Mobile for Development

mHealth Country Feasibility Report: Rwanda

The GSMA represents the interests of mobile operators worldwide. Spanning more than 220 countries, the GSMA unites nearly 800 of the world's mobile operators with 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in industry sectors such as financial services, healthcare, media, transport and utilities. The GSMA also produces industry-leading events such as Mobile World Congress and Mobile Asia Expo.

For more information, please visit the GSMA corporate website at www.gsma.com

Follow the GSMA on Twitter: @GSMA

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.

Mobile is the predominant infrastructure in emerging markets. We believe it is the transformative technology that enables us to put relevant, impactful services into the hands of underserved people. Since the creation of GSMA Mobile for Development we have partnered with 50 mobile operators, rolling out 104 initiatives, impacting tens of millions of people across 49 countries.

For more information, please visit the GSMA Mobile for Development website at www.gsma.com/mobilefordevelopment or email m4d@gsma.com

Follow GSMA Mobile for Development on Twitter: @GSMAm4d

This document is an output from a project funded by UK aid from the Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

CONTENTS

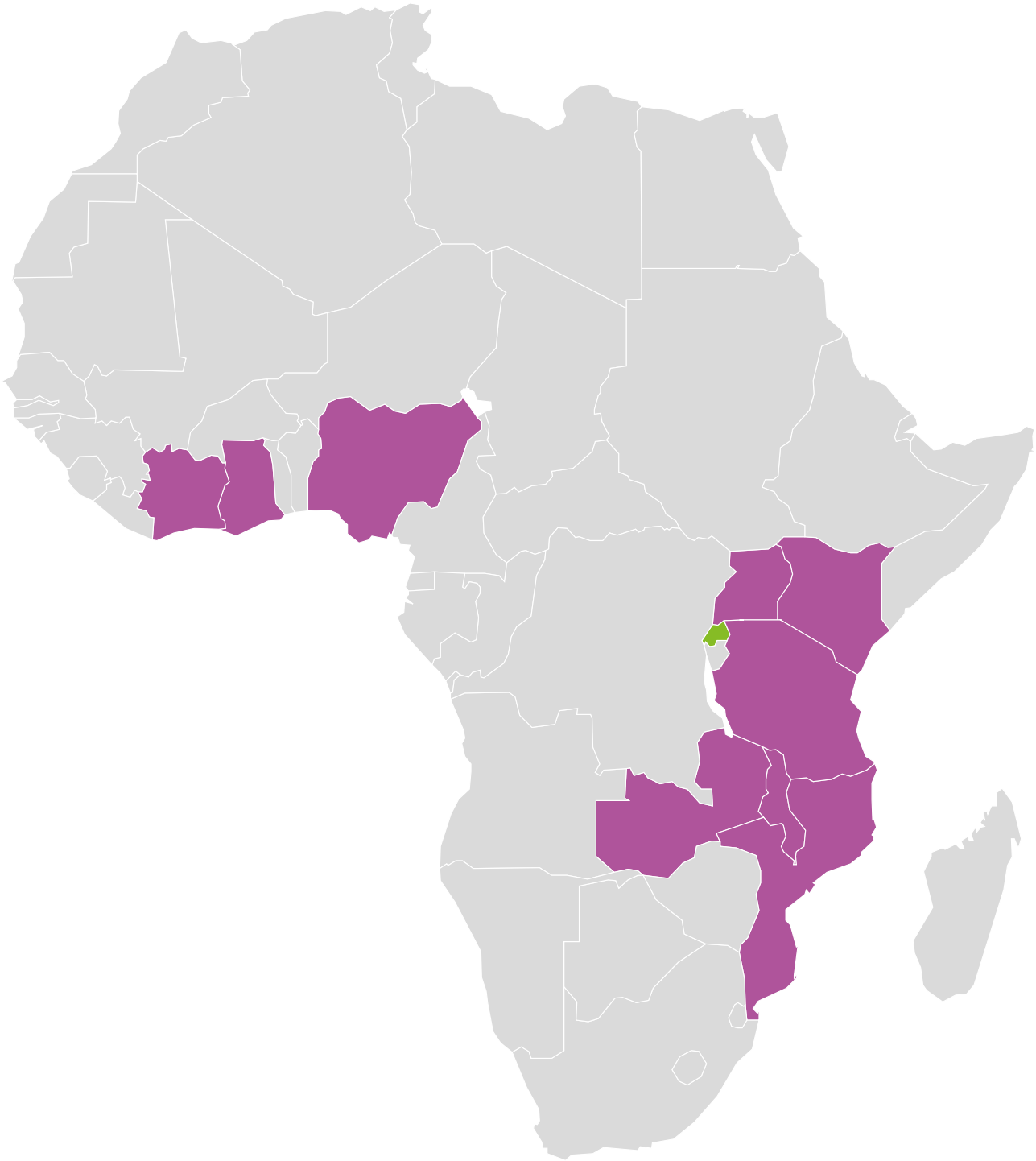
Background

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

In September 2013, the GSMA mHealth programme partnered with UK aid from the Department for International Development (DFID) to support the scale-up of mobile nutrition (mNutrition) services targeting maternal and child health, in alignment to the Millennium Development Goals 4, 5 and 6. The mNutrition initiative 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

Mojca Cargo
Paul Merry
Kim Viljoen



3-year mNutrition initiative, developing nutrition services across 8 countries in Sub-Saharan Africa. For the purposes of data comparison, 10 countries have been considered.

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

Executive summary

This report aims to carry out a comprehensive analysis of the current state of mHealth in Rwanda. Information has been gathered and presented in the context of the GSMA mNutrition initiative, which aims to develop commercially sustainable mHealth services which meet public health needs, in the areas of demand generation, registration and data surveillance, in 8 countries in Sub-Saharan Africa. An additional 2 countries, Côte d'Ivoire and Kenya, have been included for the purposes of data comparison.

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

What problems can mHealth solve?

- Infant mortality rates are approximately 39 deaths per 1000 births and mortality rates for children under 5 are approximately 55 deaths per 1000. This places Rwanda as the 9th highest country when compared across the 10 comparison countries.
- Of the total mHealth interventions tracked by the GSMA, 43% are concerned with infant and child health. Of these interventions, 29% are concerned with child nutrition. In Rwanda, mobile is uniquely positioned to tackle and make progress on these health features, thanks to good mobile coverage which creates capacity to reach the largest possible audiences.
- It is recognised that a shortage of health personnel may obstruct effective tackling of health burdens. In Rwanda, there has been an increase in skilled health personnel attendance at births. Over the 2005-2010 period, this figure increased from 39% to 69%. However challenges remain. Rwanda requires 586 more midwives to reach its target of 95% skilled personnel at birth attendance whilst rural areas remain underserved; 40% of women live more than an hour away from a health facility. Currently 47,842 health workers are interacting with mHealth services tracked by the GSMA. Mobile's role here is to bridge gaps in support by providing critical Maternal Newborn and Child Health (MNCH) information and remote patient access to health personnel and facilities.

- The stunting level in Rwanda is very high and at 44% it is above the critical population threshold of 40%. The disparity in stunting prevalence between rural and urban children is substantial; 47% of rural children are stunted, compared with 27% of urban children. This strengthens the case for introducing mobile which has the potential to increase reach to vulnerable populations in rural areas.
- Stunting has continued to grow (increasing 12% between 2008 and 2012) and other child health nutrition problems remain important issues in the country. Approximately 6% suffer wasting, 15% are underweight, 4% are severely underweight and child anaemia sits at 69%. Mobile can assist in reducing the impact of these factors by disseminating information on efficient nutrient intake to a broad and widely scattered population.
- Death as a result of nutritional deficiencies ranked 8th in the top ten causes of mortality in Rwanda (excluding the infectious disease categories). Death resulting from maternal conditions ranked 6th across all women (excluding the infectious disease categories)[1]. Mobile can provide pertinent information on nutritional and MNCH best practice to improve this situation.

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

What is conducive to in-country mHealth success?

- The potential addressable market for maternal segments (women who are literate, are pregnant or have a child under-five) is 710,000 thousand in Rwanda. This is forecast to rise to 1.25 million (total addressable maternal market) by 2020.
- GSMA mHealth tracked services report the number of beneficiaries as approximately 4% of the total population of Rwanda. This equates to 14% of the target audience of MNCH users[2]. Approximately 57% of the services tracked aim exclusively to improve the health of women and 43% target children. This data indicates an acceptance of mHealth, although there is room for improvement. This improves the likelihood that funded initiatives will develop into self-sustaining propositions.
- Like many Sub-Saharan African (SSA) countries, Rwanda wishes to better utilise its health personnel. The country has made great advances in this area, there are now 45,000 community health workers (CHW) providing primary health services at village level, but there is an ongoing need to provide more support. The mHealth services tracked by the GSMA have reached 47,842 health workers. Mobile can help to better utilise the limited health personnel available through the use of efficiency tools, decision support, time saving processes and human resource planning/ management.
- There is an ongoing disparity in the level of assistance provided during childbirth across urban and rural regions in Rwanda. Forty seven percent of rural children are stunted compared with 27% of urban children. Mobile has a potential role to increase health information, advice and outreach to these vulnerable rural populations.
- Successful initiatives and ongoing opportunities in Rwanda have led to some success in the Rwandan mHealth sector. Approximately 71% of mHealth service providers tracked by the GSMA have secured partnerships with the Ministry of Health (MoH). As new launches occur and existing services begin to scale, it is critical to continue to forge these cross-sector relations and increase the penetration of total partner arrangements to ensure the success of mHealth.

1. WHO 2008
2. Children under-five and pregnant women or pregnant and with a child under-five - GSMA calculated and WHO

3 The readiness of stakeholders to support mHealth in Rwanda

What position are stakeholders in to facilitate mHealth?

- The Rwandan Government has instituted a number of initiatives to tackle problems in the area of health personnel, beyond just providing more of them. Rwanda's CHW strategy and management control system have been decentralised to strengthen community involvement, by allowing villagers to elect their health workers. A national performance-based financing system rewards health workers according to selected health indicators including MNCH. The inclusion of mobile fits well with an integrated approach as described, providing a means to pay health workers directly without the need for a bank and ensuring remote health personnel can be continually trained and kept up-to-date with the latest health training tools.
- Rwanda has undertaken a highly structured and results orientated approach to its population's health needs. This clarity of vision means that the MoH and other applicable units within the Rwandan Government look favourably on any innovations they feel can assist in their broader aims. Mobile provides a mechanism to bridge a number of gaps in coverage, health information dissemination, personnel management and data collection which fit with the government's clear vision for health and the role that Information and Communications Technology (ICT) has to play.
- While the government in Rwanda has opted to decentralise much of its outreach to bring health personnel and health activities to specific communities, villages and towns, it has also incorporated integration activities where these are suitable. There is a single national Monitoring and Evaluation (M&E) framework which was designed to improve priority setting, planning and resource allocation. Rwanda has also developed a cloud-based central Health Information System (HIS), to collect data from multiple and disparate sources. Mobile can play an important role in assisting in the government's strengthening of data collection processes by providing a non-static mechanism for gathering and uploading data to centrally held databases.

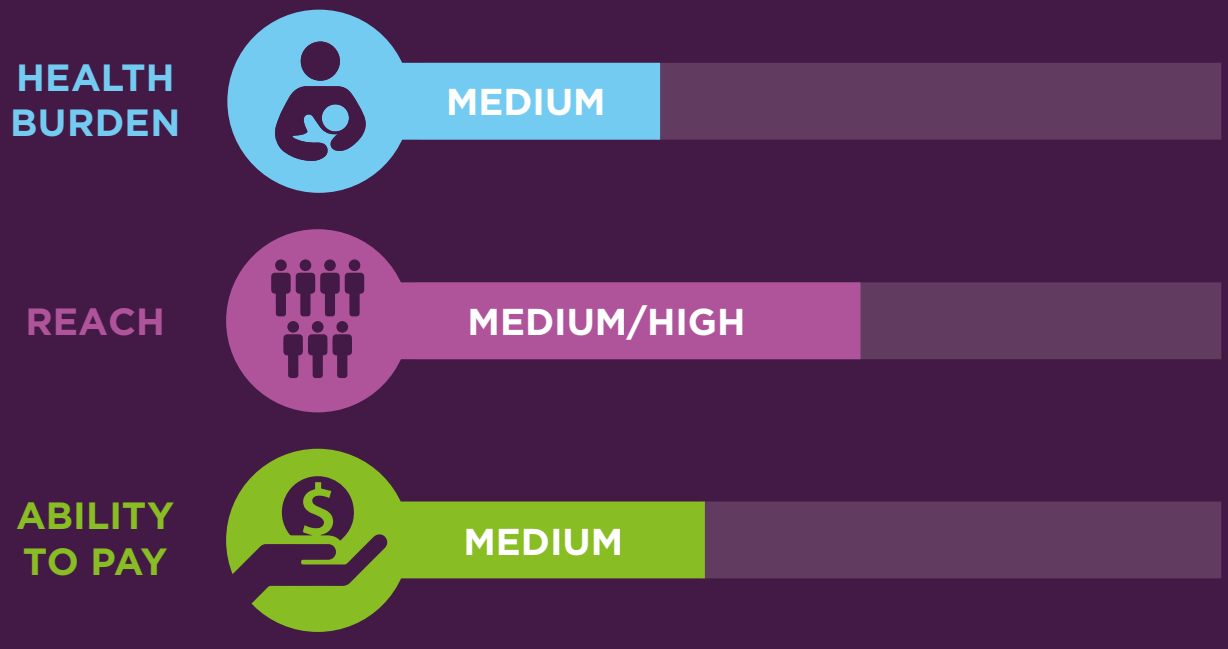
Market conditions in Rwanda

mHealth indicators

Rwanda shows strong potential to scale mHealth, despite a number of challenges, as indicated by its top five positioning in 57% of the selected indicators compared in the 10 comparison countries. If the challenges faced can be tackled, there is a strong future for mHealth in Rwanda.

