



Mobile for Development

mHealth Country Feasibility
Report: Ghana



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Mobile for Development

GSMA 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, economic and environmental impact and stimulate the development of scalable, life-enhancing mobile services.

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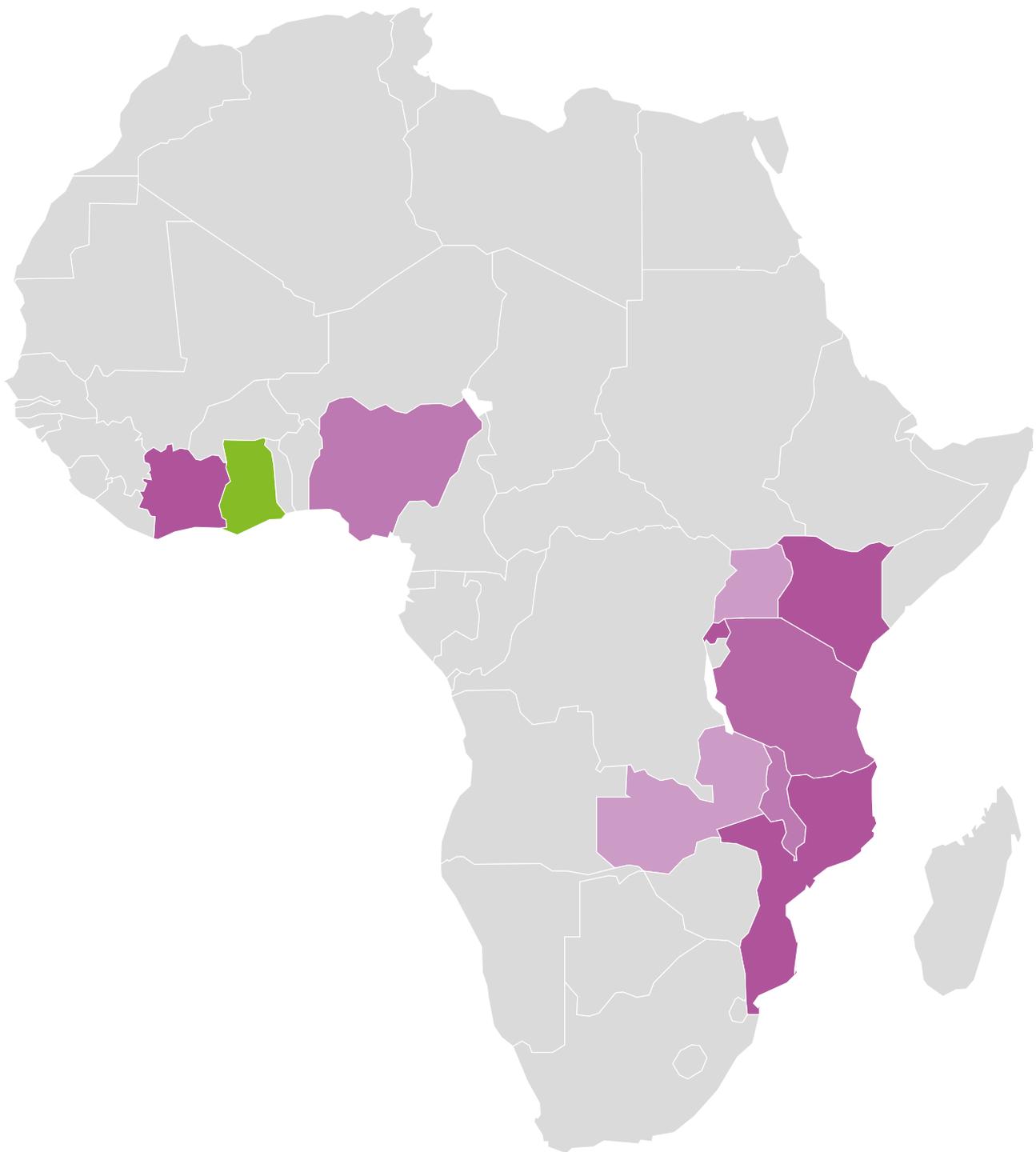
Background

The GSMA Mobile for Development mHealth programme connects the mobile and health industries, with the aim of developing commercially sustainable mHealth services that meet public health needs.

In June 2012, the GSMA mHealth programme launched the Pan-African mHealth Initiative (PAMI). PAMI has been funded by UK aid from the Department for International Development (DFID), to support the scale-up of mHealth in nutrition and maternal and child health, in support of the Millennium Development Goals 4, 5 and 6. PAMI is closely aligned to the UN's Every Woman Every Child Initiative, Scaling Up Nutrition (SUN) and the Global Nutrition for Growth Compact.

For more information on the GSMA Mobile for Development mHealth programme, please contact mhealth@gsma.com or visit www.gsma.com/mobilefordevelopment/programmes/mhealth

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3-year 10-country nutrition initiative which aims to develop mHealth services in the area of maternal and child health in Sub-Saharan Africa.

Ghana has been selected as a GSMA priority country.

- ⊕ Côte d'Ivoire
- ⊕ Kenya
- ⊕ Mozambique
- ⊕ Rwanda
- ⊕ Uganda
- ⊕ Ghana
- ⊕ Malawi
- ⊕ Nigeria
- ⊕ Tanzania
- ⊕ Zambia

Executive summary

This report aims to carry out a comprehensive analysis of the current state of mHealth in Ghana. Information has been gathered and presented in the context of the GSMA Pan-African mHealth Initiative and more specifically is aligned to the aim of the 10-country nutrition initiative – to develop commercially sustainable mHealth services that meet public health needs, in the areas of demand generation, registration and data surveillance.

1 The case for nutrition and maternal and child health in Ghana

What problems can mHealth solve?

- Infant mortality rates are approximately 49 deaths per 1000 births, placing Ghana sixth highest for this indicator across the 10 mHealth nutrition countries. Of the infant and young child mHealth interventions tracked by the GSMA 70% are directly related to reducing infant mortality.
- The critical shortage of Community Health Workers (2 CHW/10,000) is being addressed through the 1 Million Community Health Workers campaign and aims to increase the total number of available Community Health Workers to 20 CHW/10,000. The three mHealth services tracked by the GSMA and targeting Community Health Workers (CHWs) have reached 219 CHWs and 167 facilities (Q3 2014). Coordinated scale up and integration of CHW mobile services will greatly assist the 1 Million CHW initiative.
- Accessibility of health services could be increased through mHealth service provision. 47.5% of Ghana's population is based in rural areas with 40% of the addressable population living one hour or more from a health facility. 80% of specialist health services are only available in facilities in regional capitals.

2 The opportunity for mHealth to support nutrition and maternal and child health initiatives

What is conducive to in-country mHealth success?

- The total number of beneficiaries reached by mHealth services in Ghana was 628, 343 (Q3 2014). The highest segment targeted amongst all initiatives was women (58%) closely followed by children (38%).
- Policy developments in Ghana are gearing towards an enabling mHealth environment. For example, the Ghana e-health policy document provides guidance for the integration into existing ICT infrastructure and efforts to centralize regulatory infrastructure as part of the Ministerial Review of the United Nations Economic and Social Council will ensure implementation is efficient and accelerated.
- The potential addressable market for maternal segments alone is 950,000. This forecast is estimated to rise to 1.2 million by 2020.
- Maternal health is the second most prevalent mHealth intervention in Ghana behind family planning. These interventions have reached a cumulative total of 107,193 beneficiaries of which 38,693 are engaging on an ongoing basis.

3 The readiness of stakeholders to support mHealth in Ghana

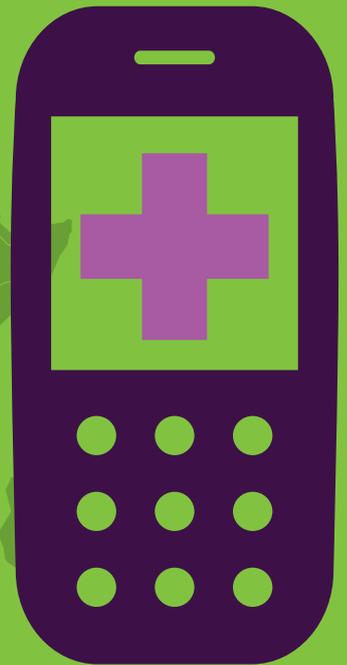
What position are stakeholders in to facilitate mHealth?

- The Ghanaian Ministry of Communication has a sustained drive to connect regional hospitals and selected district hospitals through its National Communications Backbone Company (NCBC) initiative. A connected hospital network will enable mHealth by creating centrally connected hubs that CHWs can connect to via mobile. Registration, disease tracking, remote diagnostics and CHW training are all areas that would benefit.
- The Ghana National Health Insurance service will facilitate the improvement of overall health indicators by providing those in most need access to basic health services. Mobile as an almost universally accessible device within Ghana (over 85% of the population have at least access to a phone) can assist in this endeavor by providing access to nutritional, maternal and child health content.
- Ghana's recent CHW roll-out is closely aligned to the work being undertaken by the GSMA and mobile stakeholders. Specifically, mobile provides an easy route to connect CHWs in regions where health needs are under serviced, providing access to standardized health content, a mechanism to push in-the-field health data to central data depositories and inbuilt scalability.

Market conditions in Ghana

mHealth indicators

Ghana shows strong indicators for mHealth, being in the top five of the metrics considered across 43% of selected indicators, ranked against the other ten target countries.



Advantageous for mHealth

Current state of Ghana Health

HEALTH BURDEN



LOW

REACH



MEDIUM/HIGH

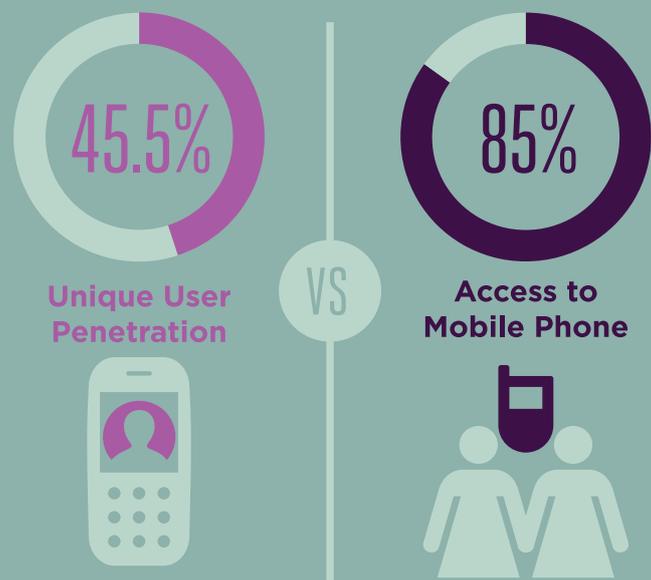
ABILITY TO PAY



HIGH

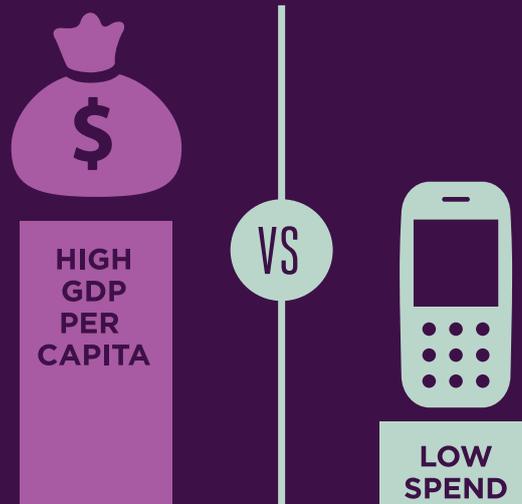
Penetration versus access

Indicates a strong potential for mHealth that is not necessarily seen if only unique user penetration is considered.



Advantageous for mHealth

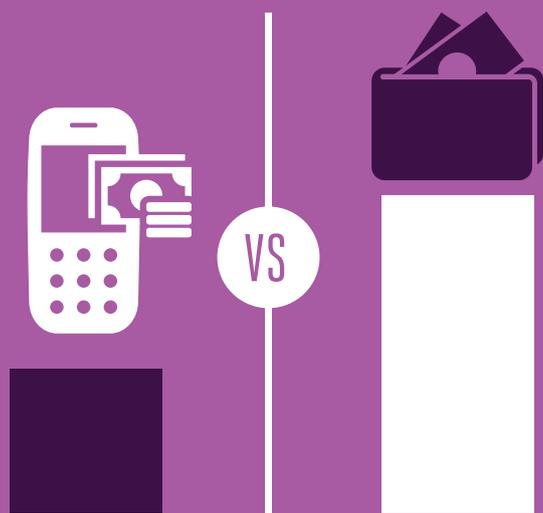
GDP versus spend



Despite high GDP Ghana exhibits the lowest spend in percentage terms on mobile services of the 10 countries we are considering. Spend is 7% of overall GDP (over 12 month period)

Obstacle to mHealth

Spend versus income

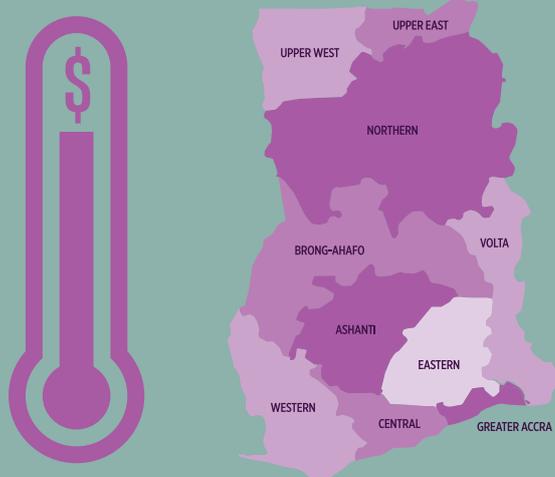


While the spend on mobile relative to available income is lower than one would expect in Ghana the size of spend sits squarely in the normative range for the 10 nutrition initiative countries, at USD\$10 per month.

Advantageous for mHealth

Government support of health services

Ghana has the third highest spend by government on health initiatives.



Advantageous for mHealth and business to business models specifically

General market considerations

Key Observations

Ghana is actively involved in fulfilling the aims defined in the Ministerial Review of the United Nations Economic and Social Council. In particular the country is gearing up to fulfil policy toward integration of ICT into governmental infrastructure. Part of this process entails the development of its eHealth policy document. This document stipulates the parameters, approach and landscape of the Ghana ICT environment and the role that mobile and supporting core network infrastructure will play. The roles of health providers, international funding bodies and telecommunication providers are also outlined in this document.

Figure 1 highlights some of the features of the Ghanaian market in relation to mHealth.

Despite instigating a number of initiatives, including free maternal healthcare, incentives for health workers to move to underserved areas and the review of risk adjusted systems, all aimed at tackling inequalities and improve aggregate levels of health in Ghana, there remains a number of challenges to the achievement of the Millennium Development Goals (MDG) by 2015.

One of the core challenges identified from interviews with stakeholders in the Ghanaian health industry is the reactive nature of healthcare in the country. Health users seek treatment for their symptoms rather than knowledge and education that would reduce the need to seek treatment. The strong feasibility to scale mHealth In Ghana should be exploited to provide, for example, behaviour change messaging that reduces the total burden on the health system.

Figure 1

General Ghana ICT market view SWOT **STRENGTHS**

There are at least 4 mHealth projects in each region of Ghana with the most serviced regions having upwards of 8. Health burden demands are broadly aligned e.g. the highest rates of child mortality and stunting are in the Northern region (16% and 14% respectively) which is serviced by 8 GSMA tracked mHealth initiatives.

mHealth services in Ghana are targeting the most important burdens within the health system: 25.8% of the GSMA tracked mHealth initiatives are related to maternal health.

Five of the top ten causes of death in Ghana, cumulatively accounting for 32.7% of all deaths in all ages, and six of the top causes of children <5 are addressed by mHealth initiatives.

 **WEAKNESSES**

Although there is evidence of strong partnerships in Ghana, only 16% of tracked mHealth services include the MoH/GHS as a strategic partner.

The base of pyramid users in Ghana have the most to gain from mHealth as the least provided for segment. As a subsidised group providers need to be convinced of the efficacy of mHealth. Consequently there is a high burden of proof for mHealth services to demonstrate safety, efficacy, cost, health system and user adoption benefits.

 **OPPORTUNITIES**

The ratio of health staff to population in Northern regions is 1:1367 compared with 1:874 in the Greater Accra region. Staffing and capacity constraints provide a strong feasibility for the use of mobile to enable, extend and empower health workers and the communities they serve.

Progress towards achieving the Millennium Development Goals is static. Various experts cite a lack of time sensitive and accurate data collection and reporting. This is something that can be addressed through robust data surveillance, reporting and results based financing solutions delivered through mHealth.

Ghana has the second highest female literacy rate of the GSMA nutrition initiative countries at 65%. Over 60% of GSMA tracked mHealth services use SMS as an access channel.

 **THREATS**

Without adequate coordination across the mHealth ecosystem it is unlikely that the full potential of mHealth will be achieved. It is critical that multi-sectoral partnerships are incentivised to drive economics of scale in their service offerings to ultimately impact the health of target populations.

Impetus will need to be sustained in the provision of mHealth services targeting MDG 4 and 5 as there is a risk other more visible high ticket initiatives such as regional disease outbreaks (Ebola) will drain resources.

Initiatives are in place to distribute connectivity (e.g. the NCBC) to the wider populace in Ghana but there remains a digital divide delineated by geography, income, education level and literacy.

Healthcare in Ghana is provided by a mixture of players, including government, private sector, NGO's, civil society and the informal sector.

The status of healthcare within the country has come under intense scrutiny in recent years. This is due to the slow improvement in the prevention and management of nutritional deficiencies, preventable disease and recurring epidemics. Particular attention should continually be paid to addressing poor nutritional practices and habits at household level.

Primary healthcare improvement targets, as identified by the Ghanaian government, are shown in Figure 2 below, as well as the potential role of mobile to assist with these requirements.

Figure 2

Planned Ghana health sector and mHealth enablement

Ghana Health Sector Reform objectives	Mobile enablement of objective
Improved access to services across the service user spectrum (urban AND rural)	Mobile is fully disseminated out to the extremities of the network (rural & urban) and can act as an assistance tool for health workers remote from central health structures.
Better quality of the service user experience	Provides real time access, 24/7 support and empowerment of health service users through self help/care capabilities.
Efficiency improvements in the use of resources and mitigation of waste	Direct and immediate access to data at all times and on-demand. Effectively no downtime. Mobile acts as a resource multiplier. Healthcare workers can be accessed from multiple points that are geographically dispersed.
Enabling efficient collaboration across partner ecosystems	As a nationwide data-capable communication network mobile is built for collaboration from the outset.
Improving funding process and investment for the delivery of health services	As a potential commercial proposition mHealth is self-perpetuating and can generate revenue for health infrastructure re-investment through taxation etc.

