Healthy Pregnancy, Healthy Baby

A mobile health service offered in partnership with leading mobile operators in Tanzania

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GSMA mHealth

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ABBREVIATIONS

ANC	Antenatal care
API	Application programming interface
ARPU	Average revenue per user
ATL	Above-the-line marketing
BTL	Below-the-line marketing
B2B	Business to business
CHW	Community health worker
CSR	Corporate social responsibility
GCP	Global content partner
GPS	Global positioning system
eHealth	Electronic health
HIV	Human immunodeficiency virus
ICT	Information and communication technology
IVR	Interactive voice response
LCP	Local content partner
MNO	Mobile network operator
MoH	Ministry of Health
MoHCDGEC	Ministry of Health, Community Development, Gender and Children
M&E	Monitoring and evaluation
NGO	Non-governmental organization
PMTCT	Prevention of mother to child transmission
PPP	Public-private partnerships
SBCC	Social and behaviour change communication
SMS	Short message service
USSD	Unstructured supplementary service data
VAS	Value-added service
2G	Second-generation cellular technology networks
3G	Third-generation cellular technology networks

Executive summary

The *Healthy Pregnancy, Healthy Baby* (HPHB) text messaging service is a mobile health (mHealth) value-added service (VAS) currently available across four major mobile network operators (MNOs) in Tanzania - Airtel, Tigo, Vodacom and Zantel. The service is owned by the Ministry of Health, Community Development, Gender and Children (MoHCDGEC), managed by Cardno Tanzania under the mHealth Tanzania Public Private Partnership. With funding from the United States Government Centers for Disease Control and Prevention (CDC), HPHB enables all mobile phone owners, and their families and friends, to have access to vital health and nutrition information via their phones by short message service (SMS). The HPHB service has been available in Swahili as a free service to the end-users since its launch in 2012. As of November 2017, over 1,800,000 users have cumulatively received over 115 million messages through the service.

Service users have access to a variety of content, covering prevention of mother-to-child transmission (PMTCT) of human immunodeficiency virus (HIV), family planning, antenatal and postpartum care (including nutrition and danger signs). The service also provides subscribers with pregnancy and child development milestones, as well as reminders of essential healthcare services.[1] The content is scheduled based on user profiles, which ensures relevance and timeliness of the service.

The GSMA has partnered with the mHealth Tanzania PPP since 2014 on various aspects of the HPHB service. In 2016, the expansion of existing content to include maternal and newborn nutrition information was made possible by the GSMA mNutrition Initiative, funded by UK aid (the UK Department for International Development, DFID). In addition to the development of localised nutrition content, the GSMA provided service diagnostics and consultancy to identify opportunities to enhance the HPHB service user experience. The GSMA has also provided in-kind monitoring and evaluation (M&E) support to investigate the pathway towards desired nutrition outcomes - namely improved nutrition knowledge and practices. This case study highlights the key learnings from GSMA's engagement.

Key findings

Service design

- **Users find text-based self-registration challenging, whilst assisted registrations through healthcare workers and community health workers (CHWs) had a high success rate.** Trained CHWs are more successful in registering users and are also more likely to persevere through the issues caused by poor connectivity. Despite the challenges faced by end-users, self-registrations make up 39 per cent of total registrations to HPHB.
- **Comprehensive and frequent training on registration mechanisms is required to overcome low technical literacy amongst CHWs.** CHWs tend to lack confidence when navigating unstructured supplementary service data (USSD) menus and often face the additional challenge of not knowing how to operate different types of mobile devices.
- **Proactive service interaction with end-users is required to improve retention.** Messages on general service administration[2] could greatly improve the end-user experience and overcome their current passive usage patterns.

Partnerships

- **Establishing a relationship with the MoHCDGEC in the early stages of programme development is key** for building a high level of trust amongst service users. MoHCDGEC validation and support adds credibility to the service which attracts other partners and makes negotiations easier.
- **The involvement of multiple parties has resulted in longer decision-making processes, with significant resources required to build, maintain and manage the HPHB partner network.** Each partner contributes to different aspects of service development, awareness, delivery and implementation. Whilst independent organisations can take solutions to market within a few months or even weeks, this is typically not the case for the mHealth Tanzania PPP. On the upside, such an approach results in long-term buy-in from all partners, and most importantly, the MoHCDGEC.
- **MNOs are key partners as their in-kind contribution reduces operating costs by 63 per cent.** Message delivery costs are currently zero-rated by all MNO partners. Leveraging MNO networks enables the large-scale delivery and extensive reach of the service.

