

Mobile for Development

mHealth Country Feasibility Report: Mozambique

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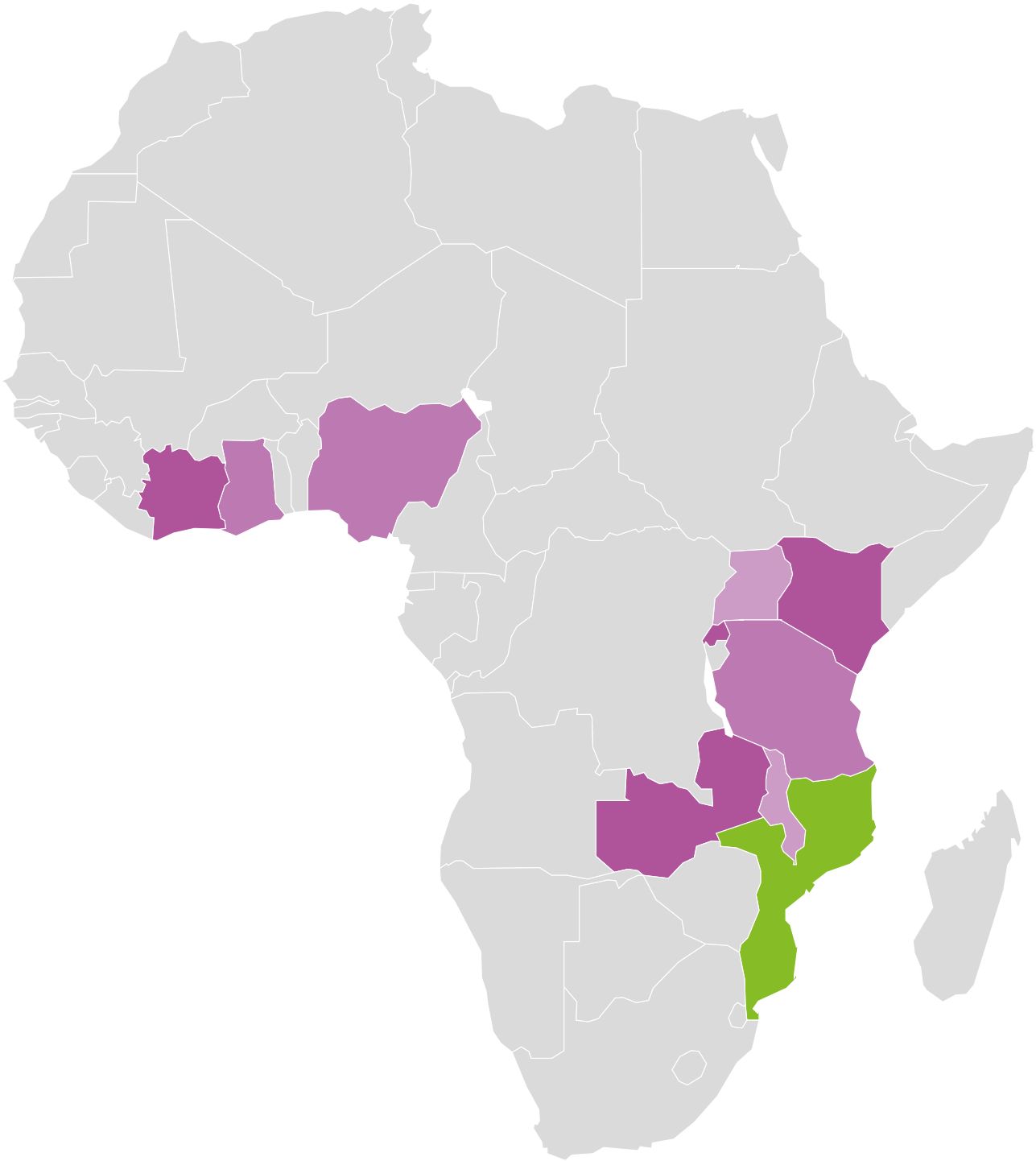
Background

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). Within PAMI, a mobile nutrition initiative 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

Craig Friderichs
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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.

Mozambique has been selected as a GSMA priority country.

- 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 Mozambique. 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 GSMA 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 Mozambique

What problems can mHealth solve?

- Infant mortality rates are approximately 63 deaths per 1000 births and mortality of children under-5 reached approximately 90 deaths per 1000, placing Mozambique as the third highest country for these indicators across the 10 GSMA nutrition initiative countries. Of the total mHealth interventions tracked by the GSMA, 50% are concerned with infant and child health. Only 22% of these interventions are concerned with child nutrition. In Mozambique mobile is uniquely positioned to tackle and improve on this health feature, through its coverage and capacity to reach the largest possible audiences.
- It is recognised that there is a shortage of health personnel in Mozambique (approx. 0.46 maternal and child nurses/1000). The National Community Health Worker (CHW) Program seeks to tackle this imbalance by improving opportunities, remuneration rates and long-term prospects for personnel and training. mHealth services tracked by the GSMA, that report their numbers and target health workers, reached 1,183 facilities (Q4 2014) while services that target women and children reached 593 facilities. Scaling up and integrating mobile services with health personnel resources will greatly assist national strategies to improve overall health indicators while retaining staff, particularly if used in the areas of training and retention.

- Stunting levels, at 42.3%, are above the critical population threshold of 40%. The majority of stunting occurs in rural areas. Currently the rate is 47% in rural areas versus 35% in urban areas. In terms of absolute numbers, children affected by stunting grew by approximately 60,000 between 2008 and 2011. 6% of children suffer wasting, 15% are underweight, and 4% are severely underweight. Child anaemia (in children under-5) is 69% and maternal anaemia is 54%.1 Mobile can tackle these challenges, by disseminating information on efficient nutrient intake across the country and into difficult to reach rural districts.

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 alone is 1.1 million (women who are literate and pregnant or have a child under-five) in Mozambique. This is forecast to rise to 1.22 million by 2020.
- Only four of the GSMA mHealth tracked services reported the number of beneficiaries reached, however these three initiatives reach approximately 27% of the total population, or over 7 million people. Approximately 44% of the services tracked aim exclusively to improve the health of women and children. This data might indicate a market that is accepting of mHealth, which in turn improves the likelihood that funded initiatives will develop into self-sustaining scalable business propositions.
- Approximately 86% of the total mHealth initiatives tracked by the GSMA target women and infants, with child initiatives having slightly more than women (50%). This shows a strong alignment between the core aims of the Mozambique Ministry of Health (MISAU) and the mHealth initiative of the GSMA to reach maternal and infant segments with health and nutritional information.
- The Mozambican health sector faces a number of challenges. One of the most pressing is the need to better utilise its limited health personnel through the use of efficiency tools, time saving processes and human resource planning/management. Of the mHealth services tracked by the GSMA 43% can be said to be directly involved in this process. This presents an opportunity for mHealth to develop its role in providing a unique combination of pushed and pulled information and decision support services incorporating retention strategies and training features that continue to bridge an important gap in the Mozambican health sector.

1. All data from DHS 2011

3 The readiness of stakeholders to support mHealth in Mozambique

What position are stakeholders in to facilitate mHealth?

- The Mozambican government has instituted a number of initiatives to tackle the lack of health personnel in-country. Its National CHW Program 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 and allowing data to be pushed to beneficiaries in the field. Capacity can also be increased on-the-fly due to the inbuilt scalability of mobile.
- Regulation that is conducive to mHealth development and that balances the needs of public sector organisations and patients with commercial realities is rare within Sub-Saharan African (SSA). While Mozambique has not developed any regulation that is specific to mHealth, there exists a progressive attitude in the legislation process. One example is the development of the Telecoms Strategy Policy through the instigation of a public consultation involving mobile operators and relevant stakeholders. This open attitude will assist in the process of developing regulation that is specific and pertinent to the unique requirements of mHealth, leading to a market environment that is more conducive to successful mHealth.
- mHealth initiatives are active across all the principal mobile operators in Mozambique, creating a market favourable to mHealth.
- Cross-stakeholder communication in the regulatory sphere is mirrored in the health sector through the Mozambique Human Resources for Health Observatory. This communication and information sharing vehicle will facilitate communication across stakeholder cadres, ensuring that best practice is identified and disseminated to all applicable stakeholders and ultimately will assist in the development of mHealth.

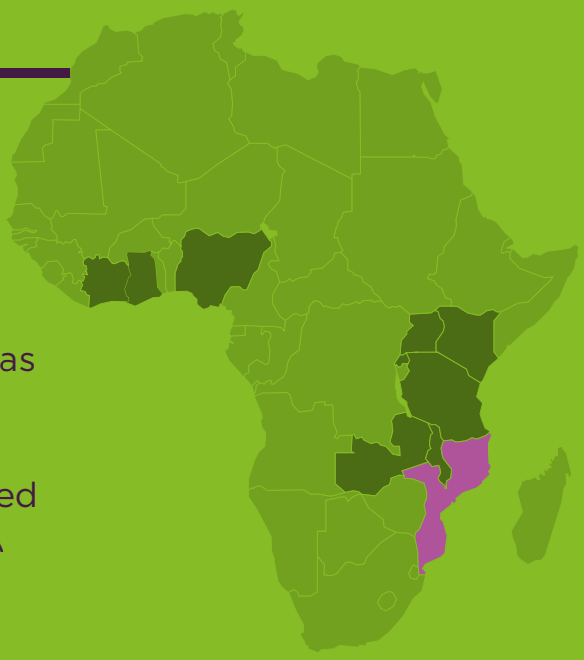


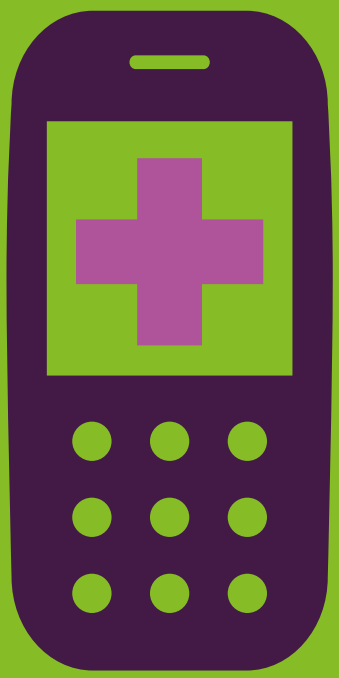
Market conditions in Mozambique

mHealth indicators

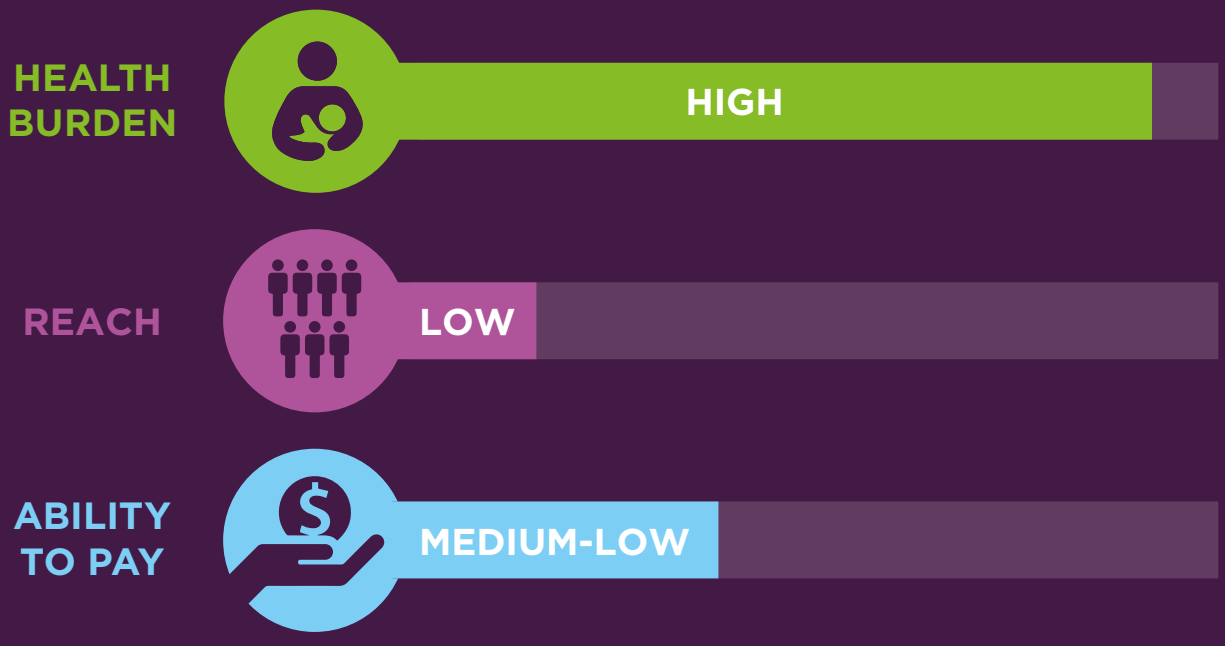
52%

Mozambique shows strong potential to scale mHealth, as indicated by its top five positioning in 52% of the selected indicators compared against the other ten GSMA target countries.



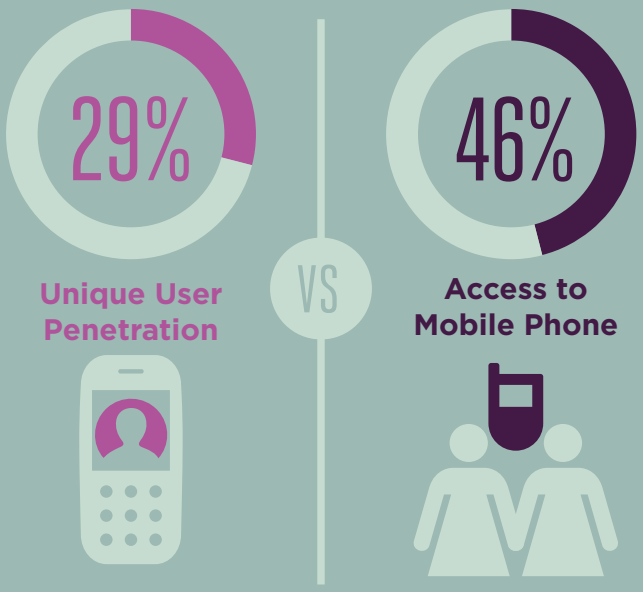


Current state of Mozambique Health



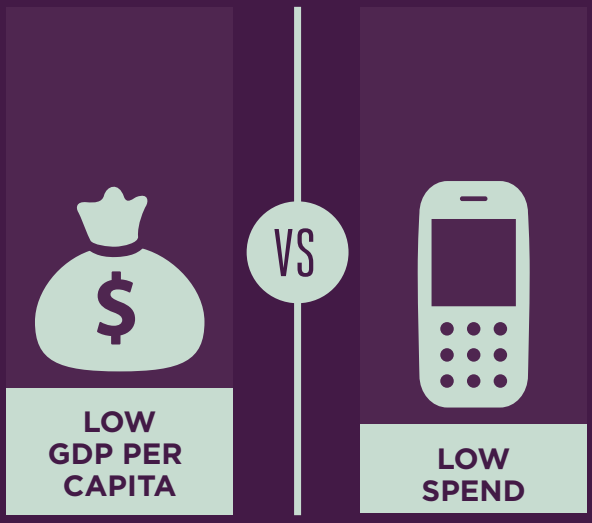
Penetration versus access

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



Advantageous for mHealth

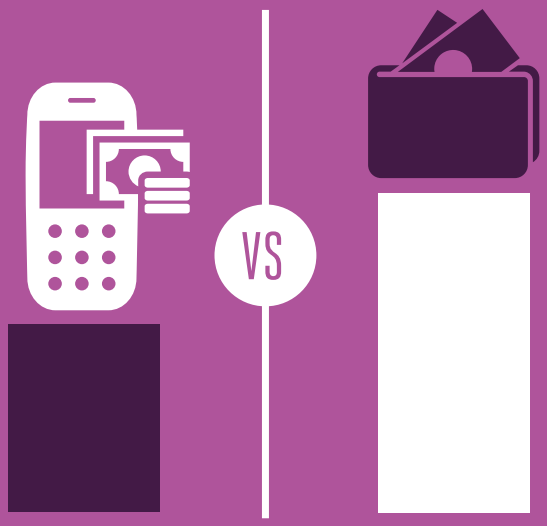
GDP versus spend



Mozambique has a relatively low GDP per capita, ranking third lowest, but has a high percentage of GDP spent on mobile services, ranking highest across the comparator countries. This is an indicator of B2C opportunity.

Advantageous for mHealth

Spend versus income



Spend on mobile relative to available income is slightly lower than the normative range for the 10 nutrition initiative countries

USD$10 per month

Advantageous for mHealth

Government support of health services

Mozambique has the fourth highest spend by government on health initiatives.



Advantageous for mHealth and B2B models specifically

General market conditions

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

Figure 1

Mozambican general market view SWOT

STRENGTHS

Spend on mobile, relative to available income, sits slightly below the normative range of the comparison countries, at USD$10 per month. However, Mozambique has the highest percentage of GDP spent on mobile of the GSMA comparison countries. This might indicate that mobile VAS are more of a priority than in other African countries.

While only four of the GSMA tracked mHealth services provide the number of beneficiaries reached, this number is particularly high at 7 million. This shows a high conversion rate of service offering to service usage. Of the 7 million beneficiaries, 44% of the services are aimed at improving the health of women and children exclusively.

A critical component of a successful mHealth service is the direct involvement of the Ministry of Health. In Mozambique all three of main operators have succeeded in partnering with the MISAU in their respective mHealth offerings.

WEAKNESSES

Whilst there is ongoing discussion around telecommunications regulation in Mozambique, specifically involving increasing access for customers. there remains a lack of mHealth specific legislation. This position is unlikely to change in the short-term, as other regulation, designed to enable unified publications and market evolution, has been deemed more important and prioritised.

There are a number of initiatives in Mozambique tackling increasing penetration and adherence to vaccination targets, including countrywide activities like the Vodafone GSK initiative. 67% of services offering infant and child health interventions focus on improving access to, and driving demand for increased vaccination. While this aligns with government schemes, it has led to the de-prioritisation of other areas of maternal and infant health. There is a risk of pigeonholing mHealth into a prescribed role that does a disservice to its potential: part of toolkit that can tackle the multiple health challenges in Mozambique.