Source: GSMA extracted data from Ghana health sector reform report

Ghana is relatively advanced in its understanding of the challenges inherent in launching mobile and ICT-based solutions for health. It is understood that the health sector will depend on some form of national infrastructure that delivers the core elements and/or framework for eHealth, which integrates with the supporting fixed infrastructure. However, there is a disconnect between the long-term value and sustainability of these services. Moving forward what needs to be demonstrated is a shared value creation. This should clearly depict the tangible (health impact, cost, ROI, market share, other) and intangible (quality of service delivery, brand loyalty, other) value proposition to both public and private stakeholders.

Telecommunication and ICT infrastructure within Ghana

The Ghanaian government has launched a number of core network infrastructure initiatives to tackle the infrastructure gap and assist in the roll-out of mHealth and eHealth services within Ghana. One of the most significant is the Ministry of Communication's drive to connect regional hospitals and selected district hospitals to fibre backbone networks.*

While such initiatives are conducive to increasing connectivity, there remains a digital divide within Ghana delineated by geography, income, education level and literacy.

*The National Communications Backbone Network Company (NCBC) initiative



The Ghanaian opportunity to scale mHealth services

As part of the GSMA nutrition initiative country feasibility research we set out to identify the most comparable health, mobile and economic indicators and datasets within each of the 10 priority countries. These indicators are represented in figure 3.

Ghana shows strong potential to scale mHealth, as indicated by Ghana's top five positioning in 43% of the selected indicators.

Indicators of mobile performance, incorporating penetration, growth rate, and overall coverage in Ghana are very strong, placing Ghana in the top three amongst our target countries.

Figure 3

General market indicator metrics - top 5 country ranking

INDICATOR METRICS SCALE*	1	2	3	4	5
Maternal mortality	Nigeria 6.3	Mozambique 4.9	Tanzania 4.6	Malawi 4.6	Zambia 4.4
Infant mortality	Nigeria 77.8	Cote D'Ivoire 76.2	Mozambique 63.1	Zambia 56.4	Kenya 48.7
Child mortality <5	Nigeria 123.7	Cote D'Ivoire 107.6	Mozambique 89.7	Zambia 88.5	Kenya 72.9
Children aged <5 stunted	Malawi 48%	Zambia 46%	Rwanda 44%	Mozambique 43%	Tanzania 43%
No. of pregnant mothers	Nigeria 5.7	Tanzania 1.5	Uganda 1.3	Kenya 1.2	Mozambique 0.8
No. of mothers with children <5y	Nigeria 17.7	Tanzania 5.3	Kenya 4.1	Uganda 3.8	Mozambique 2.8
Penetration + growth + coverage	Rwanda 1.29	Malawi 1.16	Ghana 1.14	Uganda 1.11	Zambia 0.90
Unique mobile subscriber penetration	Ghana 50%	Cote D'Ivoire 45%	Zambia 40%	Kenya 32%	Rwanda 30%
Mobile subscriber penetration 5 year growth	Rwanda 25%	Zambia 15%	Malawi 15%	Mozambique 14%	Ghana 10%
Mobile geographical coverage	Malawi 79%	Uganda 76%	Rwanda 74%	Ghana 54%	Tanzania 41%
Overall literacy rate >15y	Uganda 73%	Kenya 72%	Ghana 71%	Tanzania 68%	Rwanda 66%
Female literacy rate <15y	Kenya 67%	Ghana 65%	Uganda 65%	Rwanda 62%	Tanzania 61%
Per capita GDP	Ghana 1605	Nigeria 1555	Zambia 1469	Cote D'Ivoire 1244	Rwanda 1244
Health expenditure	Zambia 87	Nigeria 80	Cote D'Ivoire 79	Rwanda 79	Ghana 75
% above poverty line	Uganda 74%	Cote D'Ivoire 73%	Rwanda 73%	Nigeria 63%	Tanzania 60%
% out-of-pocket spend on health	Nigeria 95%	Cote D'Ivoire 88%	Rwanda 88%	Kenya 77%	Zambia 67%
Spend on mobile (ARPU/month)	Nigeria 16	Cote D'Ivoire 13	Rwanda 13	Kenya 12	Zambia 12
% of GDP spent per month on mobile	Mozambique 1.77%	Malawi 1.49%	Uganda 1.46%	Kenya 1.27%	Cote D'Ivoire 1.05%
% of GDP spent per month on mobile over 12 months	Mozambique 21%	Malawi 18%	Uganda 18%	Kenya 15%	Cote D'Ivoire 13%
Gini co-efficient	Rwanda 5.82%	Tanzania 37.58%	Malawi 39.02%	Uganda 44.30%	Mozambique 45.66%
Income share held by top 10% of the population	Tanzania 29.61%	Cote D'Ivoire 31.75%	Malawi 31.85%	Ghana 32.75%	Uganda 36.10%
% government funding on health	Malawi 73%	Zambia 60%	Ghana 56%	Mozambique 42%	Kenya 40%
% donor funding on health	Mozambique 70%	Malawi 52%	Tanzania 41%	Kenya 39%	Zambia 27%

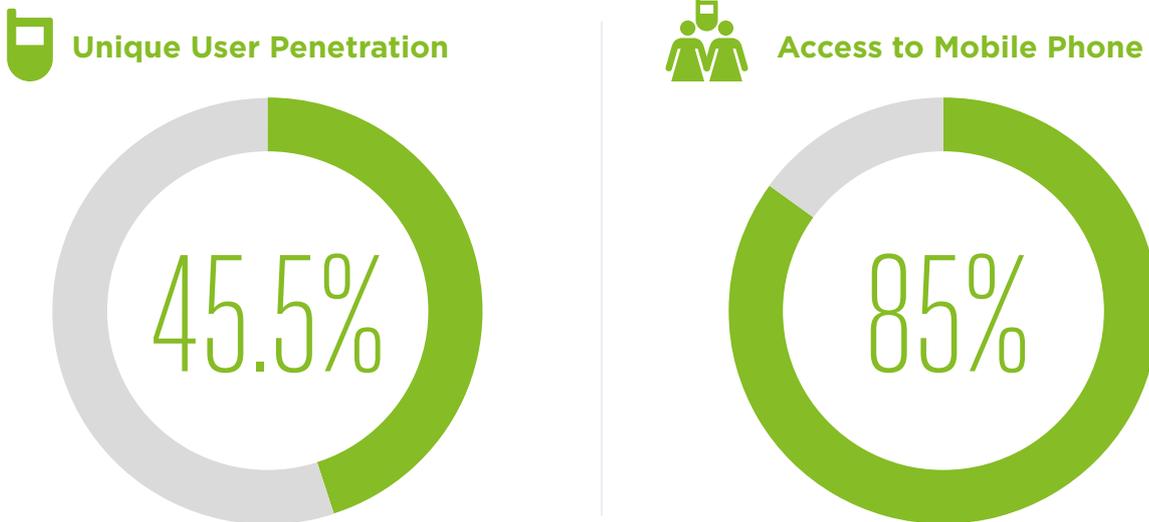
Source: WHO, World Bank, GSMA Intelligence, M4D Impact 2014

*Indicator metrics in table are in original format. Data normalised for cross indicator comparison

Phone penetration is one indication of phone usage but the incidence of phone sharing (access) in Ghana shows there is a greater market in terms of potential users of mHealth than penetration alone would indicate.

Figure 4

Mobile phone use - penetration versus access to mobile



Source: AudienceScapes National survey Ghana July 2009 N=2051 adults (15+)

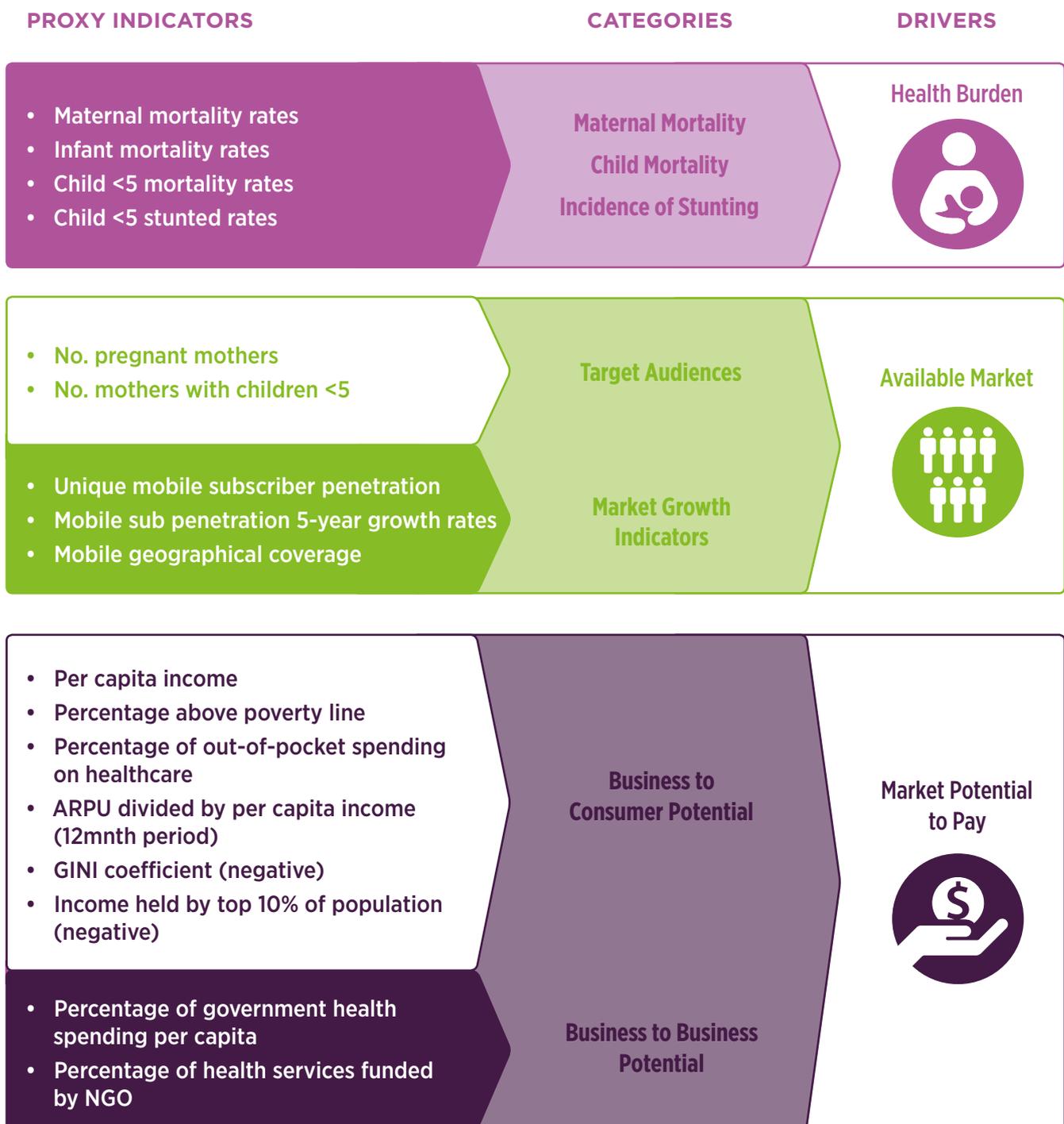
Ghana market indicators

As part of the quantitative evaluation process the 10 GSMA nutrition initiative target countries were placed in a ranked scale.

The exact methodology, justifications for metrics chosen and source material used are available separately in the GSMA mHealth Country Feasibility Report Methodology. It is highly recommended that the methodology is read in conjunction with this report.

Figure 5

Criteria considered for opportunity matrix indicator

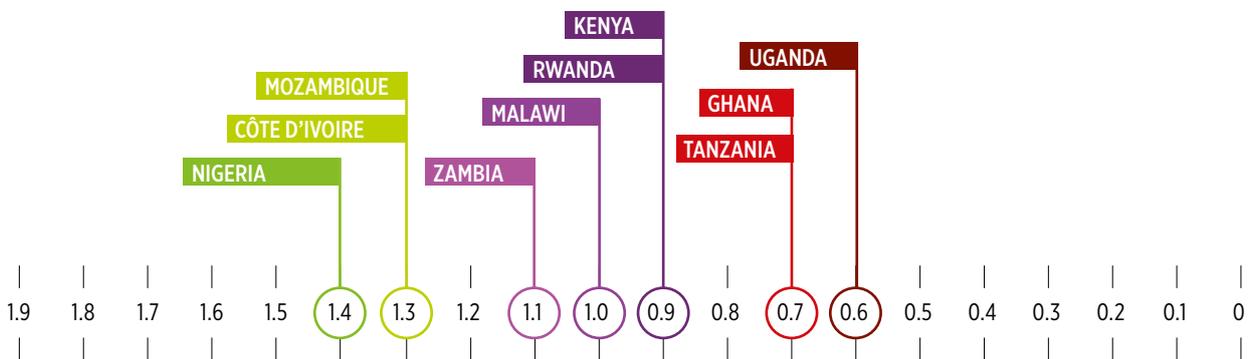


It is important to consider what proxy indicators combine into the category and output drivers when considering the opportunity matrix scale. Seemingly counterintuitive assumptions, e.g. a particular country having a higher addressable market than one might think, can be explained by considering the input metric indicators.

Figure 6 represents a comparative health opportunity in each country. 1 indicates an average opportunity, less than 1 indicates a lower opportunity for the particular indicator considered. For example the indicator considered in figure 6 is overall health burden. Ghana's comparative index of 0.7 indicates a lower health burden compared to other priority countries. Interestingly in Ghana, there is an average incidence of infant and child mortality (just outside the top five at #6) relative to the other nutrition initiative countries. This feature is unusual when compared with maternal mortality and stunting which are the third lowest and lowest overall respectively on the 10 country point scale. Normally when these indicators are low child mortality is correspondingly low. This variance highlights the opportunity to target maternal health and nutrition.



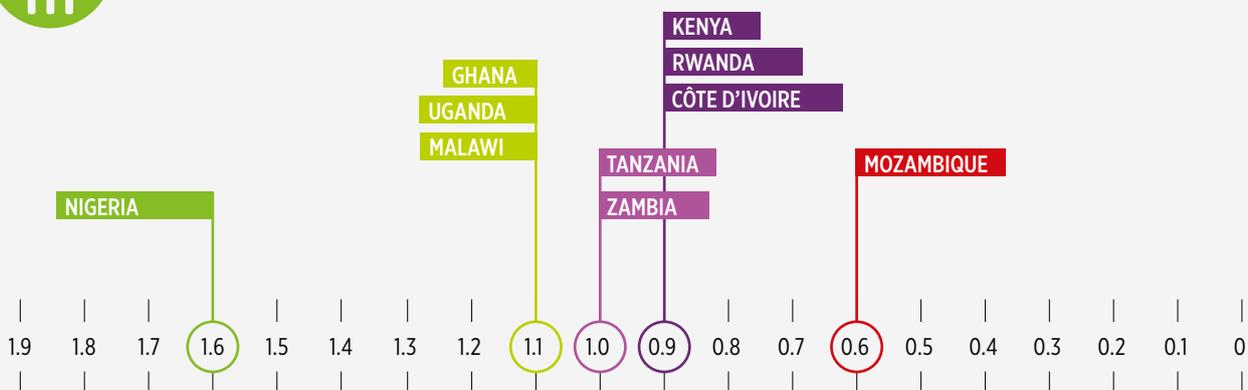
Figure 6
Ghana health burden opportunity matrix



The addressable market in Ghana exhibits strong market feasibility characteristics (figure 7), being over the index for the ideal market conditions indicator (1.1). This is primarily due to strong mobile features including the highest unique mobile subscriber penetration rate and the third highest for combined mobile user features (historical growth rate, cell-tower coverage and overall penetration).



Figure 7
Ghana addressable market opportunity matrix

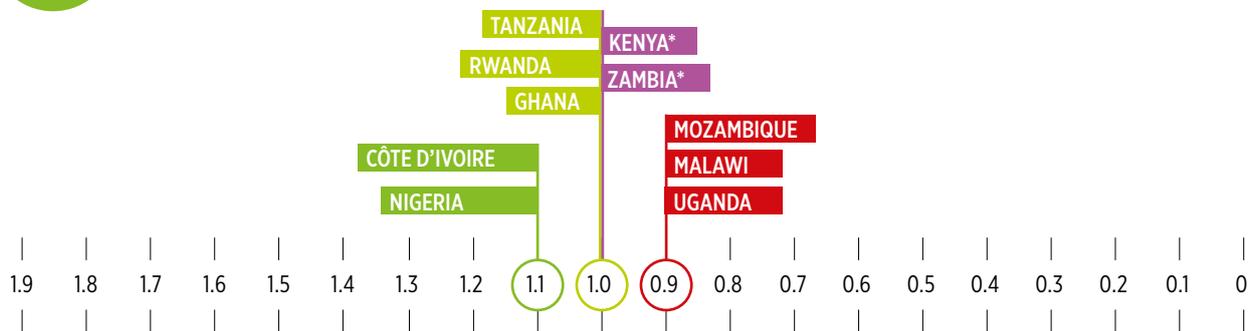


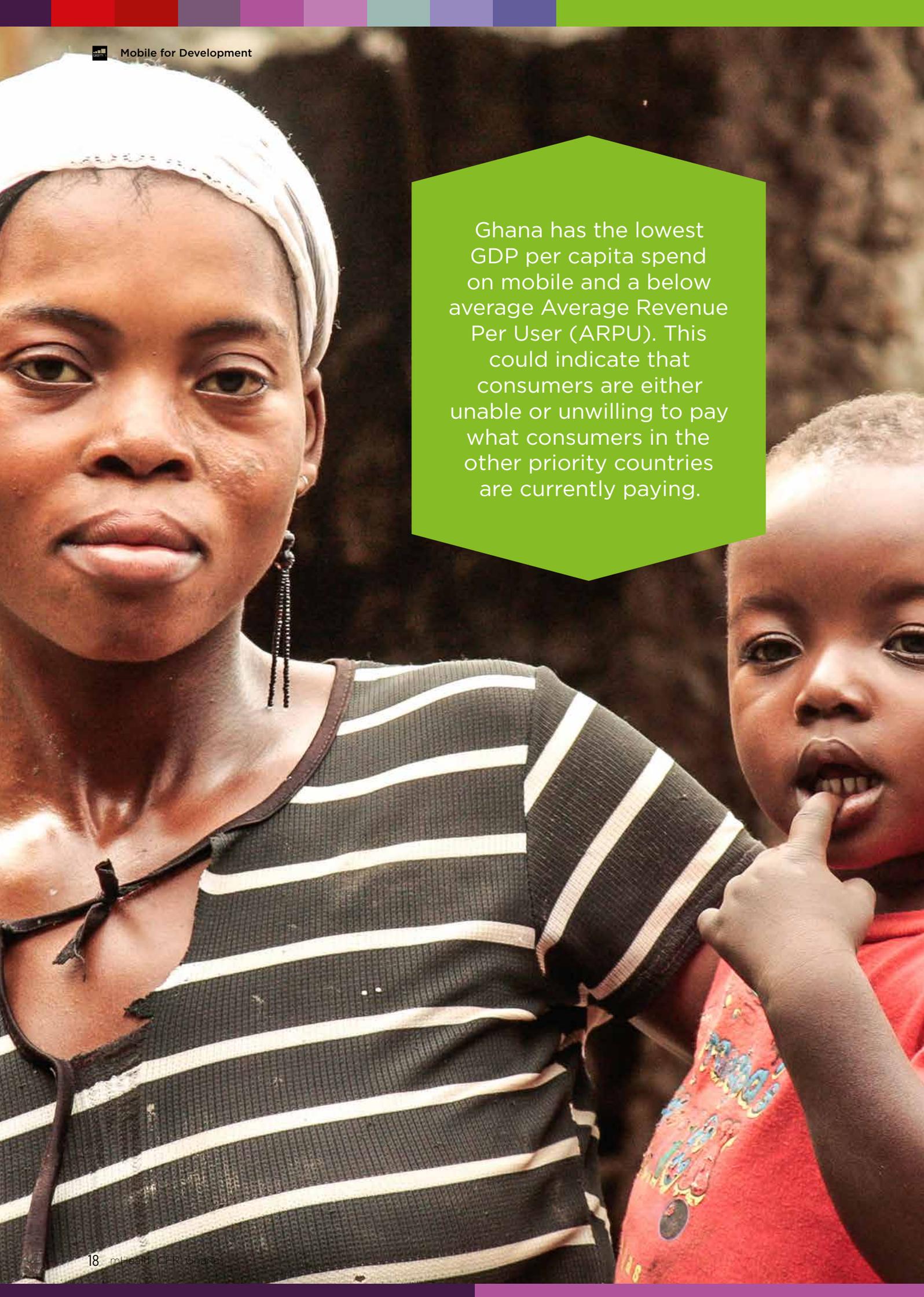
The Ghanaian market opportunity related to ability to pay for mobile health services is characterised by a number of features pertinent to the B2C and B2B segment opportunity indicators.