1. Immunisations, clinic visits and malaria prevention medication reminders etc.

2. Such as confirmation of successful registration, frequent registration process reminders and prompts for users to update their registration information

Sustainability

- **Providing evidence that the service is delivering value to existing funders is essential to see their contributions secured or increased over time.** Defining and monitoring service KPIs for each funder needs to be prioritized.

- **Exploration of other business-to-business (B2B) opportunities,** such as third-party sponsorship of messages as a form of advertising, **could identify alternative payers for the service and reduce the dependency on donor funding.**

Nutrition content

- **Factually correct content is essential, but a user centric design approach to content development is key.** Content developed on nutrition factsheets[3] had high accuracy, but low suitability for key target audiences and required additional stylisation to ensure that messages were actionable, clear, useful and relevant for HPHB target audiences.

- **Repetition of information could strengthen the service impact.** End-user research shows that messages are more easily trusted when they align with advice already heard before.

- **Information from the mobile service is being shared with the wider community:** 73 per cent of the user feedback survey participants declared to share the information they learn from the service with their community.[4]

Marketing

- **Mass media campaigns need to be supplemented with on-the-ground activations to drive user uptake.** Above-the-line (ATL) campaigns were effective in raising brand awareness amongst a vast population. However, many users reported only subscribing to the service when they were prompted by family, friends or healthcare workers.

Health outcomes

- **The HPHB service is delivering nutrition content to populations that need it most.** The service has a 68 per cent female user base and approximately 45 per cent of its users are living below the basic needs poverty line.

- **Experienced users[5] are changing their nutrition behaviours in line with knowledge acquired through the service.** Eighty-one per cent of experienced HPHB users could correctly recall that babies under the age of six months should only be given breast milk. This high knowledge level translated well into appropriate behaviours with 76 per cent of experienced users reporting to exclusively breastfeed their babies up until six months of age.

- **Experienced users are more likely to demonstrate improved nutrition knowledge and behaviours than non-users.[6]** As of June 2017, the percentage of users who correctly recalled appropriate breastfeeding practices was 73 per cent for experienced users and 67 per cent for non-users. Similarly, 73 per cent of experienced users are implementing appropriate breastfeeding practices in their households compared to only 64 per cent of non-users.

- **HPHB SMS reminder notifications are highly valued and adhered to.** Seventy-three per cent of experienced users recall receiving messages reminding them to go to the clinic. Of this group, 78 per cent reported that they did in fact go to the clinic in response to receiving this reminder message.

3. Factsheets provide information based on the best evidence available related to various nutrition practices as well as the sources of the information.
4. 62 per cent share it with the spouse – in most cases, these were men sharing information with their wives.
5. Experienced users are users who had been subscribed to the service for more than six months at the time of the user feedback survey and had therefore been exposed to a comprehensive set of nutrition information.
6. Non-users are new users who had been subscribed to the service for less than 1 month at the time of the user feedback survey and had therefore not had a chance to fully experience the value of the nutrition content.

Introduction

The HPHB service, otherwise known as Wazazi Nipendeni (Swahili for 'my parents love me'), is a MoHCDGEC owned, nationally available SMS service offering free maternal and early childcare health and nutrition information to subscribers on all leading mobile networks in Tanzania. The core mandate of the service is to promote healthy pregnancies and proper early childcare practices through the provision of timely content tailored for pregnant women, mothers with children up to age five and their supporters and caregivers.