Despite the countrywide challenges of stunting, malnutrition and other nutritional deficiencies in Mozambique, there is only one mHealth initiative tracked by the GSMA that is available nationally.

OPPORTUNITIES

Mozambique has a high ARPU comparative to GDP, and a high percentage of users in lower socio-economic segments (Grade D), especially in rural regions. This relatively high spend might indicate an accepting VAS consumer. The large health burden in rural Mozambique creates an opportunity to fulfil a patient need and access an audience that is more likely to adopt mobile services such as mHealth.

Mozambique has high stunting and undernutrition health indicators. However, health initiatives are not reaching those provinces that have the highest prevalence of stunting. For example, the Gaza region has a provincial stunting rate of 27 and upwards of 70 health personnel per 100,000 population. In contrast Nampula has a provincial stunting rate of 55 and 50 health personnel per 100,000 population. Support is not targeted to the right regions, in respect of demand and health burden. There is an opportunity for mobile to bridge this gap, and provide education about good nutritional intake to end-users.

While health worker numbers are increasing in Mozambique, they are not keeping pace with population growth. There has been a 38% increase in health personnel over a five-year period, but the number of doctors comparative with population remains very inadequate. Mobile can provide an increase in efficiency and quality of service delivered, by multiplying the number of health personnel, by removing the need for proximity to a health worker and by increasing the support that community health staff can provide.

Only 26.4% of deliveries in Zambezi Province are assisted by skilled paediatric providers in comparison to 84% in Maputo Province. Zambezi Province has a considerably larger population and overall health demand (stunting is almost twice as prevalent). Mobile can assist in alleviating this deficiency, by improving the quality of care provided by frontline workers using decision support, efficiency and better time management.

THREATS

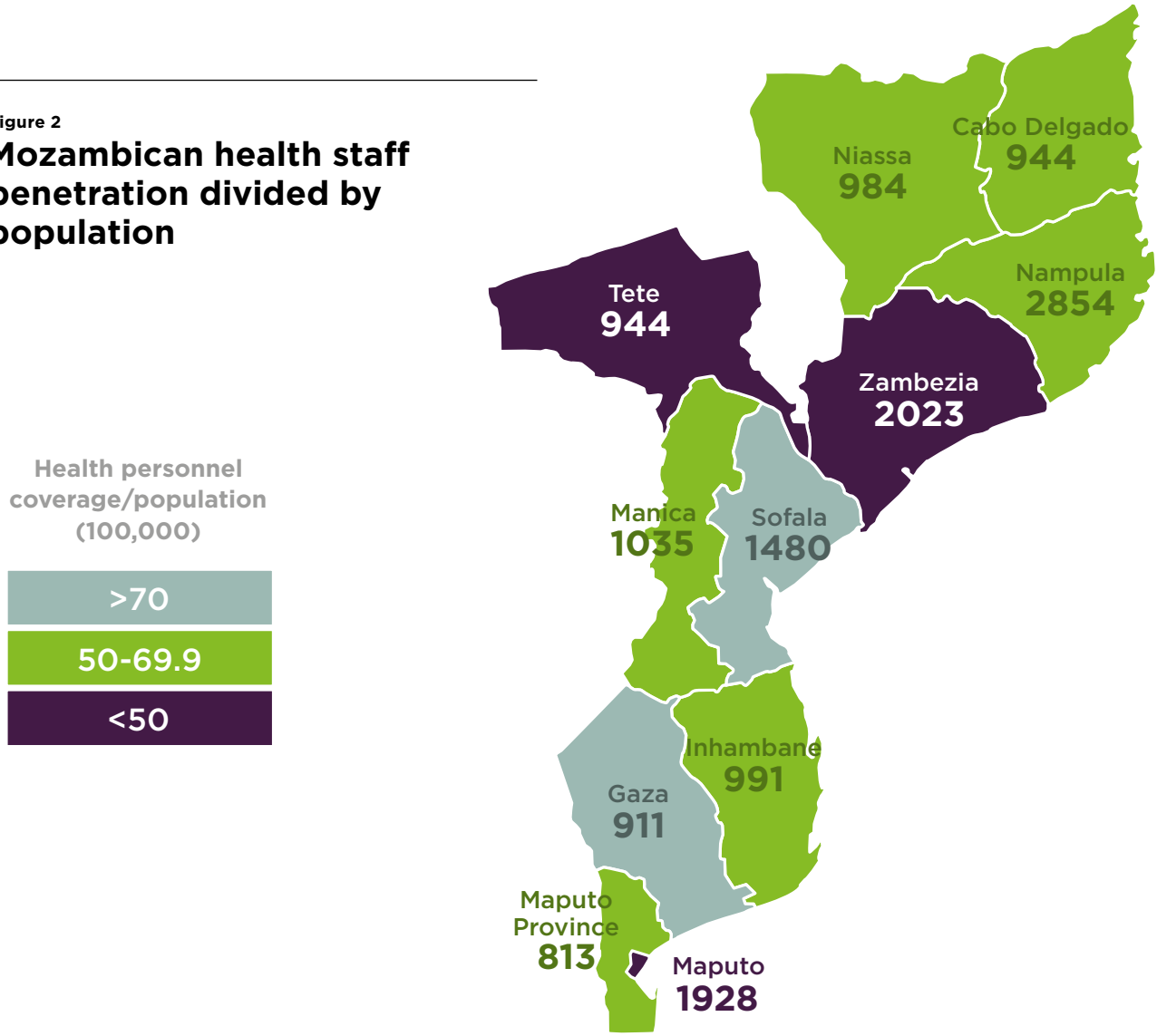
In order to succeed, mHealth requires multi-stakeholder partnering. This is a particular issue in countries like Mozambique, where there exist challenges in coverage, particularly in rural areas. The Mozambican mobile operator market is highly competitive. The three main mobile operators have a similar market share, resulting in an ongoing battle for market share. This enforced competition might create problems for the type of multi-partnering arrangements that are required to ensure mHealth success. The lack of cross-operator partnerships amongst the mHealth initiatives tracked by the GSMA provide some evidence of this feature.

The GSMA mHealth tracker follows 18 live mHealth services in Mozambique. There are 45 organisations involved in the process of provisioning these services. Whilst cross-stakeholder partnerships are conducive to success, this number appears excessively high. There is a risk that managing this number of organisations will create problems for the mHealth industry as it scales up.

Source: GSMA M4D mHealth 2015

Figure 2

Mozambican health staff penetration divided by population



Source: MISAU Directorate of Human Resources for Health 2011

These staffing issues are compounded by additional pressures on specific healthcare cadres. The density of physicians in Mozambique is approximately 2.7 per 100,000, while the density of nurses and midwives is 31 per 100,000[2].

While health worker numbers are increasing, they are not keeping pace with population growth in Mozambique. From 2006 to 2011 there was a 38% increase in health personnel, yet in a country of 25 million (2011) there were only 1,268 doctors within the National Health System of Mozambique (2011). A sizeable number of these (23%) were foreign nationals[3].

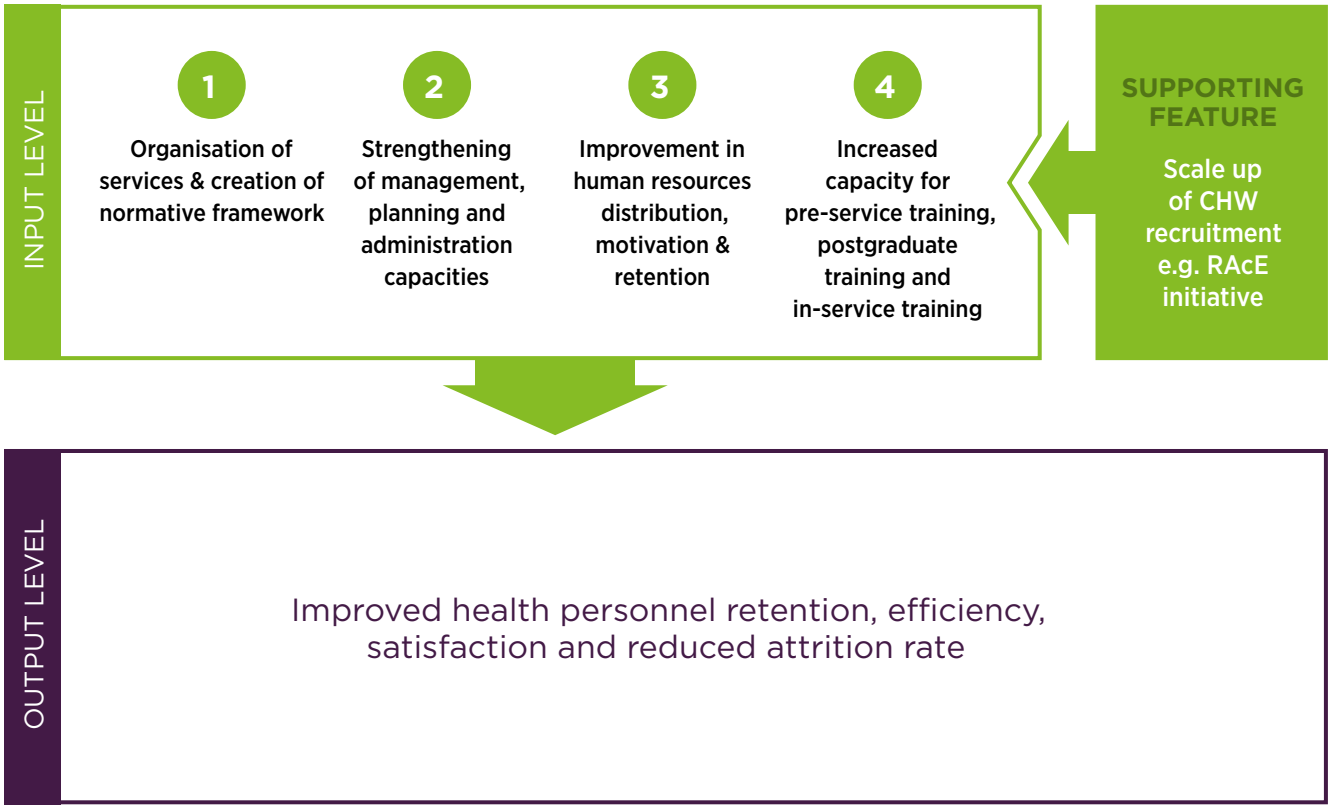
These personnel issues are compounded by difficulties in attracting and retaining qualified personnel, particularly in remote areas, while levels of staff satisfaction remain low due to remuneration and working environments. Interestingly, competition from the private sector, in the form of NGOs who are also seeking skilled health resources, particularly in managerial positions, is a problem in Mozambique.

The deficiency in health personnel is recognised in Mozambique and the MISAU has sought to tackle it by implementing a revised National CHW Program.

2. USAID , maternal and child health integrated programme - http://www.mchip.net/node/98
3. WHO Mozambique Health Workforce Situational analysis

Figure 3

Core areas of Mozambican human resources development plan 2008-2015



Source: Mozambique Ministry of Health Human Resources Development Plan 2008-2015 – visualisation GSMA 2015

This programme faces a number of logistical implementation challenges, as well as a need to instigate cross-department cooperation, particularly between the Ministry of Finance and the Ministry of Public Administration. There are also challenges in the achievement of buy-in from provincial and district governments.

Dialogue between the various stakeholders at the programme level has been greatly assisted by the launch of a Human Resources for Health Observatory in Mozambique. This observatory follows the framework of similar initiatives initiated by the World Health Organization (WHO), including policymakers, researchers (academia) and health practitioner members. Prescribed outputs have included a Human Resources for Health Development Plan and the creation of a number of task groups charged with tackling particular challenges in this space with support from the MISAU

The Mozambique 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 4.

Mozambique shows strong potential to scale mHealth, as indicated by its top five positioning in 52% of the selected indicators.

In terms of this top five positioning, Mozambique sees a broad spread of indicator ranks, including 25% in the topmost position (rank 1). The average for rank 1 indicators, when compared across all 10 GSMA nutrition initiative countries, is 10%, placing Mozambique considerably higher than the norm for this indicator.

Mozambique's number one ranking in 3 mHealth feasibility indicators places it in the 80th percentile, compared across the 10 nutrition initiative countries.

Figure 4

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	**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

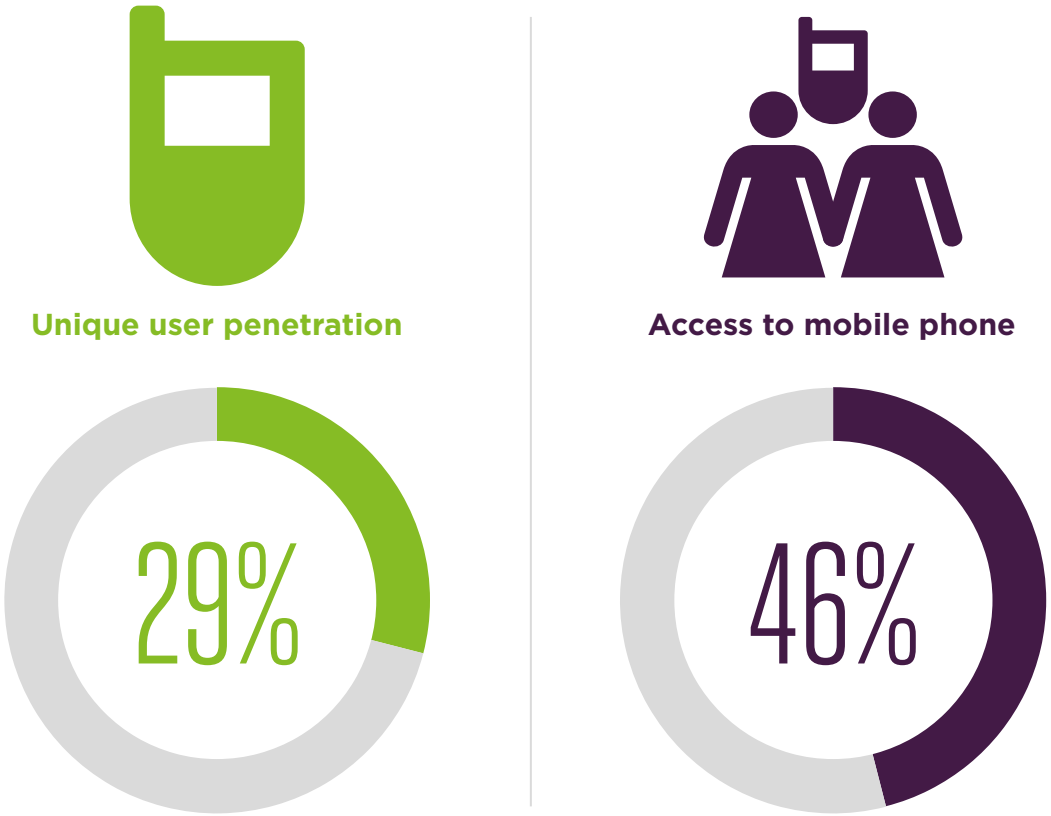
*Indicator metrics in table are in original format. Data normalised for cross indicator comparison

Mozambique market indicators

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

Figure 5

Mobile phone use: penetration versus access to mobile



Source: GSMAi Q4 2014, Understanding what is happening in ICT in Mozambique Evidence for ICT Policy Action Policy Paper 10, 2013 research ICT Africa.net

An AudienceScapes study from 2009[4] indicates that of those users able to access mobile approximately 43% are female and 63% are based in urban regions in Mozambique.

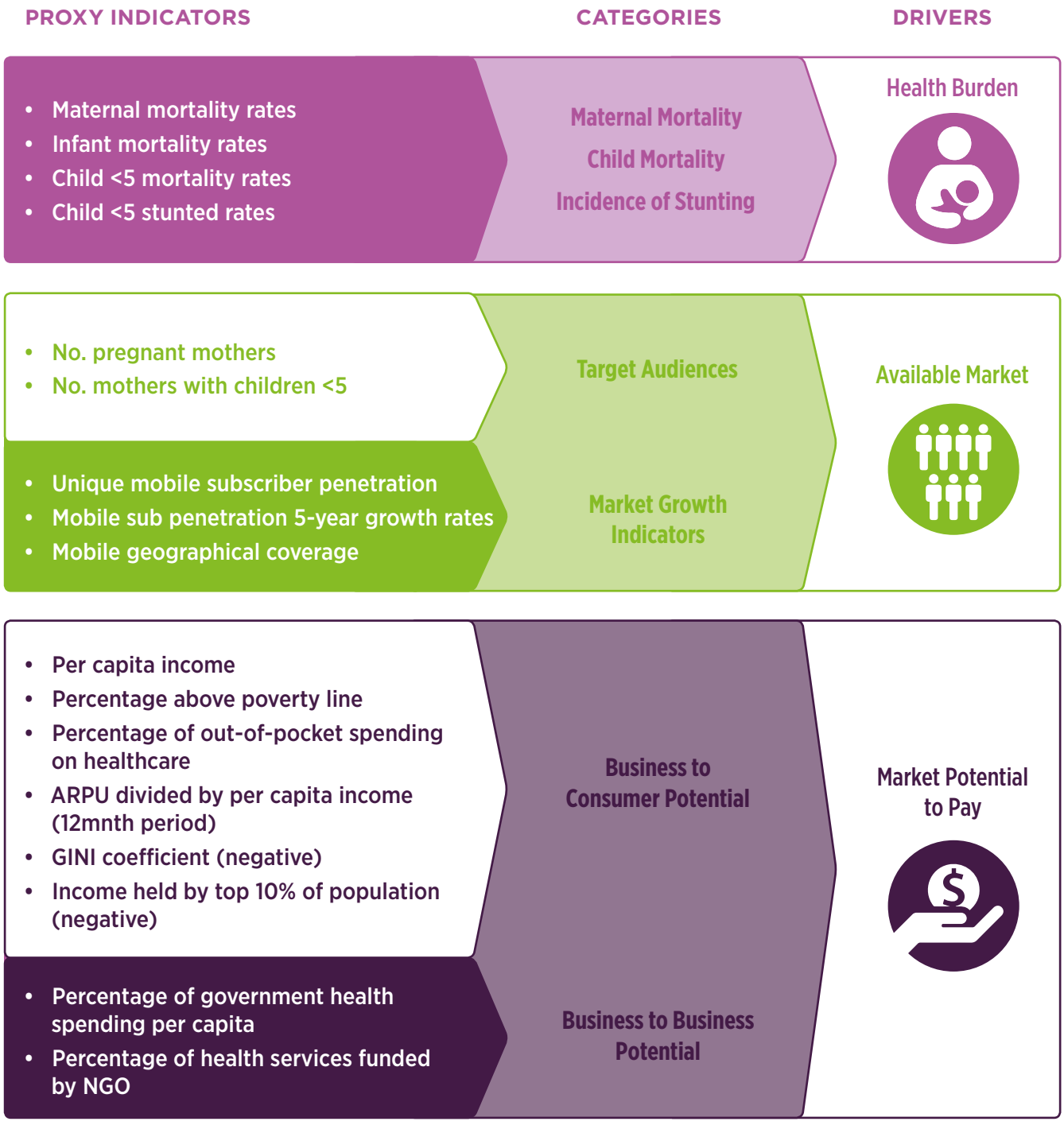
As part of the quantitative evaluation process, the 10 GSMA nutrition initiative target countries were evaluated, scored against a set of comparable indicators and placed in a ranked scale.