Advantageous for mHealth

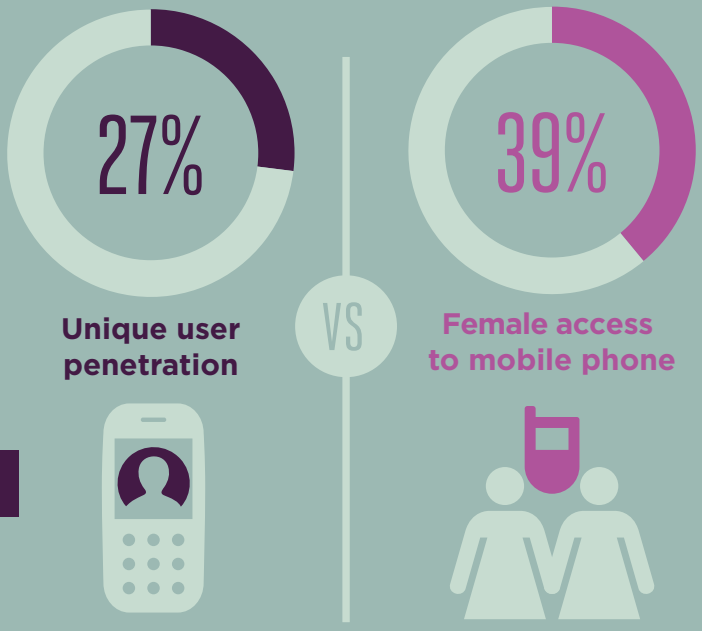
Current state of Rwanda health

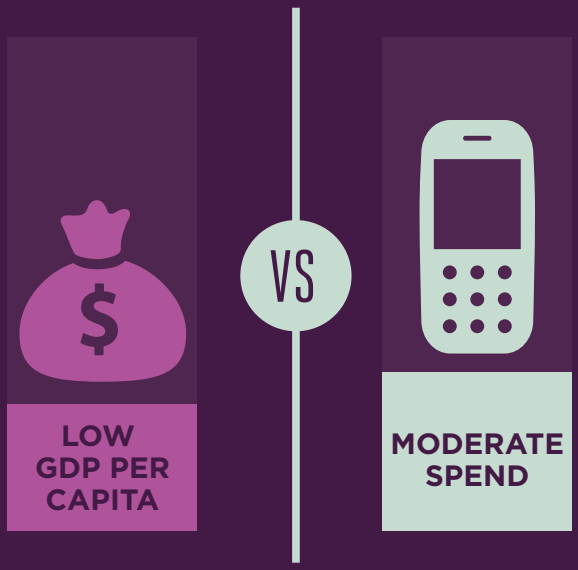


Penetration versus access

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

Advantageous for mHealth





GDP versus spend

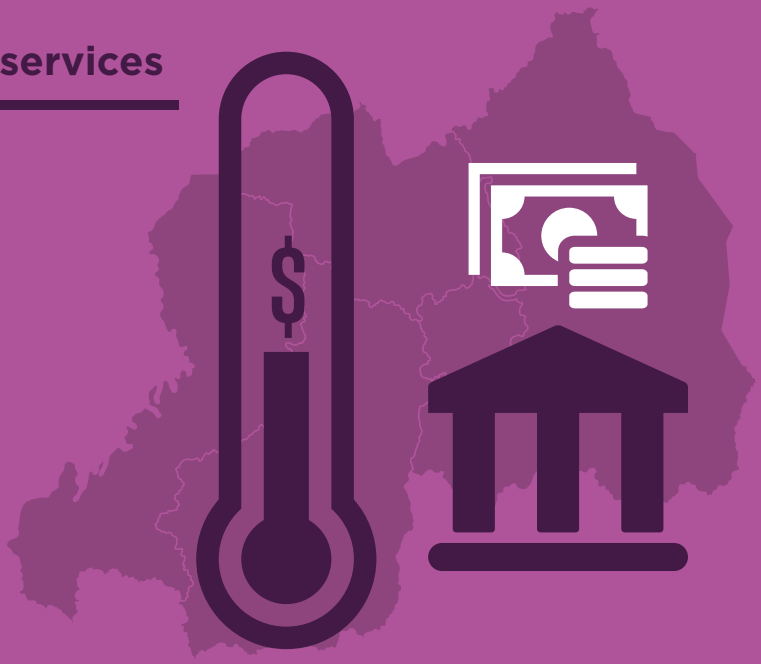
Rwanda has a low GDP per capita, ranking lowest amongst the 10 mHealth comparison countries but when percentage of GDP spent on mobile services is considered, its position improves, falling within the 30th percentile. This is an indicator of a moderate B2C opportunity.

Obstacle to mHealth

Government support of health services

Rwanda falls in the bottom third for government spend on health. Despite this, Rwanda is one of the few countries with fully government owned and funded mHealth initiatives, which is advantageous for mHealth and B2B models specifically.

Advantageous for mHealth and business to business models specifically



General market conditions

The Rwandan MoH has made good progress toward increasing the percentage of skilled health workers attending birth. Approximately 87% of its target, laid out in its Health Sector Strategic Plan (HSSP) stage I was reached within the 3-year period planned. The success in reaching HSSP-I targets has seen the acceleration of subsequent HSSP launches. The current iteration (III) runs from July 2012 to June 2018 and is in line to reach its targets.

Figure 1

Rwandan general market view SWOT

STRENGTHS

The Rwandan MoH has a well-established plan for ensuring the health of its populace, including defined targets for improving efficiencies and reducing health burdens. These are defined in HSSP-III. The country has also sought to tackle the integration of ICT into healthcare through its E-health Strategic Plan (2009-2013). These features place mobile in a strong position to bring ICT to the masses, exploiting its penetration and reach to assist in the integration of the government's overall strategy to become a knowledge-based middle-income country. This aim is defined in its Vision 2020 initiative.

There is a strong motivation to tackle MNCH related health burdens in Rwanda. Between 2000 and 2015, the country achieved the largest reduction in under-five mortality rates and maternal mortality ratios globally (it is estimated that 590,000 children have been saved[3]). Success has resulted from an open attitude to technological innovation and this outlook is integrated into all features of the country's planning e.g. developing skills in information technology as defined in its Vision 2020 strategy.

WEAKNESSES

Increases in taxation imposed on mobile users (excise tax has increased from 8% to 10%) have had some impact on the usage pattern of subscribers. While growth in subscribers to mobile services is an opportunity to generate tax dollars, some caution is advisable in order to avoid dissuading experimentation in service use like mHealth, which could have a potentially greater economic impact over time than tax revenues in the mid-to-long-term (a healthier population means greater economic growth potential).

While 57% of GSMA tracked mHealth services in Rwanda have behaviour change features, none are currently providing content to mothers in order to educate them around pregnancy and better nutrition practices for their children.

3. http://www.bbc.co.uk/news/world-africa-32438104

OPPORTUNITIES

Rwanda is experiencing a population growth rate of 2.7% and will reach a population of 16 million by 2020[4]. It is currently the most densely populated country in Africa. The impact of poor health and nutritional practices have increased exponentially as the population has grown, in turn increasing pressure on the limited health facilities of the MoH. There is an opportunity for mHealth to provide cost-effective health messaging, bridging gaps in nutrition and MNCH knowledge in Rwanda.

The centralisation of records and the improvement of patient registration are defined aims of the HSSP-III. The MoH has reported some success in this area, including data compliance and the automation of systems including Health Management Information System (HMIS), Community Health Worker Information System (SISCom) and notably RapidSMS.

However the MoH has identified the need to scale successful initiatives and reduce data collection demands placed on health workers. Incorporating mobile can assist in rapidly scaling projects and improving registration and data surveillance activity.

During the 2012-13 period, 86% of births occurred at health facilities in Rwanda's highest wealth quintile. In comparison, the lowest quintile saw 61% of births at health facilities. The Rwandan MoH is working to increase this percentage to 72% by 2018, but faces a number of challenges including difficulties in the recording and tracking of pregnancies and the instructing of individuals to attend health facilities. With a penetration rate of 71%[5], mobile offers a widely dispersed platform for registration which cuts across socio-economic boundaries. It can also play a role in MNCH education and encouraging health facility attendance.

THREATS

Rwanda has a highly competitive mobile environment, with three mobile operators actively focused on building market share. Within such a competitive environment, service differentiation becomes an important feature. The provision of mHealth services is a mechanism which offers differentiation but in Rwanda only one mobile operator has shown a consistent interest in mHealth. Competition breeds innovation and if the other mobile operators cannot be drawn to mHealth, development may be stalled.

Providing health information using SMS is a key feature of any consistent mHealth service offering and an important stage in development toward a fully sustainable offering. The escalating costs of SMS, with all three Rwandan operators increasing their basic charges, could dissuade would-be payers, whether they are government, Non-Governmental Organisations (NGO) or B2C organisations. SMS-based health messaging is one of simplest most effective methods of providing early stage mHealth. Without successful and affordable SMS initiatives, it is unlikely that sustainability will be seen in mHealth.

The central planning and strong oversight by the Rwandan MoH have resulted in exceptional reductions in health burdens and improvement in overall Rwanda health. This success has been contrasted by claims from other quarters that a lack of flexibility in the government's approach has stymied experimentation by commercial players.

Source: GSMA M4D mHealth 2015

4. MINISANTE Health Sector Strategic Plan
5. Rwanda utilities and regulatory authority: Active mobile telephone subscriptions March 2015

Population growth and density are important features of the Rwandan health and economic landscape. The country will reach a population of 16 million by 2020[6] and has a population growth rate of 2.7% (the second highest of the mNutrition countries, behind Uganda[7]). It is currently the most densely populated country in Africa and the Rwandan Economic Development and Poverty Reduction Strategy group has identified that this growth has the potential to negatively impact economic growth and efforts to reduce poverty[8]. The impact of poor health and nutritional practices are compounded by population growth, increasing pressure on the limited health facilities of the MoH. As an example, the Ebola crisis in Africa is forecast to cost approximately $32bn in lost Gross Domestic Product (GDP) in 2014-2015[9]. There is a compelling argument for the use of mHealth messaging which bridges the gaps in nutrition and MNCH knowledge to provide a cost-effective solution to tackle this problem in Rwanda.

Health is recognised as central to the economic success of the country. Rwanda's Minister of Health, Dr Agnes Binagwaho, has stated, "health is a key pillar of our development" and affirms that without health, poverty will never be alleviated[10]. It is also recognised that Base of Pyramid (BoP) citizens would benefit the most from improved health opportunities, with the ensuing effect of economically advancing Rwanda. Defined improvements in access, quality and the reduction in cost of healthcare are identified as key considerations[11] and are all areas with which mHealth can directly assist.

Improving efficiency drive in health

Component 3 of the Rwandan HSPP-III is directly concerned with the drive to improve efficiencies in providing health services. It was designed and structured to strengthen policies, resources and management mechanisms of health services delivery.

mHealth provides a number of efficiency improvements, specific to procedure streamlining, which result in direct cost savings and improved performance. For example, Rwanda faces a number of challenges in providing frontline health workers and keeping those CHWs who are in the field adequately trained and upskilled[12].

Mobile has a role here as training content can be provided, updated immediately and pushed out to health workers. Mobile training aids also bring the advantages of two-way communication tools, as opposed to written manuals and instructions. Communication is encouraged and characterised by a request and answer format. Ongoing training and upscaling is also a strong retention feature, which can be delivered more cost effectively over mobile, particularly when health workers are in remote or rural locations.

6. MINISANTE Health Sector Strategic Plan
7. UN 2010 -
8. EPDRS2 -
9. The Economic Impact of the 2014 Ebola Epidemic: Short and Medium Term Estimates for West Africa; The World Bank
10. http://www.theatlantic.com/health/archive/2013/02/rwandas-historic-health-recovery-what-the-us-might-learn/273226/
11. Rwandan vision 2020 Ministry of Finance and Economic Planning
12. HSSP-III p.81

The Rwandan opportunity to scale mHealth services

As part of the mNutrition initiative country feasibility research, the GSMA set out to identify comparable health, mobile and economic indicators and datasets within each of the 10 comparison countries. These indicators are represented in figure 2.

Rwanda shows strong potential to scale mHealth, as indicated by its top five positioning in 57% of the selected indicators.

In terms of ranking, Rwanda sees a broad spread of indicator ranks, including 23% in the topmost position (rank 1) - the third highest across the mNutrition comparison countries. The average for top ranked indicators when compared across mNutrition initiative countries is 10%, placing Rwanda considerably higher than the norm for this indicator.

Rwanda's number one ranking in 3 mHealth feasibility indicators places it in the 80th percentile compared to the 10 comparison countries.

Figure 2

General market indicator metrics – top 5 country ranking

INDICATOR METRICS*	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	**Kenya** 67.21%	**Zambia** 54.63%	**Ghana** 51.84%	**Rwanda** 50.82%	**Nigeria** 48.83%
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 have been left in original format. Data in market indicator analysis normalised for cross indicator comparison.

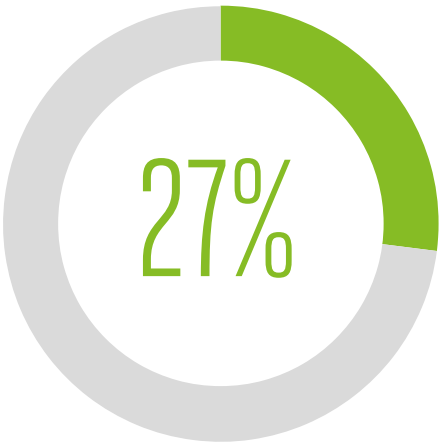
Rwandan market indicators

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

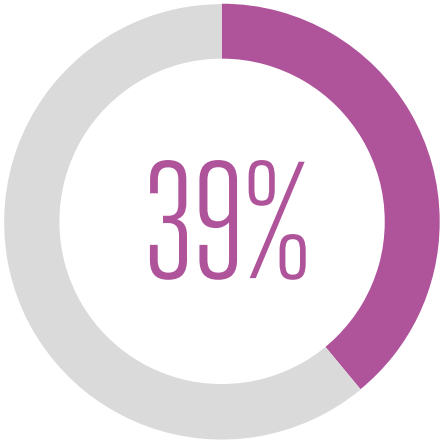
Figure 3

Mobile phone use – unique user penetration[13] versus total access to mobile

Total unique user penetration



Female access to mobile phone



Source: GSMAi Q1 2013 and Divided We Call: Disparities in Access and Use of Mobile Phones in Rwanda; University of Washington 2012.

Of those users able to access a mobile device, approximately 33% are female and 67% are male[14]. This is a relatively strong gender bias when compared to the mNutrition comparison countries.

As part of the quantitative evaluation process, the 10 GSMA mNutrition comparison countries were evaluated, scored against a set of comparable indicators and 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 this methodology is read in conjunction with this report.

13. Unique users are specific mobile users, not taking into account multiple SIM ownership. Penetration rates reported by regulators are generally higher as they do not consider multiple SIM ownership.
14. Divided We Call: Disparities in Access and Use of Mobile Phones in Rwanda; University of Washington

Figure 4

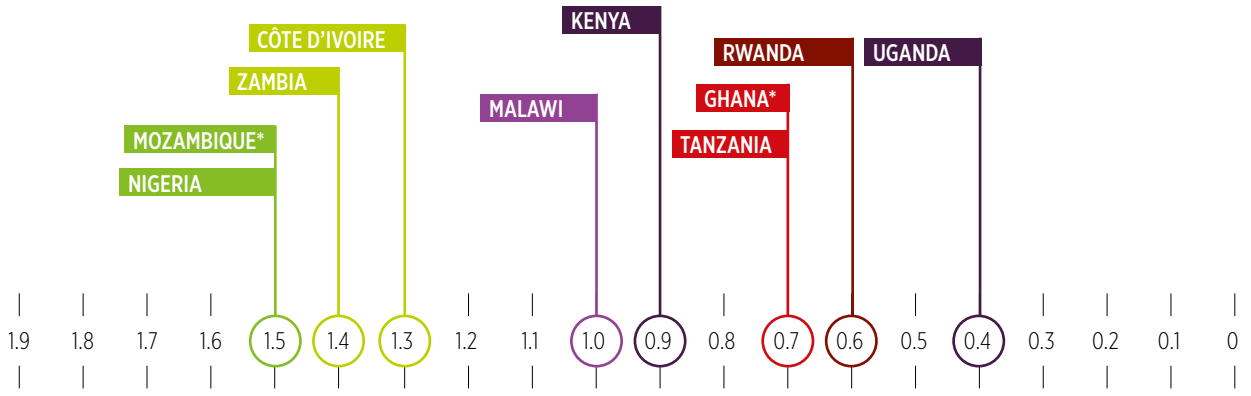
Criteria considered for opportunity matrix indicator

The opportunity matrix has a scale range centred on a score above or below 1. A score of 1 is ideal a score above 1 is better than ideal and a score below 1 is less than ideal. The gradation of scoring is shown by the proximity of the score above or below 1.

It is important to consider the proxy indicators which are included in the category and output drivers of the opportunity matrix scale as these dictate the output score; seemingly counterintuitive assumptions relating to countries can be clarified by considering these proxy indicators and their influence on the outputs.