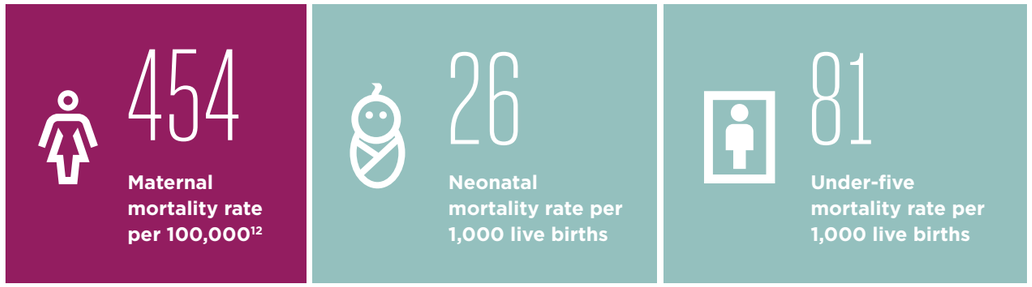
The first version of the HPHB service was launched in 2012, with a strong focus on HIV testing and driving safer deliveries by promoting appropriate antenatal care amongst pregnant women. In 2015, the scope of content was expanded to include postnatal care and in 2017 the service re-launched with a complete content refresh, shifting focus to include more comprehensive nutrition content for the same target group. The HPHB service was also embedded onto the newly developed Ministry of Health (MoH) mHealth platform, which currently houses several other mHealth services.[7]

7. Including the National Blood Transfusion Text Messaging Service (NBTS), the Electronic Integrated Disease Surveillance and Response (e-IDSR) System and the National Feedback Mechanism for health services (public feedback on health services provided).

Country context

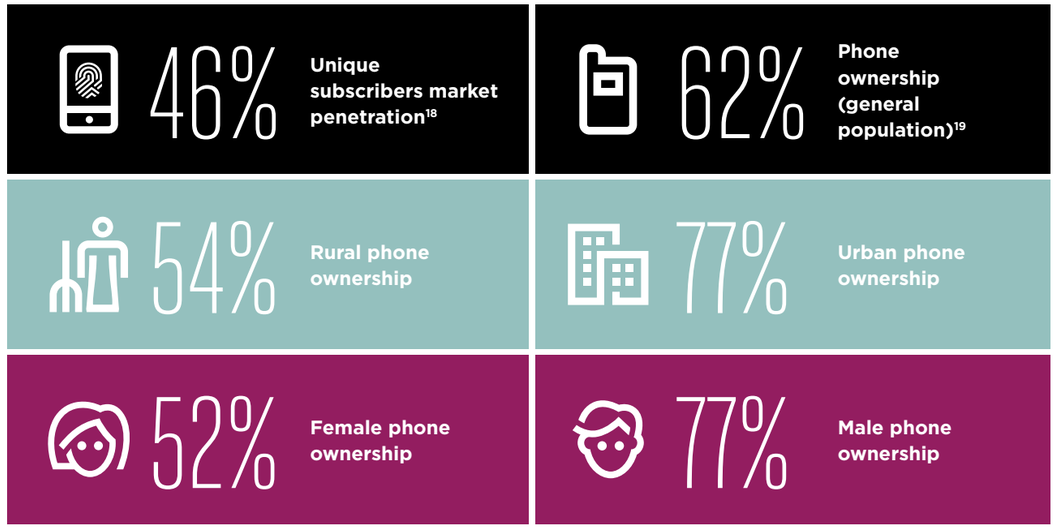
Since 2010, Tanzania has witnessed an improvement in maternal health indicators, with an increased number of women who attended antenatal care (ANC) appointments from their first trimester of pregnancy and more than 50 per cent of women attended the recommended number of ANC appointments. The occurrence of unassisted childbirth, typically associated with high incidences of child and maternal mortality, has also been reduced.[8]

Despite progress in improving Maternal and Newborn Child Health (MNCH), Tanzania's female population still faces high risks of preventable illness and mortality during their reproductive years. The high death rates of newborn babies, infants and children under-five are also concerning. Rural women in particular face a disadvantage in access to information and healthcare during pregnancy.[9] An estimated 40 per cent of rural women in Tanzania do not have timely information on signs of pregnancy complications[10] and approximately 30 per cent of Tanzanian women are not participating in significant decisions regarding their own healthcare.[11]



One of the goals of the Tanzania National Electronic Health (eHealth) Strategy (published in 2013) is to enable electronic access to healthcare services for patients in remote, rural and disadvantaged communities with particular emphasis on the provision of services to reduce maternal and child mortality.[13] Since 2010, the government has increased public health spend by more than 77 per cent, which has led to the implementation of several projects under the eHealth strategy.[14] As part of broader efforts, the Tanzanian government's 2016 investment roadmap outlines a range of digital health interventions leveraging mobile and other Information and Communication Technologies (ICT) for healthcare system strengthening.[15] The increase in mobile growth,[16] coupled with the prevalence of 2G network coverage,[17] paves the way for mHealth services delivered via SMS or Interactive Voice Response (IVR) to reach the majority of the population.