Overall the country occupies an index of 1, representing a good feasibility for payment capability of mHealth users within the B2B and B2C sectors. Conscious of the fact that the burden of out-of-pocket (OoP) expenditure on the patient should be reduced, it does provide a proxy for the willingness of those patients to seek out medical care independent of the public health system. This willingness should drive the adoption and active use of mHealth services (while aiming to reduce the OoP burden at all times).



Figure 8
Ghana ability to pay opportunity matrix





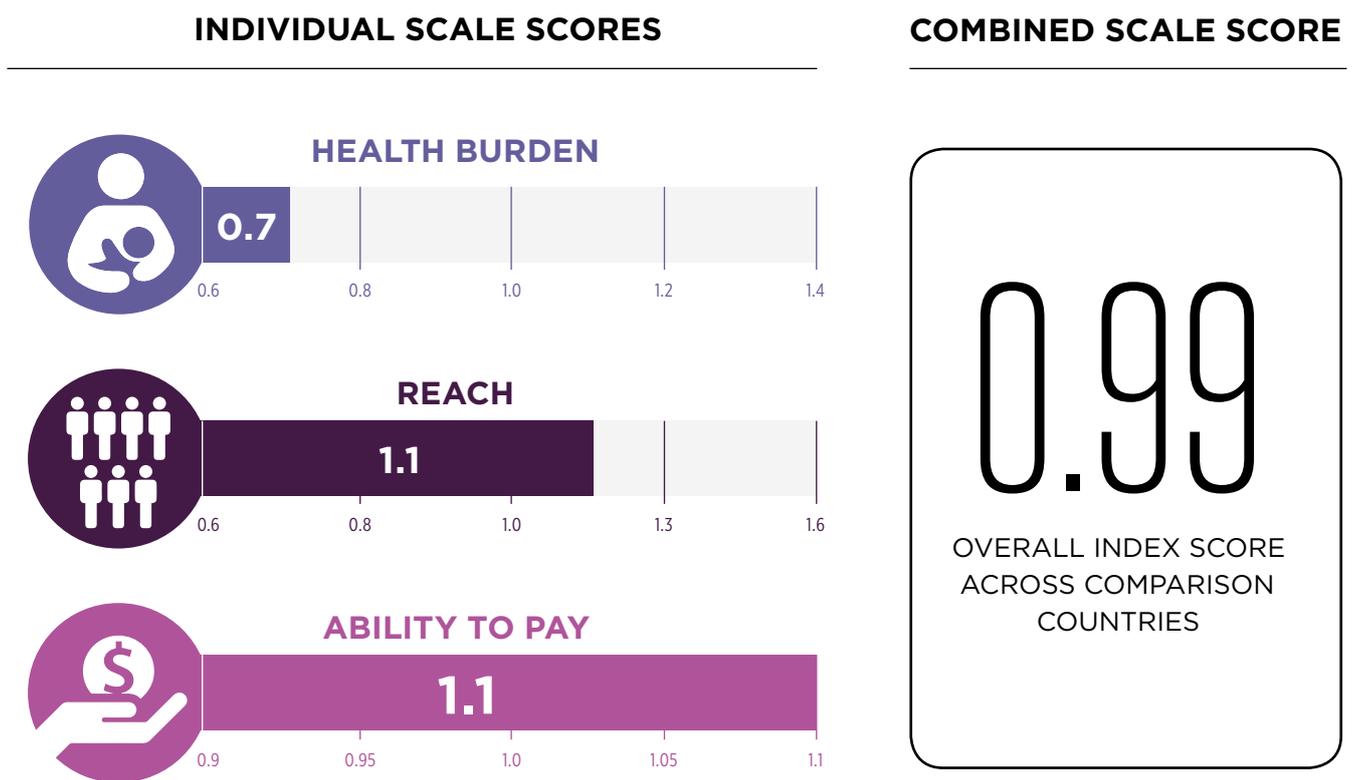
Ghana has the lowest GDP per capita spend on mobile and a below average Average Revenue Per User (ARPU). This could indicate that consumers are either unable or unwilling to pay what consumers in the other priority countries are currently paying.

Ghana has the lowest GDP per capita spend on mobile and a below average Average Revenue Per User (ARPU). This could indicate that consumers are either unable or unwilling to pay what consumers in the other priority countries are currently paying. Despite this, wealth distribution indicators are good (fourth position amongst mHealth nutrition countries) meaning there is potential long term consumer market segment.

B2B shows a strong indication, due to the high percentage of government spend on health (#3), which, when combined with the government’s strong impetus toward the development of advanced health solutions that leverage ICT, further enhances the opportunity to service this segment through mHealth.

When the aggregate mHealth driver indicators are considered as a combined output (Figure 9 below) the opportunity index score for Ghana shows a good potential which is well within positive index score indicators.

Figure 9
Ghana opportunity to scale mHealth services*



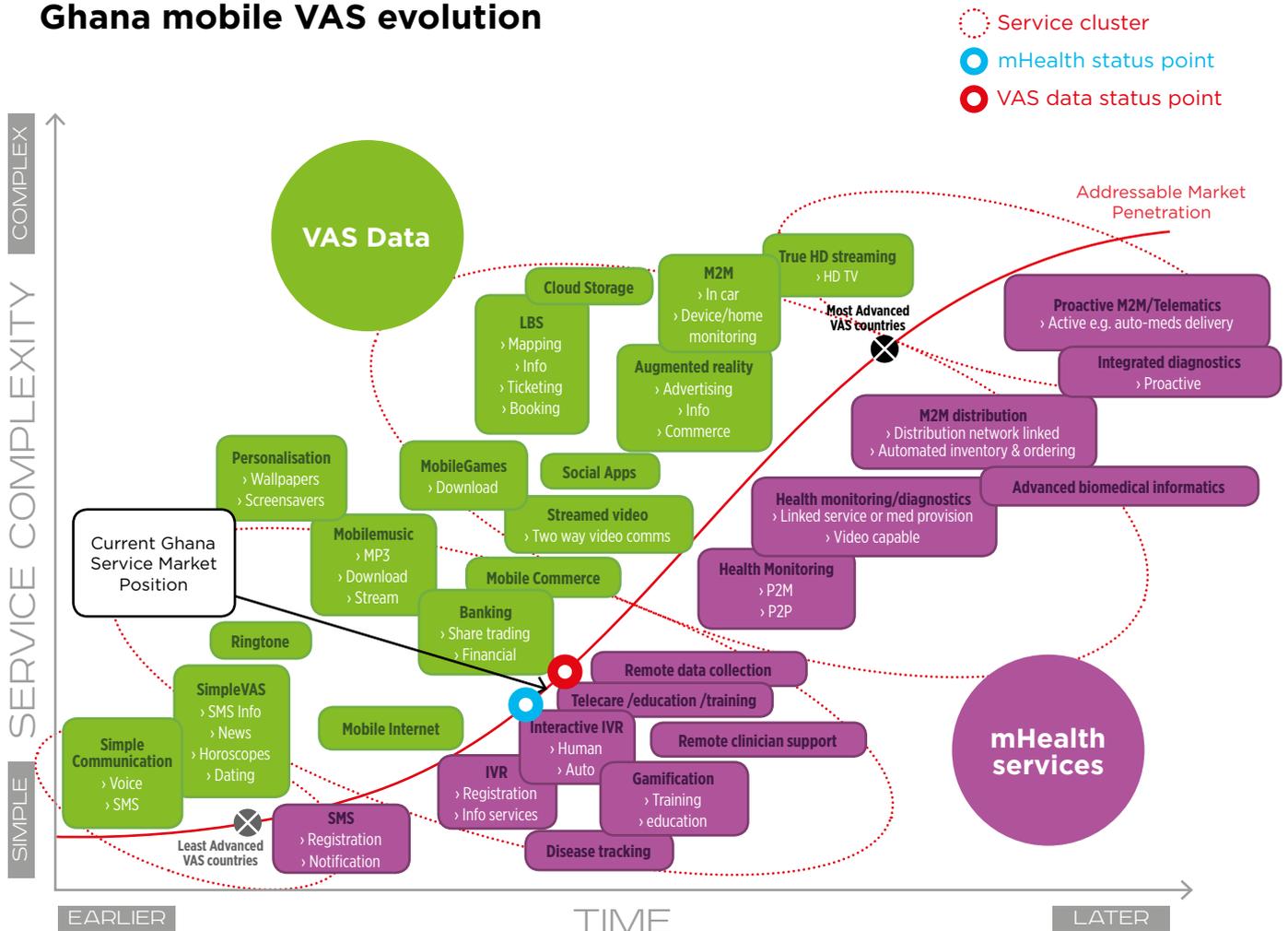
* Please see GSMA methodological framework for additional clarification on quantitative scoring
 Source: GSMA

Mobile service development

The dotted service clusters in Figure 10 denote 4 evolutionary points within the Value Added Service (VAS) and mHealth service environments. The evolution of mHealth services corresponds with the VAS evolution points as depicted below.

Ghana's VAS and mHealth service development are shown with a blue and red indicator circle. The distance between most developed service markets and least developed service markets denotes overall maturity. The position of Ghana on this maturity scale was evaluated by considering overall market maturity. Data considered a number of usage metrics including total number of VAS and mHealth services offered, complex versus simple service ratio, data ARPU and data ARPU increase over defined periods. This process was replicated across all of the 10 country feasibility report countries in order to generate a scale of service maturity.

Figure 10
Ghana mobile VAS evolution



Source: GSMA M4D mHealth

The data services market in Ghana is reasonably developed. VAS data revenue in Ghana has increased by over 210% (Q2 2013 vs Q2 2014), CAGR of ARPU has increased 31% by data connection (Q2 vs Q4 2014), and there is a parallel 70% decrease in SMS ARPU per connection, over the same period.

mHealth services on the other hand are currently reaching an estimated 628,000 people (Q3 2014). 60% of services are being delivered via SMS and the comparative use of basic versus smartphone devices to access these services is 45% vs 29%.

For comparison a country such as the USA would be further up the scale toward most advanced VAS, based on a number of

advanced mHealth service functionalities and offerings: scripting, machine-to-machine, reimbursement and decision support.

While the spend on mobile relative to available income is lower than the comparison countries, overall level of spend is within the normative range, at USD\$10 per month.

Qualitative feedback from stakeholder interviews shows that mobile operators in Ghana have historically targeted their commercial mHealth services at core VAS segments. These were identified as young digital adopters predominately found in urban areas. The motivation for mHealth resides in both urban and particularly rural regions based on access to infrastructure.



Realising the potential of mHealth requires a critical consideration of how to reduce the cost, access and quality burdens of customers (as a user and potential buyer of health VAS) and health providers (governments, NGOs, civil society and others).

Increasing the level of access and adoption of mHealth services amongst underserved population groups requires subsidisation on behalf of both mobile and health stakeholders. This subsidisation requires robust multi-sectoral partnerships that demonstrate strong value creation. As mentioned previously, scale and sustainability of these services can only happen if the core value drivers for both public health and mobile industry are clearly demonstrated.

More work is needed in Ghana to demonstrate this at scale across a multi-sectoral partnership that paves the way for future integration into the health system.

In Ghana there is motivation for this strategy, as the government drives to tackle the urban-rural and north-south inequality gaps present in the country. This is the central tenet of its evolving eHealth policy.

Pricing mHealth services

Feedback from in-country interviews has indicated that mHealth services were considered a viable opportunity in Ghana. The consensus was that as services become established consumers will actively seek out services providing information and advice, driving demand and subsequently creating service diversification. However, the potential revenue model supporting such services has experienced some early setbacks. Testing of services identified that users were open to use mHealth but expected services to be free. Multiple respondents highlighted this issue independently.

This is not an insurmountable challenge in Ghana. Many mobile services have launched as free with premium add-ons encouraging customers to purchase aspects of the service as use increases. This model relies on the service becoming a critical element of a service plan for a customer rather than a nice-to-have feature. The importance of health should motivate and accelerate this process.

Features of the Ghana VAS ecosystem

Feedback from VAS players in Ghana identified a revenue share that largely favours operators, although there is scope for negotiation dependent on the relationship with and the size of the VAS player and the potential coverage areas.

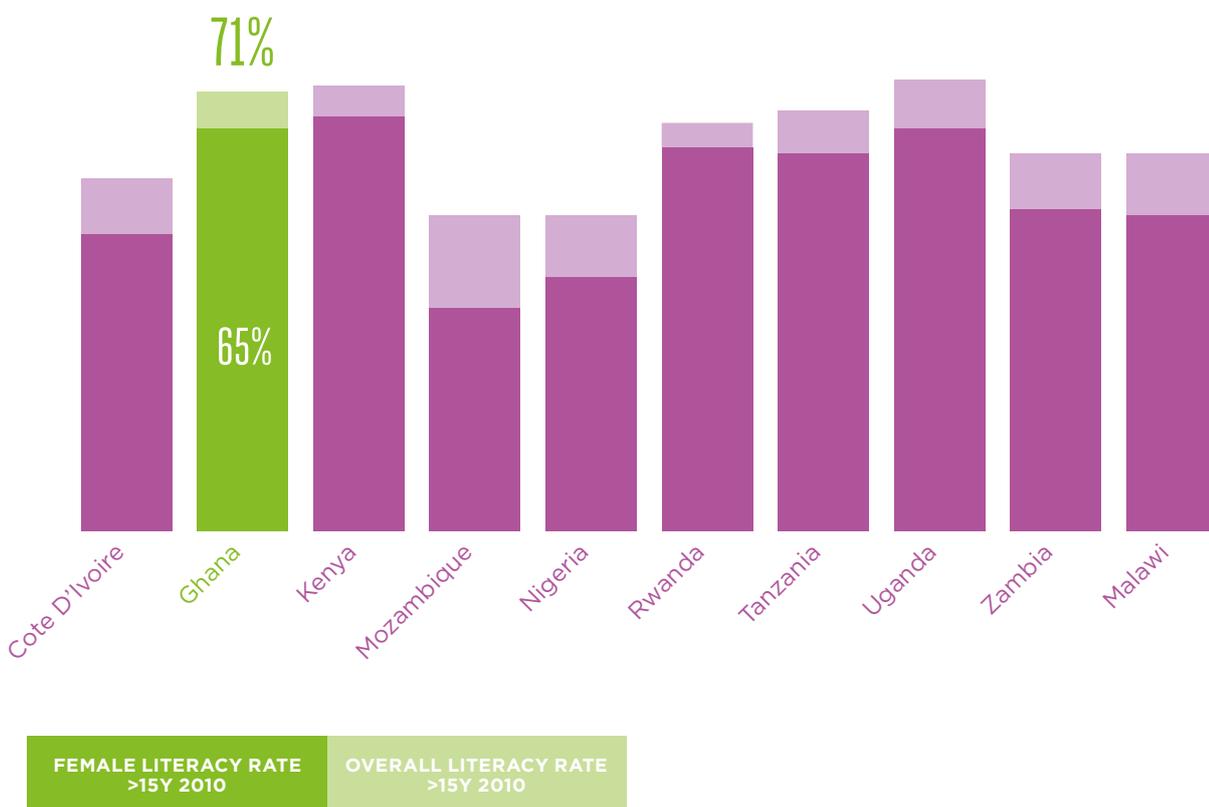
Response to the GSMA in-country surveys stated that on average the take-up of new services was around 1% of user base. It was posited that mHealth services would see a slightly lower take-up based on the comparable experience when mobile money was launched. Mobile money initiatives in Ghana faced an uphill struggle due to a lack of understanding around the service. This was a particular problem with low income segments, despite a concerted effort to educate end-users. The complexity of explaining mHealth, it has been argued, could be even greater.

One of the simplest mHealth services to provision is SMS delivered information. Such services can be launched relatively quickly through existing infrastructure, are relatively inexpensive to launch comparative with data VAS, have a low infrastructure demand and are simple for customers to use.

In Ghana messaging equates to 32.8% of non-voice revenues (Q2 2014). Over 60% of mHealth services tracked by GSMA use SMS as an access channel. In their current format the vast majority of these SMS maternal messaging services are not sustainable and should consider a number of best practices from the VAS industry: high literacy rates and access to mobile devices suggests an opportunity for bundling of content; freemium vs premium offerings; inclusion of surveys and campaigns which can subsidise operational costs; and inclusion of a transacting component - voucher/coupon or other.

Figure 11

Total literacy and female literacy rates



While literacy rates are high, mobile operators in Ghana have highlighted the problem of reaching mass markets and particularly those in rural areas where literacy is considerably lower.

Mobile and VAS sector alignment to mHealth

The mobile and VAS sector within Ghana is highly competitive and benefits from a number of large players and no single dominating player (defined as a market share above 60%).

Mobile operators interviewed for this report identified Vodafone as one of the major movers in the mHealth space in Ghana gaining good traction with advice based services including Healthline and Health Call Centre. Tigo was also mentioned as notable in regard to innovative health insurance tie-ins.

The market opportunity in Ghana has been defined but a full picture of the market is incomplete without considering a selection of the value chain players who facilitate the mHealth process from a service perspective.

Mobile operators

A number of the mobile operators interviewed highlighted the challenges in commercial mobile propositions in Ghana in terms of stand-alone revenue generation. Their solution was to integrate health offerings into their CSR activities using mHealth as a mechanism to drive penetration. Latterly, the strategy will be to migrate mHealth users from basic service propositions to more advanced premium channels.