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 the methodology is read in conjunction with this report.

4. Audiencescapes.org The Who and What of the Mobile Phone Market 2010

Figure 6

Criteria considered for opportunity matrix indicator



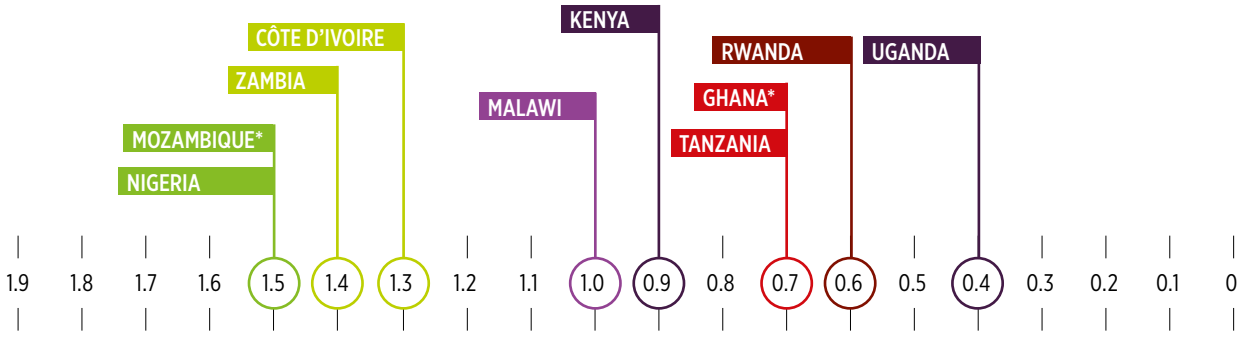
The opportunity matrix has a scale range, centred on a score above or below 1. A score of 1 is ideal, a score above 1 is better than ideal and a score below 1 is less than ideal. The gradation of scoring is shown by the proximity of the score above or below 1.

It is important to consider the proxy indicators that are included in the category and the 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.

Mozambique's comparative index of 1.45 indicates a higher health burden opportunity compared to the ranking of other priority countries. 1.45 is just behind Nigeria, despite having a population that is almost seven times smaller than that of Nigeria. This is a feature of Mozambique's high maternal, infant and child mortality rate, which rank second and third most prevalent respectively across the comparison countries.

Figure 7

Mozambique health burden opportunity matrix



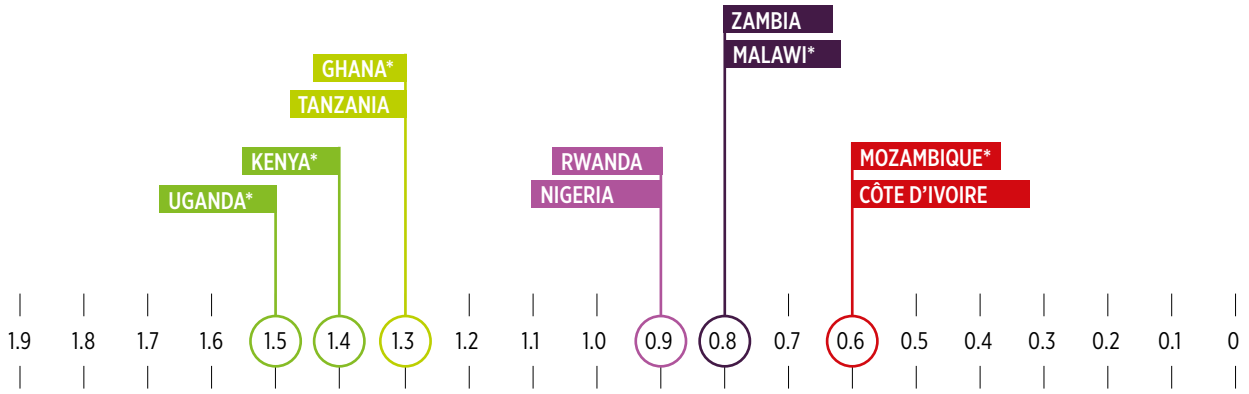
* Denotes rounding of figure

Mozambique's ranking, in regard to addressable market country feasibility indicators, is an almost complete reversal of health burden indicators. The country ranks 0.58 overall for this indicator, despite relatively good indicators for pregnant women and women with children under-five, both ranking 5th amongst the 10 comparator countries. Subscriber penetration growth over a 5-year period ranks fourth and in the 25th percentile for this indicator. However other mobile service indicators let Mozambique down. Combined penetration and growth rate indicators place Mozambique last comparative with the nutrition initiative countries and mobile geographic coverage at 10% is far below the 10 country average of 46%.

By considering ongoing trends, a longer term view of Mozambique can be gleaned. The CAGR for mobile penetration rate increase over 2008-2013 places the country fourth across the comparator countries and at 15% is above the average increase rate of 12% for this indicator. As such, Mozambique exhibits the potential to improve its mobile user indictor metric opportunity indicators in the mid to long-term.

Figure 8

Mozambique addressable market opportunity matrix



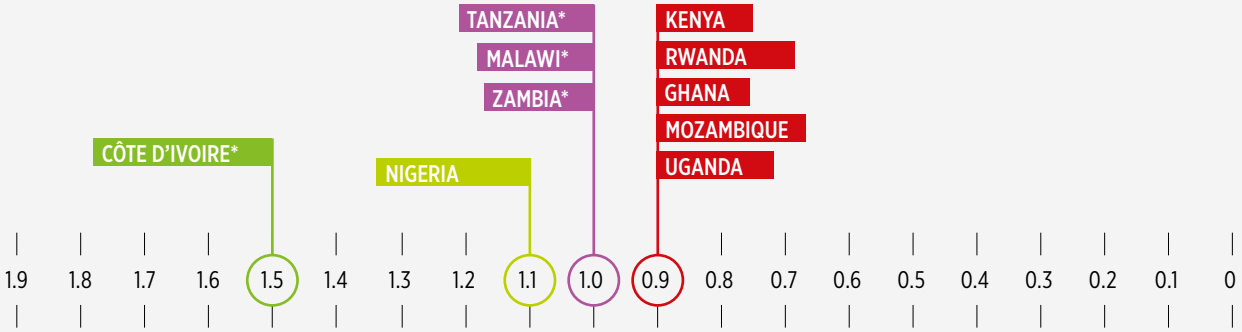
* Denotes rounding of figure

In Mozambique, market opportunity related to ability to pay, as defined by both B2B and B2C markets, features evolving trends in mobile Value Added Services (VAS) usage. Overall the country occupies an index of 0.95, which represents good feasibility for payment capacity in potential service users. B2B indicators are considerably higher than B2C, at 0.88 vs 1.1 (7th in contrast to 3rd when ranked) respectively, indicating a good opportunity to reduce the impact of Out of Pocket (OoP) spend, by involving government and NGOs in mHealth funding activities. NGO funding is the highest across the comparison countries, at 70%, which is well above the indicator average of 46%.

Despite B2B pointers being higher than those for B2C, there remain positive indications for a future mHealth sector run on commercial terms. The percentage of GDP spent on mobile is the highest across the comparator countries, and there are good indicators of user willingness to purchase mobile VAS in-country including Base of Pyramid (BoP). Allied to this, Mozambique exhibits the second highest growth rate in broadband mobile users, the second highest number of broadband subscribers (Q4 2014) and the 5th highest smartphone percentage penetration amongst the nutrition initiative countries. These are all indicators conducive to a market excepting of new and innovative VAS like mHealth.

Figure 9

Mozambique ability to pay opportunity matrix

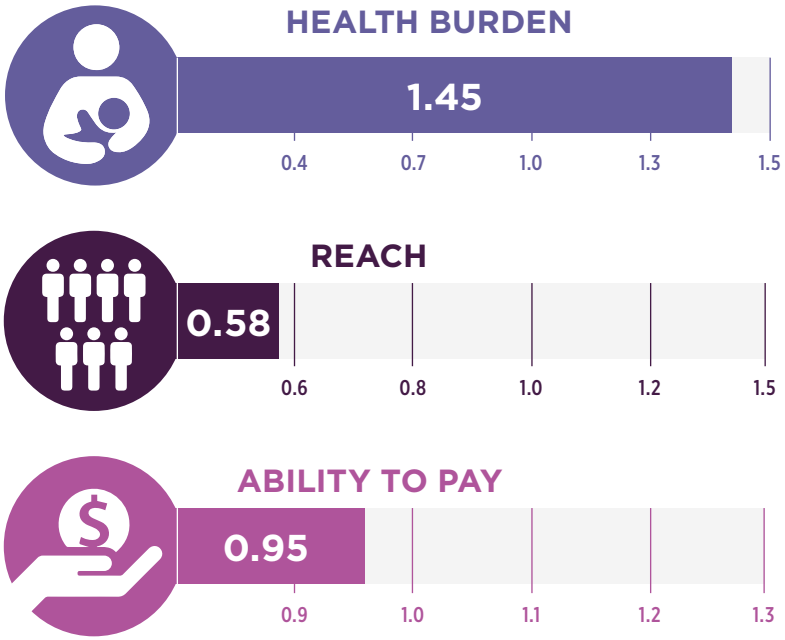


* Denotes rounding of figure

Figure 10

Mozambique opportunity to scale services*

INDIVIDUAL SCALE SCORES



COMBINED SCALE SCORE

0.79

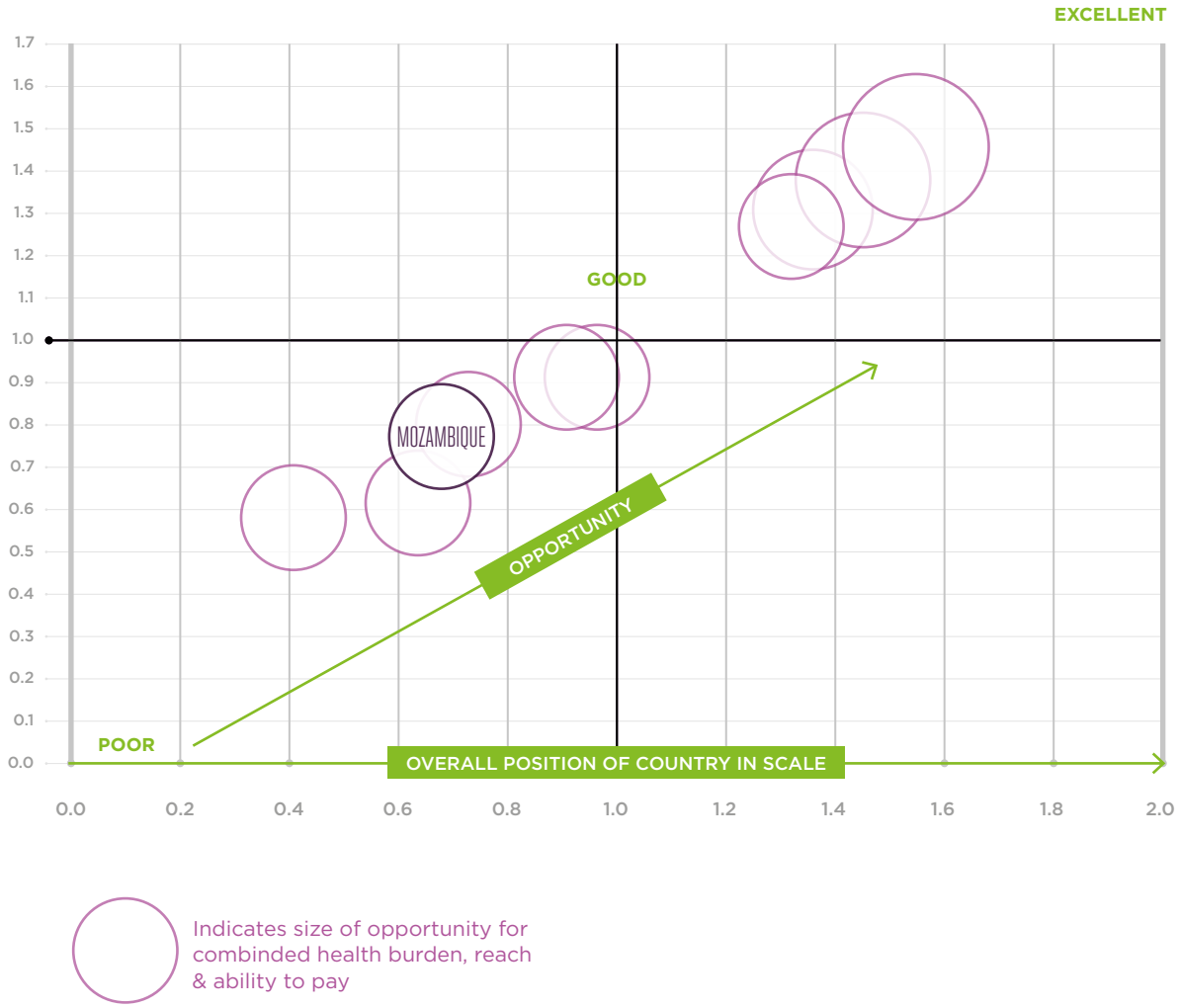
OVERALL INDEX SCORE ACROSS COMPARISON COUNTRIES

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 11), the opportunity index score for Mozambique shows an acceptable comparative score, which is close to ideal feasibility score indicators.

Figure 11

Mozambican 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.

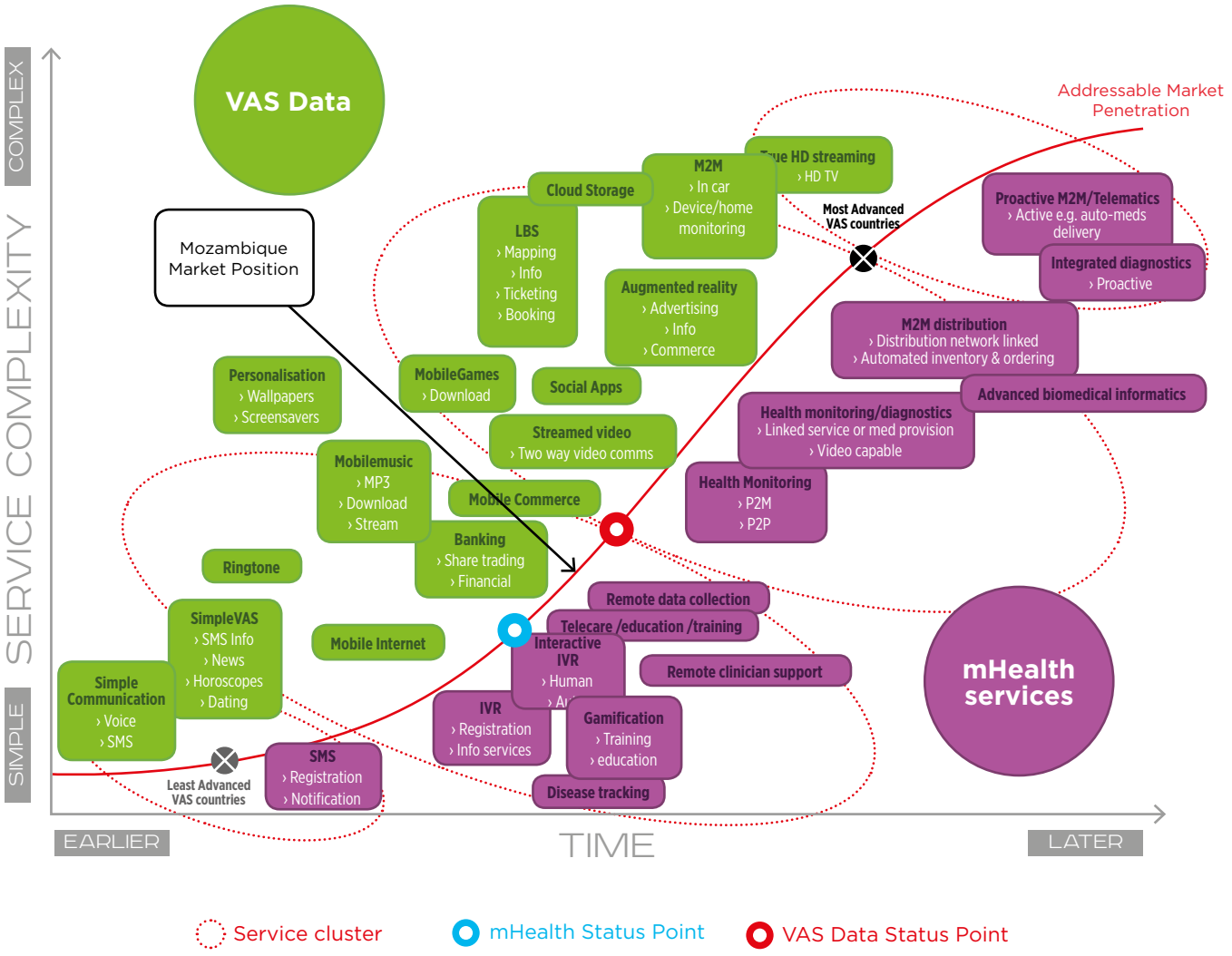
*** Please see GSMA methodological framework for additional clarification on quantitative scoring

Figure 11 compares overall ranking of GSMA nutrition initiative countries and combines this data with the overall size of the opportunity across all indicators. The relative combined opportunity is an indication of the capacity (size of opportunity) of Mozambique, while the position on the scale gives an indication of the ease with which mHealth services might be launched (i.e. degree of challenge versus opportunity).