Figure 5

Rwandan health burden opportunity matrix

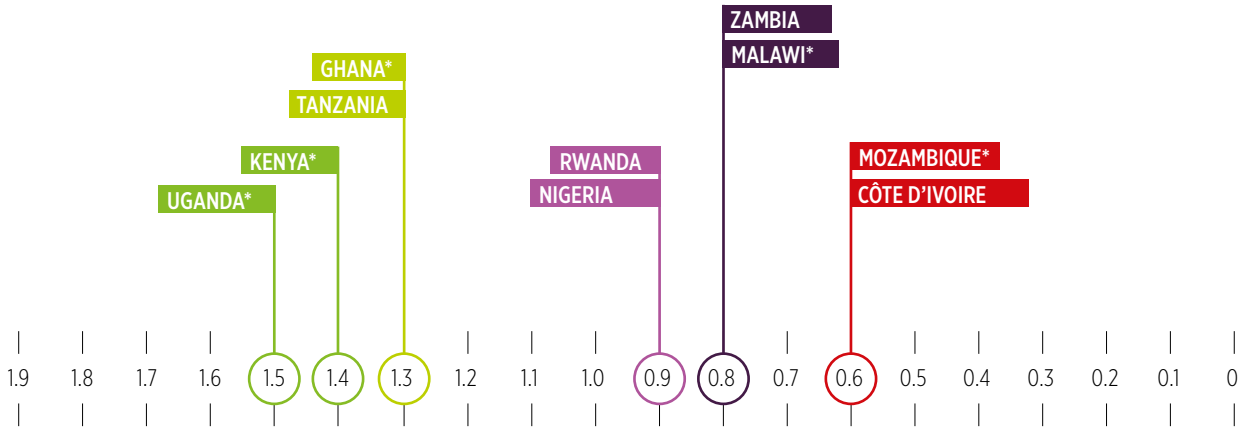


* Denotes rounding of figure

Rwanda's comparative index of 0.64 indicates a lower health burden opportunity compared to other comparison countries, although it is somewhat higher than Uganda, the lowest country for this indicator. This is partly due to the immense inroads the country has made in tackling health burdens, including mortality rates in the under-fives and new mothers. Despite this, there remain a number of health challenges where mobile can assist. Nutritional deficiencies within the country result in a stunting rate which is the third highest in children under-five across the comparison countries. A lack of basic knowledge around nutrition has been identified as an underlying reason. Mobile has an important role in bringing basic nutrition, cooking and food preparation knowledge to Rwandans via pertinent pushed messaging.

Figure 6

Rwandan addressable market opportunity matrix

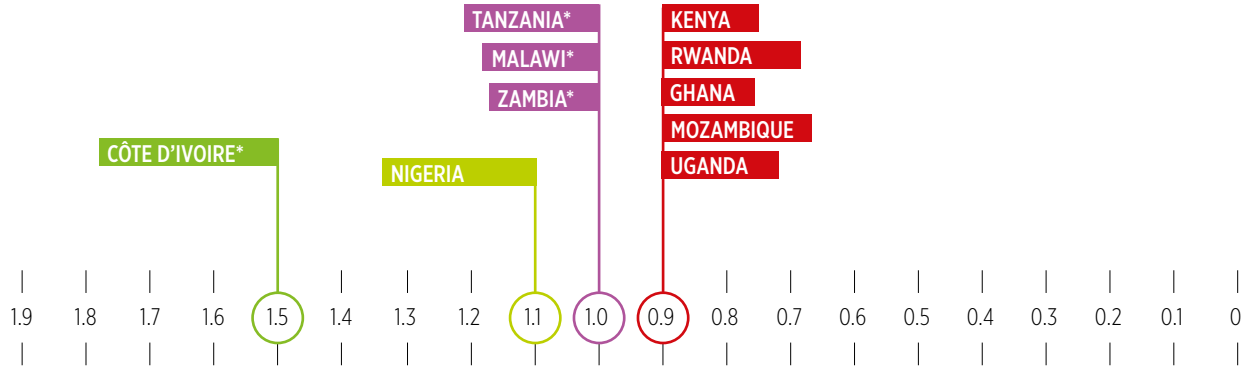


* Denotes rounding of figure

Rwanda has both a high population density and a fast growing population and yet the indicators for the number of pregnant women and number of women with children under-five is the lowest of the mNutrition comparison countries. Adoption and take-up of mobile services are more positive features. The country exhibits the highest rate for combined penetration, growth and coverage of mobile, while mobile penetration rates are also within the top five for this indicator. The sophistication of the Rwandan mobile user is also relatively high. The percentage of connections which are broadband-enabled are the highest of the mNutrition comparison countries.

Figure 7

Rwandan ability to pay opportunity matrix



* Denotes rounding of figure

Rwanda sits just outside the main group of mNutrition countries for opportunity to pay indicators.

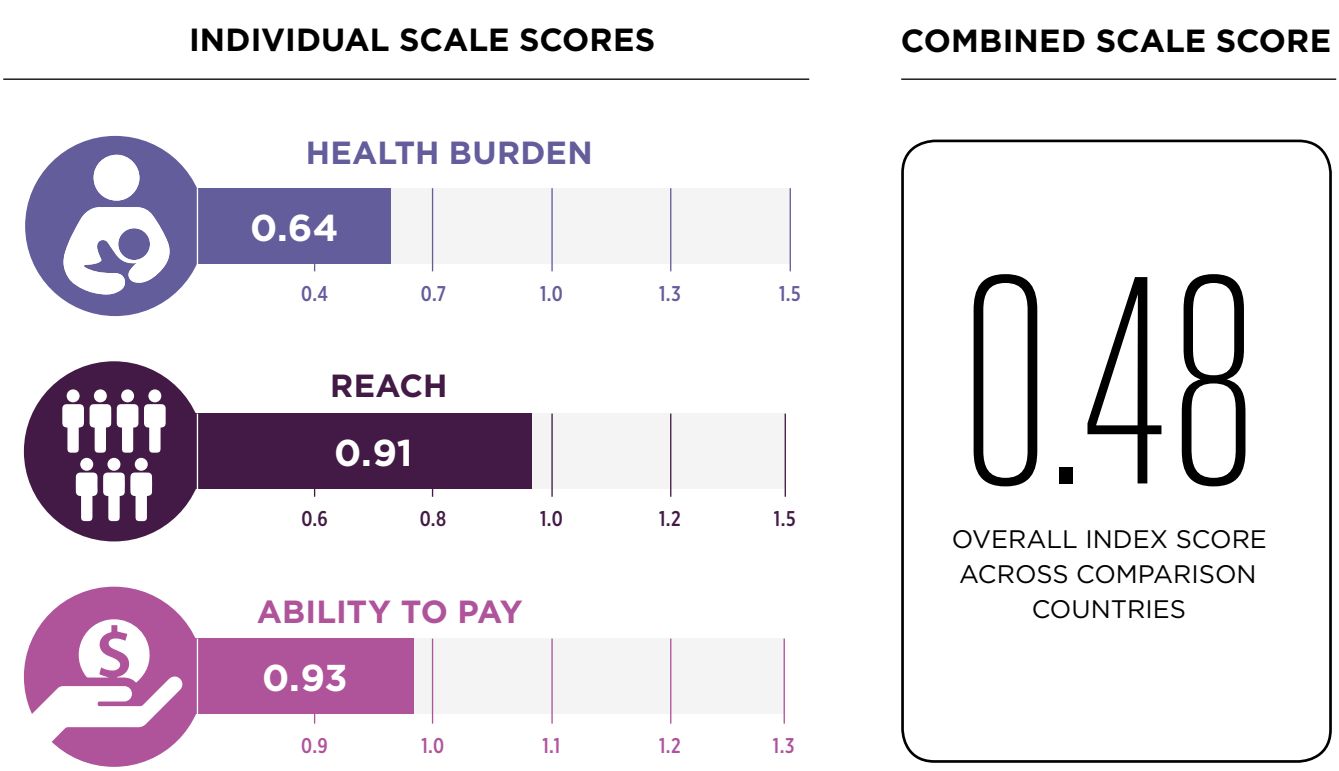
The distribution of wealth indicators are moderate. Rwanda shows a Gini coefficient figure within the top five for the GSMA comparison countries (#4), but ranks lowest (10#) for distribution of wealth (with share of wealth held by the top 10% of society).

There are high out-of-pocket spend indicators on health (#3) and low government and external funding (joint 9th) in Rwanda. This would indicate an opportunity for a B2C mHealth service proposition (combined with an end-user desire for such services) but the high percentage of individuals on less than $1.25 a day, estimated to be approximately 63%[15] of the population, means that developing a sustainable and commercial mHealth model might be challenging.

15. The World Bank <$1.25: 2012

Figure 8

Rwanda opportunity to scale services*



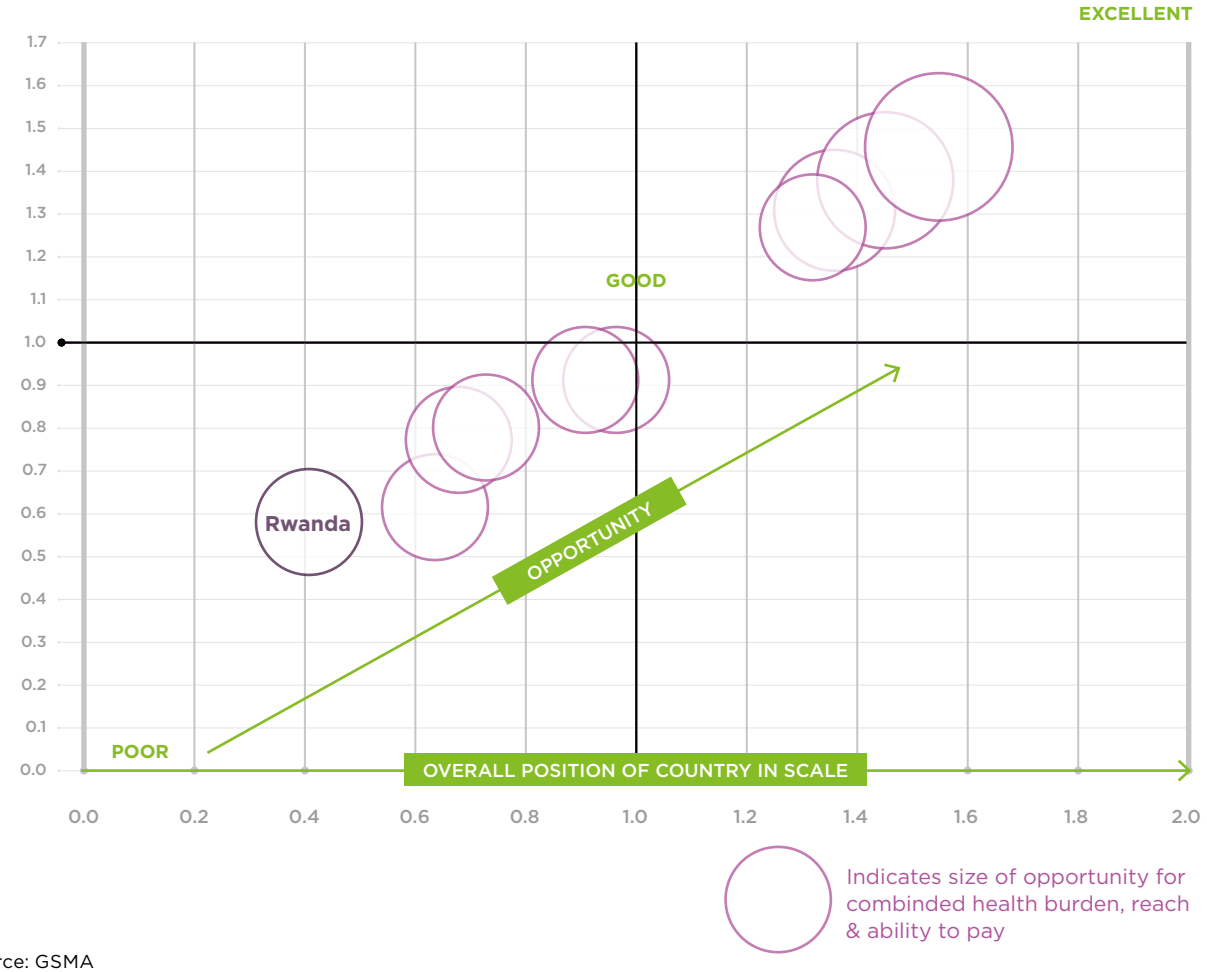
Source: GSMA. *Please see GSMA methodological framework for additional clarification on quantitative scoring

When the aggregate mHealth driver indicators are considered as a combined output (Figure 8) the opportunity index score for Rwanda shows an acceptable combined score, some way from ideal feasibility score parameters but with good potential for the future.

Rwanda sees a number of highly positive indicators for general markets indicators in relation to mHealth. When these indicators are combined into categories of opportunity which consider particular health drivers, those prospects become less evident. This demonstrates a market with good potential but still requiring a degree of development. The GSMA, through its stakeholder partners, is committed to providing support which will facilitate and streamline this development.

Figure 9

Rwandan combined indicator rank and comparative size of market opportunity



Source: GSMA

* Purple circles denote other GSMA nutrition initiatives countries.

** Data shows overall ranking and size of market opportunity denoted by size of sphere.

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

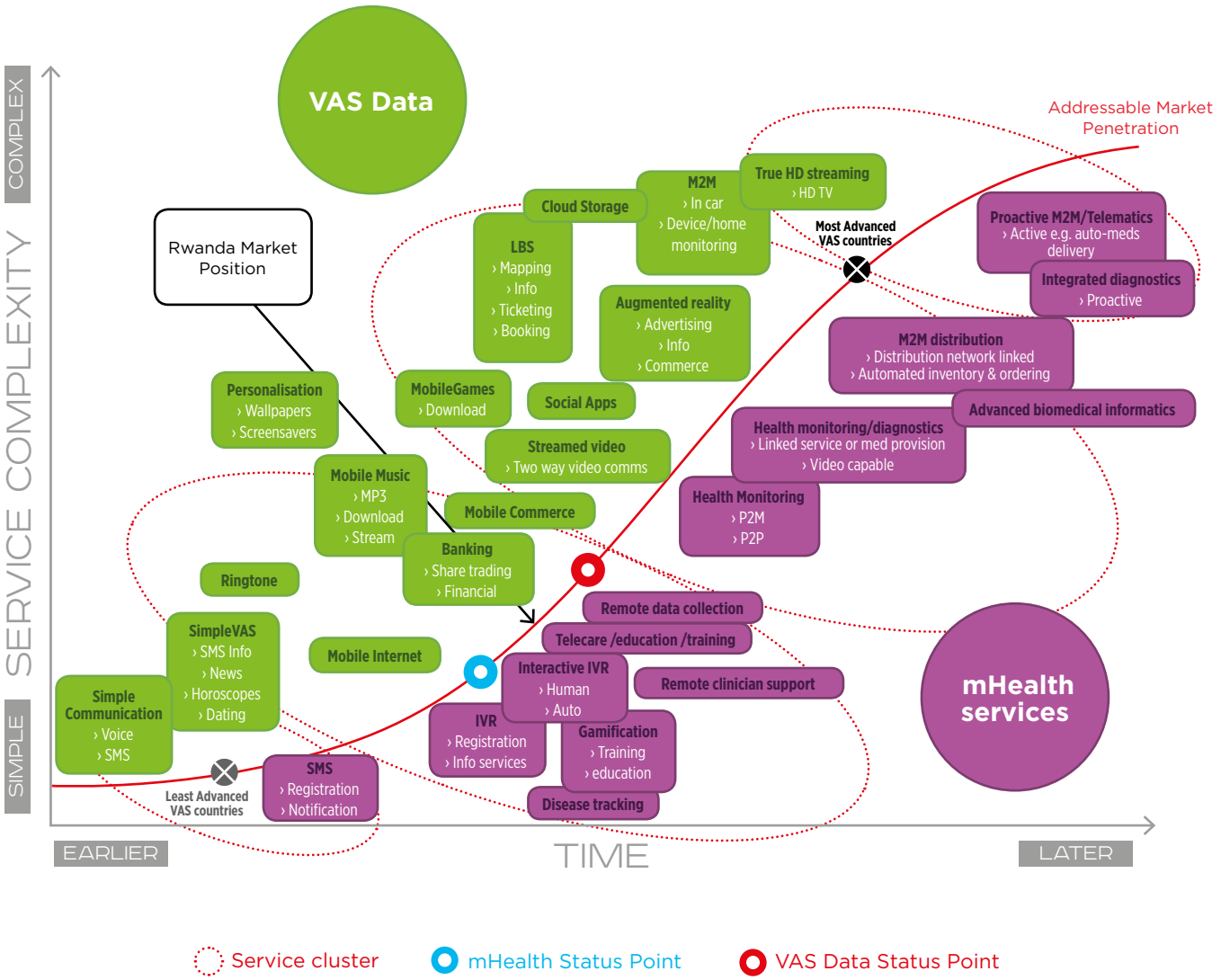
Figure 9 compares overall ranking of GSMA mNutrition countries and combines this data with the overall size of the opportunity when all indicators are considered. The combined opportunity is an indication of the capacity (size of opportunity) and the position on the scale gives an indication of ease with which mHealth services might be launched (degree of challenge versus opportunity).