8. Tanzania DHS, 2015-16
9. Roughly 68 per cent of Tanzania's population live in rural areas. Tanzania DHS, 2015-16
10. Quality of antenatal care in rural Tanzania: counselling on pregnancy danger signs; BMC
11. Tanzania DHS, 2015-16
12. Tanzania DHS, 2015-16
13. Tanzania national eHealth strategy 2013 - 2018
14. The District Health Management Information System (DHMIS) has resulted in decrease in patient wait times from a full day to 30 minutes and an increase in secure health information collection and transfer resulting in a decrease of lost files from 30 per cent to less than one per cent - Less innovation, more scale Realising the promise of health technology in Africa, Excelsior group
15. The investment roadmap outlines a range of digital health interventions aiming to deliver improvements across five main areas: enhancing health service delivery, strengthening health systems performance, optimizing resource allocation, improving data supply and demand, and connecting and harmonizing data systems; Tanzania's new digital health road map has the government 'in the driver's seat, devex
16. Unique subscriber penetration is expected to increase from 46 per cent in 2017 to 52 per cent in 2020.
17. Over 85 per cent of Tanzania's population is covered by 2G networks, with 32 per cent covered by 3G networks.



The GSMA mHealth deployment tracker currently lists 17 mHealth services in Tanzania,[20] of which the majority are donor funded. The most notable services that have strong MNO partnerships include:

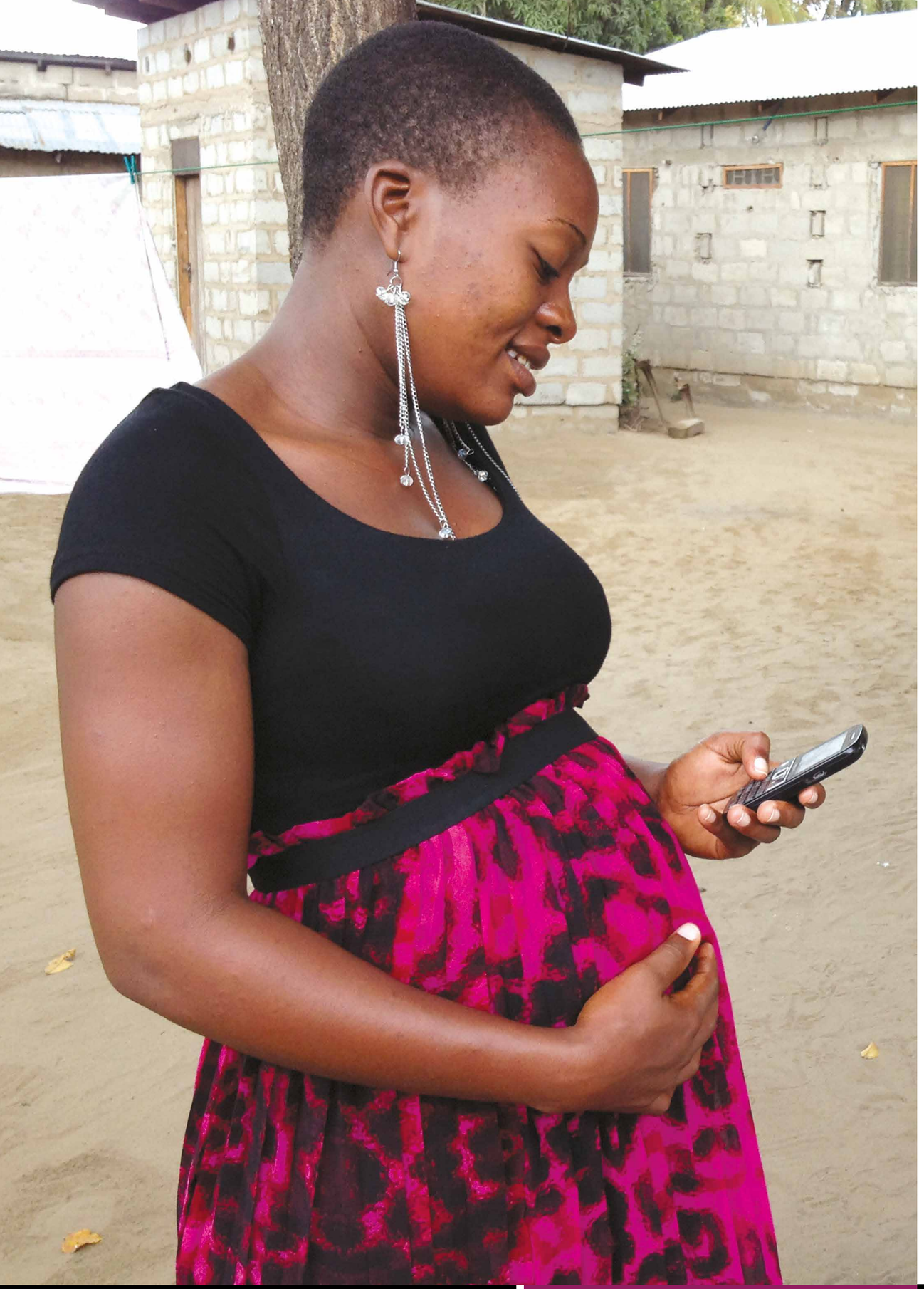
- **Mobile birth registration:** Tigo Tanzania in partnership with the Registration Insolvency and Trusteeship Agency (RITA) and United Nations International Children's Emergency Fund (UNICEF) piloted a mobile birth registration programme allowing Tigo agents to register births via a mobile application. Within six months, registration rates in intervention areas rose from 8.9 per cent to 30.3 per cent.[21]

