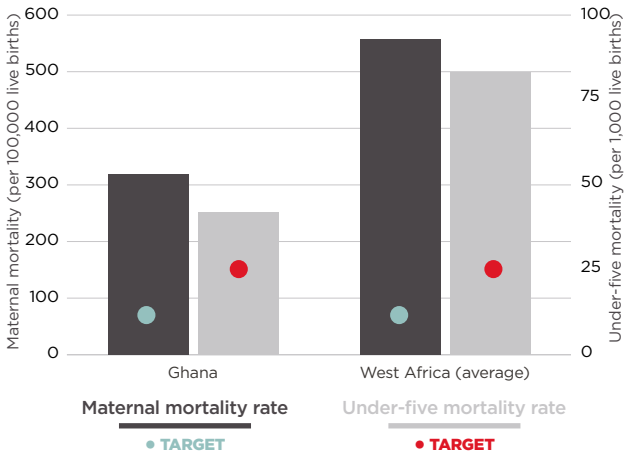
Appendix B
SDG benchmarks for Ghana

To measure progress in achieving the SDGs, the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) has developed a global indicator framework.[39] General agreement has been reached on 230 indicators. In the charts below, we provide Ghana's current benchmark for a selection of indicators relevant for SDGs 1: No Poverty, 2: Zero Hunger, 3: Good Health and Well-being, 4: Quality Education, 5: Gender Equality, 6: Clean Water and Sanitation, and 7: Affordable and Clean Energy.

In line with the NDP aim, these are the SDGs that have been given priority by the Ghanaian government and UNDP (particularly SDGs 1: No Poverty, and 2: Zero Hunger). Due to issues around data availability and the fact that complete and up-to-date data has not been compiled for each country (including Ghana), it is not possible to assess every individual target for any of the SDGs. However, the analysis provides an indication of where Ghana currently is with respect to seven of the SDGs.