Mobile service development

Figure 12

Mozambique mobile VAS evolution



Source: GSMA M4D mHealth

The dotted service clusters in figure 12 denote four evolutionary points within the VAS and mHealth service environments. The evolution of mHealth services corresponds with the VAS evolution, depicted here.

Mozambique'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. For comparison, a country such as the USA would be further up the scale, towards 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 Mozambique on this maturity scale was evaluated by considering overall market maturity data that considered a number of usage metrics including total number of VAS and mHealth services offered, complex versus simple service offering ratios, data ARPU and data ARPU increase over defined periods, amongst others. The full criteria for scoring is available in the GSMA mHealth Country Feasibility Report Methodology. This process was replicated across all of the 10 target countries in order to generate a scale of service maturity.

Spend on mobile relative to available income sits slightly below the normative range of the comparison countries, at USD$10 per month in Mozambique. The average is USD$10.40. However the country has the highest percentage of GDP spend on mobile of the comparison countries, which might indicate that mobile VAS is more of a priority than in other African countries.

The country also sees lower decreases in ARPU (1%) over the 2008-2013 period, comparative with the other nutrition initiative countries. This is well below the 9% average for this indicator. It appears that Mozambique is resisting the general trend in Africa of falling ARPU figures.

Smartphones provide a richer and more sophisticated environment to provide health services and along with competitive data pricing encourage the use of VAS. In Mozambique smartphone adoption was 16% (Q4 2014), placing the country fourth in comparative rankings for this indicator and fifth in terms of the number of smartphone devices in the market.

There is an ongoing trend within SSA to access online services using mobile, effectively leapfrogging fixed network infrastructure. Consequently, mobile broadband is an important feature to consider for any market feasibility analysis. In Mozambique there where approximately 3.4m broadband subscribers (Q4 2014), equating to a 22% share of total connections at this time. Compared across the mHealth GSMA priority countries, this places Mozambique fourth for mobile broadband penetration, providing ample opportunities for mHealth services to exploit data connectivity in their patient service provisioning.

The mHealth service providers tracked by the GSMA have reached approximately 7.3 million benefactors (Q4 2014) in Mozambique. The comparative use of basic versus smartphone devices to access these services is 30% vs 16%.

The potential to use sophisticated data-driven platforms and services to provide mHealth is an important feature of an evolving mHealth sector. However, a key partner in the process of the popularisation of mHealth and one of its primary users, in the early stages of development, is the frontline mHealth worker. It is critical that these users buy in to the concept of mHealth and understand its advantages, as well as its shortfalls. Analysis undertaken by USAID's MEASURE Evaluation on Formative Assessment of an mHealth Site in the Nhamatanda region of Mozambique in 2013 is particularly pertinent here. One of the recommendations of this analysis was to use the simplest mobile technology available for health workers. This is the most affordable and therefore the easiest to train health workers with. It is consequently the easiest option to popularise. Simple and accessible technology, it was argued, was also the most likely to scale across country.

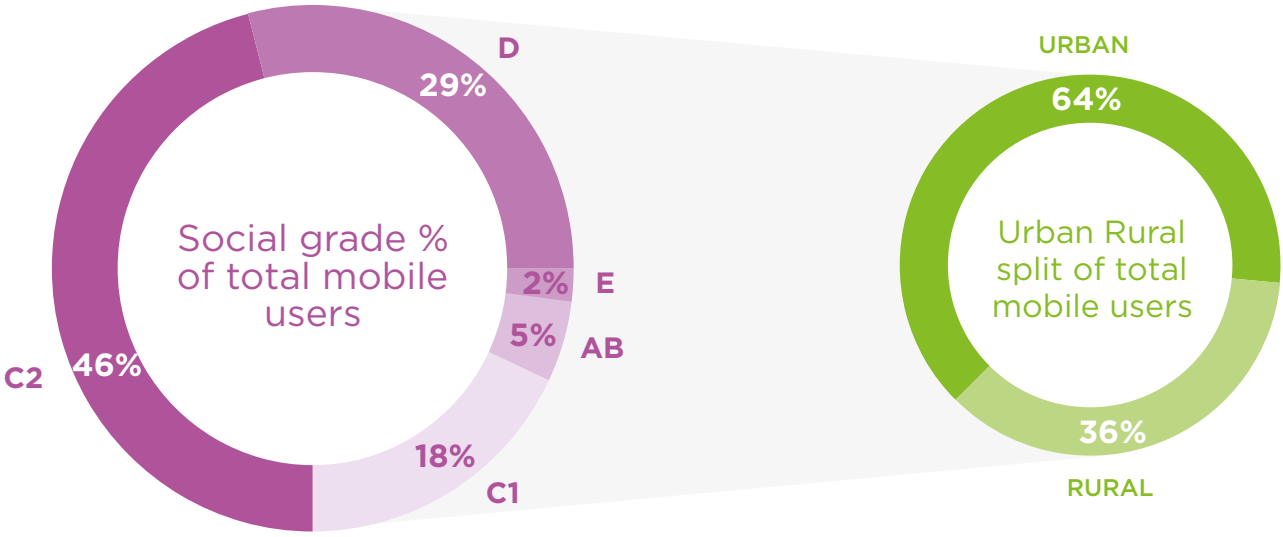
The GSMA is committed to facilitating mHealth in whatever format thought to be most successful. This includes supporting the simplest and most inclusive technologies. To this end an adaptable product concept has been developed which is based on direct embed on SIM with common short codes, leveraging USSD. This solution is designed to increase accessibility of free basic services, increase data sharing between services, provide a single user experience and perhaps most importantly provide a configuration that is customisable for both health workers and consumers.



Pricing mHealth services

Figure 13

Mobile user profiling for rural and urban users in Mozambique*



*Percentages denote amount of ESOMAR socio economic ranking users

Source: Mozambique: The Who and What of the Mobile Phone Market Intermedia (AudienceScapes)

Mozambique's high ARPU, comparative to GDP, indicates a voracious mobile consumer base. Analysis undertaken by AudienceScapes lends credence to this assumption, while demonstrating the potential for mobile to reach lower economic segments in rural parts of Mozambique. Survey analysis[5] found that rural mobile users, defined as persons who received an SMS or made a call at least once a week, were made up of a higher percentage of socio-economic grade D, at approximately 44%, in comparison to 22% of grade D within urban regions. The difference between urban and rural mobile user's usage and comparative income (socio-economic grade) demonstrates that there is a greater willingness for lower income users to spend disposable income on mobile services, and in particular within rural regions. The health burden is particularly great in rural Mozambique and as such there is an opportunity to fulfil a need and provide access to an audience more likely to adopt mobile services with mHealth.

5. Mozambique 2009 media diary survey of adults (15+) he sent or received an SMS or made a call in the previous week n=1207

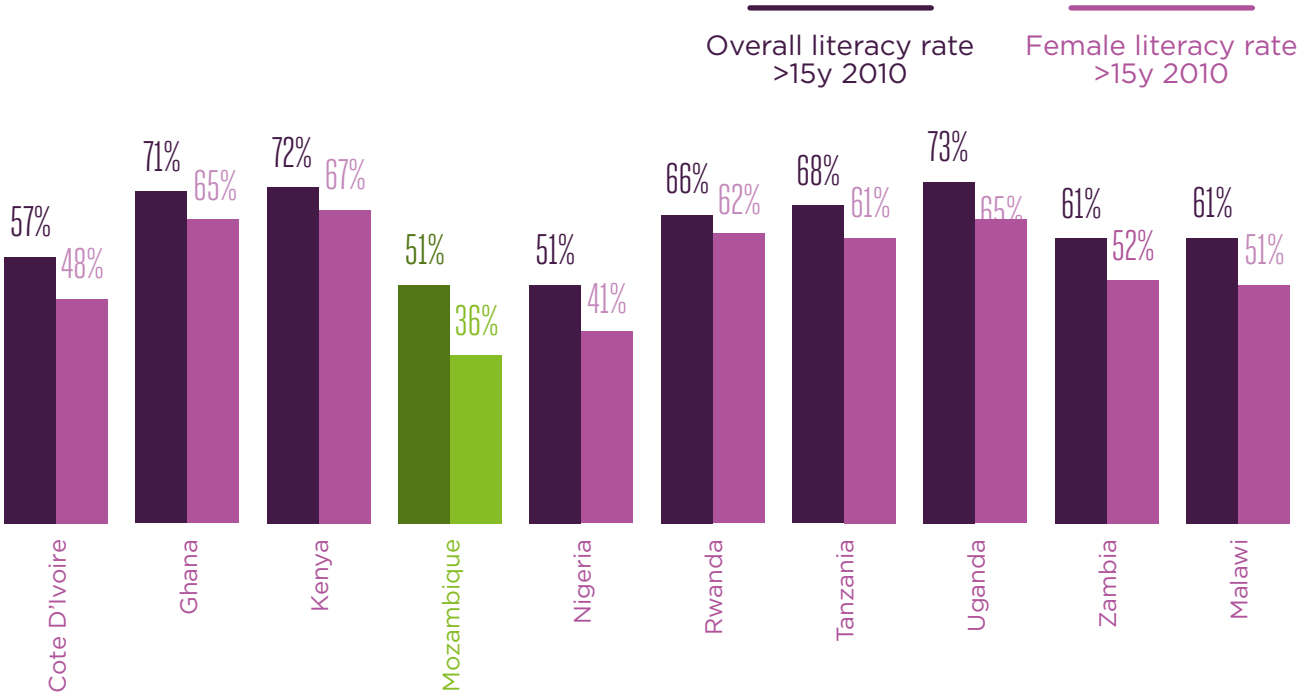


Features of Mozambique VAS ecosystem

There are a number of advantages in providing SMS with health and nutritional information. The format is conducive to both funded (B2B) and premium SMS commercial (B2C) models to an extensive and inclusive audience.

Figure 14

Mozambique total literacy and female literacy rates



In order to reach the target audience, health and nutrition content must be in a format that can be consumed by that audience. In Mozambique there is a moderate-to-low level of literacy, particularly for women. Mozambique ranks 2nd lowest for overall literacy rates and lowest for female literacy rate amongst the 10 GSMA nutrition focus countries. To tackle this discrepancy a number of initiatives have been launched, including literacy programmes especially designed to target women e.g. the Institute for International Cooperation of the German Adult Education Association's FELITAMO programme launched in 2010. Mobile messaging itself has an important role to play, specifically in its use as a pre-literacy and literacy improving skills device; using the mobile phone and SMS texting to reinforce and practice literacy skills.

Independent VAS providers face some challenges in developing mHealth services in Mozambique. Mobile operators control the distribution channel through their control of the SIM and existing revenue shares are unfavourable to VAS providers, with 60-70% going to the operator. There has been minimal development in local App stores. None of the mobile operators has a dedicated store, despite the announcement that mcel would launch one in the second quarter of 2014, requiring any VAS provider to have a direct relationship with the mobile operator in order to get a service into the market.

Mobile and VAS sector alignment to mHealth

In order to get a full picture of the market opportunity, we must also consider the value chain players who facilitate the mHealth process from a service perspective.

The mobile and VAS sector within Mozambique is highly competitive and benefits from three large players with relatively similar market shares. This creates an extremely competitive market defined by a motivation toward subscriber acquisition, avoidance of churn and increasing customer stickiness. These requirements are best achieved by encouraging service innovation and mobile operator differentiation.

There have been several mobile operator, NGO and government led initiatives in the Mozambique health sector. Successful initiatives require a broad grouping of partners who can bring their requisite skills to the challenge of mHealth. Vodafone (Vodacom) and GSK with additional support from GAVI[6] is one such partnership, designed to improve medicine and vaccine logistics, distribution and the overall numbers of those vaccinated (impact on specific health burden). This pilot project was designed as a proof of concept in collaboration with the MISAU, aimed at increasing the proportion of children that are covered by vaccination in Mozambique, using pushed SMS reminders, appointment data and selected health information updates. Secondary aims were the registration of mothers and caregivers into a MISAU database. Logistics capabilities were also built into the pilot, by using mobile as a reporting device for healthcare facilities to provide updates on vaccination stock levels. This was identified as of particular use in inaccessible rural areas.

Health personnel support features were incorporated by providing workers with smartphones and embedded software capable of accessing recorded vaccination histories, vaccination schedules and by allowing for pushed report data to be sent from the device.

6. GAVI Alliance public-private global health partnership committed to increasing access to immunisation

An important feature of this initiative was the availability of the platform across all of Mozambique's mobile networks.

The service was ramped up from 10 clinics at project inception in 2013 to 100 clinics from March 2014, with the technical support of Mezzanine to integrate the solution into the MISAU's IT infrastructure. It is planned to commercially scale the service to all 1,500 clinics in Mozambique if it proves successful.

Another Vodafone innovation in Mozambique was its partnering with Absolute Return for Kids (ARK) and the MISAU's provision of support to anti-retroviral treatment in selected regions of the country (Maputo province) using SMS. The initiative was launched as an 18-month proof of concept, based around pushed appointment and reminder messaging as well as educational content around ante and post-natal care and HIV management.

Movitel (Vietel) has worked with Grameen and the MISAU in a secondary paid access network provider role on the Muecate MNCH project. The initiative was targeted to improve newborn and child survival in the Muecate district of Nampula province, by adapting behaviour using nutritional data as a key mechanism.

The mobile feature of the initiative was monitoring and data collection, and was achieved using Motech ComCare and SMAP[7] suite (a mobile data collection and mapping suite). Effectively a pilot, the initiative has attained some scale reaching 32,700 community members from a target 93,906 and is set to end in September 2015.

mcel is also active with SMS-based health initiatives partnering with UNICEF and the MISAU to push best practice advice covering a number of topics including disease, injury and health practices to all of its subscribers. The three-year programme is based around "SMS for Life", a source of information designed to raise awareness around basic healthcare and child protection issues with specific attention paid to MDGs 4 and 5..

This initiative also highlights the strong support given to mHealth from UNICEF Mozambique, who has long identified this platform as a mechanism to incorporate private sector involvement in support of national public health initiatives. The Mozambican arm of the UN program has been successful in advocating for child-focused corporate social responsibility amongst the various stakeholders involved in mHealth in the country.

It is not just mobile operators that have innovated in the ICT health space within Mozambique. The non-profit organisation DKT International launched what it termed a social franchising programme called Intimo. While this initiative is not wholly mobile-based and concentrates on sexual health within Mozambique, its use of social media to increase access and attendance to its clinics is demonstrative of the pervasive nature of data driven communications across all social, geographical and financial boundaries. DKT was reporting upwards of 7,000 Mozambican patients reached, with 85% of those within the target age segment of 18 to 34, with information on family planning and reproductive health. The project's success in reaching this distinct segment demonstrates the capacity of telecommunications to target highly defined and historically difficult to reach segments.

7. http://www.smap.com.au/aboutUs.shtml

The B2B vs B2C sectors

The mHealth opportunity in Mozambique is made up of both a B2C and a B2B opportunity. Figure 15 highlights a number of the feasibility metrics considered for these particular user segments.

The relative data point indicators for the B2C and B2B market opportunity are 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 Mozambique, relative to the other nutrition initiative target countries, are indicated by the index score beneath the main chart.

It should be cautioned that 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.

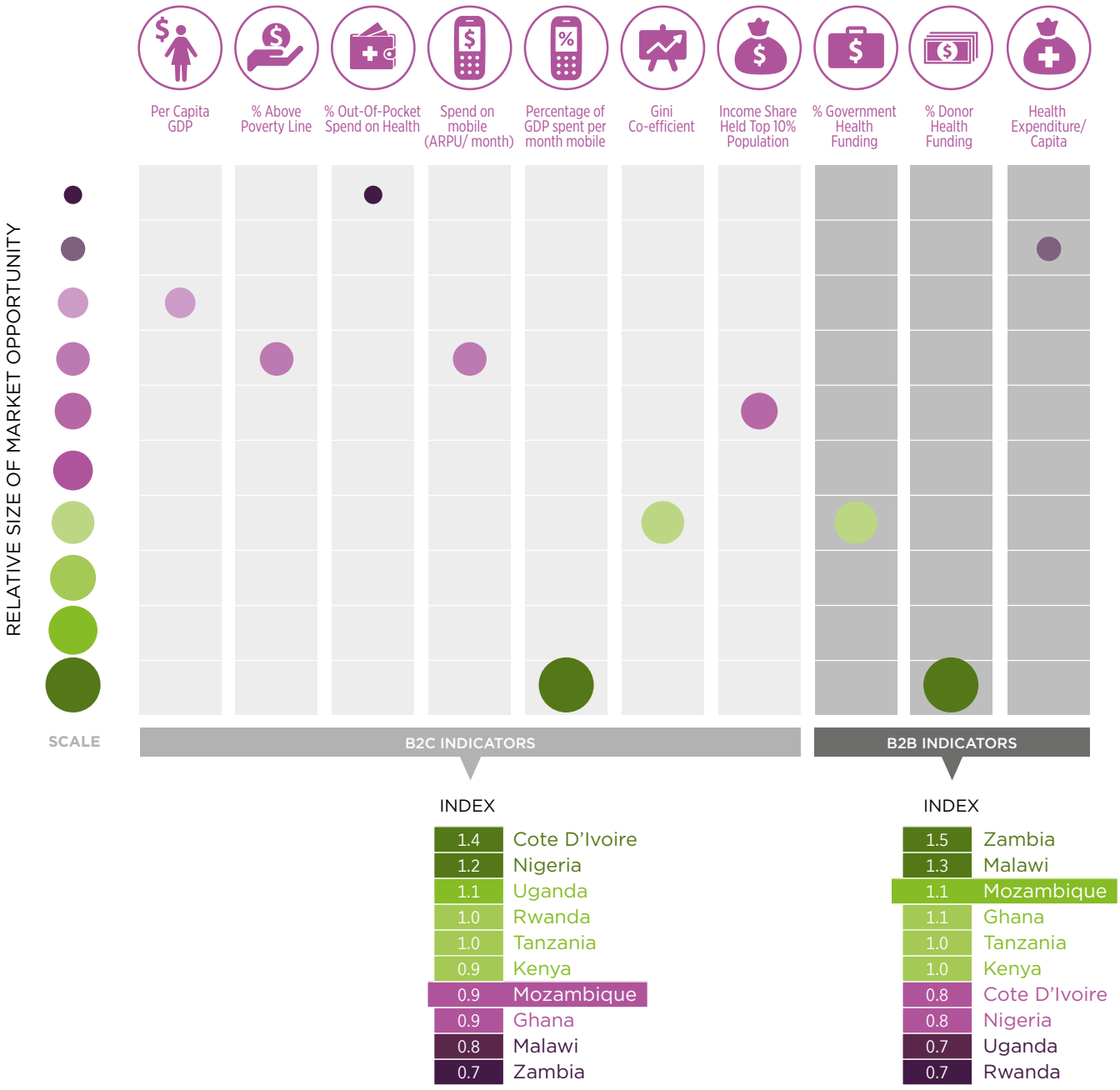
Mozambique follows the pattern for the 10 nutrition countries in that it is expected that government will guide overall mHealth strategy. Indicators for B2B versus B2C support this scenario. NGO funding for health ranks top across the comparator countries and there is a strong percentage of government funding spent on health indicators.