- **Mobilising Maternal Health in Tanzania:** Vodafone Foundation has partnered with United States Agency for International Development (USAID), Pathfinder International and the Touch Foundation to launch a number of mHealth services to improve maternal healthcare indicators.[22] These include:

  - The Mobilising Maternal Health mobile application developed to support CHWs;
  - An 'Uber Ambulance' allowing pregnant women to call a 24-hour toll-free emergency hotline whose location will be identified via global positioning system (GPS). This service is funded by the Vodafone Foundation and all fares are paid via M-Pesa;
  - Text-to-treatment, specifically targeting women who are potential fistula patients. Vodafone facilitates the payment of transport and treatment for fistula patients through M-Pesa agents and programme ambassadors (community of doctors and health volunteers).

- **HPHB** is another example of an mHealth service with strong MNO partnerships. The service is being delivered at scale across four major mobile networks in Tanzania - Airtel, Tigo, Vodacom and Zantel.

18. GSMA Intelligence, 2017
19. Financial Inclusion Insights, Data Fiinder
20. GSMA mHealth deployment tracker
21. Birth Registration in Tanzania: Tigo's support of the new mobile birth registration system, GSMA
22. Mobilising Maternal Health in Tanzania, Vodafone



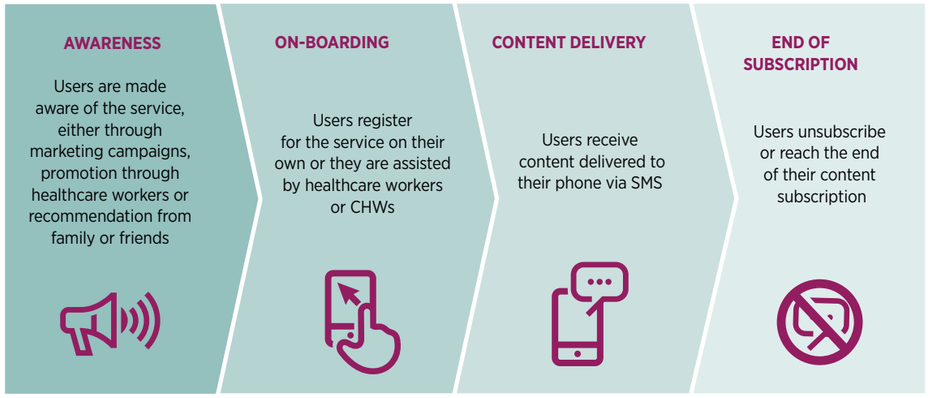
Service design

The HPHB service delivers highly relevant, localised, timely and tailored content for four key audiences: Pregnant women, mothers of children under five, and their supporters, as well as general information seekers.