As previously highlighted, the opportunity status in Rwanda is hindered by a number of challenges. This feature is reflected in its positioning on the complexity of launch scale relative to other a nutrition countries. None of these challenges are considered insurmountable or critical to the successful launch of mHealth services and there are prescribed routes to success, many of which are discussed in this report. The overall size of the market opportunity (denoted by size of circle) is comparable with the majority of mNutrition countries.

Mobile service development

Figure 10

Rwandan mobile Value Added Services evolution



Source: GSMA

The dotted service clusters in Figure 10 denote four evolutionary points within the Value Added Services (VAS) and mHealth service environments. The evolution of mHealth services corresponds with VAS evolution and is depicted above.

Rwanda's VAS and mHealth service development are shown with a red and blue indicator circle respectively. The distance between most developed service markets and least developed service markets denotes overall maturity. 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 e.g. automatic prescription ordering, machine-to-machine, reimbursement and decision support. The position of Rwanda on this maturity scale was evaluated by considering overall market maturity data. This considered a number of usage metrics including total number of VAS and mHealth services offered, complex versus simple offering ratio, data Average Revenue per User (ARPU) levels and increase over defined periods. This process was replicated across the mNutrition comparison countries, in order to generate a scale of service maturity. The distance between the mHealth and VAS status points indicates the state of mHeath service development (the further apart, the larger the service gap and greater requirement for development).

Rwanda has seen immense growth in subscriber indicators; unique subscribers grew by over 246% over the 2008-2013 period, while overall penetration rates have increased by a Compound Annual Growth Rate (CAGR of 24%), over twice the average rate for the mNutrition countries. However indicators around the use of mobile services have not increased correspondingly. Rwanda has seen the largest fall in ARPU according to GSMAi data of all comparative countries (down by a CAGR of 23%) over 2008-2013, which is well above the average of 9% for this period.

A potential explanation for this fall in CAGR, despite a marked increase in subscriber numbers, is the democratisation of access. In the early stages of mobile service, take-up costs are high leading to the most affluent segments using mobile. This niche segment has a high CAGR as well as a low volume of users. As mobile penetrates lower socio-economic segments, the volume of subscribers increases while CAGR falls. This is an opportunity driver for mHealth, as BoP segments are the most likely to benefit from these services.

Smartphones provide a richer and more sophisticated environment to provide health services, which coupled with competitive data pricing, encourages the use of VAS. In Rwanda, smartphone penetration is 12% of the total devices owned, placing the country 8th overall across the comparison countries. Of the 443,110 (Q1 2015) benefactors of mHealth service providers tracked by the GSMA in Rwanda, 42% are accessed over a basic device compared with 17% using smartphones and 8% using feature phones.

Mobile broadband encourages a more sophisticated use of mobile by improving the experience of VAS, which, when combined with competitive data pricing, encourages further use. mHealth services can benefit from this increased sophistication. In Rwanda there were approximately 1.1M broadband users (Q4 2014). This means that 28.4% of Rwandan subscribers had mobile broadband capability to access broadband services. This places Rwanda in the top position for this indicator. Enabling mHealth service providers in the country to focus on data connectivity in their patient service support.

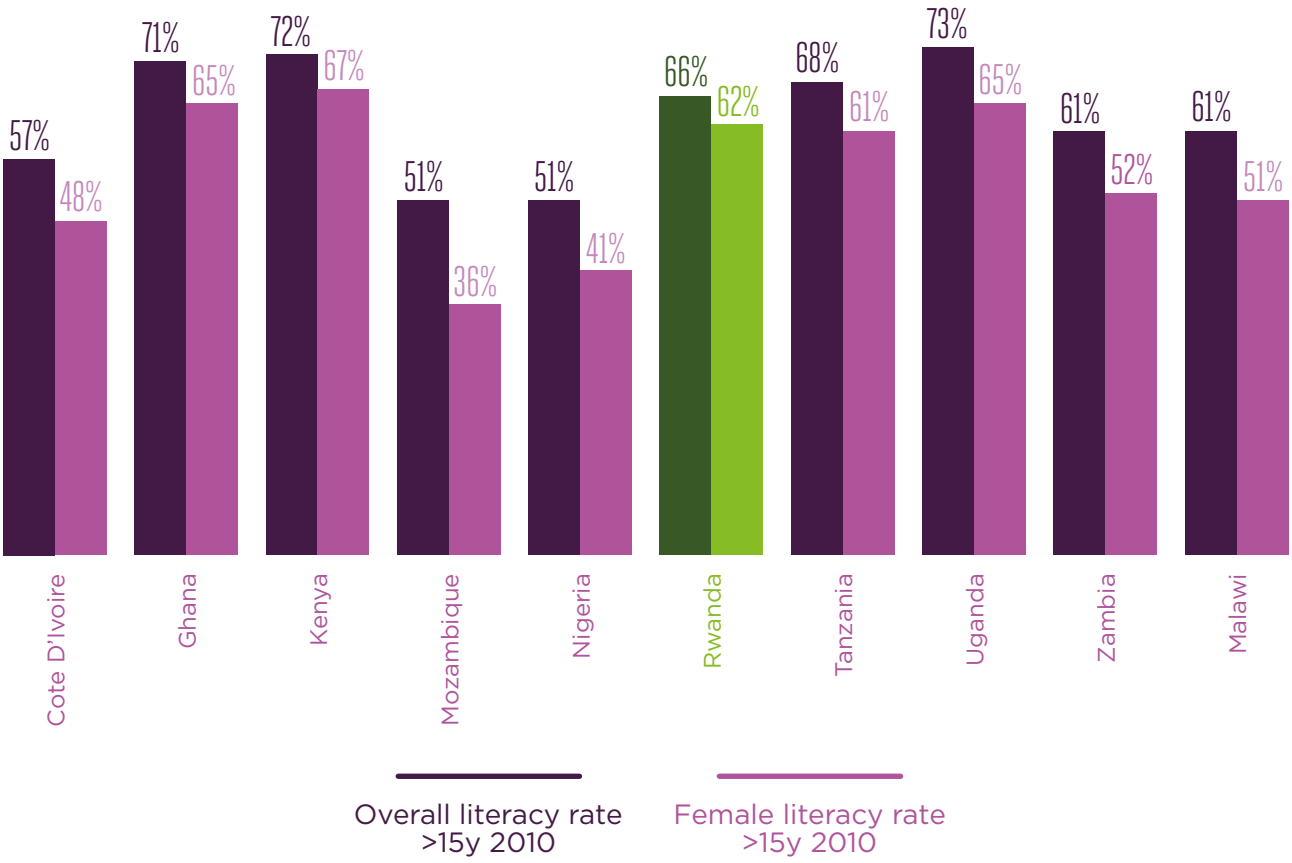
Features of Rwandan VAS ecosystem

There are a number of advantages in providing SMS health and nutritional information and the format is conducive to both funded (B2B) and premium SMS commercial (B2C) models. The approach is also highly inclusive and able to access an extensive audience, based on penetration and ability to receive SMS.

Part of the GSMA mHealth product concept includes a freemium upsell stage-based SMS messaging service which is geared to MNCH in its content design.

Figure 11

Rwandan total literacy and female literacy rates



In order to reach a target audience, health and nutrition content must be in a format that can be consumed. In Rwanda there is a high level of literacy, in comparison to the other comparison countries. Female literacy, at 62%, is well above the average of 55%, while the ratio between male and female literacy rates are the closest of all the comparison countries.

mHealth service provisioning in Rwanda using SMS comes with a number of challenges. Due to recent market pricing adjustments. SMS costs have risen almost five-fold in 2014, creating challenges for the financial sustainability of text-based services, as payers are finding it increasingly difficult to purchase or subsidise.

Rising costs in providing SMS have been blamed for the increases, but a migration of voice minutes to text messaging in the country may also have influenced pricing strategies. According to the Rwanda Utilities Regulatory Authority (RURA), approximately 7.42bn on-net-and-off net SMS were sent in 2014 compared to 963m in 2013 (a 653% increase). Moreover this increase occurred during a period of increased excise tax on airtime, (rising from 8% to 10%), operator instigated price increase on voice minute charges and the market expanding into lower spending customer segments. The combination of all these factors has influenced charging strategy and may increase the difficulty in ramping-up mHealth messaging-based services.

Mobile and VAS sector alignment to mHealth

The mobile and VAS sector within Rwanda is highly competitive and benefits from three operator competitors. This creates a competitive market defined by a drive for subscriber acquisition, avoidance of churn and increasing customer stickiness.

Mobile health innovation coming from operators has been limited in Rwanda. There have been some partnerships between MTN, the government and mHealth service providers but less than seen in other countries. Those partnerships which have been forged have been highly successful and this is, in no small part, due to the organisational structure of the Rwandan MoH. The government has been demanding in its requirements of potential mHealth partners requiring a highly structured approach from them. It has made integration with existing plans and strategies integral to all negotiations. This is a reflection of the government's strategy around Vision 2020, its ongoing project to transform Rwanda into a knowledge-based middle-income country, and in particular the requirement of partners to fit within the plan and meet transparency and accountability standards. The rigidity of this strategy is such that even funding agencies have been instructed to leave the country if they cannot acquiesce to these requirements[16].

MTN has acquiesced to the requirements of the country's MoH signing a memorandum of understanding in 2014 toward accelerating progress in the MDGs (Millennium Development Goals). This public/private partnership agreement was defined to include only those development priorities identified in the country with specific attention paid to the development of mobile phone applications which "ease access to health care, support agricultural productivity and education". The operator was also broadly accepting of the requirement for strong evidence of efficacy in any mhealth initiatives, based on the MoH policy of rejecting any approach not justified by robust data. This is an unusual feature as amongst the GSMA mHealth priority countries; it has proved highly problematic convincing operators of the need for strong evidence and M&E.

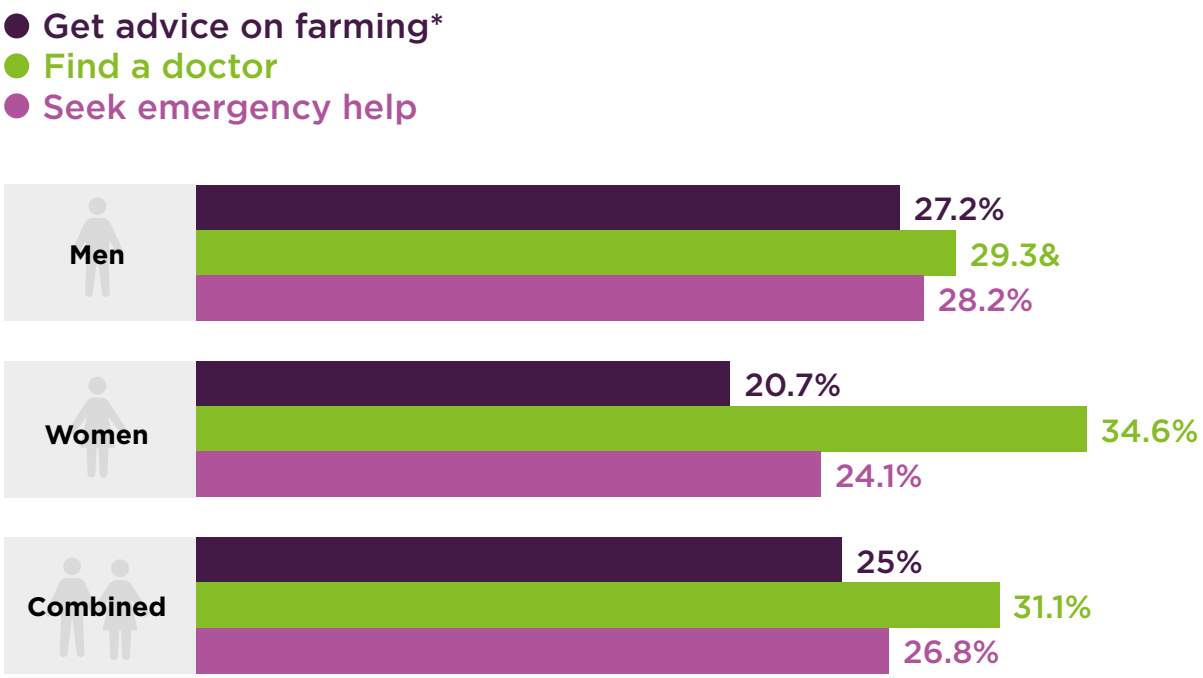
Consideration of in-country mobile usage scenarios is important when planning mHealth services which will have the most impact on health burdens. In Rwanda, there is a high incidence of knowledge seeking using mobile.

16. Rwanda's Historic Health Recovery: What the U.S. Might Learn: The Atlantic,February 2013

Figure 12

Use of mobile by device for knowledge seeking

The response of Rwandan mobile phone owners to the question
'Have you ever used your phone to...'



*This response is considered due to the impact of good nutritional practices on health which rely on efficient farming practice and behaviour change

Source: Divided We Call: Disparities in Access and Use of Mobile Phones in Rwanda University of Washington and MIT

Figure 12 demonstrates the efficiency of targeting women with mHealth services in Rwanda. Over a third of all women respondents have used their mobile phone for this activity, almost a fifth more than men when comparing both groups.

There is also evidence that a larger proportion of households, than in comparative countries, are headed by women in Rwanda (up to 29% in rural regions) as a consequence of the Rwandan conflict during the 1990s[17]. The country is also unusual in having a slightly higher ratio of females to males, 50.2% according to estimated 2014 data from the CIA Factbook.

One of the metrics considered in evaluating the opportunity for mHealth in Rwanda was the number of mHealth services and their relative maturity. This maturity was measured against sustainability criteria and specifically the length of time that services have been live.

Services are deemed permanent services rather than pilots if they have been live for between 3 and 5 years. The average length of time mHealth services have run amongst the 10 mNutrition countries is 4.5 years.

In Rwanda, 88% of GSMA tracked mHealth initiatives have run for longer than 4.5 years. This places Rwanda in the 54th percentile across the mNutrition comparison countries.