The general attitude from mobile operators in relation to mHealth is cautious confidence. They were quick to highlight obstacles, including geographic spread and literacy issues as well as the lack of appetite for mHealth. They are generally positive towards mHealth in the future. NGOs were identified as the main drivers of mHealth, in particular USAID, along with some of the larger mobile operator multinationals.

Mobile operators are broadly accepting of the view that consortium-led approaches will prove the most successful in the short to mid-term. Latterly, and as the market develops, market diversification comes into play allowing mobile operators to begin to differentiate on service offering, pricing and/or service-mix.

Registration, secured data interchange, privacy and the role of mobile

One of the challenges facing the Ghanaian health sector is the need for data service user registration, data interchange and secured patient health data. Mobile operators and their technical service partners are in a strong position to facilitate this process offering mobile as a platform ready-made for the interoperable exchange of data, that can be provided instantly, securely and across a wide-area networked community.

There is also an opportunity to utilise the NHIS and mobile as a mechanism to accelerate this registration process. In Ghana's larger hospitals terminals are available at almost all service delivery points but they are not

networked and data is not interoperable and so cannot be aggregated. When these facilities are used in the future they will need to be checked against the NHIS but this capability is not in place yet. Using mobile at this point would provide a solution by exploiting the networking and connectivity of mobile devices to push pooled data into a cloud or data-centre based server allowing registration while fulfilling the requirements of the NHIS and the government's registration mandate. In addition there is a higher penetration of mobile devices than computers in Ghana, allowing facilities other than large hospitals to act as registration gathering depositories.

Mobile as a knowledge multiplier

Improving primary care is a requirement of the Ghana eHealth policy and is envisaged to be facilitated by the deployment of training to primary care providers.

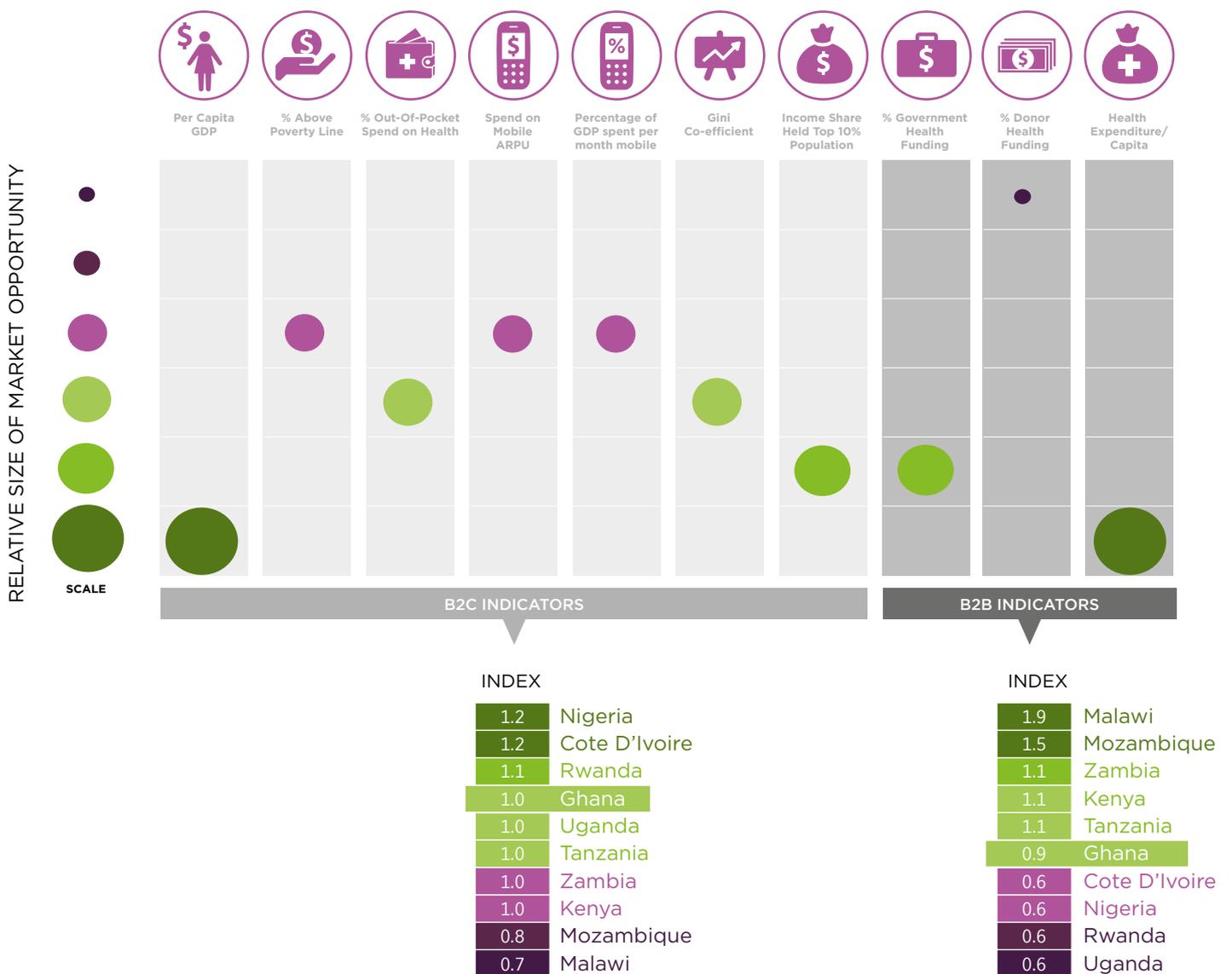
The challenges in this area are centred around the need to develop expertise in ICT-enabled health that can then be disseminated to a wider audience.

Mobile provides the ideal solution. Information can be shared across regions without the need to be facility-based, while a two-way mobile device means that data can be pushed and pulled, which is more conducive to education (question and answer). More complex devices have multimedia capabilities that have the potential to enrich approaches to education (video, visuals, immersive multi-media, augmented reality, gamification etc.).

The B2B vs B2C sectors

The mHealth opportunity in Ghana is made up of both a B2C and a B2B opportunity. Figure 12 takes a deeper look into the feasibility metrics considered for these particular user segments.

Figure 12
Relative B2B and B2C Indicators



Source: WHO/World Bank/GSMA extracted data

Figure 12 illustrates the relative data point indicators for the B2C and B2B market opportunity in Ghana, denoted by the size of the circle. The larger the circle the greater the opportunity for that particular indicator compared with the other indicators shown. The aggregated B2C and B2B opportunities for Ghana, relative to the other nutrition initiative target countries, are indicated by the index score beneath the main chart.

Ghana is well positioned within the positive index scoring zone for both B2C and B2B indicators, showing a slight predilection toward B2C business indicators.

At this point it is assumed that mHealth will not be fully opened to market forces, with the government guiding overall strategy. There is a strong impetus within government to improve healthcare delivery through robust multi-sectoral partnerships, similar to those being advocated through the Scaling Up Nutrition (SUN) Business Network. Qualitative feedback, from stakeholder interviews, strongly support this claim.

The data shown is a single set of reference points and provides a normalised and averaged view of the market. Additional insight would be attained using other qualitative indicators pertinent to specific audiences of this data e.g. a mobile operator vs an NGO. Such user-specific cross-referencing cannot be undertaken here but is encouraged to better focus market entry and market development strategy.

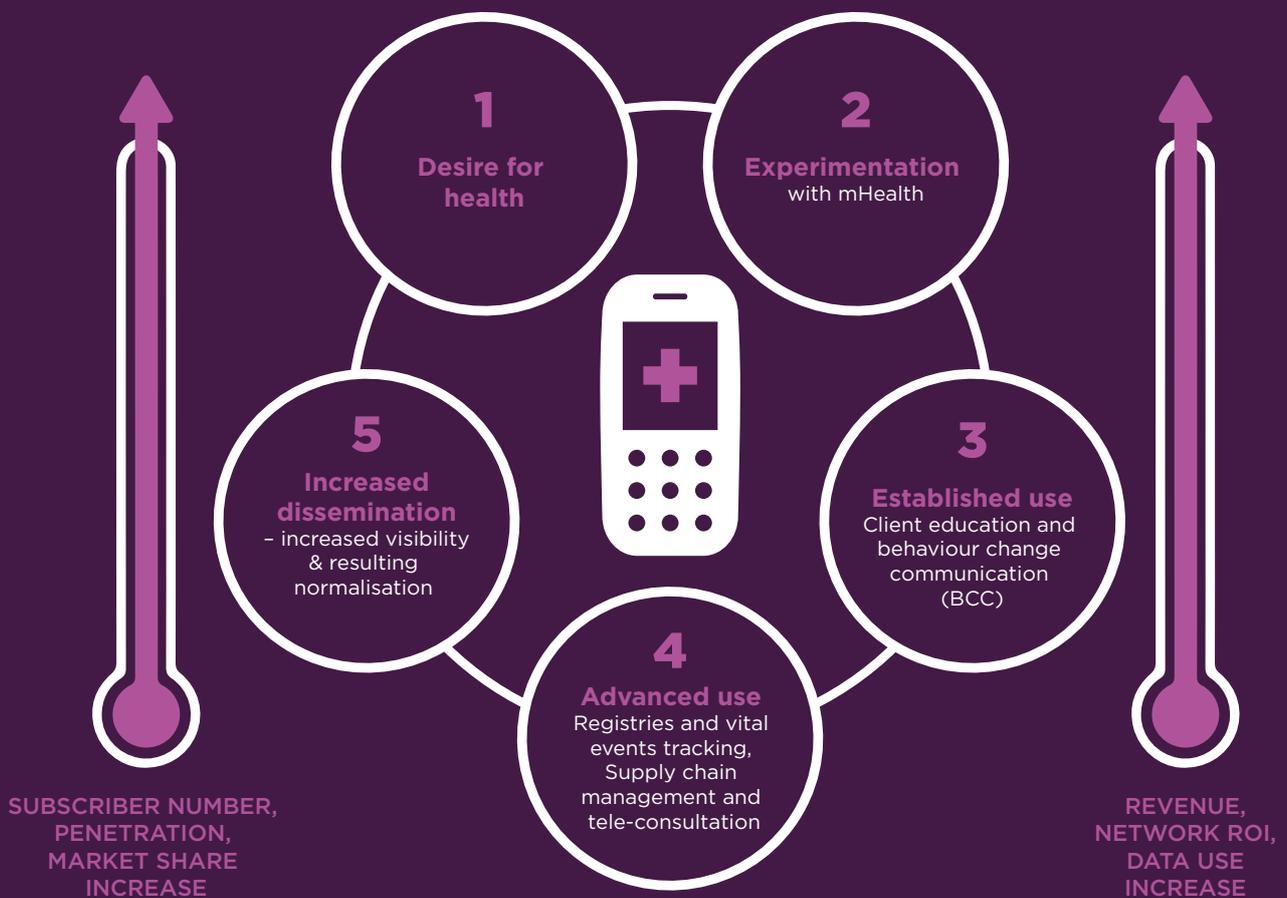
Mobile market view

The mHealth opportunity has two distinct pathways. On the one side it provides a valuable mechanism to grow operator subscriber numbers, market share and overall penetration. On the other it is a strong driver for take-up of data VAS services, with the proposition built around providing and gathering health information (push and pull) and health monitoring (tracking disease and health indicators). There is a strong inbuilt impetus to consume services that can improve or ensure health. These features create the potential for mHealth services to become self-perpetuating. Mobile operators providing mHealth services have the opportunity to occupy a position within markets without established health infrastructure that positions them as the preferred health service providers and in this way they become normalised (ie. are identified as the go-to option for such services). In such a position mobile operators can create a sustainable service offering.

Figure 13

mHealth normalisation process and the impact on mobile operators

mHealth Service Use Feedback Loop



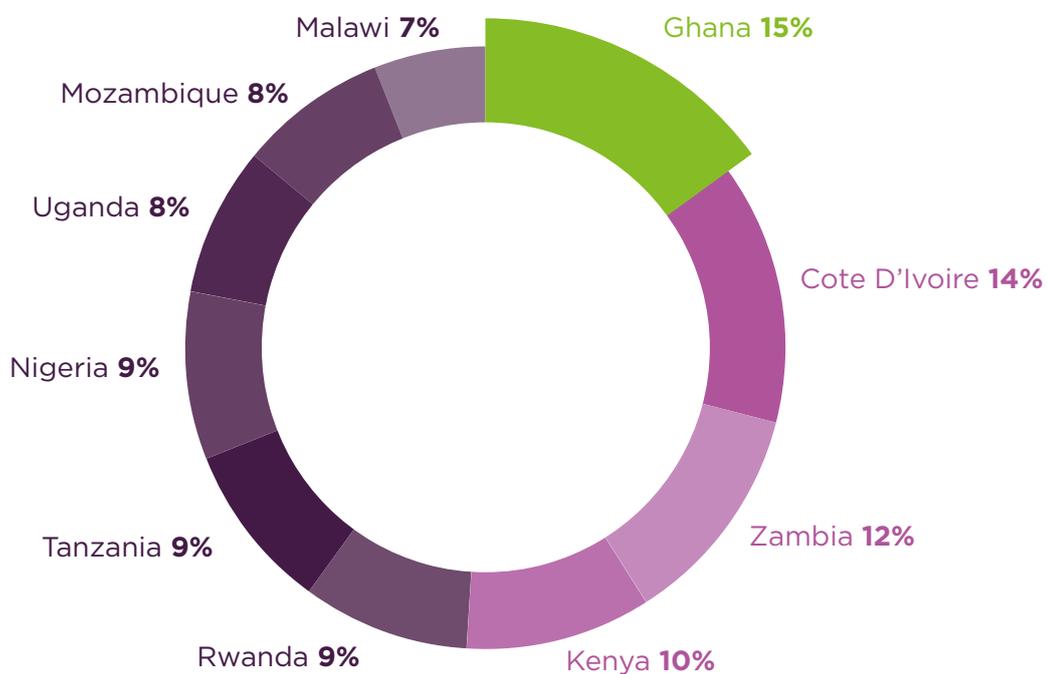
Source: WHO/World Bank/GSMA extracted data

The Ghanaian mobile market – market specifics

Ghana has an average ARPU spend of \$10, placing it slightly below the median of the 10 GSMA nutrition initiative countries. When compared with overall GDP per capita and percentage spent on mobile this figure falls considerably placing Ghana as the lowest in the scale with 7% of GDP per capita spent over a 12 month period. This falls to 5% when converted to a scale and compared with the other nutrition initiative countries.

Figure 14

Comparative mobile penetration rates of GSMA nutrition initiative countries - Ghana extracted



Source: GSMA

Running counter to the low ARPU relative to GDP is Ghana's unique mobile subscriber penetration rate which at 50% is the highest of the nutrition initiative countries.

In Figure 14 the penetration rates of the 10 countries are converted to a percentage scale and compared. The juxtaposition between low relative ARPU and a high unique mobile subscriber penetration rate in Ghana provides a strong opportunity for mHealth to grow revenues within the mobile operator sector, particularly if consumers can be educated on the benefits of mHealth.

In Ghana some of the most successful innovations launching new service-types have involved bundling of services. Tigo's Family Care product took micro-insurance, healthcare and mobile contract services to create a successful product that reduced churn, increased stickiness and ultimately became a stand-alone service in its own right (of the 500,000 initial free users approximately 80% have become paying customers). Family Care's bundled innovation was to link the level of free insurance cover provided to the amount of airtime used. This is one way to overcome the challenges of reaching the discerning Ghanaian consumer.

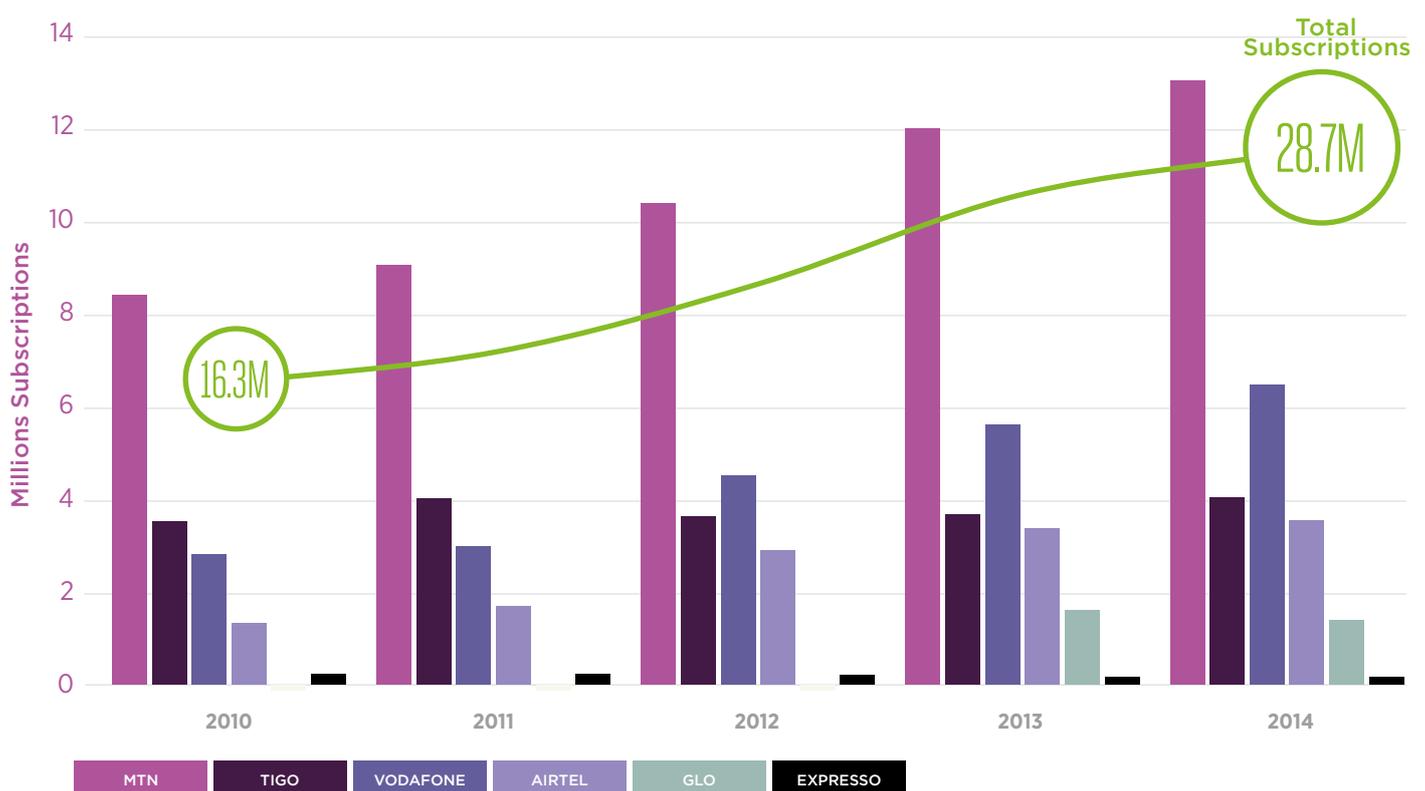
Like other African markets Ghana exhibits the legacy of Nokia handset dominance with a strong prevalence for Series 40 devices. As the series 40 platform is superseded, Android is beginning to occupy the market dominant position. Android provides a similar use characteristic on devices it runs over and importantly is affordable. A number of South East Asian manufacturers provide discount devices to the market. There is also a good choice and diversity in handset design types (covering different handset user segments).