Once these key audiences are made aware of the service: (the first step in the user journey detailed in Figure 1), they can subscribe to receive SMS content for free for the duration of their subscription.

FIGURE 1

The HPHB user journey



Users learn about the HPHB service in different ways. The way in which users are made aware of the service will affect how they subscribe to receive messages – either through self-registration or assisted registration. Self-registration is typically the option for users who are made aware of the HPHB service through marketing campaigns (TV, radio, billboards, flyers or posters etc.) or by word-of-mouth. In this event, users dial the short code, *15001#, and complete registration over USSD or text 'Mtoto' (meaning 'baby' in Swahili) to 15001 and complete registration through several SMS interactions. The second option (assisted registration), is where CHWs (or other champions and healthcare workers) lead users through the registration steps on their own mobile phones.

As part of registration, pregnant women or their supporters, are asked the stage of their pregnancy, according to which they will receive stage based messages – relevant content delivered at the right time. They are then encouraged to attend an ANC appointment where a health worker will confirm the stage of pregnancy. Mothers of children under five and their supporters are asked about the child's age. Once registered, users receive four or five messages per week, depending on their stage of pregnancy or age of child. Users are also sent a welcome SMS which includes instructions on how to opt out of the service. Once a woman has reached the end of the end of her pregnancy, she is automatically transitioned to the postnatal content subscription.

Key insights along the user journey

Users find text-based self-registration challenging, whilst assisted registrations had a high success rate. Usability tests were conducted with 12 users, during which all failed to complete the subscription on their own via SMS or USSD in this way before. CHWs who are trained on how to register users on their phones were slightly more successful in registering users. They were also more likely to persevere through the challenges resulting from poor connectivity. Maintaining a 2G connection to complete a USSD registration is quite challenging, especially in rural areas.[23] Despite the challenges faced by end-users, self-registrations make up 39 per cent of total registrations to HPHB, making it a viable option for registration.[24]

"I've never subscribed to anything on my phone like this before."
- User, rural

"I would sign up with the CHW because they are at my house showing me how to sign up."
- User, rural

Low technical literacy amongst CHWs could be improved through extended, more frequent training on registration mechanisms. CHWs tend to lack confidence when navigating USSD menus and often face the additional challenge of not knowing how to operate different types of mobile devices. This hinders their ability to successfully assist users in registering for the service. The majority of the interviewed CHWs felt that more comprehensive and frequent training on service registration and content would greatly benefit them:

"Many of my colleagues have given up, they forgot what we learned in the training. We need more follow-up"
- CHW, Moshi

Regular feedback to CHWs could be useful for: confirming the registration success (in the current design CHWs are not aware if they have registered a user successfully); and ongoing feedback on overall performance (e.g. number of people registered, users who have unsubscribed, user segments reached etc.). Without feedback CHWs feel disconnected and don't feel the added value of their efforts:

"Many times people register and they never receive information. They get suspicious of what has been done on their phone"
- CHW on assisting registrations of users using their phones, Dar es Salaam

"I never follow up on users directly – we don't have access to the platform, so we would find information on who has unsubscribed really useful"
- CHW, Moshi

Proactive service interaction with end-users is required to improve retention. Messages on general service administration could greatly improve the end-user experience and overcome their current passive usage patterns. These could include messages confirming successful registrations, frequent registration process reminders (details on how to resubscribe if they were unintentionally unsubscribed or want to refer a friend to the service) and prompts for users to update their information in order to receive relevant content.

"The messages stopped coming. I really miss them, I hope that they will start coming again."
- User, urban

23. USSD registrations in particular were hampered by poor 2G network connections that would often be lost mid-way through registrations. Although this was a challenge even in urban and peri-urban areas in Tanzania, it was a much bigger issue in rural areas. In some cases, CHWs were so determined to register a user that they would go to great lengths, such as climbing trees or walking up hills, to get better signal.
24. Up until September 2017.