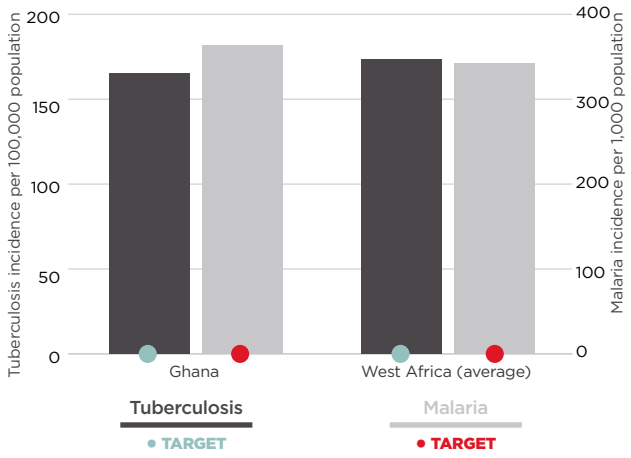
Source: UN

Maternal and infant mortality



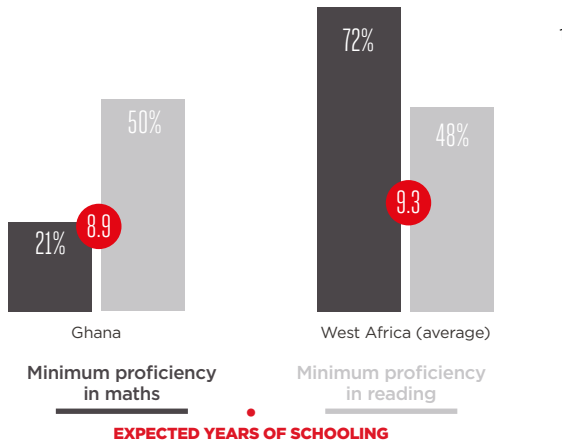
Source: UN

Tuberculosis & malaria incidence



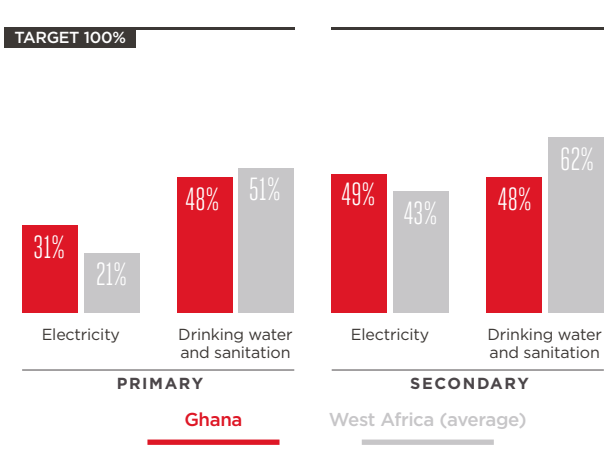
Source: UN

Percent of primary pupils with minimum proficiency and school life expectancy



Source: UN

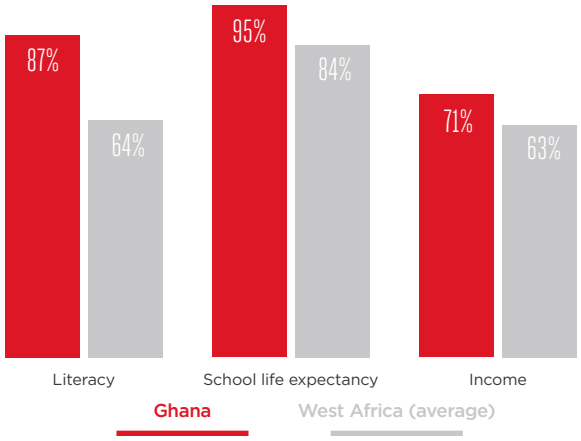
Proportion of schools with access to basic facilities