General mobile market indicators

Mobile market indicators in Ghana demonstrate robust year-on-year growth in aggregated subscriptions as reported by the Ghanaian National Communication Authority. Growth over the period reached 76% with a CAGR of 15% between 2010 and 2014.

Figure 15

Total mobile subscriptions and operator subscriptions Q1 2010 to Q1 2014

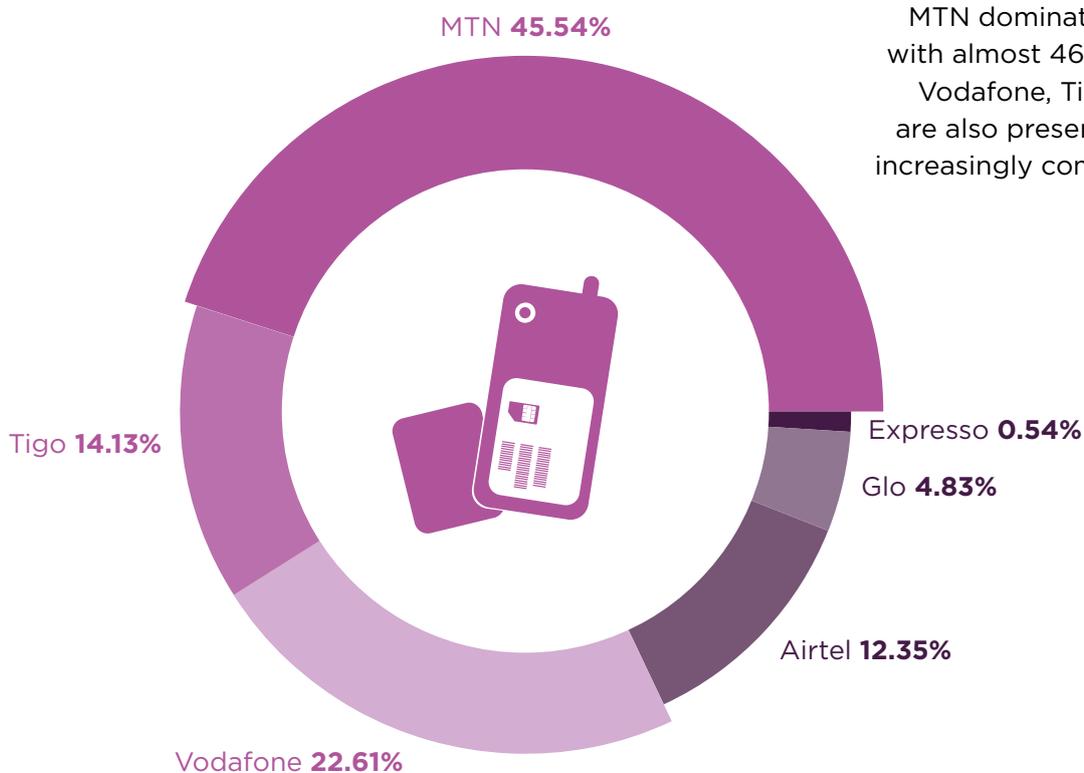


Source: Ghanaian National Communication Authority

As a growing market Ghana exhibits a high churn rate averaging 4.5% per month which is higher than the African average of 2-3%. Churn in other developed markets has resulted in increased competition and service innovation designed to reduce churn. mHealth service provision in Ghana has a strong motivation as a mechanism to dissuade churn by improving the stickiness factor of services offered.

Figure 16

Mobile operator market share



MTN dominates the market with almost 46% market share. Vodafone, Tigo and Airtel are also present in what is an increasingly competitive market.

Source: Ghanaian National Communication Authority Q1 2014.



Mapping mHealth service penetration and reach in Ghana

As part of the qualitative review of Ghana's feasibility as an mHealth target country, service mapping was undertaken with a mix of survey, interview and desk research. The following sections highlight some of the insights from this activity.

Aligning Ghana's mHealth initiatives to desired health outcomes

Key Insights

- Both B2B and B2C mHealth initiatives have been launched and trialled in Ghana. Currently there is no clear primary evidence to support the sustainability of one approach over another.
- Around 35% of the mHealth services in Ghana have partnerships between 3 or more different stakeholder groups with players in this cadre providing a greater diversity of service offerings.
- mHealth services in Ghana that have extensive partnership networks have proven to be successful for a number of reasons:
 - **Richness of offering.** Creating a more diverse and complete service provision
 - **Increased viability.** The average age of deployed services launched by partnering groups was 4.5 years compared with two years for those without such relationships
 - **Greater geographic coverage.** Across all mHealth services, 9 have managed to achieve regional deployment. The majority of these are partnership led
 - **Penetration.** Partnered groups in Ghana show an average 33% annual growth in the number of beneficiaries reached by their mHealth services
 - **Strong alignment with health infrastructure.** Approximately 80% of partnered mHealth services providers have a close working relationship with MoH/GHS while 40% have managed to secure partnerships across 4 leading mobile operators in Ghana

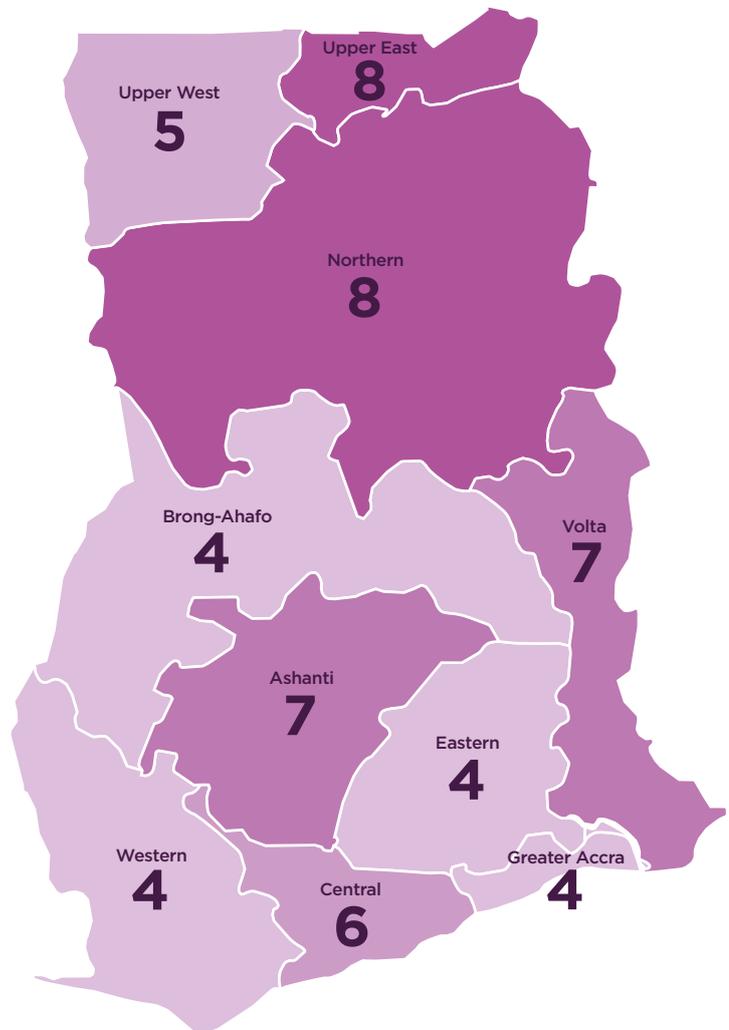
Overall mHealth coverage in Ghana

The GSMA mHealth Tracker is currently tracking 31 live mHealth services deployed in partnership with over 46 different organizations representing multiple stakeholder groups in Ghana. Just over 10% of total districts have an mHealth project deployment.



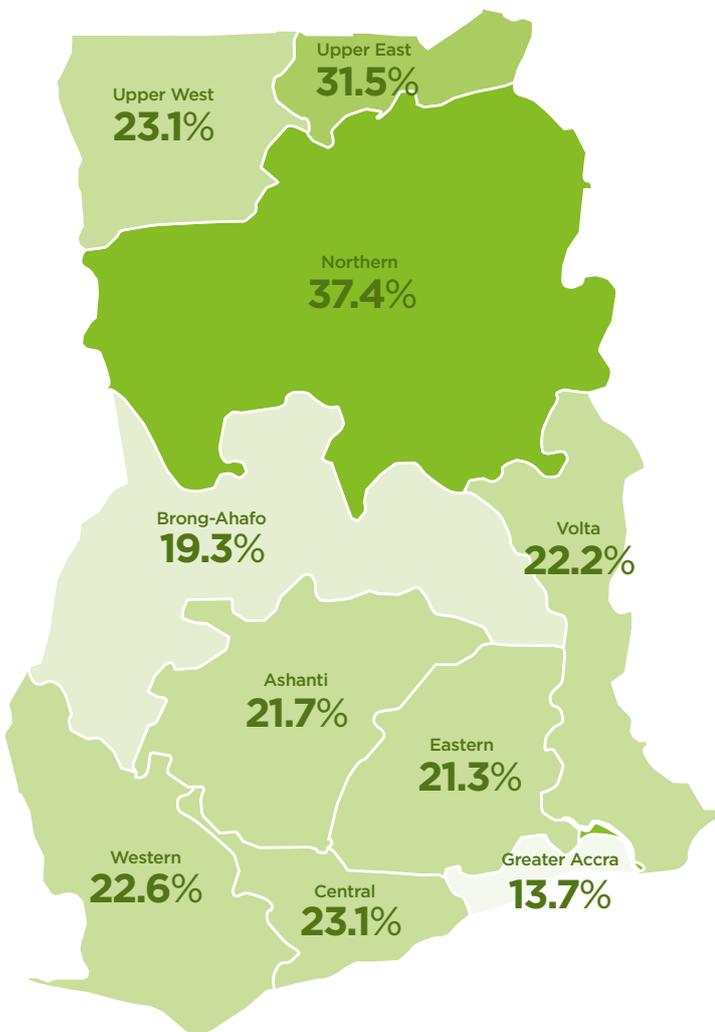
There are at least four mHealth projects in each region with the most serviced regions having upwards of eight different mHealth services.

Figure 17
mHealth services: regional distribution



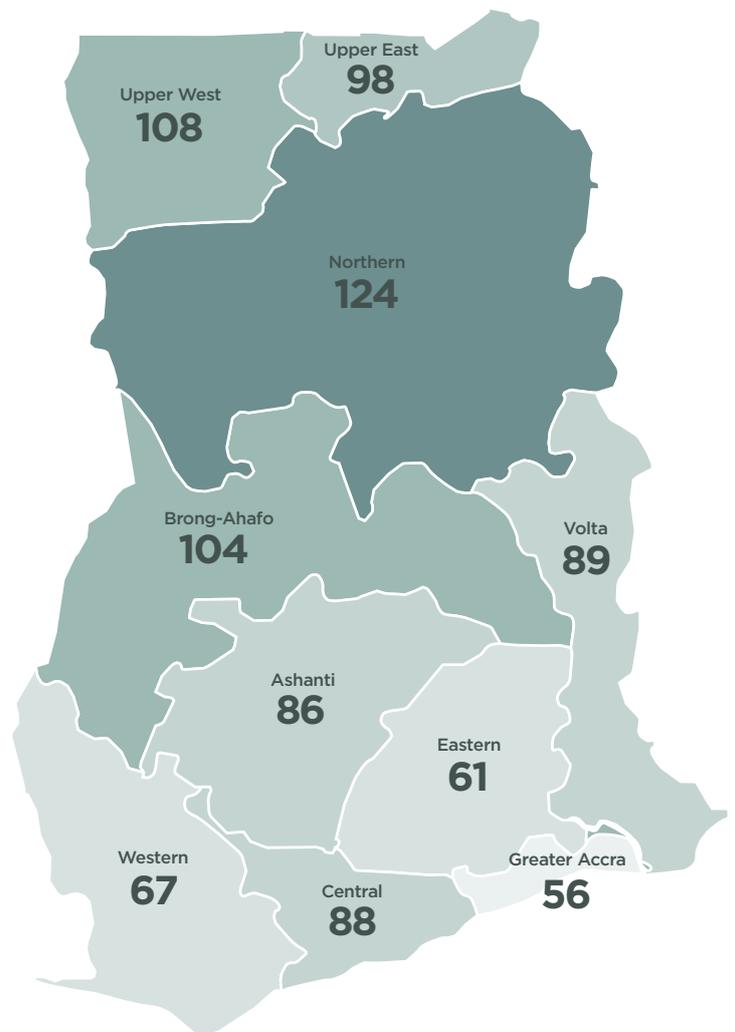
Source: GSMA mHealth Tracker

Figure 18
Stunting in children under 5:
regional distribution (height
for ages - % below -2 SD)



Source: Multiple Indicator Survey, MICS, 2011

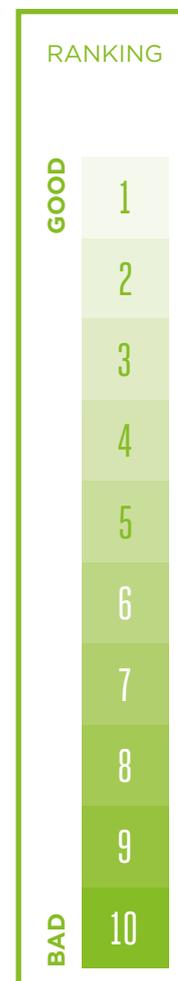
Figure 19
Child mortality rates per 1000
births: regional distribution



Source: Multiple Indicator Survey, MICS, 2011

Table 01
Health burden indicators from the Northern region and the Greater Accra region

INDICATOR	Northern Region		Greater Accra Region	
	NUMBER	RANK	NUMBER	RANK
Delivery at health facility	37.1%	10	87.6%	1
Delivery assisted by skilled provider	37.3%	10	89.7%	1
No post natal check-up	58.4%	6	57.1%	5
Under-5 mortality (per 1000 births)	124	10	56	1
Stunting in children (% below -2 SD1)	37.4%	10	13.7%	1
Nurse to patient ratio	1,367	10	874	4
Malaria (% of children age 6 - 59 months)	48.3%	9	4.1%	1
Number of mHealth service deployments	8		4	

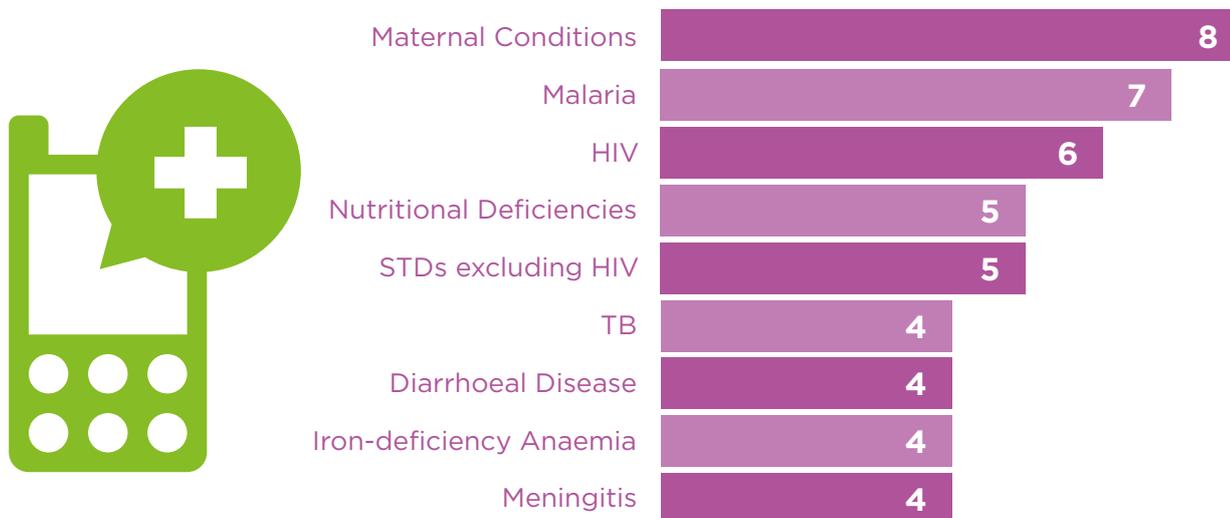


Source: GSMA. Data from Multiple Indicator Survey, MICS, 2011; The Health Sector in Ghana, Facts and Figures, GHS, 2010

Table 01 compares various health burden indicators from the Northern region and the Greater Accra region. This data demonstrates a greater overall health burden in the Northern region. Relative to the other GSMA nutrition initiative countries, Ghana has a good distribution of mHealth services to underserved regions with high health burdens. 8 services are deployed in the Northern region and surrounding regions whilst the Greater Accra region only has 4 mHealth services. The demand for health staff in the Northern region, shown in the data, provides a strong motivation (feasibility) for the use of mobile to extend health information and other health services to underserved communities.

Figure 20

Health conditions addressed by mHealth services



Source: Source: GSMA mHealth Tracker

In Ghana the most addressed health conditions for mHealth are related to maternal considerations (25.8%), followed by antimalarial initiatives (22.6%).

Five of the health conditions currently addressed by mHealth are amongst the top 10 causes of death in all ages in Ghana: malaria, HIV, anaemia, meningitis, diarrhoeal disease (cumulatively contributing to 32.7 % of deaths in all ages) and six of the health conditions are amongst the top 10 causes of death for children under 5: malaria, anaemia, HIV/AIDS related conditions, diarrhoeal disease, malnutrition, and meningitis (cumulatively contributing to 36.6 % of deaths for children under 5 years).

There is at least 1 mHealth service addressing all of the top health burdens/conditions, as defined by the World Health Organisation, with strong alignment to MDGs 4, 5 & 6.

Figure 21

Health interventions



Maternal health is the second most prevalent health intervention addressed by 25.8% of mHealth services. The mHealth services driving maternal interventions have reached (Q3 2014) a cumulative total of just over 107,193 beneficiaries, of which 38,693 are currently actively engaging with the services.

Figure 22



8 SERVICES ADDRESS Maternal health interventions

The mHealth services that are driving nutrition interventions for mothers (5 mHealth services) and children (4 mHealth services) have reached a cumulative amount of 102,600 beneficiaries of which 34,100 are currently actively engaging with the services.

OF THE 8 SERVICES THE FOLLOWING ARE ADDRESSED:

8 Pregnancy	6 Emergency Procedures
7 Antenatal Care	4 Labour
6 Pregnancy Complications	7 Postpartum Care
6 Pregnancy Danger Signs	5 Breast Feeding



5 SERVICES ADDRESS Infant & young child health interventions

The most addressed infant and young child interventions include vaccines / immunizations, newborn care, and growth and development, closely followed by prevention of mother to child transmission (PMTCT).