Favouring a B2B or government/NGO funded approach will prove successful in the short term but in order to open up the commercial sector a robust multi-sectorial partnership approach is desirable. Currently 11 services tracked by the GSMA have secured-cross sector partnerships.

Aggregate B2C indicators place Mozambique just outside the ideal score of 1 at 0.88. This is predominantly due to a very low OoP spend on health, a low percentage of those above the poverty line and a lack lustre GDP per capita. A high spend of available GDP on mobile, an average-to-good Genie coefficient and income share by the top 10% of society indicators, moderate these features somewhat.

Figure 15

Relative B2B and B2C indicators



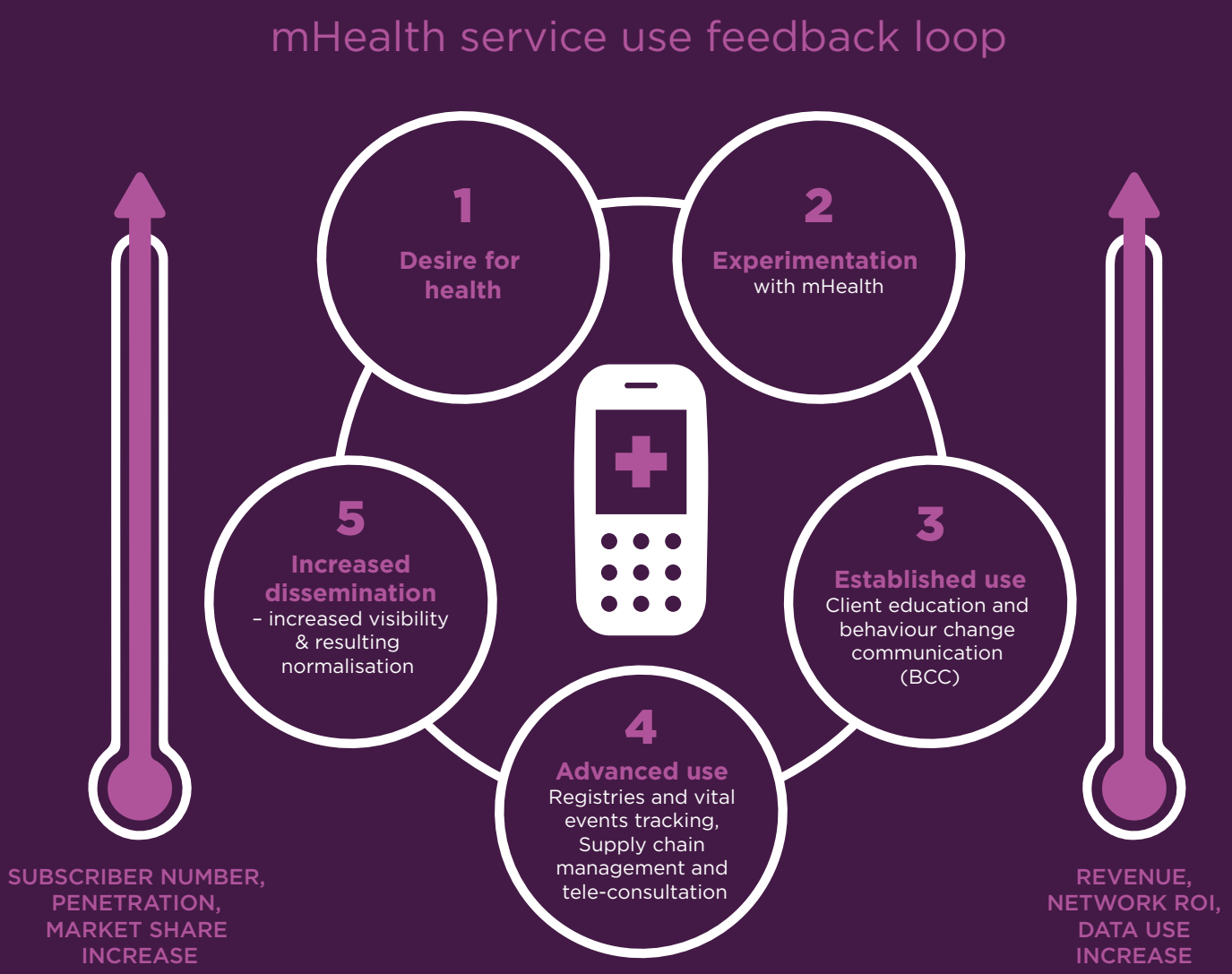
Source: WHO/World Bank/GSMA extracted data

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 of preferred health service providers within markets that do not have an established health infrastructure. In this way they can become normalised (i.e. they are identified as the go-to option for such services). In such a position mobile operators can create a sustainable service offering.

Figure 16

mHealth normalisation process and the impact on mobile operators



Source: WHO/World Bank/GSMA extracted data

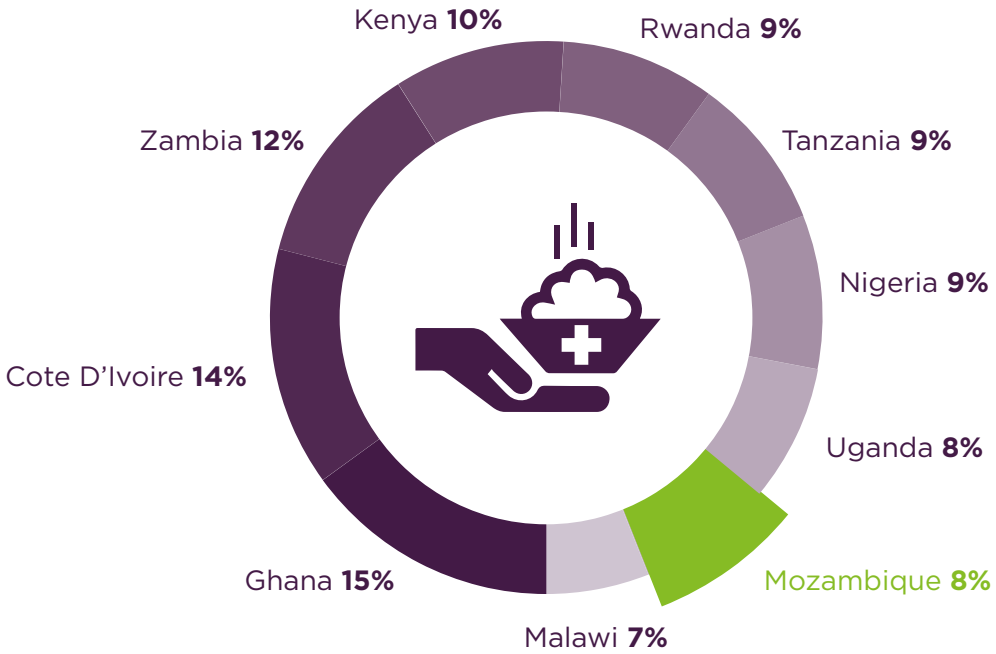
The Mozambique mobile market

Mozambique has the second lowest penetration rate for unique subscribers across the comparison countries (Q4 2013). Average ARPU spends of USD$10 per month place it just below the average of the GSMA nutrition initiative countries (average USD$10.4). However, when spend is compared against relative GDP Mozambique moves to the top of the ranking indicating that the average Mozambican mobile user is more accommodating of premium service charges than comparator country users.

Mozambique sees the lowest fall in ARPU, defying the SSA-wide feature of crashing revenues per user and despite the fact that the country saw the fourth highest growth in users over 2008-2013. High subscriber growth can negatively impact ARPU as new users generally spend less. In addition as markets are penetrated lower socio-economic segments are accessed. This is a result of lower expendable incomes, which reduce overall ARPU (i.e. greater volume but lower average revenues). This resistance to a general market feature creates a strong opportunity for mHealth if service developers and mobile operators can bring an attractive service proposition to customers.

Figure 17

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



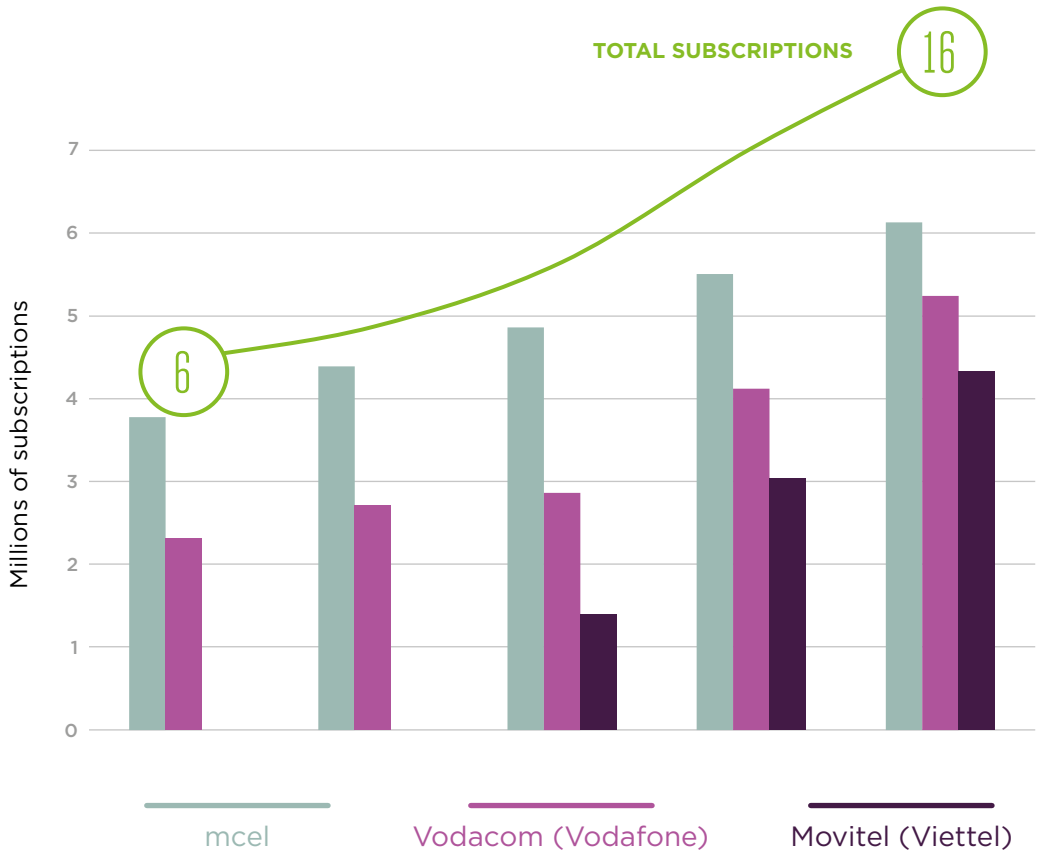
Source: GSMAi

General mobile market indicators

Mozambique is a market defined by growth, there was a 158% increase over the 2010-2014 period. This growth has continued despite the launch of a third player to the market in 2012. Based on the low unique subscriber penetration rates in the country (25% Q$ 2013), it is likely that organic growth will continue. However, a low overall (GDP) leading to a reduced potential for users to access mobile services (ability to spend) will likely mean that the addressable market ceiling will be reached soon. At this point market differentiation and innovation will become critical to retain and grow the ARPU of customers. mHealth opens up new markets in the B2B sector, as governments look to improve how they provision for health, increasing efficiency and reach while reducing cost burdens. Any innovations coming from this sector will help to seed the B2C business opportunity and create good prospects for competitive differentiation through service innovation.

Figure 18

Total mobile subscriptions and operator subscriptions Q4 2010 to Q4 2014



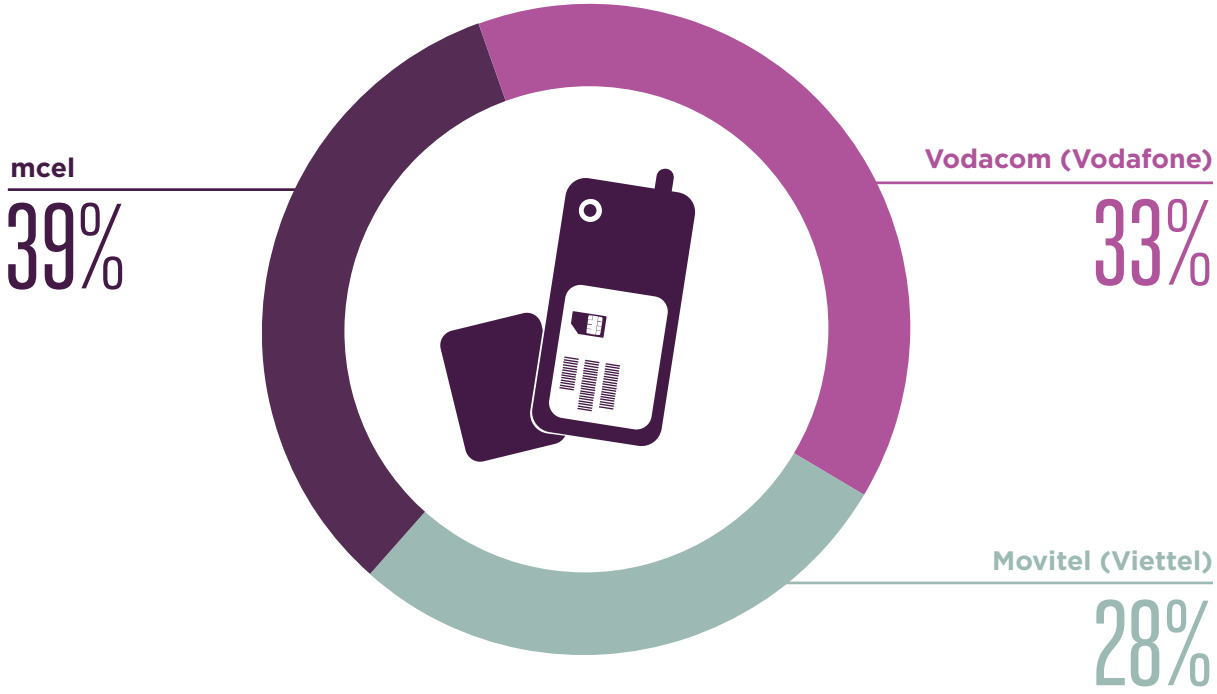
Source: GSMAi

mcel remains the dominant player in Mozambique, but has seen its market share steadily eroded over this period, to just 6 percentage points from its height of 24 (2010). Movitel joined the market in 2012 and has injected intense competition into the market by its rapid acquisition of market share, growing almost 210%. This has benefited Mozambique mobile customers, by creating a compulsion to innovate in service offering which has increased customer options.

Movitel claims to be particularly active in urban regions, having launched a 'door-to-door' sales strategy which it claims has enabled the achievement of an 80% penetration rate in these markets. There is no independent confirmation of this claim, but even if partially true it positions Movitel as a critical partner for mHealth services, reaching BoP and undersubscribed urban regions. This may explain its selection in the Muecate MNCH project.

Figure 19

Mobile operator market share



Source: GSMAi

The comparable shares of the three players also provide a strong impetus for differentiating market offerings. This feature will become more significant as organic growth slows and addressable audiences are penetrated.