39 Source: Official list of SDG indicators http://unstats.un.org/sdgs/indicators/indicators-list/

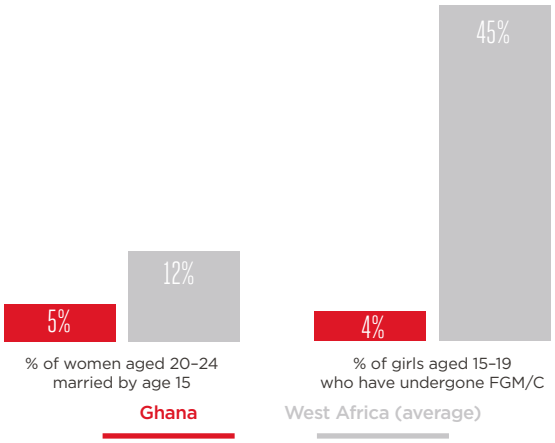
Source: UN/UIS

Gender parity index for literacy, school life and income



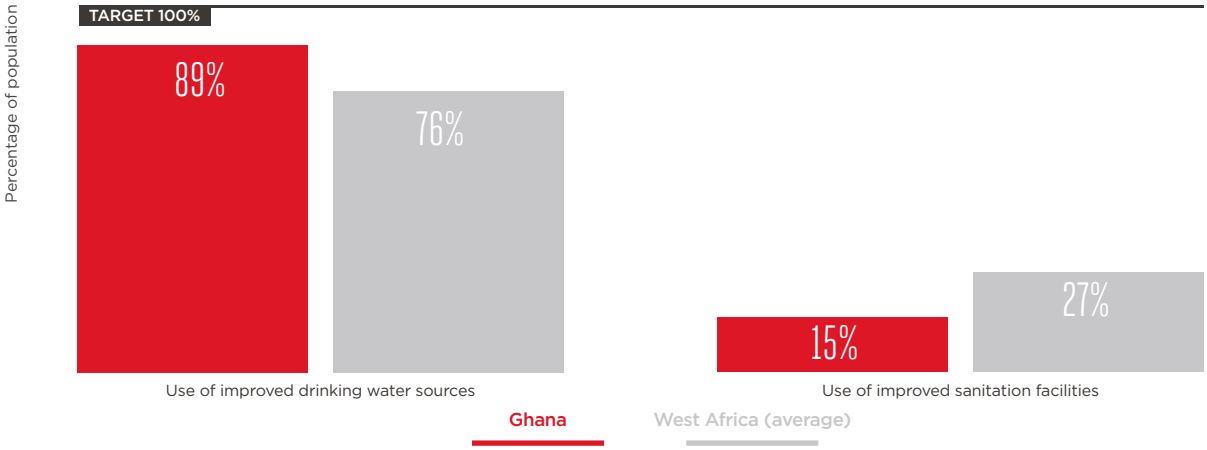
Source: UN

Incidence of harmful practices against women



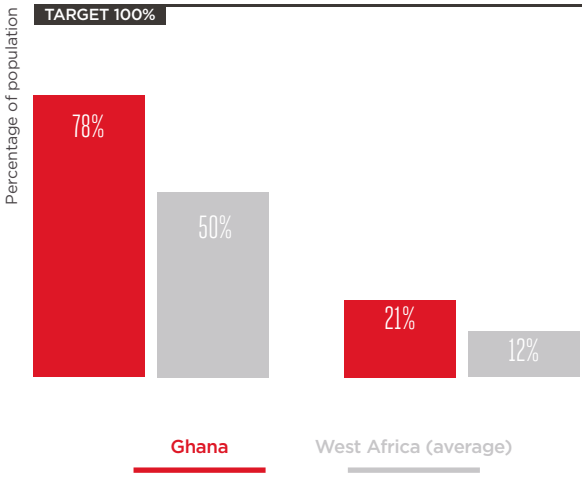
Source: UN

Use of safe drinking water and sanitation



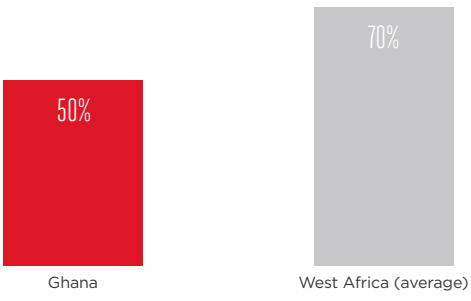
Source: UN, World Bank

Access to electricity and use of clean fuels



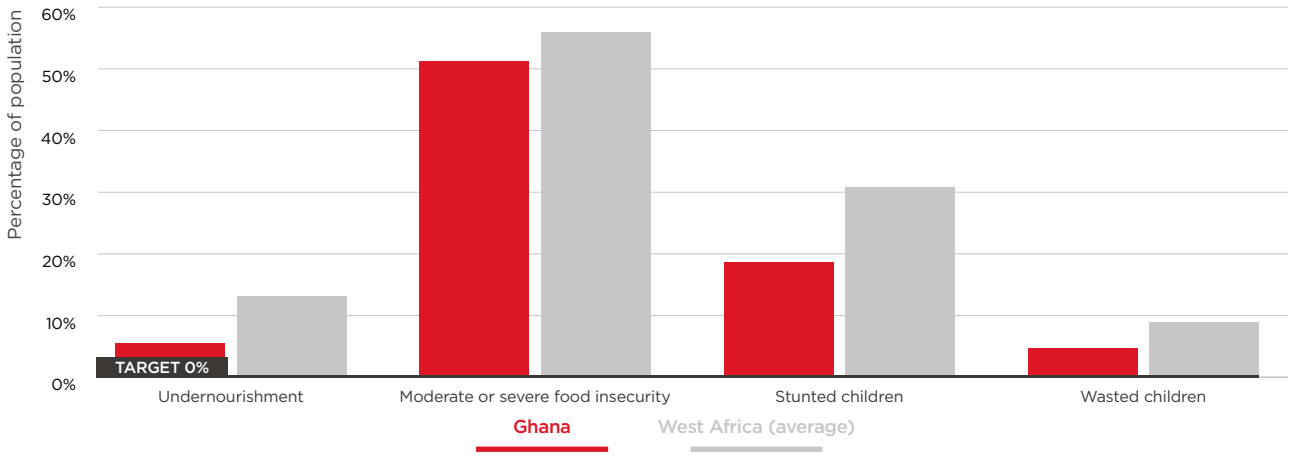
Source: UN

Renewable energy as a proportion of total final energy consumption



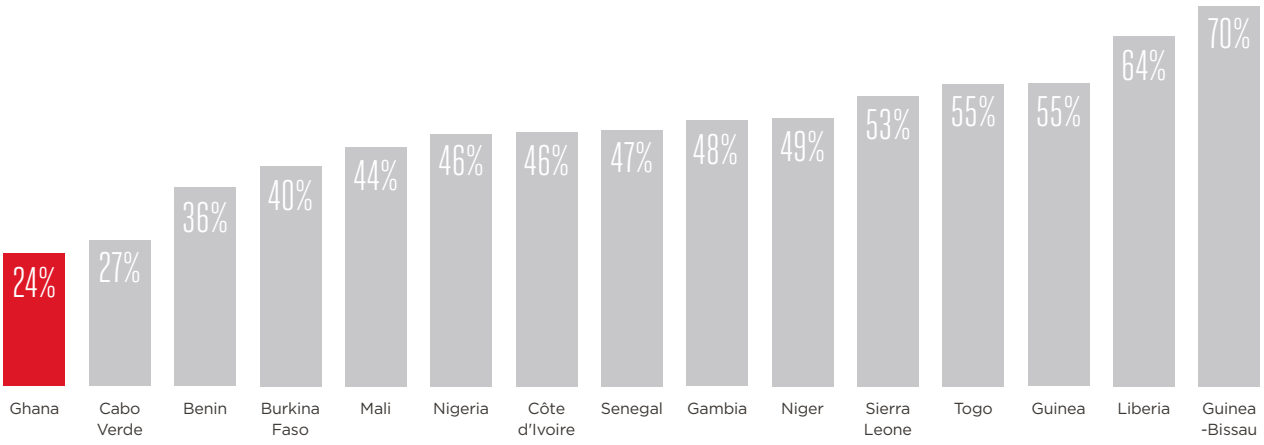
Source: UN

Undernourishment and food insecurity



Source: UN, INS

Proportion of population below poverty line



gsma.com

GSMA Head Office
Floor 2
The Walbrook Building
25 Walbrook
London EC4N 8AF
United Kingdom
Tel: +44 (0)20 7356 0600
Fax: +44 (0)20 7356 0601