OF THE 5 SERVICES THE FOLLOWING ARE ADDRESSED:

5 Growth and Development	4 PMTCT
5 Newborn Care	1 Child Abuse
5 Vaccines/Immunisations	



6 SERVICES ADDRESS Maternal nutrition

mHealth nutrition interventions are varied in service offering in Ghana. The most addressed maternal nutrition intervention is education around improving use of locally sourced foods toward improved nutritional intake.

OF THE 6 SERVICES THE FOLLOWING ARE ADDRESSED:

- | | |
|--|---|
| 3 Improved use of locally available foods to ensure increased intake of important nutrients | 2 Food fortification with folic acid, iron, vitamin A, zinc and iodine |
| 1 Iron and folic acid supplements and deworming | 1 Vitamin A supplement in first 8 weeks after delivery |



5 SERVICES ADDRESS Infant & child nutrition

The most addressed nutrition intervention for infants and young children is education around exclusive breastfeeding.

OF THE 5 SERVICES THE FOLLOWING ARE ADDRESSED:

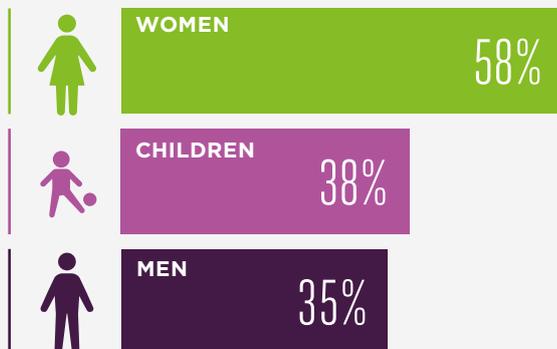
- | | |
|--|---|
| 5 Exclusive breastfeeding | 3 Timely, adequate, safe and appropriate complementary feeding |
| 2 Initiation of breastfeeding within 1 hour (including colostrum feeding) | 2 Vitamin A supplementation and deworming |
| 1 Continued breastfeeding | 1 Zinc treatment for diarrhoea |
| 1 Iodised salt consumed as table salt and/or as food-grade salt (used in food processing) | |

It should be noted with all indicators that the number of mHealth services given is not necessarily new unique mHealth services. A service which is addressing maternal nutrition may also be addressing child nutrition or any other intervention.

Quantifying users

Figure 23

Target Beneficiaries



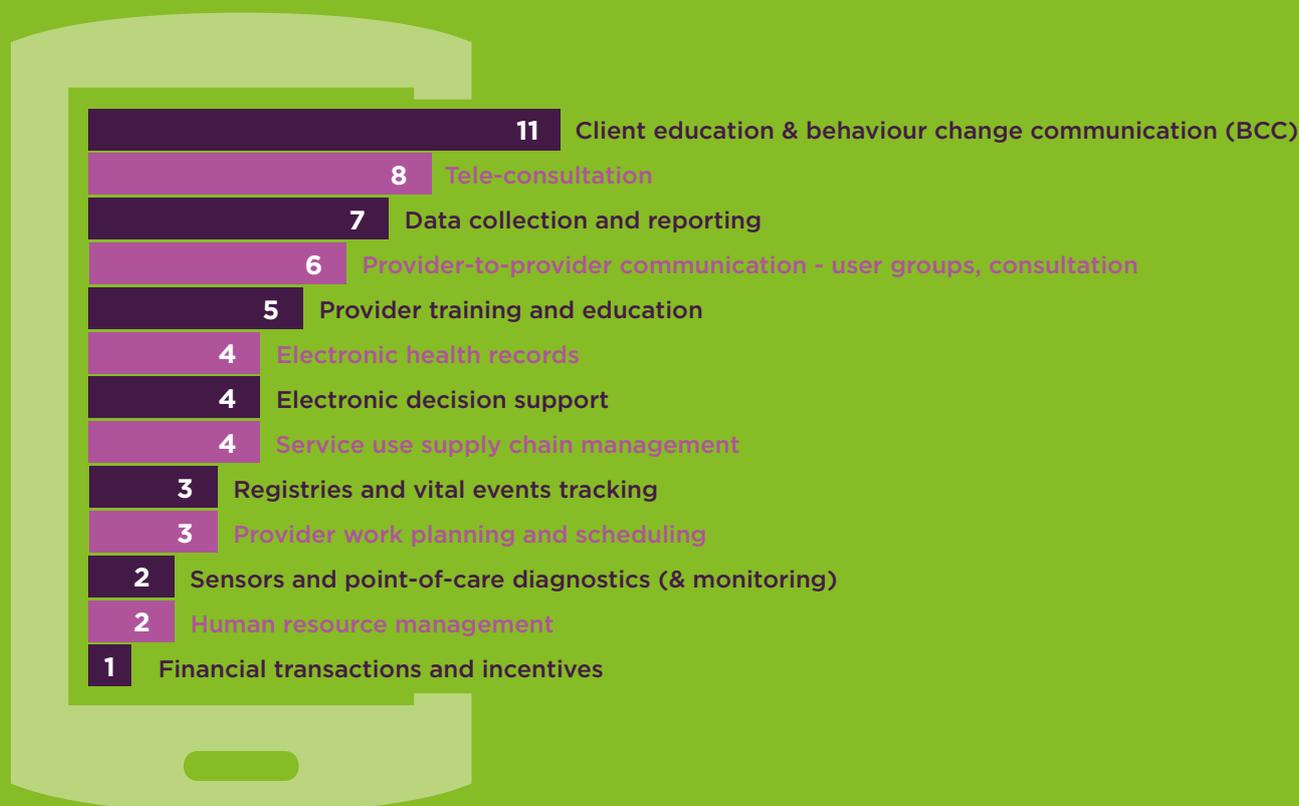
The total number of end users/beneficiaries reached in Ghana by eight mHealth services tracked by the GSMA was 628,343 (Q3 2014). The most targeted segment was women.

The number of Community Health Workers reached was 219 (reached by 3 services) and the number of facilities reached was 167 (by 4 services).

mHealth applications

- 8 out of the 13 mHealth applications are addressed by 4 or more mHealth services
- All 13 of the common mHealth applications are addressed by at least 1 mHealth service

Figure 24



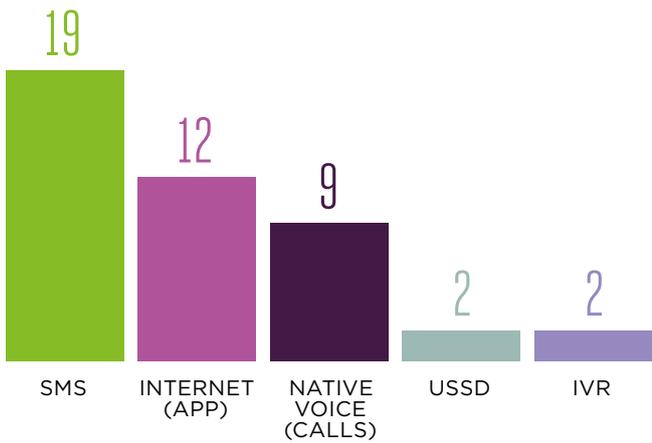
Source: GSMA mHealth Tracker

Definitions of mHealth Applications available at: Journal - Global Health: Science and Practise; mHealth innovations as health system strengthening tools: 12 common applications and a visual framework

Not included in source: Tele-consultation: provider to patient interaction - in real time or deferred - which can include, but is not limited to, remote diagnosis.

Figure 25

Channel



Over 60% of mHealth services use SMS as an access channel and 35.4% make use of the internet (3G or other) as an access channel for their application based projects. USSD and IVR usage is low, cumulatively being used across only 13% of mHealth services.

Partnerships

Despite a number of highly successful partnering initiatives the number of services that have MoH/GHS partnership is quite low at around 16%. The number of services that have a mobile operator partner stands at 29% while the number that have 3 or more different stakeholder groups (public private partnerships (PPP)) is 35.5%.

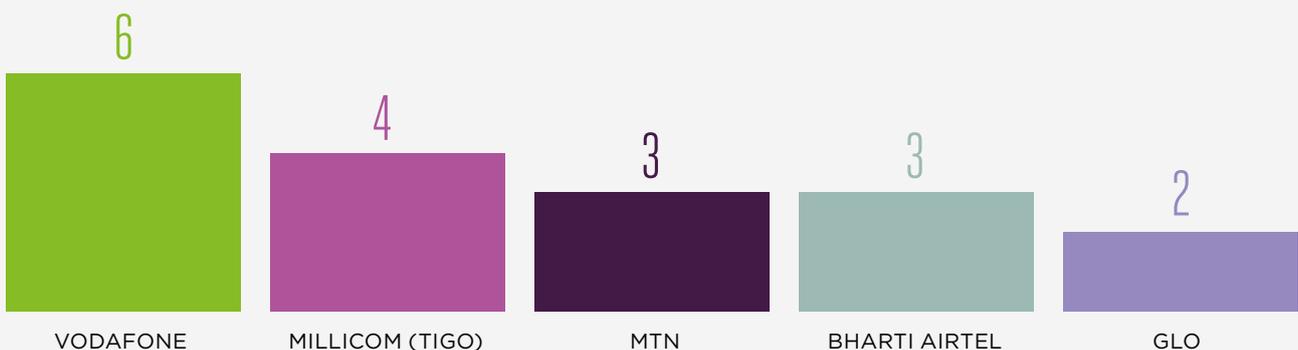
Stakeholder groups include: government, academic institutions, technology companies, aggregators, mobile operators, donors, investors and NGOs.

Operator involvement

According to service mapping Vodafone is the mobile operator with the most investment in mHealth, leading or partnering 6 services. Millicom (Tigo) has recently commenced increased engagement in the mHealth industry and is planning a number of mHealth initiatives in the near future which will bring its total number of engagements to 4.

The majority of services mapped by the GSMA initiative are donor funded (15), whilst three are funded by the government, two are B2C, two are operating on a B2B model, and two are paid for by the service providers. There are a small number of revenue generating models emerging – including two based on subscription models and two pay per transaction services.

Figure 26



mHealth Case Studies

Ghana

NGO-led case study: Grameen Foundation – Mobile Midwife & client data application



mHealth use case

MOTECH Ghana provides two interrelated services. The Mobile Midwife application enables pregnant women and their families to receive pre-recorded voice messages or SMS on their mobile phones that provide time-specific information about their pregnancy in their own language (the majority of women select voice messages). The messages continue throughout the first year of life for the new-born and reinforce well-child care practices and vaccination schedules.

There is also a Client Data Application that enables community health nurses based at Community Health Planning Services (CHPS) facilities to use the mobile phone to electronically record care given to patients and identify women and new-borns in their area that are due for care. The two components are linked so that if a patient has missed

treatment that is part of the nationally defined care schedule, the Mobile Midwife part of the service sends a message to remind them to go to the clinic while the health worker is also informed that the patient is due for treatment.

Delivery channels

CDA: App (Internet)

MM: IVR, SMS

There is a support centre that monitors and reviews the channel usage on a daily basis. Qualitative reviews of the data are compiled on a monthly basis and every 6 months interviews and surveys are conducted to better understand the usage of the channels. A study to understand the efficacy of the channels for various applications within this service and to understand user preferences was executed prior to service launch.

Technology device

MM: Basic phone

CDA: Feature phones, smart phones

An extensive design phase included testing of devices prior to launch of the service. Devices were tested with local nurses and this revealed many interesting user preferences like the preference of bigger screens making capture of data into the phone easier. There is also a well-defined phone use policy (essentially a contract which nurses sign) which stipulates that when a mobile phone breaks it should be returned to the office for repairs and/or replacement. If this happens three times the nurse has to pay for the repairs. This has greatly improved care of phones. Thefts are also meant to be reported to management. This has provided greater insight into barriers regarding phone ownership one of which is the issue of theft of phone batteries. Staff are now expected to leave devices at their respective health facilities the majority of the time which also enables device sharing.

Health focus

Maternal/child health, family planning, and nutrition interventions

Target audience/ beneficiaries

Pregnant women and new mothers

Grameen Foundation has completed 2 informal qualitative studies around the impact of the Mobile Midwife and Client Data Application services on end beneficiaries and target actors. The Foundation is currently undertaking an extensive impact evaluation on health outcomes across an entire district with results to be released by the end 2014. There is a strong effort to raise awareness of the service and enrol mothers at health facilities.

Target actors

Frontline health workers: community health workers and community volunteers

Healthcare workers at health facilities: nurses and midwives

All service actors are given initial training around the use of the Client Data Application and the Mobile Midwife project, with specific focus on data collection and reporting using the application. All service actors go through a trial period where they use the application for data collection and reporting. During this time they are also expected to write a manual report in parallel. After this trial period the quality of their data is collected, and their accuracy and frequency of data collection is reviewed. If performance is satisfactory, the individual is no longer required to do an additional manual report reducing workload. There is automated data reporting to management. Data captured by service actors is continually reviewed because it influences the messaging component of the service. At the end of each year one individual is given a 'best user' award and a facility is given a 'best facility' award to acknowledge their usage of the Mobile Midwife and the Client Data Application. In each district there is a Grameen field officer who travels around once a week to various facilities to offer support to service actors. There is also a district health information officer (employed by GHS) and a call centre for support for service actors. Every six months nurses feedback is gathered with updates and changes announced at these points. At this forum nurses are given the opportunity to suggest changes/ improvements. Management Identify and acknowledge good performance on an ongoing basis and supervisors are notified and they are requested to call CHW's or nurses to acknowledge and commend them on their good performance.

Geographical focus

136 healthcare facilities

Kassena-Nankana West District
Upper East Region

Awutu Senya East Municipal
Central Region

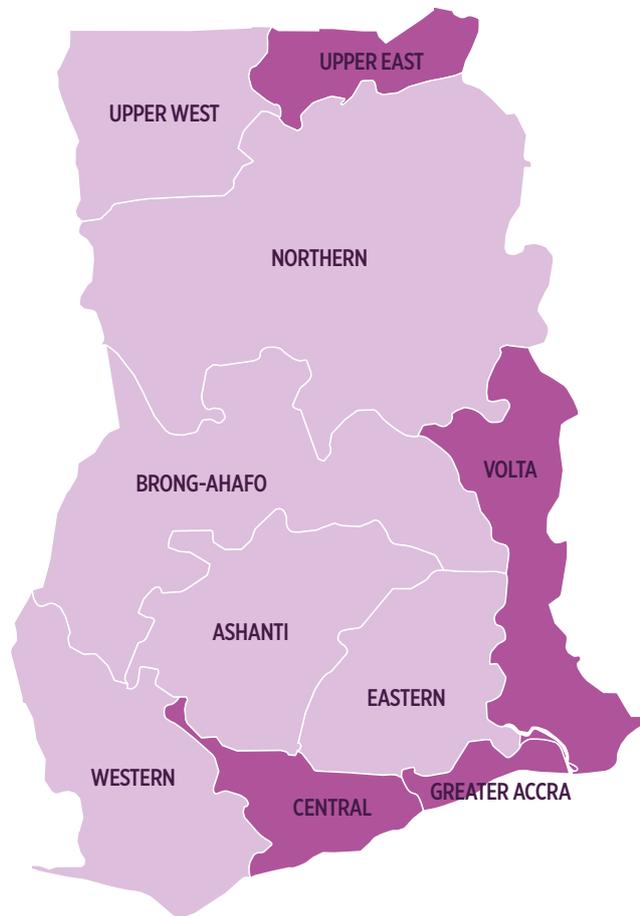
Awutu Senya West District
Central Region

Gomoa West District
Central Region

Ada East District
Greater Accra Region

Ada West District
Greater Accra Region

South Tongu District
Volta Region



Content

Content covers: SMS messages and the care protocols in the application cover various health topics relating to MNCH, family planning and nutrition: Vitamin A deficiency, iron and folic acid supplements, diarrheal disease, diphtheria, meningitis, hepatitis B, malaria, upper respiratory infections, maternal haemorrhage, neonatal infections and other conditions.

Source: Developed by Grameen and Ghana Health Service (GHS). Grameen led the review to ensure that content was in line with WHO standards and GHS approved the content.

Localization: Extensive localization of the content was carried out and content was tailored specifically for use in different regions. During the research phase it was clear that difference in health priorities and even cultural differences existed between the Northern and Southern parts of Ghana. Messaging needed to be appropriate and relevant for example, ensuring that nutritional foods that are recommended in the messages are actually available in that area. It was also evident that in the North grandmothers are key

stakeholders that influence the mothers and so some messages were targeted and tailored specifically for them. In the South domestic violence was a bigger issue and so content was tailored to include more educational messages on avoiding violence. Each of the different regions had different languages so messages had to be translated into multiple languages. It was assumed that there was basic level of literacy across the entire country. Grameen is undertaking a trial version of a paid for Mobile Midwife service with MTN which is targeted at urban areas where literacy levels are higher. Content tailoring is also required for this segment. Testing of the content prior to launch revealed some interesting findings. Initially Grameen were going to use a famous local actor to read out the IVR messages, but beneficiaries questioned the validity as this actor had no health experience or training. Grameen opted for the voice of a local nurse instead which was well received by beneficiaries.

Expansion: Continuous updates/ improvements are made to the content with dynamic updating. Grameen has replicated this content in the Nigerian market.

Implementation experience

Mobile Midwife has been implemented in Ghana since 2010 and has recently been replicated in Nigeria where it is intended to be launched as a commercial project to explore different pricing structures for the service. Grameen also has experience in Zambia relying on a local partner for implementation.

Partner coverage

- **Grameen AppLab:** implementation partner
- **Columbia University's Mailman School of Public Health:** academic partner - research on impact of using mobile phone
- **Ghana Health Service:** government partner - implementation, staffing, strategy design of program, content development
- **MOTECH:** technology partner - tech platform
- **HITLab /School of Public Health, UG:** research partner, JHU: research & health economic modelling

Funding

Gates Foundation: funding entire project until March 2015

USAID (Saving lives at birth): funding - 3 additional districts (ended July 2014)

UN foundation: funding - MTN project (sustainable commercial models)

Business model

Donor funded

Scale

Reached 60,000 pregnant women and new mothers to date. Of these 13,000 are actively receiving messages. There are 74 health workers using this service. The Mobile Midwife and Client Data Application are in the process of being handed over to GHS for future management. There are a few issues that still need to be resolved to ensure the continued success of this service. The first is around funding for the IVR costs which are the bulk of the service costs. Data is fairly affordable, but each district is responsible for working these costs into their health budget. A cost for scaling study is in progress.

mHealth Case Studies

Ghana

NGO-Led Case Study: Millennium Promise



mHealth use case

mHealth platform aimed at empowering Community Health Workers to improve child and maternal health.

Community Health Workers uses android phones that provide algorithm-based decision support for targeted counselling, case management and performance monitoring.

A primary aim of the Millennium Villages Project in Africa is to meet the Millennium Development Goals by integrated multi-sectoral interventions in health and nutrition, agriculture, and environmental sustainability in hunger and poverty hot spots in Africa.