17. Rural poverty in Rwanda. Rural poverty organisation and IFAD. http://www.ruralpovertyportal.org/country/home/tags/rwanda

The B2B vs B2C sectors

The mHealth opportunity in Rwanda is made up of both B2C and B2B opportunities. The B2C and B2B market opportunity indicators are represented in Figure 13 below by the size of the circle. The larger the circle, the greater the opportunity for that particular indicator compared with the others shown. The combined B2C and B2B opportunity for Rwanda is indicated by the highlighted index score beneath the main chart.

The data shown is a set of reference points and provides a normalised and averaged view of these opportunities. They are not specific to any particular stakeholder such as a mobile operator, NGO or health service provider.

Figure 13 indicates a B2C opportunity in Rwanda with combined indicators, placing the country in the ideal score zone of 1. This is primarily due to the strong spend on mobile services relative to GDP and the initiatives which the government has instituted to tackle the number of Rwandans subsisting on or below the poverty line.

Of those services tracked by the GSMA, 42% have secured multiple sector partnership. This is considered an important prerequisite for successful B2C approaches. However, while there seems to be potential for B2C, there is currently very little commercial development within the country. There are no mHealth services currently tracked by the GSMA which could be defined as stand-alone revenue generating initiatives.

The comparatively low percentage of government and NGO funding in Rwanda shows a market that has less stimulus for B2B based approaches. However Rwanda does have several MoH mHealth funded initiatives and a successful owned and funded mHealth service in the RapidSMS service. This initiative clearly demonstrates the potential of a targeted and well defined strategy and what can be achieved when launching a mHealth initiative despite a low overall health spend.

Figure 13

Relative B2B and B2C indicators

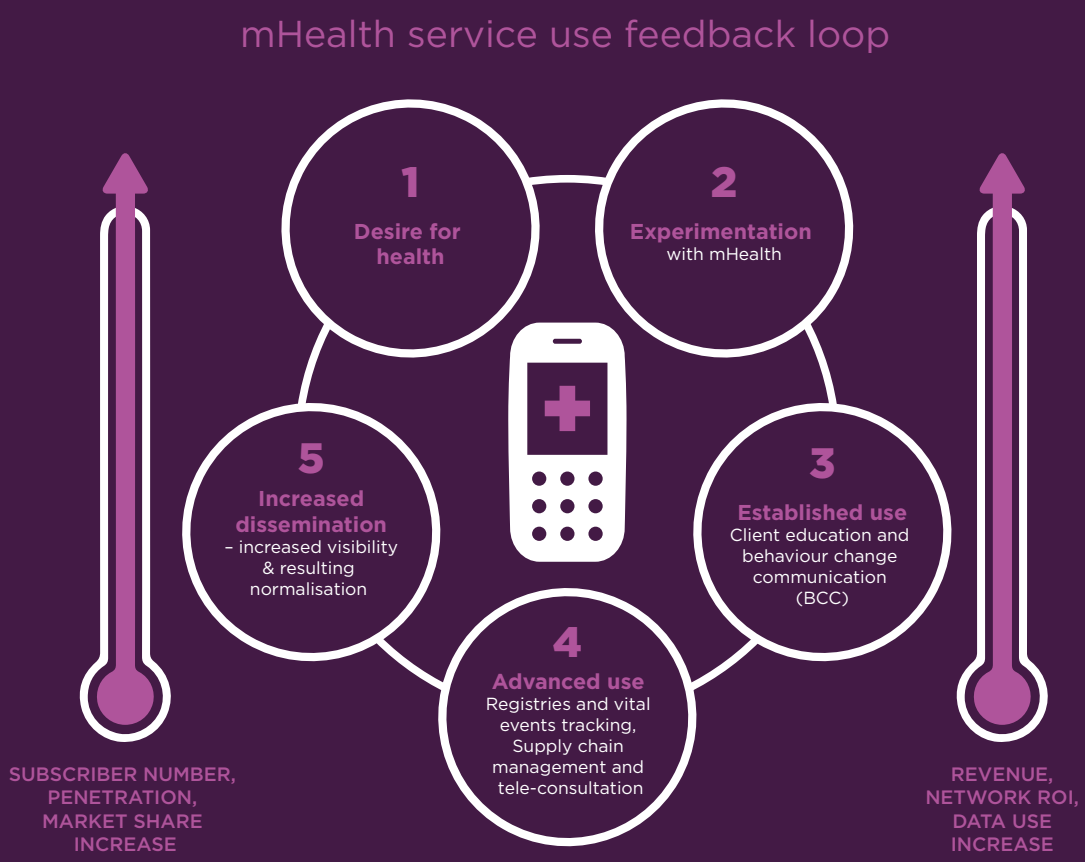
Source: WHO, The World Bank and GSMA extracted data

Mobile market view

The mHealth opportunity has two distinct pathways for mobile operator stakeholders. On the one hand, 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 a service proposition built around providing and gathering health information (push and pull) and health monitoring (tracking disease and health indicators). From the customer perspective, there is a strong inbuilt impetus to consume services which can improve or ensure health. These features combine to create the potential for mHealth services to become self-perpetuating.

Figure 14

mHealth normalisation process and the impact on mobile operators



Source: WHO/World Bank/GSMA extracted data

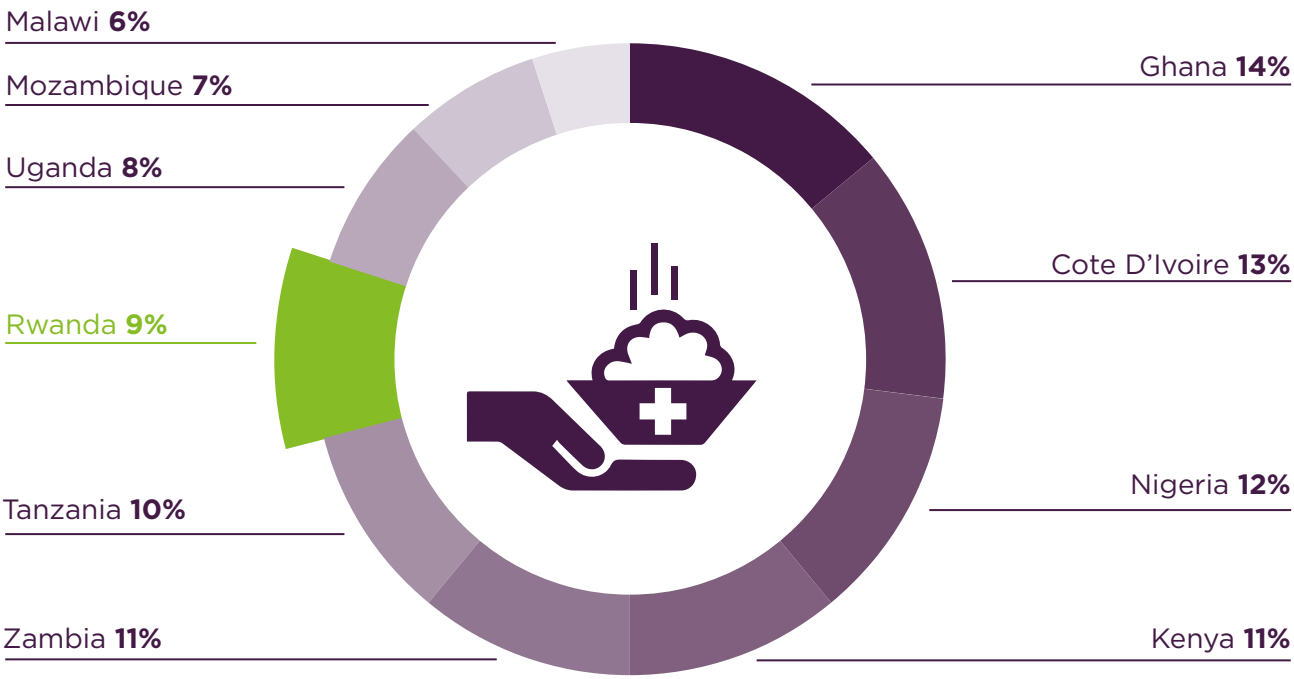
The Rwandan mobile market

Rwanda has a unique user penetration rate of 34% (Q4 2014[18]). This places Rwanda 7th amongst the mNutrition comparison countries and below the average penetration rate for Africa of 40% (Q4 2014).

Reported ARPU figures from the GSMAi[19] show an average ARPU of USD$3.32 per month (ARPU per subscriber full year average 2013). This positions Rwanda in 10th place across the mNutrition comparison countries, marginally behind Malawi and well below the African average of $10.52. The position improves when ARPU is compared with GDP per capita. Considering this metric Rwanda sees approximately 6.3% of its population's GDP per capita spent on mobile services, placing the country 7th in the GSMA comparison countries for this metric.

Figure 15

Comparative mobile penetration rates of GSMA mNutrition comparison countries - Rwanda extracted



Unique Mobile Subscriber penentration (Q4 2014)									
Ghana	Cote D'Ivoire	Nigeria	Kenya	Zambia	Tanzania	Rwanda	Uganda	Mozambique	Malawi
51.9%	49.6%	44.4%	41.8%	40.6%	38.1%	33.6%	30.5%	28.2%	23.7%

Source: GSMAi

18. Latest confirmed GSMAi data
19. GSMAi: Data used in feasibility evaluation are not those reported here

General mobile market indicators

Rwanda is a market defined by its growth. The country has seen exceptional increases in subscriber numbers.

This growth is likely to continue in the mid-term, as the country has a relatively low unique subscriber penetration rate. Increasing the average spend on mobile services and data VAS will be more challenging based on levels of in-country income. Rwandan poverty headcounts have fallen since the millennium year-on-year, but at a slower rate than other countries amongst the GSMA mNutrition comparison countries.

Market differentiation will become an important feature in boosting an increase in average mobile service spend. mHealth provides a differentiation opportunity which can add a competitive edge to mobile operators.

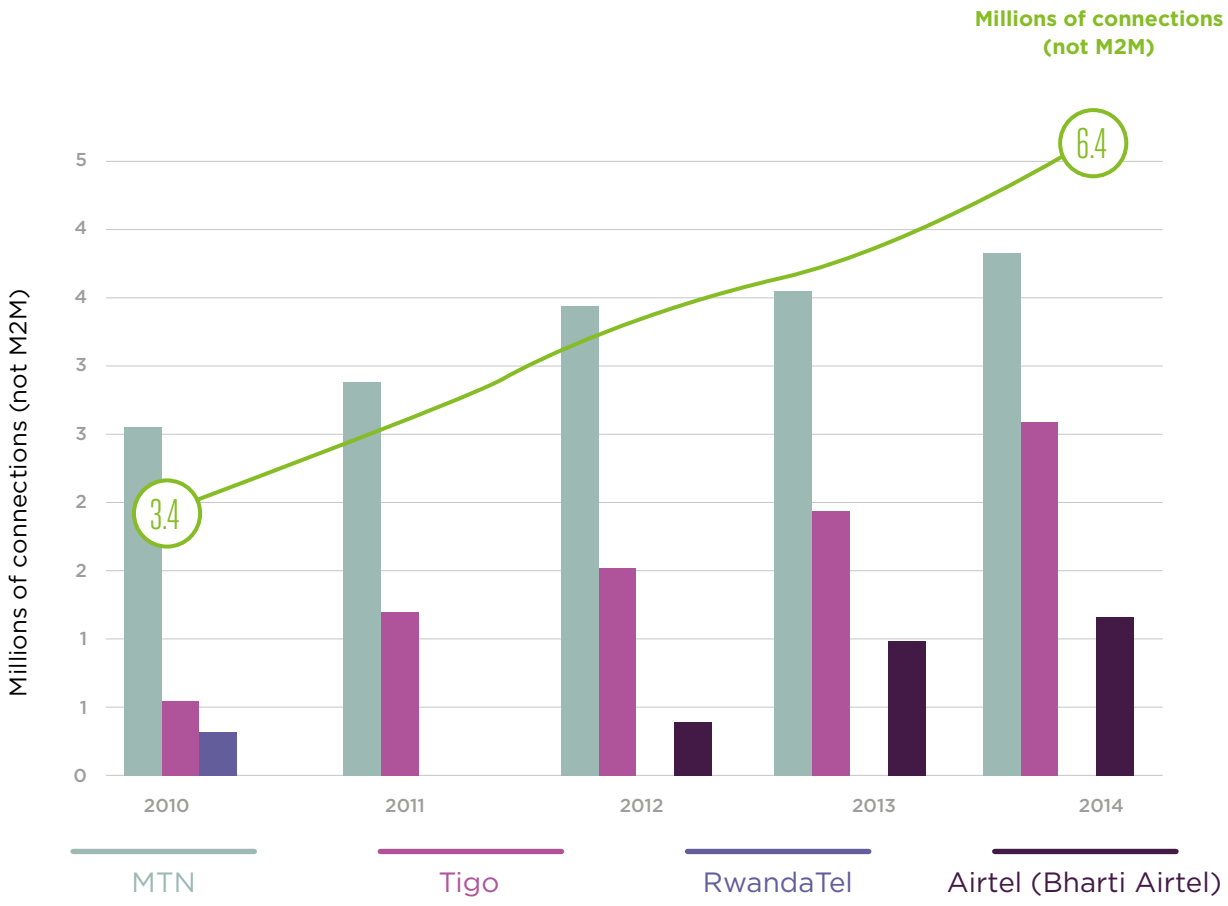
In Rwanda, there is evidence that the mobile market is becoming defined by price; the cheapest service being the most popular. The reaction to price increases from MTN, Tigo and Airtel, of approximately 28%, 36% and 25%[20] respectively for voice calls and mass user migration toward SMS use, illustrate this point. Within such a market, differentiation can provide a strong retention feature, particularly if those services offered are deemed to be valuable and/or unique.

mHealth service innovation can also open up new markets in the B2B sector. Governments are seeking to improve healthcare provision, to increase efficiency and to reach and reduce the costs associated with providing it. Mobile has much to recommend it in these areas. As partnerships progress between mobile operators, government and NGO payers, demand will be generated in the market. As this demand develops, a more commercial flavour is likely to evolve around the subsidisation model, potentially exploiting micro insurance or mobile savings.

20. The Rwandan New Times, April 2015

Figure 16

Operator subscriptions Q4 2010 to Q4 2014



Source: GSMAi

MTN remains the dominant player in Rwanda, with a 60% share of the market, but has seen its market dominance steadily eroded. Tigo has been its main rival, showing impressive annual gains in market share, from 16% to 40% with a CAGR of 47% for the period. Airtel joined the market in 2012 and has injected additional competition and a rapid acquisition of market share, growing almost 200% from launch. This competitive environment creates an obligation for Rwandan mobile operators to innovate service offerings to retain customers and dissuade churn.

Mapping mHealth service penetration and reach in Rwanda

As part of the qualitative review of Rwanda's feasibility as a mHealth target country, a service mapping process was undertaken. A combination of survey, interview and desk research was used and the following sections highlight some of the insights from these activities.