Mapping mHealth service penetration and reach in Mozambique

As part of the qualitative review of Mozambique's feasibility as a 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 mHealth initiatives to desired health outcomes

- Currently tracking 18 live mHealth services deployed with partnerships from over 45 different organizations representing multiple stakeholder groups
- There are at least 3 mHealth services that are either being implemented in each province or are nationally available
- The most serviced region is Maputo Province with 6 mHealth services, closely followed by Gaza, Nampula, Niassa, and Inhambane Provinces, each having up to 5 different mHealth services
- There are 3 services that have scaled to be implemented at healthcare facilities across deployment in 4 or more provinces (but not necessarily in each district within those provinces)
- At least 5 services have scaled to implementation in 3 or more districts (not necessarily in different provinces)
- 48% of districts across Mozambique have at least one mHealth service deployment

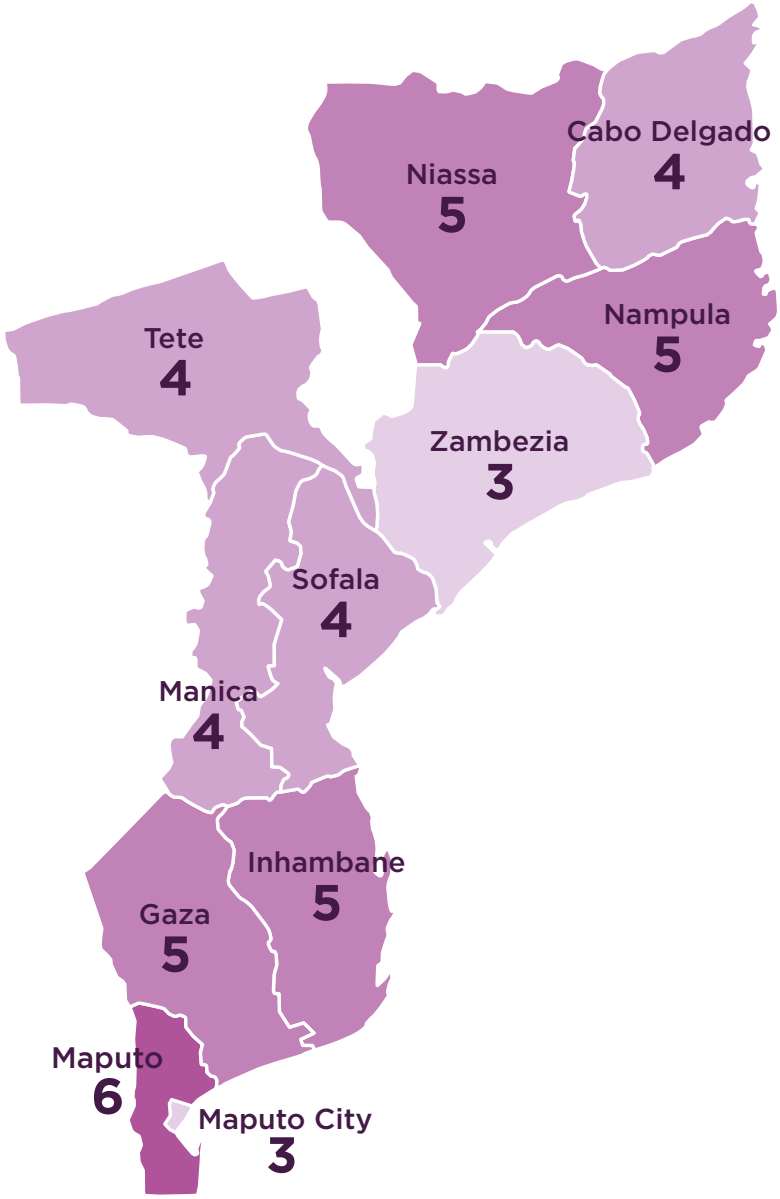


Overall mHealth coverage in Mozambique

Figure 20

mHealth services: regional distribution[8]





8. A mHealth service may be deployed in more than one province



Figure 21

Under-five mortality rates per 1000: regional distribution

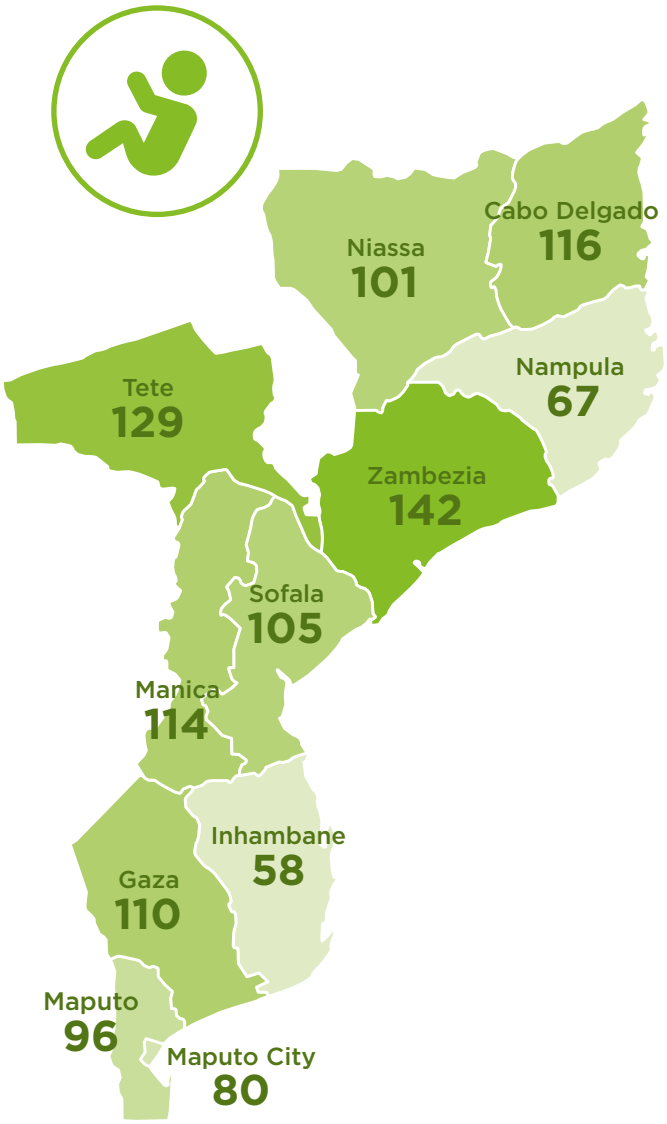
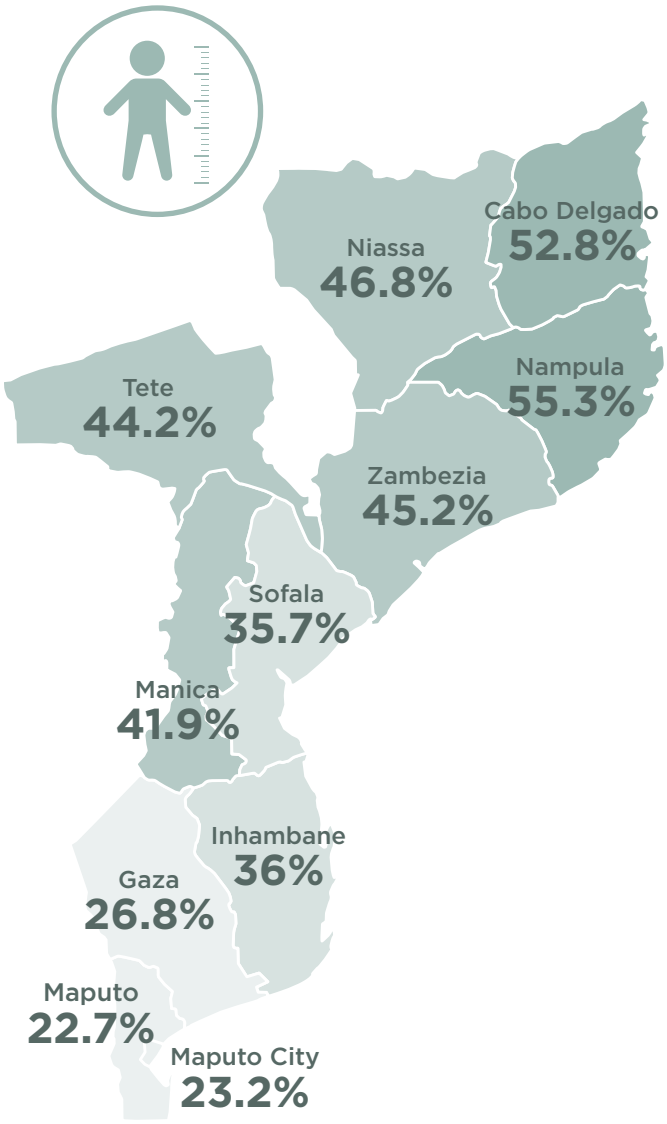


Figure 22

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



Health burden indicators

Table 1

Comparison of health burden indicators relating to maternal and newborn child health and nutrition for Zambezia Province and Maputo Province

	Zambezia Province		Maputo Province	
	Number	Rank	Number	Rank
Under-five mortality	142	11	96	4
%receiving antenatal care from a skilled provider	73.7	11	99	2
% Delivery at health facility	27.8	11	88.3	2
% Delivered by a skilled provider	26.4	11	84	2
Height for ages - % below -2SD	45.2	8	23.2	1
Number of mHealth service deployments	3		6	



Source: Mozambique Demographic and Health Survey 2011

The table above compares various health burden indicators relating to maternal and newborn child health and nutrition from Zambezia Province and Maputo Province. This data demonstrates a greater overall health burden in Zambezia Province.

Only 3 mHealth services are reported to be deployed in Zambezia Province, whilst Maputo Province has 6 mHealth services. 61% of mHealth services in Mozambique reported on their geographic distribution and this data illustrates an initial trend indicating that mHealth services are not being deployed in regions that have the biggest health burden.

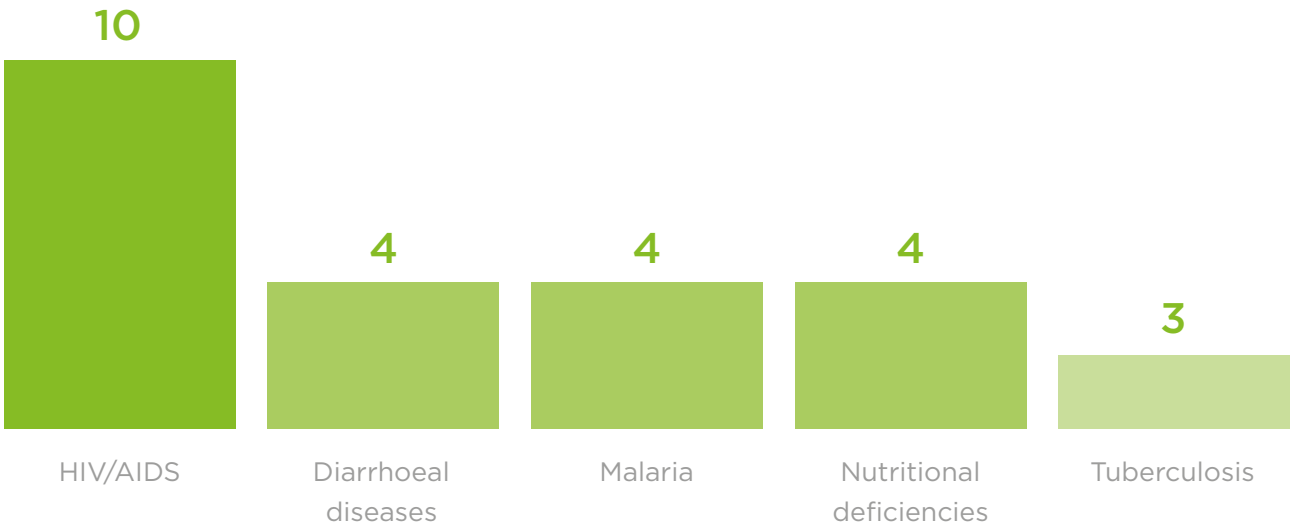
One of the biggest maternal health disparities between the Northern Province and Lusaka Province is in deliveries at health facilities (only 27.8% in Zambezia Province and 88.3% in Maputo Province)[9]. This improves the feasibility of mobile-based health services such as behaviour change communication services (e.g. educational messaging services) to drive the demand for increased deliveries at facilities in Zambezia Province.

9. Source: Mozambique Demographic and Health Survey 2011

Health conditions addressed by mHealth services[10]

Figure 23

Health conditions addressed by mHealth services



Source: GSMA mHealth Tracker



In Mozambique the most addressed health condition within mHealth is HIV/AIDS (10 services), followed by Malaria, diarrhoeal disease, and nutritional deficiencies, each addressed by 4 mHealth services. Four of the health conditions currently addressed by mHealth are amongst the top 10 causes of death in all ages in Mozambique: HIV, malaria, diarrhoeal diseases, and Tuberculosis (cumulatively contributing to 47 % of deaths in all ages)[11]. Three of the health conditions currently addressed by mHealth services are amongst the top 10 causes of death for children under-5 (malaria, HIV/AIDS, and diarrhoeal diseases, cumulatively contributing to 33 % of deaths in children under-5 years). Malaria is the leading cause of deaths in children under-5 years, contributing to 18% of deaths[12].

10. Figure 23 only includes health conditions that are address by 2 or more mHealth services
11. GBD Compare (http://vizhub.healthdata.org/gbd-compare/), 2010
12. Source: Mozambique: Health Profile (WHO)

Health interventions

Figure 24

Health interventions addressed by mHealth services



Source: GSMA mHealth Tracker

Interventions aimed at improving infant and child health are most prevalent amongst mHealth services, with 9 mHealth services currently addressing this need. Family planning, maternal, and nutrition interventions are equally offered by 4 different mHealth services.

Maternal and child health interventions



There are 4 services offering maternal health interventions and the issues covered within these services include:

- Breast feeding
- Pregnancy
- Antenatal care
- Pregnancy complications
- Pregnancy danger signs
- Emergency preparedness
- Labour
- Post-partum care



Five out of the 9 mHealth services offering infant and child health interventions focus on improving access to and driving demand for increased childhood vaccination. This aligns with the government's drive for improved vaccination adherence. Other topics covered in infant and child health interventions include:

- Growth and development
- Child abuse
- Newborn care
- Prevention of mother-to-child transmission (PMTCT)

Maternal, infant and child health nutrition

Of the 4 services addressing nutritional deficiencies, 3 are covering maternal and infant and young child nutrition, whilst 1 is addressing only infant and young child nutrition.

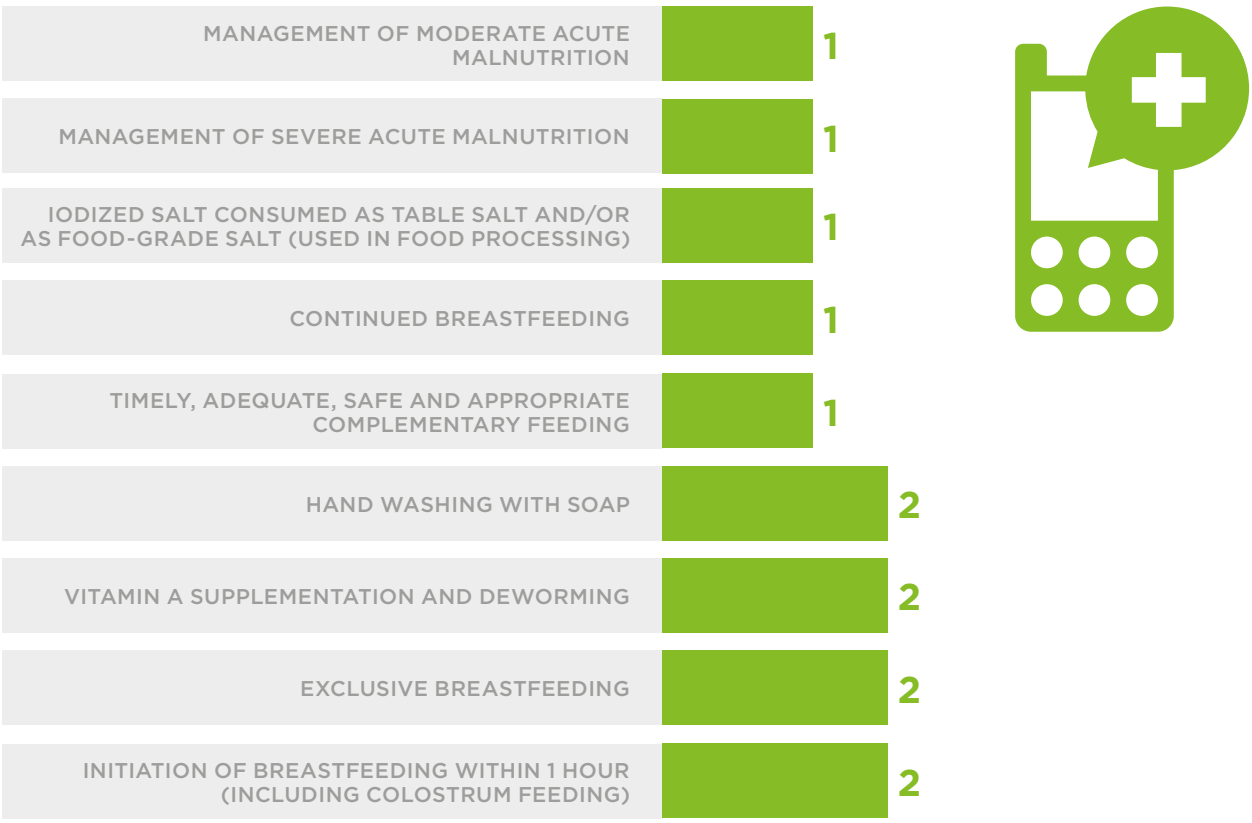
Maternal nutrition topics currently addressed by mHealth services include:

- Iron and folic acid supplements and deworming
- Iodized salt consumed as table salt and/or as food-grade salt (used in food processing)
- Improved use of locally available foods to ensure increased intake of important nutrients
- Vitamin A supplement in first 8 weeks after delivery
- Hand washing with soap

There appears to be a stronger focus on infant and young child nutrition. Figure 25 shows the various topics covered by mHealth services addressing infant and child nutrition.

Figure 25

Infant and child nutrition topics covered by mHealth services



Source: GSMA mHealth Tracker

Quantifying users

Figure 26

Number of mHealth services reaching different beneficiaries



Source: GSMA mHealth Tracker

Eleven mHealth services have reported to exclusively target mothers and children. Only 4 of the mHealth services reported the number of mHealth beneficiaries reached by their service, but this totalled the impressive number of 7,029,614 beneficiaries[13]. 3 out of these 4 services are aimed at improving the health of women and children exclusively and the total number of beneficiaries reached by these 3 services is 6,529,614.

7 services are currently targeting community based health workers. Of these 6, only 1 reported the number of community based health workers to have reached, to date, a figure of 1,000.