Delivery channels

Application

Technology device

Feature phone

Health focus:

Nutrition, HIV, MNCH, water & sanitation; MDG 4 & 5

Target audience/ beneficiaries

Pregnant women and new mothers and their families

Target actors

Frontline health workers: community health workers

Formally appointed supervisors

Geographical focus

Amansie West

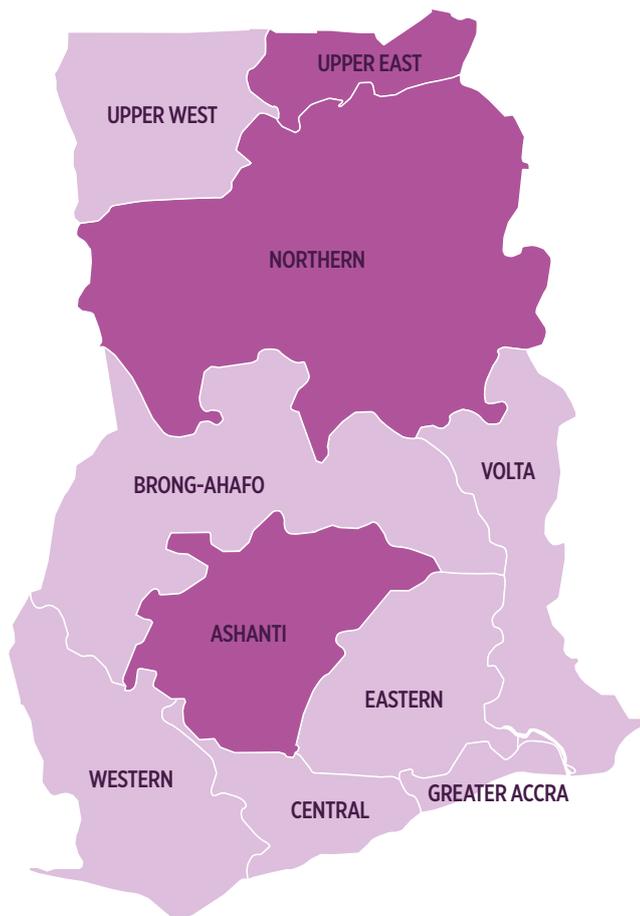
Ashanti Region

West Mamprusi

Northern Region

Builsa South

Upper East



Content

Content covers: Decision support protocols and job aids on the phone cover health topics relating to MNCH and Nutrition:

- **Maternal nutrition:** Improved use of locally available foods to ensure increased intake of important nutrients, vitamin A supplement in first 8 weeks after delivery.
- **Infant & young child nutrition:** Initiation of breastfeeding within 1 hour (including colostrum feeding), exclusive breastfeeding, continued breastfeeding, zinc treatment for diarrhoea, iodized salt consumed as table salt and/or as food-grade salt (used in food processing), vitamin A supplementation and deworming.

Localization: Decision support protocols and audio counselling content were translated into French and tested against decision protocol of GHS. The content was tested with the district health staff from the Ministry of Health and the decision support protocols were tested with CHWs to test usability.

Expansion: Regular reviews of content and decision support protocol. Continuous changes made to incorporate suggestions from CHWs and other actors.

Implementation experience

The programme began in 2013. Experience and shared learning from implementations of the same project in other countries: Tanzania, Kenya, Malawi, Mali, Nigeria, Rwanda, Senegal, Uganda. Millennium Promise has other experience in maternal and child health areas since 2006.

Partner coverage:

Airtel: Provided free data and communication among CHWs; infrastructure development (cell phone network towers) and SIM cards

Dimagi: technology partner - technology solution, technology support

Sony/Ericsson: provide equipment – handsets

Funding:

Millennium Promise – multiple donors

Business model:

Donor funded

Scale:

- Beneficiaries: 40,000 (20 000 active)
- Pregnant women and new mothers: 7,000 reached
- In Ashanti region 35 CHWs have been trained in this project and there are 12 supervisors. In northern region 46 CHWs and 6 supervisors
- Scale-up strategy is dependent on funding. Looking to integrate parts of this service with the Telemedicine Project that is funded by Novartis to be scaled to one entire district in the Ashanti region.

Revenue generation:

The partners involved in this initiative are currently exploring new payment models that should ensure sustainability once Millennium Villages completes its engagement with this project. The group is in discussions with government about potential payment models as part of the transition. They are also looking at transferring into DHIS2 which is currently funded by the government.

Successes:

Success features are derived from number of targeted nutrition interventions: Due to the availability of real time data, reporting on nutritional statistics occurs regularly. Based on these results, nutrition interventions are able to be more targeted and timely. For example, the data from the system, can be used to identify trends in nutrition in specific regions at certain times of the year and increase nutrition intervention efforts around these indicators and in these areas. Nutritionists review data on a weekly basis and respond accordingly.

Additional nutrition interventions: pregnant women are educated and assisted in income generating activities including poultry keeping, and home gardening which provides the opportunity for developing a balanced diet, which also provides a means to earn money by selling produce.

The challenge of health behaviour change and co-operation

Many of the countries involved in the GSMA nutrition initiative have attempted health initiatives including registration, health education and disease epidemiology and tracking. In many cases these initiatives have failed to produce a sufficiently tangible result. Nutritional indicators continue to fall, infections and disease increase and mortality rates remain unchanged. Part of the problem lies in the lack of a coherent strategy or too many fragmented initiatives in an environment which does not enable partnerships and cooperation. This is a problem that the government in Ghana has sought to tackle by creating the required platform and environment that will enable an effective governance and engender cooperation between government

and various health service providers and implementing organisations, who were working and generating information that is held independently. The solution posited by Ghana is the creation of a single electronic depository for information.

Until now Ghana's HMIS has relied largely on paper-based legacy approaches while gradually testing electronic approaches. A single, centralised and universally accessible electronic platform would benefit health service providers both in facilities and in the field.

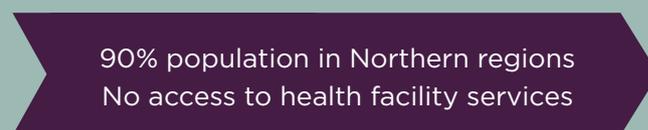
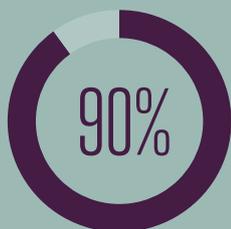
Mobile services can assist greatly in this process, reaching the very edge of health infrastructure and feeding data back to the central information depository.



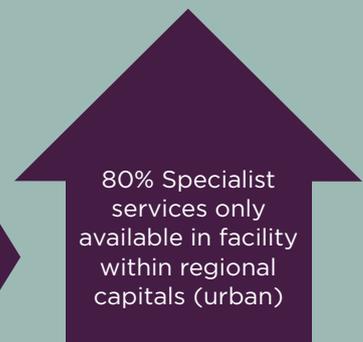
The opportunity for mHealth to support nutrition, maternal and child health

Unique challenges in Ghana

POPULATION



HEALTH FACILITY



Total addressable maternal mHealth market 2015



Total addressable maternal mHealth market 2020



Ranking of overall mHealth opportunity



Size of nutritional MNCH problem

 **MEDIUM-HIGH**



Size of addressable population

 **HIGH-MEDIUM**



Ability to pay or fund mHealth

 **HIGH**

Ability to deliver



mHealth service providers

 **MEDIUM**



Strength of supporting programmes

 **MEDIUM-LOW**



Interest from commercial aggregators

 **MEDIUM-HIGH**



Interest from mobile operators

 **LOW-MEDIUM**



Supporting mobile / health regulation

 **MEDIUM**



Willingness to partner

 **LOW-MEDIUM**

Improving efficiency drive in health

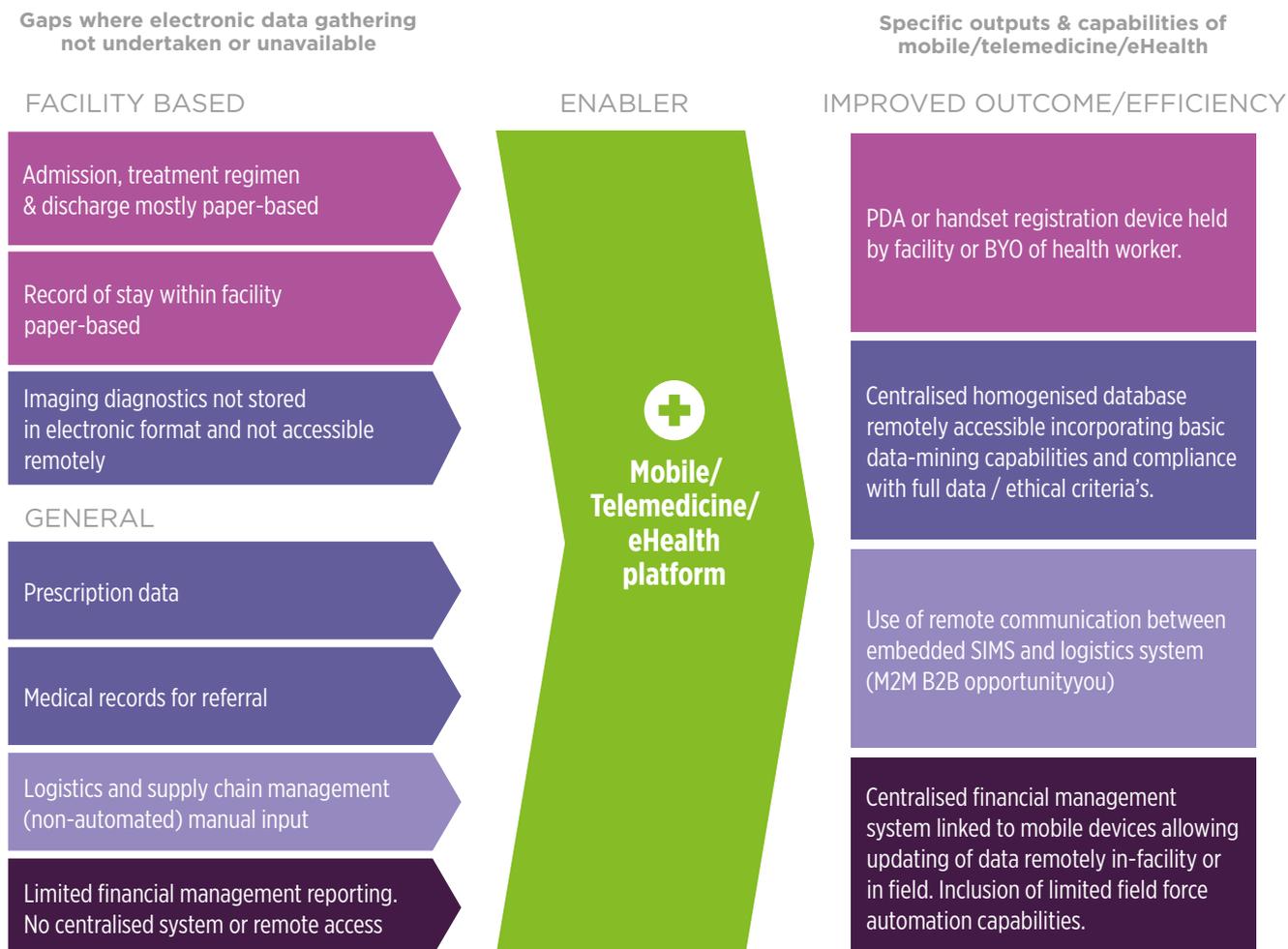
The communicative and networking capabilities of the cellular network have been identified as a mechanism to tackle instances of inefficiency in the health sector by providing a link to complex systems such as patient management systems. In many instances, these systems are let down by the lack of a well-functioning centralised communication system. Mobile can provide this capability as the outlier on the network edge (within rural and remote regions) while evolving into wider eHealth initiatives planned by the Ghanaian government.

There is not currently a universally implemented eHealth architecture in Ghana but the impetus for it is almost as important.

Figure 27 shows current gaps in Ghana facility-based registration and health information gathering. In the right-hand quadrant potential advantages and approach strategies utilising a combined mobile, telemedicine eHealth platform are envisaged. Solution paths to specific strategies are shown by the colour coding.

Figure 27

Legacy registration and data tracking Ghana vs centralised electronic strategies



Source: GSMA extracted from E-HEALTH STRATEGY FOR GHANA

Combining mobile with legacy initiatives

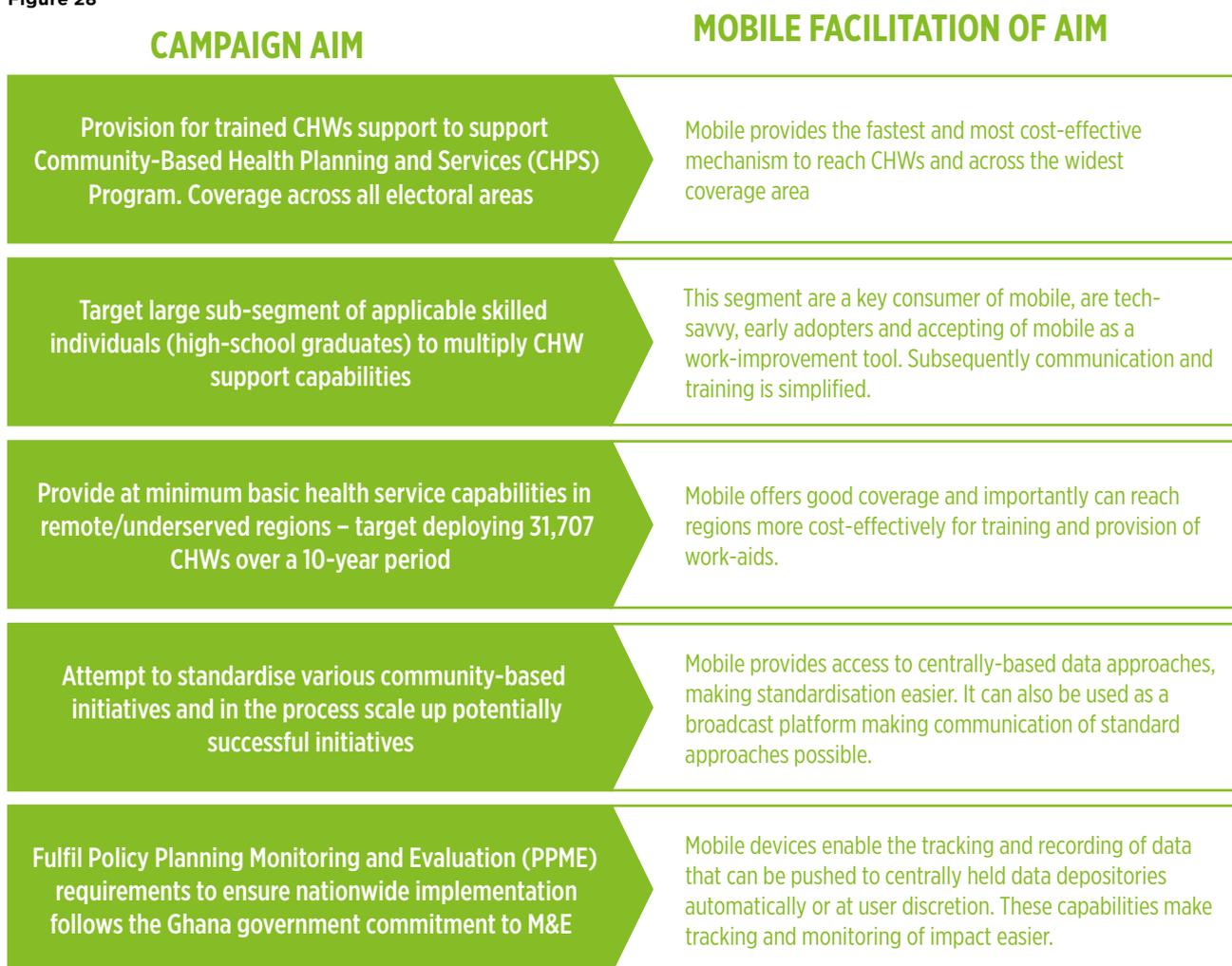
The National Health Insurance Authority (NHIA), an established national health insurance system in Ghana, has a stated remit to deploy an ICT infrastructure for the automation of health insurance services requiring accredited healthcare providers to operate a common platform, protocols, patient authentication and claims management.

The role of the NHIA includes the dissemination of the concept of health insurance which links it with technology and subsequently mobile. It is positioned to leverage opportunities by combining with commercial mobile payment and insurance enterprises to create the infrastructure and financial backbone that will facilitate commercial models for mHealth.

One Million Community Health Workers campaign

The Ghana One Million Community Health Worker campaign is active and seeks to accelerate Community Health Worker programs by scaling them up to district, regional, and national levels as demand dictates. There are a number of ways developments in mobile services within Ghana can assist in this initiative.

Figure 28



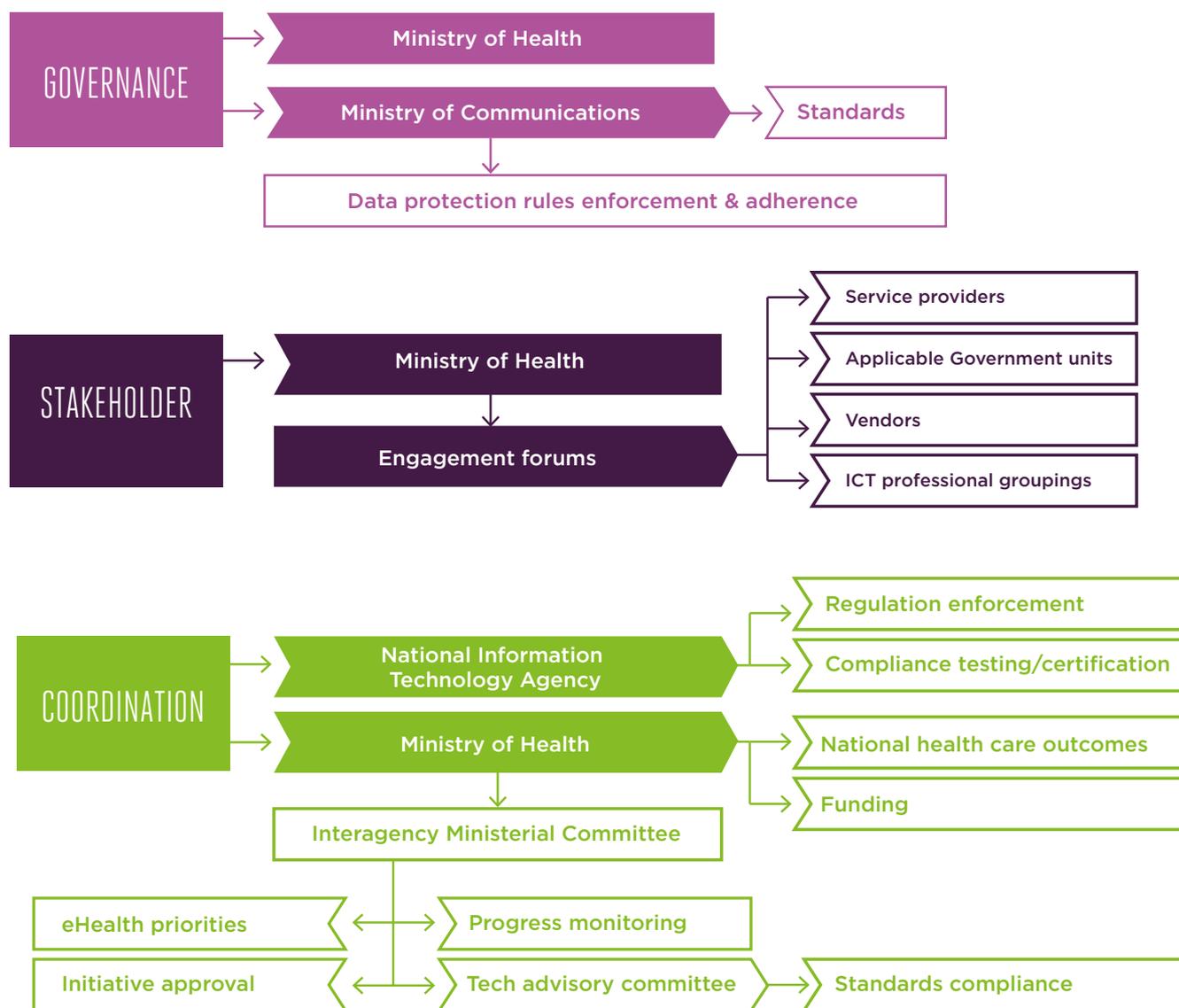
Source GSMA and Ghana 1mCHW Campaign

Bridging the funding gap

An important feature of mHealth is the process surrounding funding for initiatives. According to extracts from the Ghana National eHealth Strategy document, funding for tech-based solutions are drawn from internal funds or requested from central government. Implementation procedures are lengthy and liable to interruption due to the unpredictability of availability of funds. In many instances successful initiatives are terminated due to lack of resources and/or issues with funding administration while lessons learned from ongoing initiatives are not collected, pooled or analysed to extract best practice. There is also a challenge in hand-over between centrally run projects and local counterparts.