Aligning Rwandan mHealth initiatives to desired health outcomes

- 7 live mHealth services deployed with partnerships from 19 different organizations, representing multiple stakeholder groups, are currently being tracked
- Rwanda boasts the first fully scaled mHealth service which is owned and funded by the government – RapidSMS
- A further 2 mHealth services are planned to be scaled across Rwanda

Overall mHealth coverage in Rwanda

Graphical representation of total health services and regional breakdown

Figure 17

mHealth services: regional distribution[21]

Includes services currently planned for scale

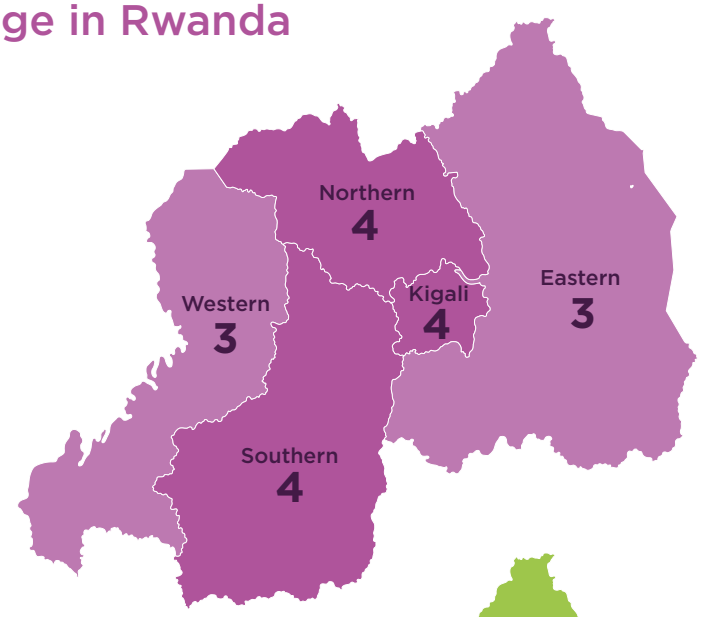


Figure 18

Stunting in children under 5 (height for ages, % below -2SD): regional distribution[22]

Rwanda Demographic and Health Survey, 2010

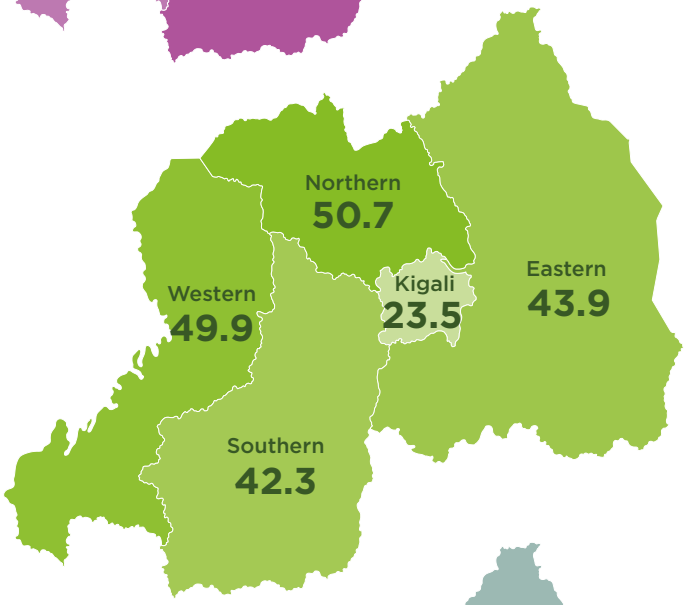
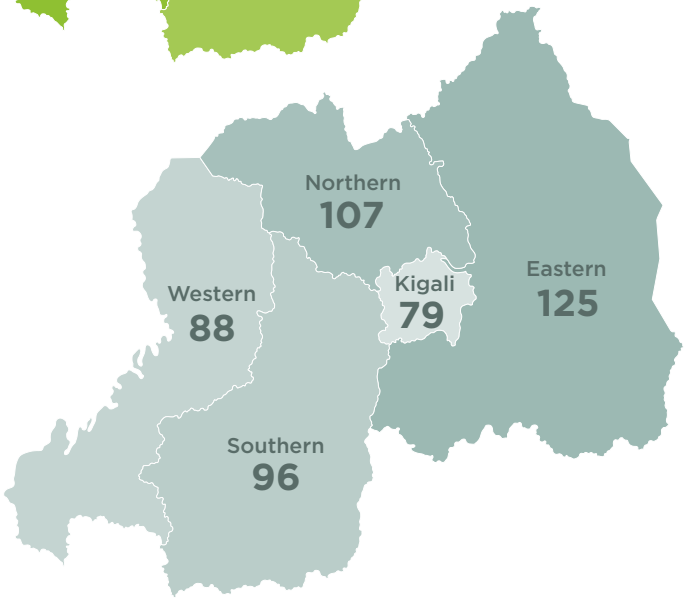


Figure 19

Children under 5 mortality rates per 1,000 births: regional distribution



21. Includes services currently planned for scale
22. Rwanda Demographic and Health Survey, 2010

Children's nutritional status

According to the Rwanda Demographic and Health Survey, 44% of children under-five are stunted or too short for their age. This indicates chronic malnutrition. Stunting is most common among children age 18-23 months (55%). Stunting is least common among children of more educated mothers and those from wealthier families. Wasting, which is a sign of acute malnutrition, is far less common (3%). Eleven percent of Rwandan children are underweight or too thin for their age.

Health burden indicators

Table 1

Comparison of health burden indicators, relating to maternal and newborn child health and nutrition, from the Northern Province and Kigali City

	North Province		Kigali City	
	Number	Rank[23]	Number	Rank
Under-five mortality	107	4	79	1
% Receiving antenatal care from a skilled professional	98.3	2	99	1
% Delivery at health facility	63.4	5	83	1
% Delivered by a skilled provider	63.8	5	83.1	1
Height for ages - % below -2SD	50.7	5	23.5	1
Number of mHealth service deployments	4		4	

RANKING

GOOD 1 2 3 4 BAD 5

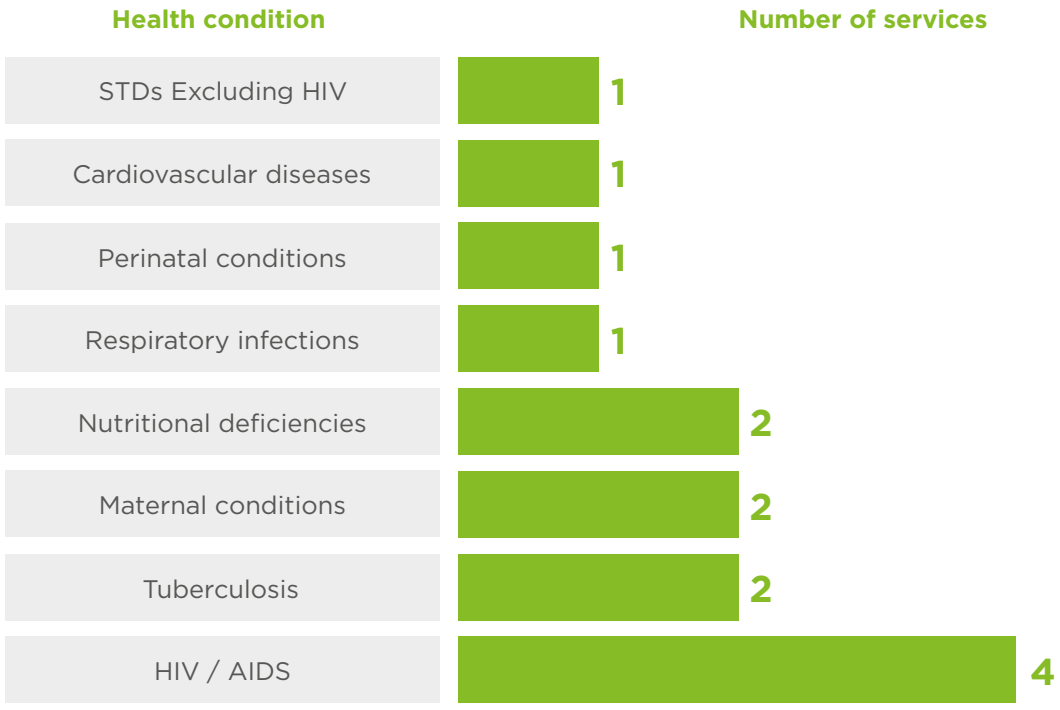
23. Rank indicates performance out of all 5 provinces, where 1 indicates the best performance and 5 indicates the worst performance

The East, South and North Provinces of Rwanda exhibit a similar performance across many of the health burden indicators represented in Table 1, with the North Province exhibiting slightly higher burdens across these indicators. The North Province was therefore selected for direct comparison to Kigali City which appears to be the least burdened across these indicators. A higher under-five mortality, a lower percentage of deliveries at a health facility, a lower percentage of deliveries assisted by a skilled provider and a much higher incidence of stunting in children in the North Province would suggest a greater need for innovative health interventions like mHealth to be deployed which might help alleviate these burdens. Although deploying mHealth services in the most burdened regions might seem intuitive, such actions are not always forthcoming. In Zambia, for example, the most burdened region (Northern Province) only had 2 mHealth service deployments in comparison with 7 in the least burdened Lusaka province.

In Rwanda, there is an equal distribution of mHealth services across provinces with 4 mHealth services available or in the planning stage. This indicates that mHealth is being implemented equally in high and low health burden regions. This equal distribution of mHealth is in line with the government's prioritisation of equitable access to care[24]. Universal access to healthcare ensures that the most vulnerable populations are not overlooked.

Health conditions addressed by mHealth services

Figure 20



Of those health conditions addressed by mHealth services, 5 are amongst the top 10 causes of premature death[25] (respiratory infections, HIV/AIDS, perinatal and neonatal conditions, tuberculosis and nutritional deficiencies).

24. http://www.theatlantic.com/health/archive/2013/02/rwandas-historic-health-recovery-what-the-us-might-learn/273226/
25. https://eahforum.files.wordpress.com/2013/03/gbd-country-report-rwanda.pdf

Health interventions

Figure 21

Health interventions addressed by mHealth services

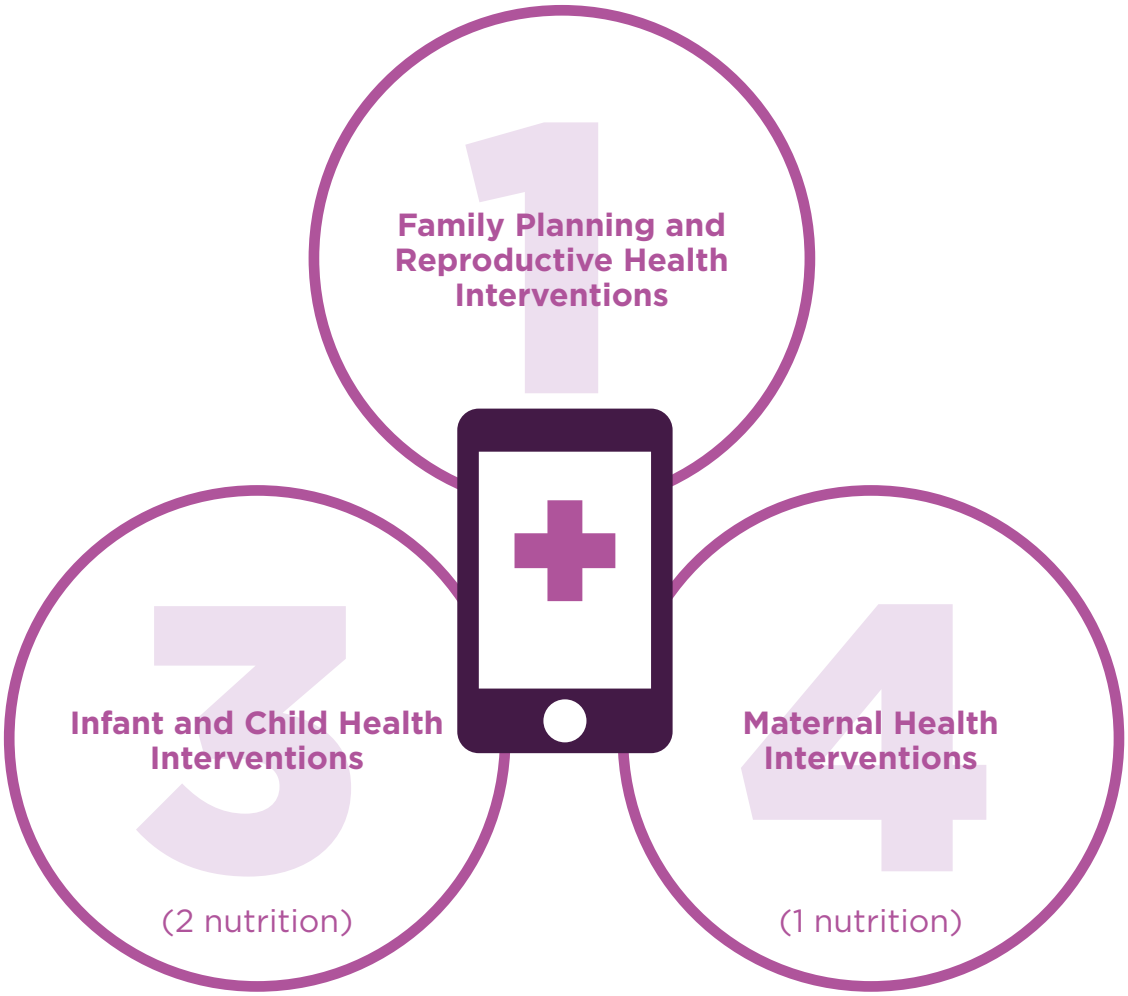


Figure 21 shows that 4 out of the 7 services being implemented in Rwanda and tracked by the GSMA focus on maternal health interventions. There are also two services which have a nutrition component. One of these services RapidSMS Rwanda, which tracks the first 1,000 days along the maternal and child continuum of care, is currently scaled nationally. It is being implemented in line with the government's '1,000 days campaign in the land of a 1,000 hills' to combat malnutrition[26]. The goal of the campaign is to improve the nutrition status of vulnerable populations - children under-five, pregnant and lactating mothers as well as school children. Targeting child segments is important as the Rwanda Demographic and Health survey (2010) indicates that nationally 44% percent of children under-five are stunted and 17% are severely stunted. This report also states that stunting is highest when the birth interval is less than 24 months (47%) or between 24 and 47 months (48%). This may indicate the need for more family planning services to run alongside nutrition services, to educate families around birth spacing, in an effort of improving nutrition outcomes.

26. Republic of Rwanda Ministry of Health

Maternal and child health interventions

Within the 4 services offering maternal health intervention, the issues covered include:

- pregnancy
- antenatal care
- pregnancy complications
- pregnancy danger signs
- emergency preparedness
- labour
- post-partum care
- breast feeding

Health services, offering infant and child health interventions, focus on education around the Prevention of Mother to Child Transmission of HIV (PMTCT), growth and development, immunizations and newborn care.

Quantifying users

Figure 22

Number of mHealth services targeting different beneficiary groups

Beneficiary data provided by 5 of the 7 mHealth services being implemented in Rwanda indicates that in total 443,110 beneficiaries are being reached through these services.

Similarly, 47,842 health workers are currently interacting with mHealth services, the majority of these being CHWs.

Of the 7 services, 2 are exclusively targeting women and children:

- East Africa Maternal New Born and Child Health (EAMNeCH) – World Vision International
- RapidSMS Rwanda - Tracking the first 1000 days along the maternal and child continuum of care – Rwanda MoH

mHealth strategies

Figure 23

mHealth strategies offered by mHealth services

Only 9 out of the 13 mHealth strategies[27] which are tracked in the GSMA mHealth Tracker are currently being provided by mHealth services in Rwanda. mHealth strategies which are not currently accessible in Rwanda include:

- Sensors and point-of-care diagnostics (and monitoring)
- Human resource management
- Financial transactions and incentives
- Tele-consultation

There have been significant improvements made in the area of nutrition in Rwanda. The percentage of stunted children fell from 51% in 2005 to 44% in 2010. These improvements are attributed to the National Plan to Eliminate Malnutrition, which includes active nutrition screening of children by CHWs. mHealth services, aimed at supporting CHWs in executing their role more efficiently and with improved quality of care, could be invaluable in the continued efforts to improve these nutrition indicators. Strategies such as data collection and reporting, provider training and education, electronic decision support and provider-to-provider communication (closed user groups) are all vital strategies which would reduce key health burdens.