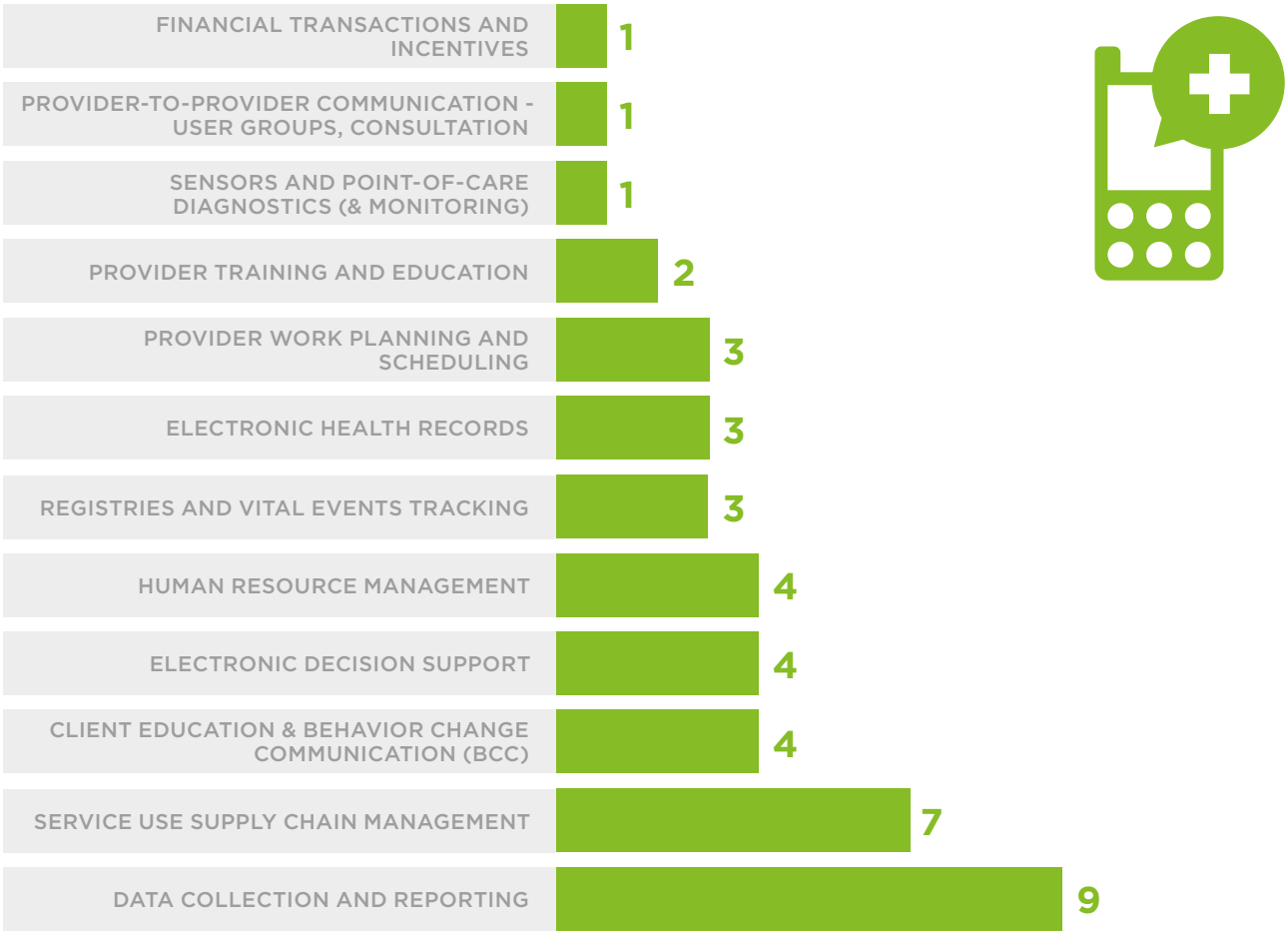
A total of 1,183 healthcare facilities are reported to have been reached by the 5 mHealth services that reported on this data point. The amount of healthcare facilities reached by only 2 of these 8 services said to be exclusively targeting mothers and children is reported to be 593.

13. This number represents numbers reached by, not numbers currently interacting with mHealth services.

mHealth applications

Figure 27

mHealth applications offered by mHealth services



Source: GSMA mHealth Tracker

12 of the 13 mHealth applications are currently being provided by mHealth services in Mozambique. Applications not currently accessible include tele-consultation.

Only 26.4% of deliveries in the Zambezia Province are assisted by skilled health workers in comparison to 84% in Maputo Province[14]. This substantiates the need for mHealth services offering applications aimed at improving the quality of care provided by frontline health workers. These include, but are not limited to, applications such as provider work planning and scheduling, electronic decision support, and provider training and education. Although these are amongst the mHealth applications currently being offered by mHealth services in Mozambique, there are only a handful of services offering these applications. From initial reports on numbers of frontline health workers reached by these services (1,000), they are still a long way from reaching all of the frontline health workers in Mozambique.

6 out of the 9 mHealth services that include data collection and reporting in their service offering are targeting women and children exclusively. Only 2 of these have indicated that they are also including registries and vital events tracking in their service offering.

14. Source: Mozambique Demographic and Health Survey 2011

Partnerships

10 of the 18 services have managed to secure a partnership with the MISAU. This is a positive indication of the good engagement of the MISAU with the mHealth industry.

11 of the 18 services have secured cross-sector partnerships.

There is a varied representation of mHealth stakeholders, including: government, academic institutions, technology, aggregators, mobile operators, donors and NGOs.

Operator involvement

Figure 28

Mobile operator involvement in mHealth



mcel **4**

Movitel **4**

Vodacom **3**

Source: GSMA mHealth Tracker

- Although the figure above appears to show mcel and Movitel as the leading operators in mHealth, in-country sources report that Vodacom and mcel are the only mobile operators making a real investment in mHealth. Both are investing CSR or other funding in at least 1 mHealth service
- 8 mHealth services have a service agreement with a mobile operator
- Of these 8 only 2 mHealth services have a service agreement across at least 2 mobile networks
- 5 of the 8 services that have a service agreement with a mobile operator are reported to be targeting mothers and children exclusively
- 7 of the 8 mobile operator services have existing partnerships with the MISAU
- Only one of the mobile operator mHealth services are reported to have a revenue generation model in place (all are supported by additional donor funding or by investment from the mobile operator)
- 1 of the mobile operator services is reported to be reaching 32,700 beneficiaries (this is an MNCH service)
- The reported numbers of beneficiaries reached by mHealth services (7,029,614) are all reached by services with mobile operator partnership

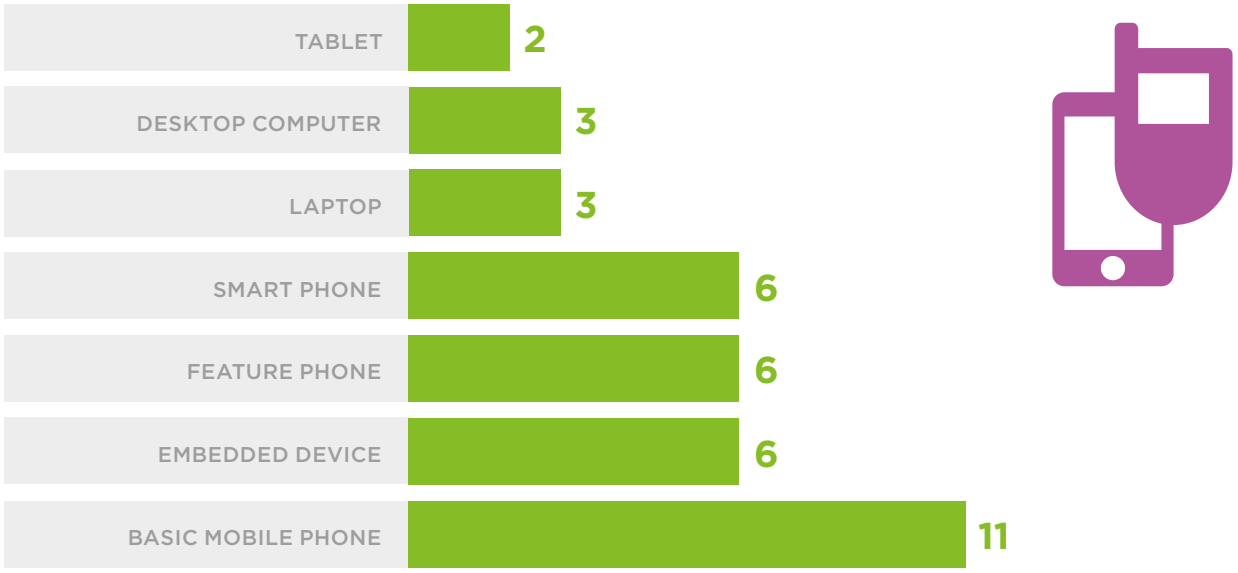
Business models and revenue generation

Of the 18 mHealth services currently being implemented in Mozambique, 14 are donor funded. Only 1 service currently incorporates revenue generation and this is consumer funded.

Technology

Figure 29

Types of technology devices used in mHealth services



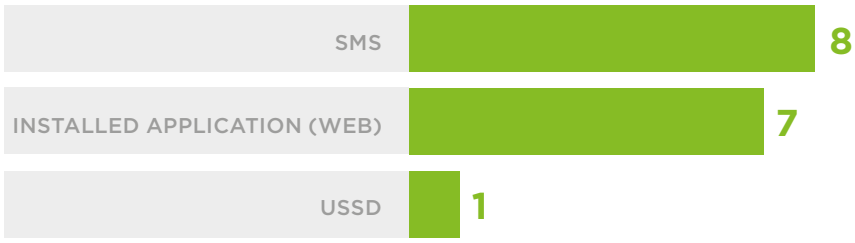
Source: GSMA mHealth Tracker

Figure 29 displays data for different technology devices used within mHealth services[15]. This figure shows that 11 mHealth services can be accessed by a basic mobile phone, making this the most popular technology device used in mHealth services in Mozambique. Of these 11, 8 are implemented using SMS. Embedded devices, smartphones and feature phones are currently being used to access 6 mHealth services each. There is currently only 1 mHealth service being implemented on USSD.

15. A single mHealth service may be accessible across multiple devises

Figure 30

Different technology channels used in mHealth services



Source: GSMA mHealth Tracker



mHealth case studies

Mozambique

NGO-led case study:
Muecate Maternal, Newborn and Child Health

mHealth use case

The 'Muecate Maternal, Newborn and Child Health' project, led by World Vision Mozambique, seeks to improve maternal, newborn and child health (MNCH) through sustainable nutrition interventions using mobile technology. The aims of the project are:

1. improved and equitable access to mother, neo-natal and child health services
2. adoption of positive nutrition, health-seeking, caring and WASH practices at community level leading to improved MNCH
3. a favourable policy environment for improved MNCH. The mobile applications utilized to achieve these aims are focused on data collection and monitoring

Specifically, the project is implementing two models of health programming that focus on both behaviour change and health promotion for MNCH and malnutrition, respectively. Both programme models utilize mobile tools that enable immediate feedback to community volunteers and beneficiaries, so that data is available in real time to project staff at all levels.

The 'Timed and Targeted Counselling' (ttC) model focuses on promoting MNCH interventions, health practices and MNCH behaviours, particularly for pregnant women. ttC is carried out by nurses or community based health workers. Mobile phones facilitate data collection for the ttC programmes and maternal and child health data, using the SMAP application.

The 'Positive Deviance/Hearth' (PDH) model is used primarily as a behaviour change approach, which seeks to rehabilitate, sustain and prevent malnutrition in moderate acute malnutrition (MAM), low weight-for-height and underweight children in the home setting. The 'Positive Deviance' aspect of Positive Deviance/Hearth refers to the promotion of uncommon yet beneficial practices by mothers / caretakers of well-nourished children in an impoverished community to others in the community with malnourished children. The 'Hearth' aspect of Positive Deviance/Hearth refers to the setting where the nutrition education and rehabilitation components of the programme are carried out; in this case, the home setting. Mobile phones facilitate data collection for this programme using the CommCare application.

Delivery channels

Application - CommCare and SMAP

Both quantitative and qualitative data collected by the service actors can be uploaded using the open source CommCare and SMAP applications for PDH and ttC programs, respectively.

Technology device

Feature phone – Samsung SGH-S730M

The program requires the use of donated Samsung feature phones. The nurses and health workers carrying out the programmes are given these phones, containing the previously downloaded respective technology. Data collection and reporting are carried out directly on the phone, through the application. Compiled data, which should include all data input into the CommCare or SMAP applications, is accessible on a central database.

Health focus

Maternal and child health and nutrition

Target audience / beneficiaries

Women and children only (MNCH)

The patient/beneficiaries are not actors of this service in that they do not input data themselves. However, this target demographic benefits from the service in that the data collected throughout the ttC and PDH programmes is organized and accessible to their respective health workers. Through improved data collection, impact can be properly monitored and evidence gathered so that implications for future programming and policy can be considered.

Target actors

Frontline health workers: nurses, community based health workers

All service actors are given initial training around the use of the CommCare and SMAP applications, through which they are meant to input collected data.

Geographical focus

Muecate District, Nampula Province

Source of content

Content covers: audio, text

Source: Dimagi

Localization

The software data collection functions are not localized. However, the distribution of the respective mobile applications for the ttC and PDH programmes may vary across the Muecate district. Variation in the geographical distribution of each mobile application would depend on the distribution of these programmes among the 360 targeted CHWs.

Implementation experience

The Muecate MNCH Project was initiated in April 2012 and is expected to continue until September 2015. The use of the Movitel network enables service availability where there is mobile coverage.

Figure 31

Geographical distribution of the Muecate MNCH Service by province



Partner coverage

- **MISAU:** resource partner, implementation partner, standards partner, advocacy partner
- **Grameen Foundation:** implementation partner, research partner – pilot testing, monitoring and evaluation
- **Dimagi:** technology vendor
- **Movitel:** network provider



Funding

World Vision Australia

World Vision Canada

Business model

Donor

Open source

Scale

The project has been funded for a three-year time period (2012-2015), the end of which is nearing this year. Phase I of the project was funded by World Vision Australia and World Vision Canada. The target population is 93,906 inhabitants, and the target number of community members reached through the mHealth service is 32,700. However, the target number of CHWs utilizing the mHealth solution is 360.

mHealth case studies
Mozambique

MNO-led case study: SMS For Life

mHealth use case

SMS For Life is a health education and advocacy mHealth service that was launched in March 2013 by mcel in partnership with the MISAU and UNICEF. Focused primarily on health promotion, the service utilizes the mcel network to help MISAU raise public awareness of best health practices. The service distributes information on a range of health topics to all mcel users free of charge. The programme is a component of the MISAU's national effort to achieve Millennium Development Goals (MDGs) 4 and 5.

Delivery channels

SMS

mcel is providing the SMS For Life services free of charge, by sending bulk Facts for Life messages as part of its pre-paid top-up and Mbip ("please call me") services. Distribution of information through SMS enables widespread and anonymous reach. The SMS channel enables access to SMS For Life for mcel network subscribers, as well as the people with whom they interact. MISAU and mcel are capitalizing on the fact that potential to share knowledge received via SMS is high. Whether through SMS forwarding functions on a mobile phone or face-to-face, information can easily be shared in households and across social networks. The number of SMS messages distributed through the 'SMS For Life' programme may also increase in the event of a disaster or humanitarian emergency.

Technology device

Basic phone

Any phone containing a mcel SIM, ranging from basic to feature and smartphones, can access this service.

Health focus

Health topic areas include:
Breast feeding
Preventing HIV and AIDS
Hygiene and sanitation
Family planning
Safe motherhood
Nutrition and growth
Vaccination
Preventing diarrhoea and cholera
Malaria
Coughs, colds and more serious illnesses
Preventing accidents and injuries
Recording and preventing violence

Target audience / beneficiaries

Children, women and men.

The 'Facts for Life' messages that are sent through the SMS For Life service on the mcel network cover a range of health topics that relate to people in all stages of life. The involvement of UNICEF, which is focused entirely on the wellbeing of the child and related concerns, is reflected in the target demographic of beneficiaries. For example, message content focused on prevention of violence against children targets parent (woman/man) and child beneficiaries. Message content focused on maternal and infant/child health targets women of reproductive age and women of all ages, and reflects the project's effort to address MDGs 4 and 5. However, message content focused on general best practices for disease prevention and injury, for example, do not explicitly target a particular age or sex demographic.

Target actors

Patient/beneficiary

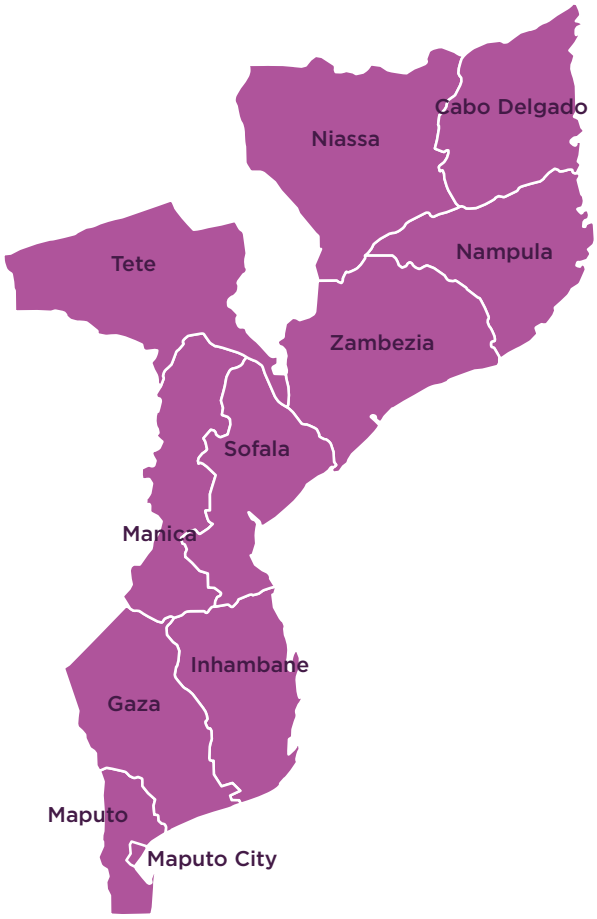
The SMS For Life service is a classic example of a health education/promotion focused mHealth service, in that the patient/beneficiary is the primary actor of the service. The patient/beneficiary, whether a child, woman or man, will receive the Facts for Life messages throughout the time period of the SMS For Life project.

Geographical focus

Available in all 128 districts across all 10 regions

Figure 32

Geographical distribution of the SMS For Life service by province



Source of content

Content covers: SMS messages

The content of the SMS messages is related to health education and advocacy, through health promotion. Specifically, this consists of best practices to prevent disease, injury, and violence against children.

Source: UNICEF, MISAU

Localization: SMS For Life is accessible to subscribers across the mcel network, which in 2009 reached all 128 districts of Mozambique. The content of the SMS messages is not localized to the geographical location of the individual subscriber.