Figure 29

The Ghana eHealth engagement and coordination plan (overview)



Source: GSMA extracted from Ghana eHealth policy

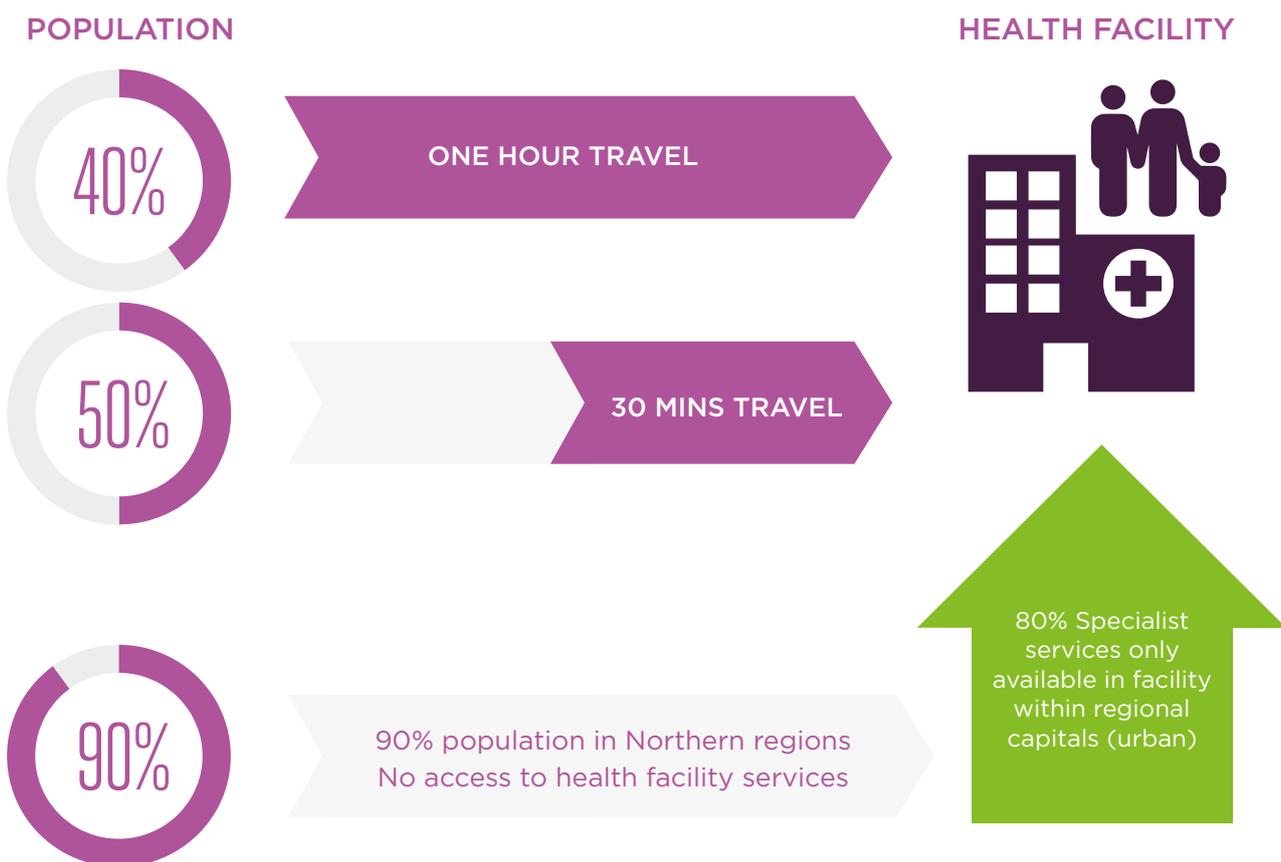
Figure 29 extracts the constituent features of the Ghana eHealth policy. The diagram shows the main areas of the eHealth engagement process and development as well as the primary actors involved in delivering next-generation health services in Ghana. Reporting lines and hierarchy provide an overview of structure. This data is useful for new entrants considering market entry or existing players considering scaling mHealth initiatives.

Geographical challenges of provisioning healthcare

The Ghanaian health market is defined by the geographic dispersion of its users. Mobile telephony has been identified as the primary mechanism to tackle this geographic feature, particularly for facility-based care scenarios that are not connected to ADSL or rely on expensive VSAT solutions.

Figure 30

Challenge of disseminated health user population



Source: Ghana National Information Technology Agency - National E-Health Strategy (www.nita.gov.gh/system/files/Ghana_E-Health_Strategy.pdf)

Figure 32 below contains insight taken from stakeholder interviews. The major themes are extracted and a strategy that is conducive to the development of mHealth is suggested.

Figure 32

Feedback from members of the mHealth value chain in Ghana

PRIMARY: INSIGHTS STAKEHOLDER INTERVIEW QUOTES	EXTRACTED CONCLUSION	SUGGESTED STRATEGY
<p>“We believe this [mobile health services] will evolve to the extent whereby customers will be calling for medical advise... though we are yet to launch that aspect “</p>	<p>mHealth has a future, and is supported as such but it is a long-term proposition.</p>	<p>Proof of concept activities & slow integration of commercial features will help mHealth to succeed.</p>
<p>“in the short to medium term mHealth will have limited success even impact...The case for mHealth needs to made much stronger”</p>	<p>While government and operators may understand the mhealth proposition end-users remain unconvinced</p>	<p>Communications to the end consumer/service user should define the features of mHealth in terms of features, drivers and needs in a context that is applicable to them.</p>
<p>“What challenges do you face in implementing mHealth in Ghana? Coming up with the right proposition and being able to make this commercially viable”</p>	<p>Evidence and clearly defined proof points that are effectively broadcast will stimulate success for mHealth</p>	<p>Adoption of evaluation mechanisms will lead to wider adoption of mHealth across the enterprise and consumer sectors</p>
<p>““there is a price barrier [to mobile health] customers will rather get it for FREE...It will therefore be prudent to look at...the CSR angle for higher penetration”</p>	<p>The sustainability model for mHealth is far from proven</p>	<p>Developing mHealth toward adjacent goals (CSR and growing penetration) will sustain it until commercial options can be investigated</p>
<p>“To be impactful mobile health will need to be targeted at the masses...Cost and availability of handsets is...a barrier.”</p>	<p>Current mHealth initiatives are not inclusive enough</p>	<p>Careful consideration of costing and access mechanism (device) will ensure success</p>
<p>“The reach of individual Telco’s is very different so will have limited reach. Telco’s would have to come together to provide unified solutions that address the network coverage issue. “</p>	<p>A consortium led approach is desirable</p>	<p>Each member of the mobile health value chain must be convinced of the efficacy and value of mHealth before initiatives are launched to ensure effectiveness.</p>

Source: GSMA extracted from the stakeholder surveys



Regulatory position in Ghana

The regulatory position in relation to mHealth and ICT within Ghana is best defined as a work in progress. There is a lack of agreement regarding confidentiality in regard to patient data and little consensus around protocols for privacy and confidentiality.

These challenges have been defined by the Ghanaian government with specific concerns relating to confidentiality and encryption methods. However responsibility and accountability are unassigned by a national approach. Continuity plans and disaster recovery plans for patient records are likewise incomplete.

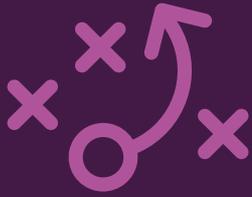
This lack of clarity will have implications for stakeholders who are considering launching and/or scaling services, making risk planning difficult particularly when considering if regulation will be conducive or problematic to development. However, the framework arrangements laid out are positive developments in the long-term.

The Ghanaian government has sought to tackle this deficiency by highlighting the need to streamline the regulatory framework for health data and information management. The first stage in this process was the development of its policy on Information and Communication Technology to protect the privacy of medical service users. Running in tandem to this but under the auspices of the Ministry of Communication is legislation covering data interchange, security, privacy and electronic data misuse and fraud.

There are a number of ongoing similar developments concerned with the regulatory situation of electronic health. While none appear to have the potential to cause problems for mHealth feasibility, players considering entering the Ghana market should be mindful of these draft plans as they develop.

Currently there is no regulatory framework for electronic data interchange in the health sector. There are several ongoing eHealth pilot programmes, but they lack a central coordinating approach.

The slow pace of change within the regulatory environment is a challenge from a market feasibility standpoint. There are two issues here. On the one hand, service providers will need to consider how their offerings comply or will comply with regulation that is not yet defined. On the other, potential customers are unlikely to take up services without the protection afforded by strictly enforced regulation. In both instances the solution is the acceleration of regulation development.



Conclusions

- In 2013 13% of Ghana's total government budget was spent on health. With the Ministry of Health being forced to do more with less, mHealth should be leveraged more effectively to address critical resourcing constraints, timely and accurate data surveillance and engagement with patients to reduce the burden on health facilities.
- There is a strong market potential in Ghana. Maternal health interventions have reached 107,193 beneficiaries alone.
- The potential market for maternal segments is 950,000 and is forecast to rise to 1.2 million by 2020.
- The national CHW roll-out provides a clear framework for service delivery and measurement. mHealth solutions should be used to enable, equip and empower these out of facility CHWs as well as begin to introduce quality assurance, measurement and mobile incentives to increase productivity and quality of service delivery. There is evidence of this happening already with just under a quarter of total launches monitored by the GSMA taking place in previously underserved areas in the Northern Region.
- mHealth initiatives are already showing early signs of success but require robust multi-sectoral partnerships in order to achieve critical economies of scale that drive sustainability and integration of services into the health system.
- Successful initiatives and ongoing opportunities in Ghana have led to some success in the mHealth sector. However ongoing support is required across the service provisioning ecosystem. Overall MoH/GHS partnering is comparatively low at 16%.
- Ghana has the second highest female literacy rate of the GSMA nutrition initiative countries at 65%. Over 60% of GSMA tracked mHealth services use SMS as an access channel and SMS provides 33% of non-voice revenue in Ghana.

Overall feasibility assessment

The feasibility of mHealth to address nutrition and maternal and child health in Ghana is good. The GSMA and the public sector will work together to address common challenges and optimize the chance of success of partnerships.

Opportunity size

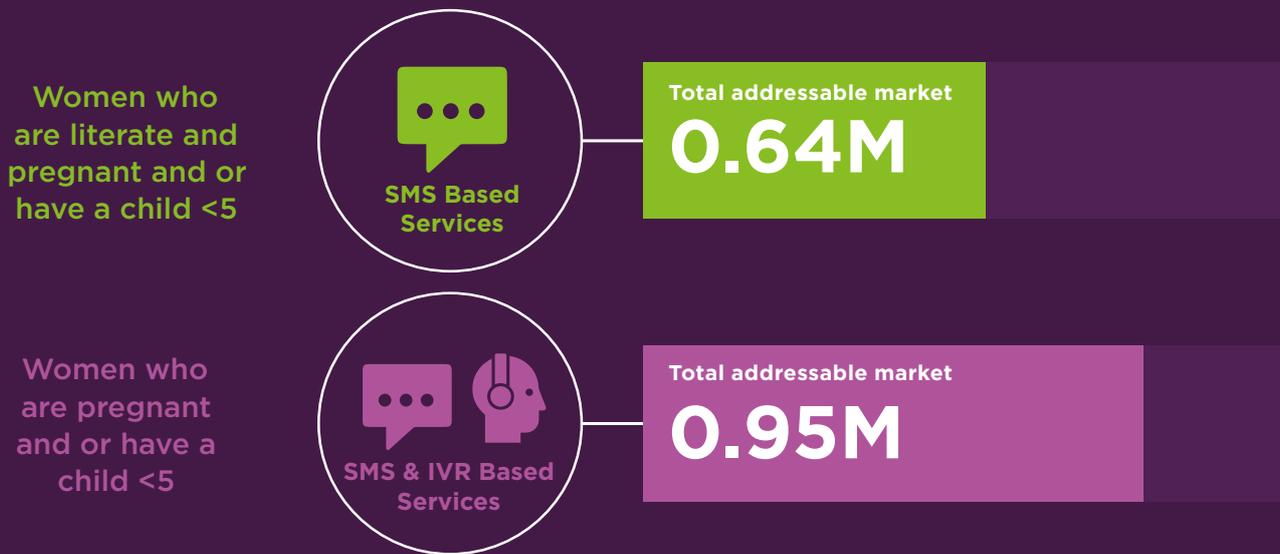
The very high incidence of phone sharing in Ghana means access to mobile phones is higher than unique mobile subscriber penetration would infer.

This feature sees a long-term opportunity in simply targeting literate women with children under five with SMS nutrition and maternal health information services. This segment is forecast to grow by 24% over the 2015-2020 period.



Figure 33

Total addressable maternal mHealth market 2015

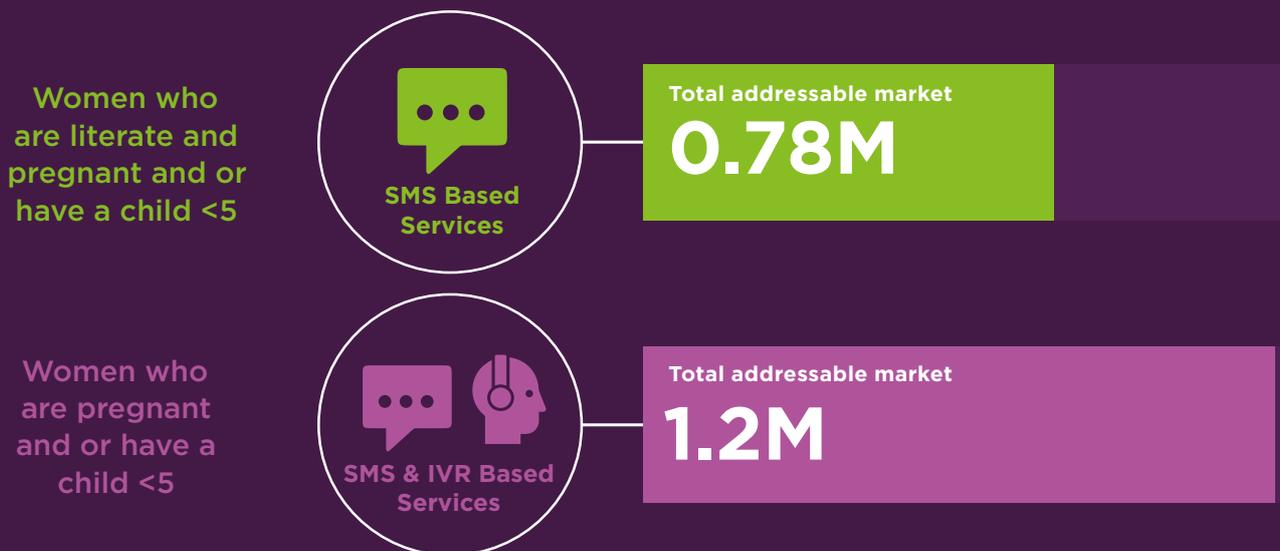


Source: GSMA M4D health model, GSMAi data

When both literate and illiterate maternal segments are targeted using IVR services this opportunity increases further, demonstrating an addressable market of 1.2 million by 2020, growing by 20% over the period 2015-2020.

Figure 34

Total addressable maternal mHealth market 2020



Source: GSMA M4D health model, GSMAi data

Ranking of overall opportunity

Ranking of overall opportunity is a combination of both quantitative and qualitative inputs.

Scale of maternal and child health / nutrition problem – **MEDIUM-HIGH**

Size of addressable population – **HIGH-MEDIUM**

Ability to pay or fund mHealth – **HIGH**

Ability to deliver – **HIGH-MEDIUM**

Ability to deliver

Ranking of ability to deliver is a combination of both quantitative and qualitative inputs.

mHealth service providers – **MEDIUM**

Strength of supporting programmes – **MEDIUM-LOW**

Interest from commercial aggregators – **MEDIUM-HIGH**

Interest from mobile operators – **LOW-MEDIUM**

Supporting mobile / health regulation – **MEDIUM**

Willingness to partner – **LOW-MEDIUM**

Abbreviations and terminology

ADSL - Asymmetric Digital Subscriber Line

ARPU - Average Revenue per User

B2B - Business to Business

B2C - Business to Consumer

CAGR - Compound Annual Growth Rate

CHPS - Community Based Health Planning & Services

CHW - Community Health Worker

CSR - Corporate Social Responsibility

DHIS2 - District Health Information System 2

GDP - Gross Domestic Product

GHS - Ghana Health Service

HMIS - Health Management Information System

ICT - Information and Communications Technology

IVR - Interactive Voice Response

M2M - Machine to Machine

M&E - Monitoring and Evaluation

MDG - Millennium Development Goals

MCH - Maternal and Child Health

MNCH - Maternal Newborn and Child Health

MoH - Ministry of Health

NGO - Non-Governmental Organisation

NHIA - National Health Insurance Authority

NHIS - National Health Insurance Scheme

OoP - Out of Pocket

OS - Operating System

PAMI - Pan-African mHealth Initiative

PPME - Policy Planning Monitoring and Evaluation

RCS - Rich Communications Services

ROI - Return on Investment

SMS - Short Message Service

SSA - Sub-Saharan Africa

USSD - Unstructured Supplementary Services Data

VAS - Value Added Services

VSAT - Very Small Aperture Terminal



For more information on GSMA mHealth
please visit www.gsma.com/mobilefordevelopment