27. http://www.ghspjournal.org/content/1/2/160.full
28. Rwanda Demographic and Health Survey, 2010

Other sustainable approaches, included in the National Plan to Eliminate Malnutrition, have been initiated and include infant and young child feeding, community based nutrition programmes, behaviour change communication (BCC), and home food fortification (using micronutrient powders)[28]. Although there are 4 BCC mHealth services in Rwanda, none of these are currently disseminating content to mothers to educate them about their pregnancy or better nutrition practices for their children. Data shows that stunting prevalence is higher amongst children whose mothers have no education (52%) than among those whose mothers have a secondary education or higher (23%). This data supports the argument that there is a clear need to educate women through BCC messaging services, delivered via mobile, in order to stimulate positive behaviour change and adoption of better nutrition practices.

The Rwandan government implemented performance based financing for CHWs has been credited with success in reducing health burdens in Rwanda[29]. There is potential for these incentives to be included within mHealth services as mobile financial transactions and incentives strategies. Mutuelle de Santé, a community based health insurance programme, was initiated by the Rwandan government in 2000. This insurance programme launched and prioritised Rwanda's poorest million inhabitants. The system lowers catastrophic out-of-pocket payments and ensures access for vulnerable populations, focusing on maternal and child health services. It has now been made compulsory and 98% of Rwandans are covered. This initiative could also be integrated with a mobile incentive or micro transaction strategy.

The Mutuelle de Santé approach incorporates community committees, in fitting with the government's decentralisation plans, responsible for mobilizing and registering members, collecting fees and clearing bills from health facilities. The programme has also been used in combination with mobile to tackle the issue of access to health facilities. CHWs can contact health facilities for referrals, using specially programmed mobile phones when pregnancy complications occur and the emergency transport is covered by the insurance.

29. http://www.bbc.co.uk/news/world-africa-32438104

Partnerships and business models

Of the 7 services which the GSMA tracks, 5 have managed to secure a partnership with the Rwanda Ministry of Health (MoH), demonstrating the strong leadership of the MoH within the mHealth industry. The Rwandan Government and the MoH have a clear vision for health; the role which ICT has to play is detailed in its eHealth strategy. This strong leadership from the MoH has ensured that NGOs and other foreign investors who are part of the health sector, and even the mHealth sector in Rwanda, work in line with this vision.

Five mHealth services have secured cross-sector partnerships and there is a varied representation of mHealth stakeholders, including government, academic institutions, technology providers, aggregators, mobile operators, donors and NGOs.

There has been relatively little involvement from the mobile operators in mHealth. MTN has partnered with at least 3 mHealth services but there has been no other investment by mobile operators in the mHealth services covered by the GSMA mHealth Tracker.

Whilst RapidSMS has proved a success, it has faced some challenges. Although the government is currently covering the costs of the project, rising SMS costs are creating challenges for financial sustainability.

Three services are currently funded by the Rwanda MoH. The remaining services are funded by donors. There are no services tracked by the GSMA which currently employ revenue generation models within their business model.

Technology

Figure 24

Technology devices

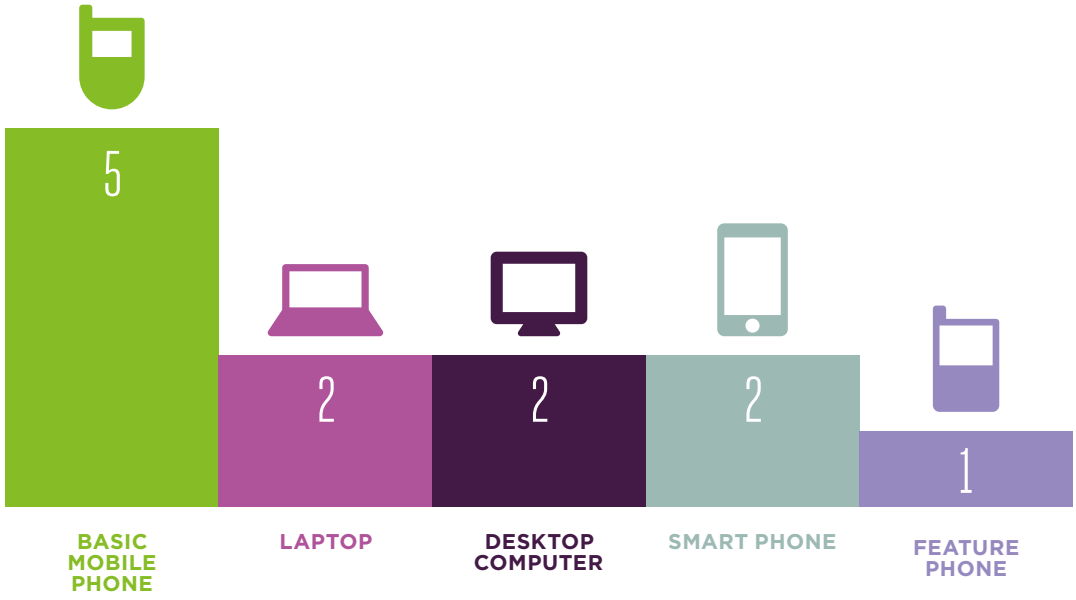


Figure 24 shows that basic mobile phones are still the preferred device within Rwanda to access mHealth services. The largest and most successful mHealth services in Rwanda are implemented over basic mobile phones.

The District Health Information System (DHIS2) has been nationally scaled and achieved best in class results over 40 countries[30]. It boasts a 98% reporting rate[31] and has improved the quality of data (completeness of reporting and internal consistency of the Rwanda health management information system data). DHIS2 is not yet being implemented over mobile, as the government remains sceptical about the use of smartphones for data collection in Rwanda. This may limit development of mHealth services to those basic services which can be offered over SMS, USSD or Interactive Voice Response (IVR).

30. Republic of Rwanda Ministry of Health
31. http://www.globalhealthaction.net/index.php/gha/article/view/25829

mHealth case studies
Rwanda

MoH-Led Case Study: RapidSMS[32]

mHealth use case

RapidSMS is an open source information technology platform using mobile technology innovation. It was introduced by the Government of Rwanda in 2009 to address and track the high rate of maternal and newborn deaths as a national development priority. RapidSMS is a community-based approach used by CHWs to transmit maternal and child health related indicators which contribute to high maternal and child morbidities and mortalities[33].

Features include[34]:

- Registration of pregnant mothers
- Reminders sent out for pre-natal and ante-natal check-ups
- Tracking of birth, death and other vital statistics of the foetus and newborn
- Enhanced charting and mapping
- Enhanced alerts and feedback
- Additions for the "1000 days" project, tracking infant weight and height through 2 years of age

Delivery channels

SMS

Data is captured in an SMS and sent to the MoH central server hosting the RapidSMS application. Automated feedback is sent to CHWs and health providers to acknowledge reception of each SMS sent and the corresponding relevant actions[35]. In the event of an emergency being logged by a CHW via SMS, the nearest health centre calls an ambulance.

Technology device

Basic phone

Health focus

Maternal and child health (early pregnancy identification, antenatal care, postnatal care, nutrition, disabilities, immunization and life threatening emergencies)

Target audience / beneficiaries

CHWs

Midwives

Doctors

Data Managers

RapidSMS Managers

M&E and National eHealth Coordinators

32. All information captured in this case study is as of Q1 2015 and may not represent most current status
33. http://www.unicef.org/rwanda/RWA_consult_rapidsmsmatnewbornnoc.pdf
34. https://rapidsms-rwanda.readthedocs.org/en/latest/
35. http://www.unicef.org/rwanda/RWA_consult_rapidsmsmatnewbornnoc.pdf

Geographical focus

The RapidSMS project is being implemented across all 5 provinces of Rwanda:

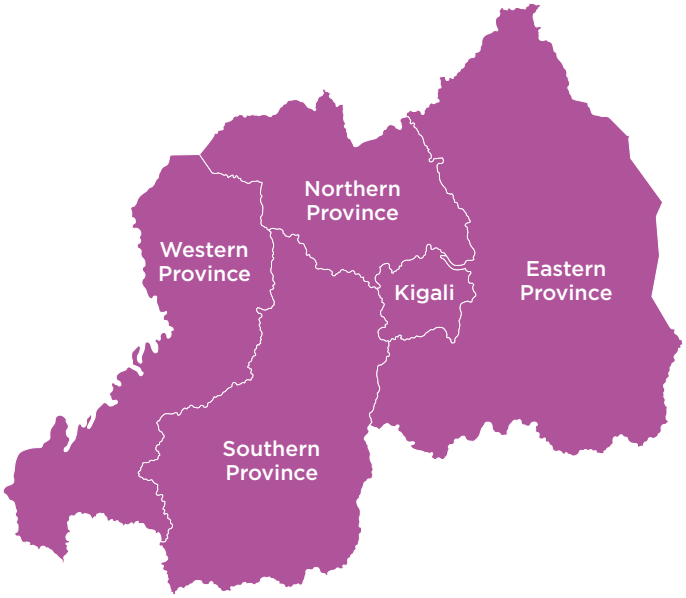
Northern Province

Eastern Province

Southern Province

Western Province

Kigali



Implementation experience

The RapidSMS-MCH system was piloted in the Musanze district, in the Northern Province of Rwanda over a 12-month period and has been scaled across Rwanda[36].

UNICEF have implemented RapidSMS for similar projects across a number of African countries including Malawi, Zambia, Burundi, Democratic Republic of the Congo, Nigeria, Swaziland and Uganda[37].

Partner coverage

- **Government of Rwanda (MoH)** – overall guidance, strategic direction and a budget allocation for the project
- **UNICEF** – initial funding, technical support and maintenance assistance
- **PivotAccess** – technical assistance
- **Management Sciences for Health (MSH)** – technical support for training[38]

Mobile operator partner

MTN - provided reverse billing systems and discounted rates on text messages to allow the government to pay for SMS communications for CHWs

Funding

United Nations Innovation Working Group's (IWG's) catalytic grant

Government funding

Scale

45 000 CHWs registering 295,000 expected pregnant mothers and newborn pairs per year, and 632,000 children under-2 for nutrition surveillance[39]

36. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3542808/
37. https://www.rapidsms.org/projects/?q=&selected_facets=countries_exact:Zambia
38. http://apps.who.int/iris/bitstream/10665/92814/1/WHO_RHR_13.15_eng.pdf
39. Dr Friday Achilefu Nwaigwe, UNICEF's Chief of Health and Nutrition

mHealth case studies
Rwanda

MoH-Led Case Study: Mobile for Reproductive Health Project[40]

mHealth use case

Mobile for Reproductive Health Project (m4RH) is a mHealth initiative focused on increasing young people's access to sexual and reproductive health information. The programme is being implemented by the Rwanda MoH, with technical assistance from FHI (Family Health International) 360's Program Research for Strengthening Services (PROGRESS) project. The m4RH project supports the national strategy released by the Rwanda MoH on Adolescent Sexual and Reproductive Health and Rights. The strategy prioritizes access to information related to the male and female reproductive systems, sexuality and the stages of sexual development, family planning, sexually transmitted infections, sex, gender, prevention of gender-based violence, risky behaviour of adolescents, alcohol and substance abuse and post-abortion care[41].

Delivery channels

USSD (Unstructured Supplementary Service Data) was chosen due to the minimal delay between sending the query and receiving the response. Unlike SMS, USSD is a session-oriented service. The users of m4RH in Rwanda enter the system through the USSD interface and then choose the desired health content which is sent via SMS to the young person. The use of USSD will allow exploration of new platforms beyond those developed for the Kenya and Tanzania pilot schemes.

Technology device

Basic phone

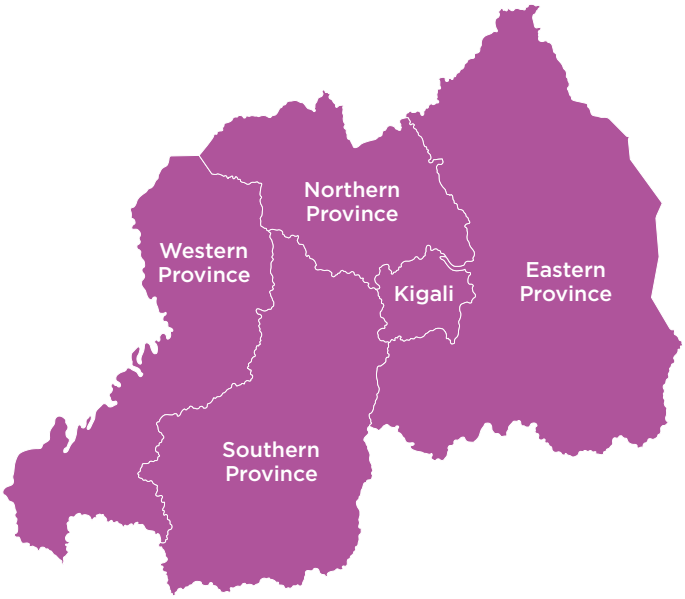
Health focus

The information provided by m4RH focuses on five content areas: puberty, sex and pregnancy, pregnancy prevention (information about contraceptives), HIV and sexually transmitted infections[42].

Target audience/ beneficiaries

Adolescents (young people between the ages of 10 –24)

40. All information captured in this case study is as of Q1 2015 and may not represent most current status
41. http://www.fhi360.org/sites/default/files/media/documents/m4rh-rwanda-brief.pdf
42. http://www.fhi360.org/projects/progress-mobile-reproductive-health-m4rh



Geographical focus

The m4RH project is planned to be implemented and available across all 5 provinces of Rwanda.

Northern Province

Eastern Province

Southern Province

Western Province

Kigali

Content

Content covers: Original m4RH content provides information on long and short acting family planning methods including implants, IUDs, permanent methods, injectables, oral contraceptive pills, emergency contraception, condoms and natural methods. m4RH messages include information about side effects, method effectiveness, duration of use and ability to return to fertility.

The m4RH platform in Rwanda also will include a database of youth-friendly services and stories which model positive sexual and reproductive health behaviours among young people.

Source: The original m4RH content was developed using evidence-based content, including the World Health Organization's handbook 'Family Planning: A Global Handbook for Providers'. The content was crafted specifically for short message service (SMS) or text message use. Each message was designed and tested to ensure user comprehension within the 160 character limit.

Together with FHI 360, the m4RH Technical Working Group expanded m4RH information from the Kenya and Tanzania pilot programmes, to include more sexual and reproductive health content. They used local and global youth sexual and reproductive health curricula along with tools to design information which would be suitable for young people aged 10 to 24.

Localization: The m4RH Technical Working Group led the process of translating the messages into the local language, Kinyarwanda, and took responsibility for revising messages after each phase of testing. The translated text message content was initially tested through focus group discussions with young people, along with parents and guardians. Feedback from the focus group discussions was incorporated into revised messages. In addition, actual usability testing with telephones is scheduled[43].