Partner coverage

MISAU: resource partner, implementation partner, standards partner

UNICEF: implementation partner, technical support, capacity development – technology development, expansion support

mcel: standards, network, resource partner

Funding:

mcel

UNICEF

Business model:

Donor

Scale:

The project was initiated on 27th March 2013 and is a funded corporate social responsibility (CSR) initiative by mcel scheduled to last three years.



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

Growth rate indicator

2015

Total addressable maternal mHealth market 2015





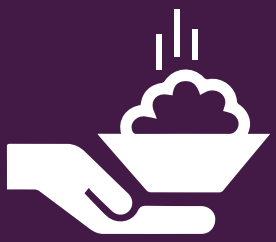
2020

Total addressable maternal mHealth market 2020





Ranking of overall mHealth opportunity



Size of nutritional MNCH problem

HIGH



Size of addressable population

MEDIUM-LOW



Ability to pay or fund mHealth

HIGH-MEDIUM

Ability to deliver



mHealth service providers

MEDIUM



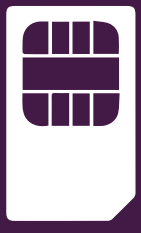
Strength of supporting programmes

LOW-MEDIUM



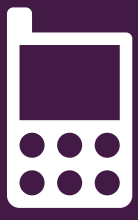
Interest from commercial aggregators

LOW



Interest from mobile operators

MEDIUM



Supporting mobile / health regulation

MEDIUM-LOW



Willingness to partner

MEDIUM-HIGH

Improving the efficiency drive in health

Access to health personnel in Mozambique is severely limited. Estimations of access for the population run as low as 30%*[14]. Initiatives to tackle this shortfall have been ongoing since as far back as 1977, with a major renewal in 2007 when a new training curriculum, terms of reference, and payment of monthly subsidies were mooted. However, logistical and financial constraints meant that these initiatives only went live in 2011. As a result of these features, health personnel support in Mozambique, particularly at the edge of the health network which is normally supported by CHWs, is characterised by severe financial restrictions and the requirement to make every Kwachi spent count. Efficiency and productivity enhancement are critical to this endeavour and the country's overall health service personnel strategy.

The communicative and networking capabilities of cellular networks serve as mechanisms to tackle inefficiencies in the health sector. Mobile can provide a number of improvements to health logistics, planning and management. An example would be the provision of a link to complex systems, such as patient management systems, which in many cases are let down by the lack of a well-functioning centralised communication infrastructure. Mobile can bridge this communication gap as it resides at the edge of the communication network which is of particular use when acting as an outlier within rural and remote regions.

There are several instances where inefficiencies in health processes that are endemic in Mozambique could benefit from mobile. Figure 33 highlights one such set of challenges facing health personnel: ensuring patients stick to treatment schedules and periodic clinical visits. In Mozambique the requirement for ongoing treatment for long-term illnesses includes HIV, diabetes and hypertension. These require health personnel to undertake community outreach which in some instances is simply the locating of missing patients. Figure 33 also demonstrates what mobile can do to tackle the challenges associated with these features.

16. Reachout Consortium - http://www.reachoutconsortium.org/countries/mozambique/ 2013

Figure 33

Impact of mobile on the time management activities of health personnel

Existing approach	Quantifying impact; time/resource impact	Mobile improvement / facilitation problem
Input Demands		Output Solution
Health personnel (known as 'activistas') spend 3 days providing home-based care with 'day four' assigned to 'busca' (community outreach activities including tracing missing patients and missed appointments. The activistas are reimbursed for their three day activities.	• Activistas report that the combination of assigned work and busca activities take upwards of 5 days to complete. • Direct tracking of busca work is not undertaken, resulting in the exact time spent on such activities being unclear particularly when it is combined with other duties.	• Tracking and monitoring of activities with real-time reporting capabilities. • Centralised tracking and analysis of activities, allowing analysis of time use and reallocation of resources/ planning where required. • Payment and reimbursement can be made via direct disbursement to the mobile device as SVA, airtime or money and to individuals that do not have bank accounts.
Health personnel must track down patients individual-by-individual to ensure they visit clinics/appointments and ensure that repeat prescriptions are filled so that treatment effectiveness is not compromised. This is particularly important with antiretroviral treatments.	• Tracking of missing patients is reported to take two days to complete in terms of tracking down the patient and then convincing them to visit the respective clinic. • Activistas must make weekly visits to clinic to gather the names of absent patients, with an average journey time of 30 minutes.	• Direct tracking of patients through cell tower triangulation. • Registration, tracking and monitoring, greatly reducing resource drain and long-term cost, allowing health personnel to concentrate on higher return health activities. • Pushed content, including absentee list, removes all travel time to clinic.

Source: Challenges USAID Formative Assessment of a Future mHealth Site in Nhamatanda, Mozambique

The efficiency improvements that mobile brings are directly applicable to the overstretched health service personnel in Mozambique and can greatly assist in reducing the need for travel to and from clinics and in some instances can completely remove the requirement for patient visits.

Figure 34

Average travel time to clinics for Mozambique 'Activistas' personnel



Source: Formative Assessment of a Future mHealth Site in Nhamatanda, Mozambique

The challenge of access to clinics is not confined to health staff alone. Over 50% of Mozambicans must walk on average 60 minutes or more to reach their nearest health facility and in many cases on arrival they face the prospect of commodity stock outs[15]. A simple request for notification on stock availability from the patient to the clinic and from the clinic to a centrally held data depository would, in a stroke, increase patient care efficiency.

17. PEPFAR Mozambique Operational Plan Report 2012

Regulatory position in Mozambique

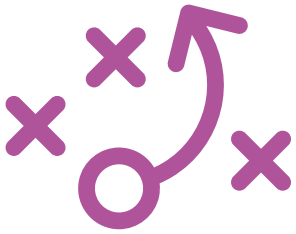
The Mozambican government is generally supportive of initiatives designed to improve the socio-demographic situation of its populace. Development in regulation conducive to these aims has been undertaken in the health, ICT and telecoms environments.

The Ministry of Transport and Communications (MTC, Ministério dos Transportes e Comunicações) developed a number of initiatives in late 2013 that considered inclusive approaches to drive socio-economic development in the country. Regulation itself was led by a public consultation, incorporating mobile operators and other stakeholders based in the country's three major conurbations of Nampula, Beira and Maputo. These sites were selected in order to garner input from all of the regions of the country (North, Central and South).

The main telecoms regulatory strategies were laid out in the 2014-2018 Telecoms Strategy Policy document, which concentrates on how to open the Mozambique telecoms market to further competition, including fixed line (which is currently a monopoly under the incumbent). These developments will no doubt have a considerable impact on the three existing mobile players in the sector and will provide a further incentive for market differentiation and the creation of new routes to market. mHealth is an untapped sector in the country, which should be considered within the increased likelihood of competition. The strong drive from users (i.e. fear of ill health) acts as a commercial motivator for mHealth.

The "Opening of the Market" section of the related policy document concerns itself with the implementation of unified licensing to create impetus for unified communication. Legislation of VoIP was slated as an output of this process and was deemed to provide a more conducive market for such disruptive players. With the advent of mobile data the opportunity for mobile VoIP will increase pressure on voice revenues as voice becomes commoditised, as it has done in developed cellular markets. This adds additional impetus for service differentiation.

One feature of the 2014-2018 strategy document that could indirectly impact mHealth development in Mozambique is SIM card registration, which was enshrined in law in 2010. The advantages of a registration system is that it also allows other forms of registration to be completed at the time of gathering the information or at any point subsequent to this point e.g. registering patients into health systems. With registration data additional information such as gender, age and approximate location could be added without transgressing any patient confidentiality or ethical clauses. With access to this type of data, registration-based mHealth commercial services could be investigated. In Mozambique the 2004 constitution protects the use and manipulation of electronic registration data but does not specifically define what a breach of this right would be, other than defining 'intrusion into private life'. Unlike other countries, such as Zambia, there are no current restrictions on transfer of data offshore. Patient data should be protected and the rights of the individual enshrined. A healthy dose of practicality, common sense and awareness of the needs of the wider industry, vis-à-vis the need to sustain scale through commercial consideration, should pervade the progression of this regulation and the development of any mHealth opportunities deriving from it.



Conclusions

- It is recognised that there is a critical shortage of health personnel in Mozambique and the National CHW Program, and initiatives like it, seek to tackle this imbalance. The mHealth services tracked by the GSMA that target health workers have reached 1,183 healthcare facilities. There is a clear benefit to attempting a coordinated scaling-up of initiatives that incorporate mobile services to better achieve the strategic aims of CHW projects, particularly through the linking-up of healthcare facilities.

- There is a need to better utilise the limited number of health personnel in Mozambique through the use of efficiency tools, time saving processes and human resource planning/management. Of the mHealth services tracked by the GSMA, 43% can be said to be directly involved in this process.

- Approximately 86% of the GSMA-tracked mHealth initiatives target women and infants. This shows that mobile is efficiently targeting the principle health challenges currently facing Mozambique, while aligning with the core aims of the country in reaching maternal and infant segments to provide better healthcare.

- The potential market for maternal segments is 1.1 million and is forecast to rise to 2.98 million by 2020.

- Health service support is not being deployed in the regions where it is needed the most in Mozambique. This is a particular issue with maternal and child nutritional health. A mother is almost three times more likely to be assisted at birth in the Maputo region versus the Zambezia region. Stunting levels in the Gaza region (population 1.3m) are ranked at 27%, with 70 health personnel per 100,000, whereas Nampula (population 4m) has a provincial stunting rate of 55% and 50 health personnel per 100,000. Consequently, there is an opportunity to target these deficiencies with mHealth services, based on the demand from health users.

- Nutrition is a particular challenge in Mozambique. The country ranks highest for malnutrition rates across the Southern African Development Community (SADC) and an increasing prevalence of Global Acute Malnutrition (GAM) and Severe Acute Malnutrition (SAM) at national level is strongly linked to a greater increase in wasting in rural settings[16]. Mobile can help in strategies to confront this ongoing challenge. Mobile is a powerful education tool which can provide the most efficient in-country data on food and nutrient intake. The GSMA's delivery of focused country-specific mobile information, as part of its ongoing project, will assist in this process, while the very nature of mobile will allow this content to be disseminated as widely as possible and into those difficult to reach rural districts where it is needed most.

- Infant mortality rates are comparatively high in Mozambique (3# highest). Of the total mHealth interventions tracked by the GSMA, 33% are concerned with infant and child health. Only 6% of these interventions are concerned with child nutrition. In Mozambique mobile is uniquely positioned to tackle this health feature, through its coverage and capacity to reach the largest possible audiences.

18. GAIN: Mozambique nutrition analysis , part one 2014

Overall feasibility assessment

The feasibility of mHealth to address nutrition and maternal and child health in Mozambique is good-to-moderate. Demand-side requirements are in place in terms of addressable market and growing mobile audience, but there remain challenges in bringing mHealth services to the end user. Specifically, there is only one commercial and no part-commercial (a combination of commercial and free aspects e.g. freemium) projects as tracked by the GSMA and those initiatives that are active are predominantly proofs of concept and pilots. Having said this, there are some strong feasibility indicators that should help to solidify opportunities in the short-to-mid-term. These include strong B2B indicators and very strong VAS usage indicators. The overall size of the market opportunity, considering aggregate category indicators, denotes a moderate opportunity that sits squarely in the middle of prospect indicators. This provides acceptable evidence of a market that will develop and grow at a sustainable, if not exponential, rate. Additional suggested considerations are the development of the mHealth proposition to bring to the forefront the concept of mobile user consideration (popularisation and marketing of mHealth).

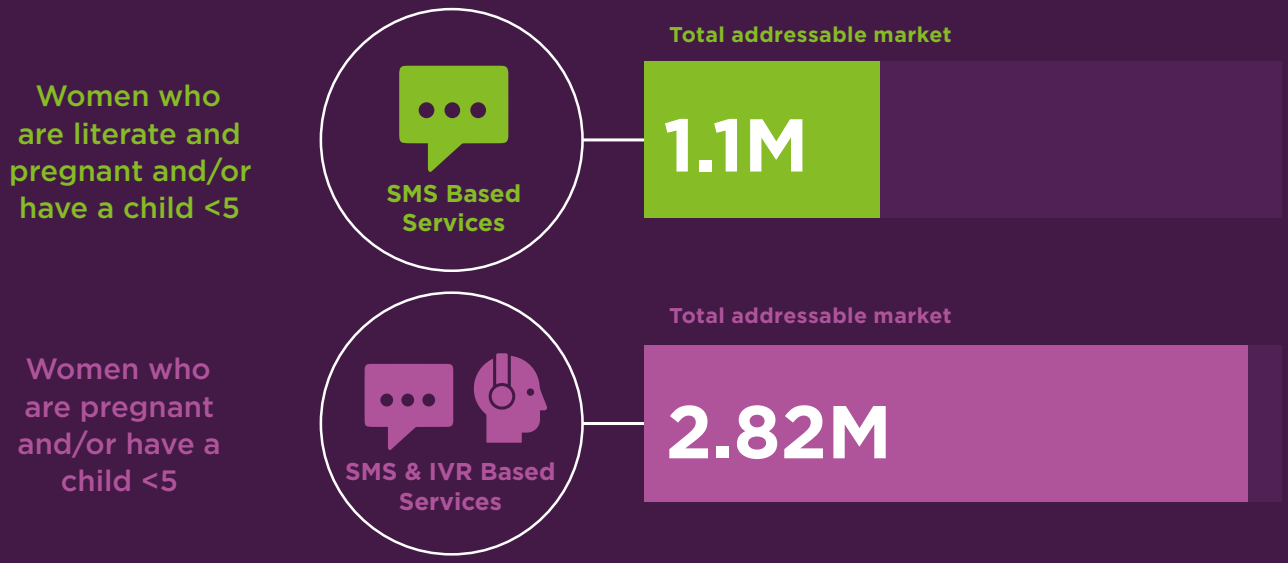
The GSMA will assist in this process by working with the public sector to address common challenges and work to optimise opportunities for partnerships between industry stakeholders.

Opportunity size

The evolving nature of the Mozambican mHealth industry suggests that mobile operators should concentrate on the simplest formats of service in the initial stages of market development. As such there is an opportunity to target literate women with children under-five using SMS to deliver nutrition and maternal health information services. This segment is forecast to grow by 11% over the 2015-2020 period.

Figure 35

Total addressable maternal mHealth market 2015

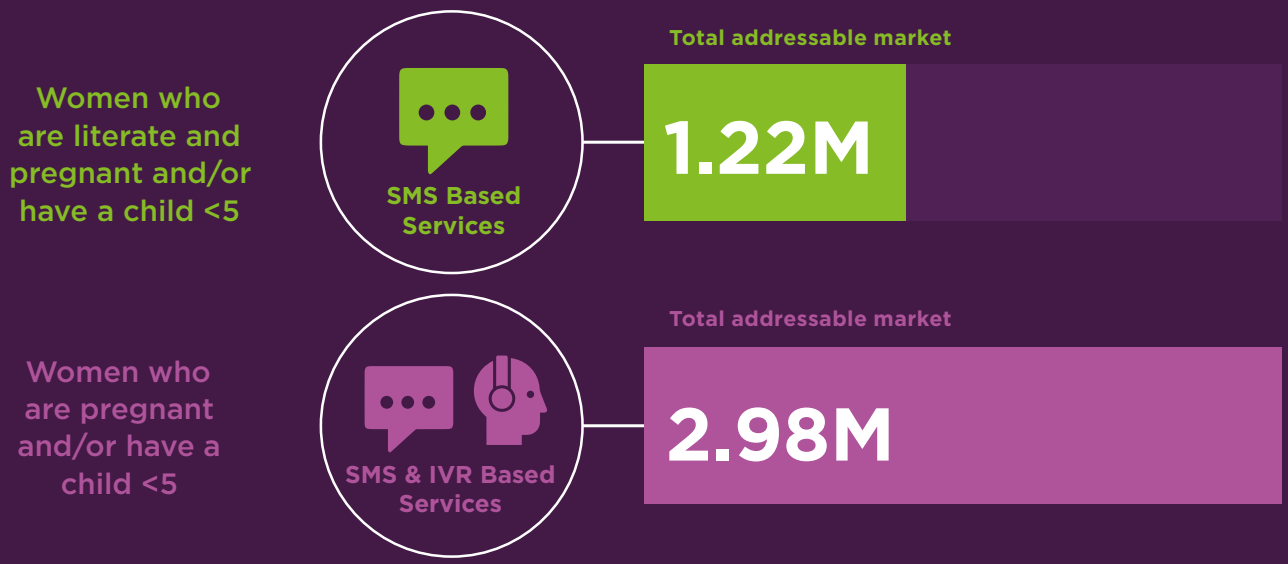


Source: GSMA Mobile for Development mHealth model, GSMAi data

When both literate and illiterate maternal segments are targeted using IVR services, this opportunity increases further, demonstrating an addressable market of almost 3 million by 2020, growing by 6% over the period 2015-2020.

Figure 36

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 – **MEDIUM-LOW**
Ability to pay or fund mHealth – **MEDIUM-HIGH**
Ability to deliver – **LOW-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 – **LOW-MEDIUM**
Interest from commercial aggregators – **LOW**
Interest from mobile operators – **MEDIUM**
Supporting mobile / health regulation – **MEDIUM-LOW**
Willingness to partner – **MEDIUM-HIGH**

Abbreviations and terminology

ARPU - Average Revenue per User
B2B - Business to Business
B2C - Business to Consumer
BoP - Base of Pyramid
CAGR - Compound Annual Growth Rate
CHW - Community Health Worker
CSR - Corporate Social Responsibility
GDP - Gross Domestic Product
ICT - Information and Communications Technology
IVR - Interactive Voice Response
MDG - Millennium Development Goals
MISAU - Mozambique Ministry of Health
MNCH - Maternal Newborn and Child Health
MoH - Ministry of Health
NGO - Non-Governmental Organisation
OoP - Out of Pocket
PAMI - Pan-African mHealth Initiative
PDH - Positive Deviance/Hearth
PMTCT - Prevention of Mother-to-Child Transmission
SMS - Short Message Service
SSA - Sub-Saharan Africa
ttC - Timed and targeted Counseling
USSD - Unstructured Supplementary Services Data
VAS - Value Added Services
VoIP - Voice over Internet Protocol



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