Implementation experience

The m4RH programme has already been successfully piloted and scaled in Kenya and Tanzania

Partner coverage

Government of Rwanda (MoH)

UNFPA (United Nations Population Fund)

Pivot Access

FHI 360

Progress in Family Planning

Funding

U.S. Agency for International Development (USAID) through the PROGRESS (Program Research for Strengthening Services) project

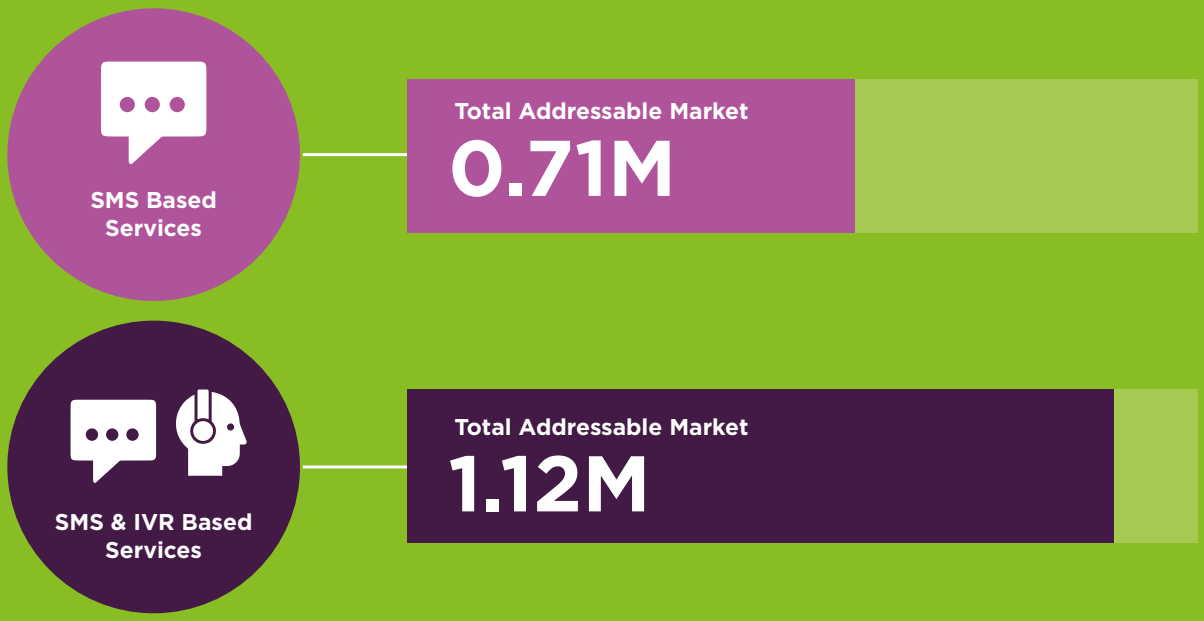
Business model

Donor funded

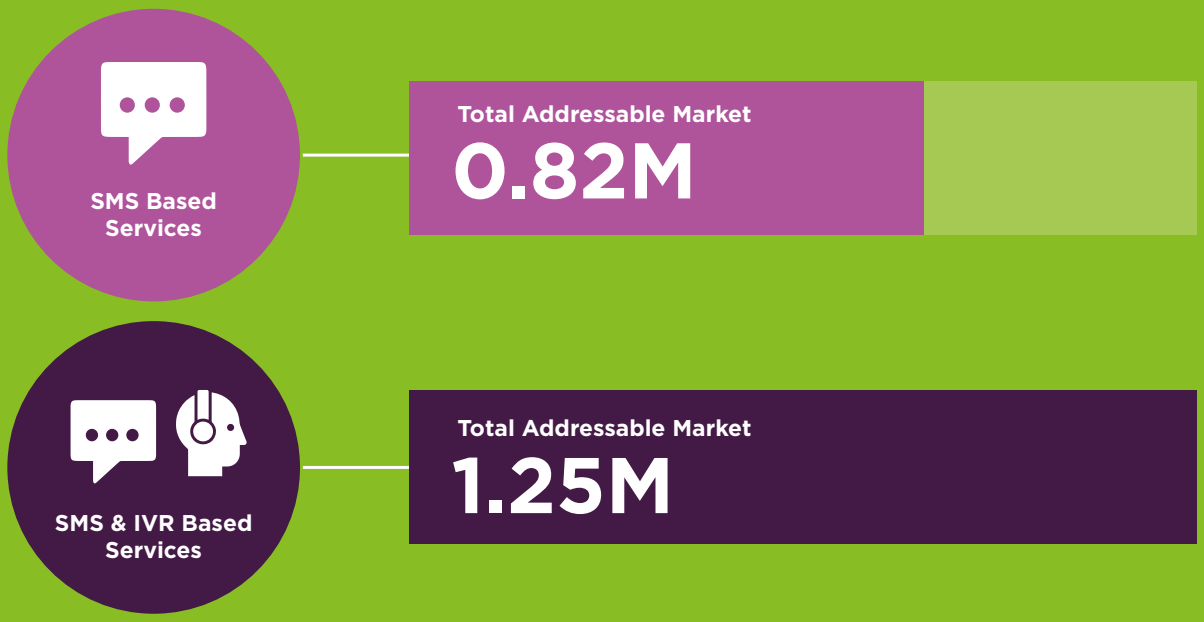
43. http://www.fhi360.org/sites/default/files/media/documents/m4rh-rwanda-brief.pdf

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

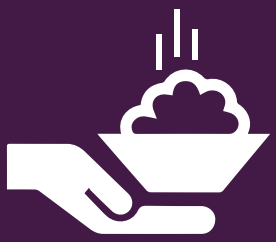
Total addressable maternal mHealth market 2015



Total addressable maternal mHealth market 2020



Ranking of overall mHealth opportunity



Scale of maternal and child health/ nutrition problem

HIGH

Size of addressable population

LOW-MEDIUM

Ability to pay or fund mHealth

MEDIUM

Ability to deliver

mHealth service providers

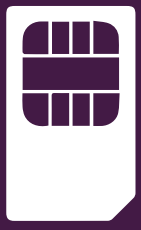
LOW

Strength of supporting programmes

HIGH-MEDIUM

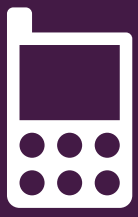
Interest from commercial aggregators

MEDIUM-LOW



Interest from mobile operators

MEDIUM

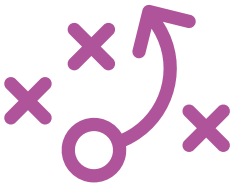


Supporting mobile / health regulation

MEDIUM-HIGH

Willingness to partner

MEDIUM



Conclusions

- The exponential growth in subscribers seen in Rwanda has provided opportunities for mobile operators and the Rwandan Government. In the short-term, there is an opportunity for mobile operators to increase revenue by providing simple services to more customers and for government there is an opportunity to generate revenue through taxation of those customers. A longer term view is to consider the indirect advantage of subscriber growth. A more connected society is a healthier and more constructive society and a more connected customer is a more sophisticated one, liable to spend more on their mobile services. Mobile operators and government must balance short-term advantages with the longer term opportunities to develop mobile services like mHealth, creating an environment where such services are affordable and attractive to potential purchasers.

- User migration to more cost-effective communication over mobile has impacted on the revenue opportunity for mobile operators. The subsequent reaction of price increases is understandable, within a commercial environment, however strategies which penalise one segment over another should be carefully assessed. Lower spending segments, such as BoP, are a potential market, particularly where there is a defined need. If commercial models cannot support mHealth in the early stages of development for these segments, there remains the potential to develop mHealth as part of a mobile operator's corporate social responsibility (CSR) requirements. In this way, the commercial opportunity of mHealth can be realised by the funding of some services, in the launch phase of the business, ensuring the market opportunity will become self-sustaining.

- The immense successes seen in reducing health challenges in Rwanda means the country will be likely to achieve many of the MDGs in contrast with other SSA countries. These successes are due to the strong control by the Rwandan MoH and its single-minded adoption of an overarching strategic plan (Vision 2020). In some cases, if potential partners have been unwilling or unable to fit into the framework, they have been asked to leave the country entirely[44]. Whilst a strong structure and a defined approach are strong tools in fulfilling the health aims of the country, some flexibility is desirable. The need to create a sustainable model for mHealth means some experimentation is needed to develop and perfect approaches. Too strict a control framework may stifle such opportunities in Rwanda, particularly when considering commercial models where any risks to investment are looked upon critically.

44. The Atlantic: Rwanda's Historic Health Recovery: What the U.S. Might Learn

Overall feasibility assessment

The feasibility of mHealth to address nutrition and maternal and child health in Rwanda is moderate. Demand-side requirements are in place, in terms of addressable market and audience, but there remains some work to be done in developing the service proposition and interest from mobile operators in order to fully popularise the concept and realise its potential. In the medium term, it is the GSMA's assertion that Rwanda has the potential to develop into a viable mHealth market opportunity.

Opportunity size

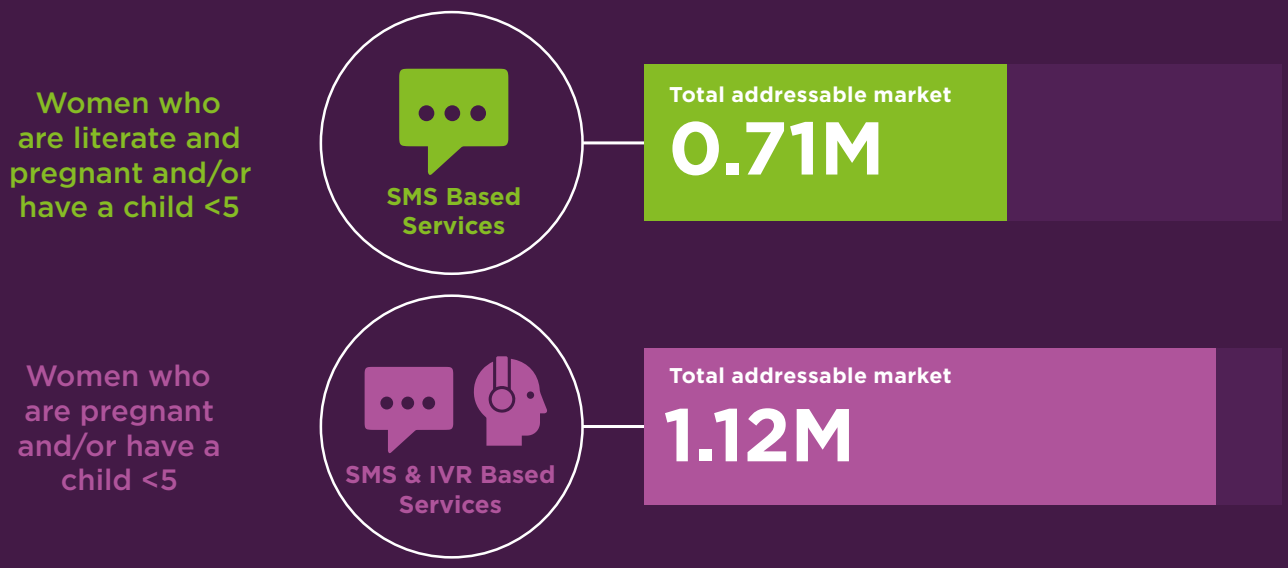
For a calculation of market size, looking at total addressable market in 2015 and forecasting total addressable market in 2020, see the diagram below.

The feasibility of mHealth to address nutrition and maternal and child health in Rwanda is moderate. The GSMA and the public sector will continue to address common challenges toward optimising the chances of success in partnerships.

The incidence of phone sharing in Rwanda means that there is a longer-term opportunity in the targeting of literate women with children under-five, with SMS nutrition and maternal health information services. This segment is forecast to grow by 15% over the 2015-2020 period.

Figure 25

Total addressable maternal mHealth market 2015

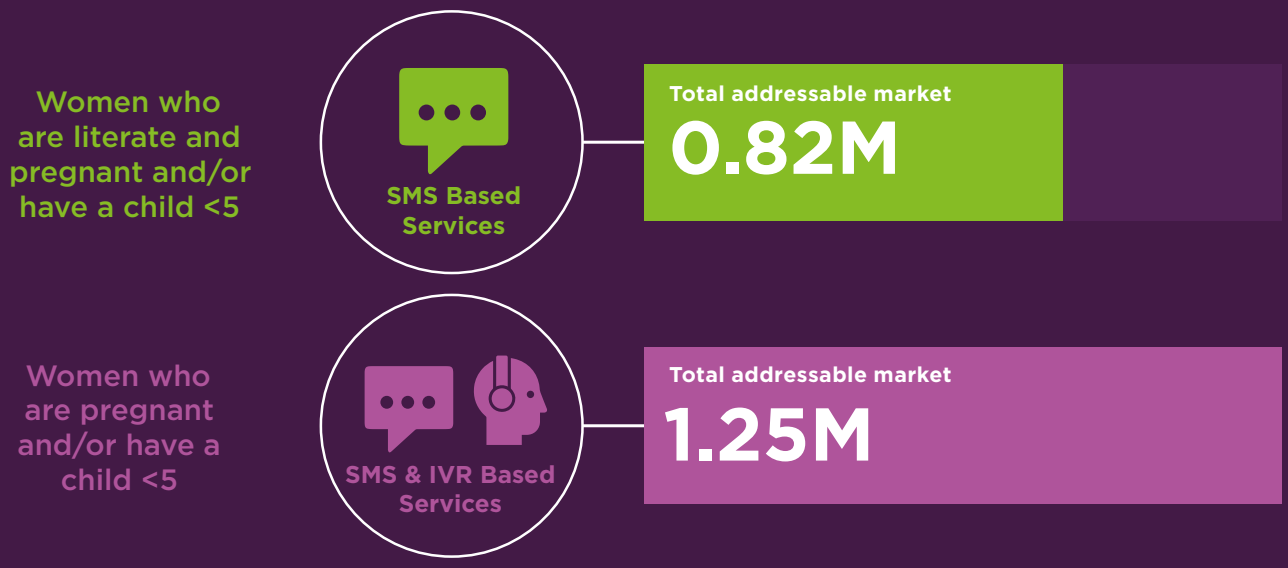


Source: GSMA Mobile for Development mHealth model, GSMAi data

When both literate and illiterate maternal segments are targeted using IVR services this opportunity increases to an addressable market size of 1.25m by 2020, growing by 11% over the 2015-2020 period.

Figure 26

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 – **HIGH**
Size of addressable population – **LOW**-**MEDIUM**
Ability to pay or fund mHealth – **MEDIUM**

Ability to deliver

Ranking of ability to deliver is a combination of both quantitative and qualitative inputs.
mHealth service providers – **LOW**
Strength of supporting programmes – **HIGH**-**MEDIUM**
Interest from commercial aggregators – **MEDIUM**-**LOW**
Interest from mobile operators – **MEDIUM**
Supporting mobile/health regulation – **MEDIUM**-**HIGH**
Willingness to partner – **MEDIUM**

Abbreviations and terminology

ARPU - Average Revenue per User
B2B - Business to Business
B2C - Business to Consumer
BCC - Behaviour Change Communication
BoP - Base of Pyramid
CAGR - Compound Annual Growth Rate
CHW - Community Health Worker
CSR - Corporate Social Responsibility
DHIS2 - District Health Information System
GDP - Gross Domestic Product
HSSP - Health Sector Strategic Plan
ICT - Information and Communications Technology
IVR - Interactive Voice Response
MDG - Millennium Development Goal
MNCH - Maternal Newborn and Child Health
MoH - Ministry of Health
m4RH - Mobile for Reproductive Health Project
M&E - Monitoring & Evaluation
NGO - Non-Governmental Organisation
SMS - Short Message Service
SSA - Sub-Saharan Africa
USSD - Unstructured Supplementary Services Data
VAS - Value Added Services
WHO - World Health Organization

For more information on GSMA Mobile for Development mHealth,
please visit **www.gsma.com/mobilefordevelopment/programmes/mHealth**