"I received a message announcing the end of service. I stopped receiving messages. Now I'm waiting to see if new messages come in, I hope so!"
- User, rural

Monitoring product KPIs in a real-time dashboard is required to improve visibility into issues along the HPHB user journey and ensure timely resolution of problems. Product performance KPIs could be used for key service functions: registration, message delivery, user response to delivery of administration message, unsubscriptions etc. Tracking unsubscriptions or inactivity (failed message delivery over a period of time) could aid the identification of users who were unwillingly unsubscribed and still wish to receive messages. A regular performance report on key metrics could help coordinate the efforts of health facilities and CHWs.

Throughout GSMA engagement, some of these core issues, such as increased assisted registrations and improved product monitoring, have been addressed. HPHB intends to continue to deliver value for an active and engaged, growing user base. Ongoing analysis of service data (user logs) or user feedback data should drive the generation of insights along the customer journey. Implementing service changes in response to these insights will ensure that the end-user experience is continuously improved.

Partnerships

The HPHB service is owned by the Tanzania MoHCDGEC, managed by Cardno Tanzania, under the mHealth Tanzania PPP, and funded by the CDC. The mHealth Tanzania PPP is continuously expanding its partnership network. This network currently includes several government entities, NGOs and private sector companies, such as MNOs.

Each partner leverages their experience, skills and resources to provide an in-kind contribution (see table 1). In exchange in exchange the HPHB service delivers value to the organisations in line with their business or programme objectives. GSMA and mHealth Tanzania PPP initiated a three year partnership in 2014 with the objective of re-launching an enhanced version of the HPHB service with a broader nutrition content offering. GSMA also provided technical assistance to the mHealth Tanzania PPP in the form of business intelligence analytics, user experience research and M&E.

TABLE 1

Roles and contributions of primary partners

Partner	Roles and contributions
Tanzania MoHCDGEC & other government organizations[25]	• Ownership, branding, guidance and validation of the HPHB service • Ownership and management of the mHealth platform • Funding of mHealth platform development
Cardno Tanzania (under the mHealth Tanzania PPP)	• Management of the mHealth Tanzania PPP network and HPHB service implementation
CDC	• Funding for several components of the HPHB service[26] • Technical assistance[27]
NGO partners	• Cross-promoting the HPHB service through existing healthcare promotion activities • Training of healthcare workers and CHWs at health facilities on HPHB service content and registration • Assisting women during service registration
MNOs	• Network connectivity • Enabling price discrimination for service users (zero rating messages to end-users)

25. Other government organisations who play a vital role in the HPHB service include the Tanzanian Ministry of Health and Social Welfare and TFNC.
26. CDC covered the majority of the setup costs for the service as well as ongoing operating costs such as Cardno Tanzania staff, government staff and staff responsible for the maintenance of the content and technical platform.
27. CDC provides technical assistance to mHealth Tanzania PPP related to management of the partnership network and the HPHB service.

The mHealth Tanzania PPP has a current network of over 20 partners. Considerable investment in time and human resource is required to establish and maintain this partner network. While a broad partner network has been beneficial to the service, the involvement of multiple parties in decision-making has resulted in relatively long lead times in taking new features to market. On the upside, such an approach results in long-term buy-in from all partners, and most importantly, the MoHCDGEC.

Spotlight

MoHCDGEC, MNOs and NGOs are key partners for the success of HPHB

1. The MoHCDGEC provided input into the development of the messaging service and in particular the content development, validation and certification. This made negotiations of other partnerships smoother as organisations were eager to be associated with a MoHCDGEC branded service. It also generated a high level of trust from service users and even non-users.

"I trust [it] because it is something certified by the government. Because the government supports [the service] then we are fine."
- Non-user, rural

For the MoHCDGEC the key value of the HPHB service is in its potential to deliver health outcomes by supporting and promoting the uptake of traditional healthcare services (reminders for clinic appointments, or medications and supplements) and by driving behaviour change through improved knowledge of appropriate health practices (see page 24).

The MoHCDGEC also derives value from leveraging the mHealth platform, upon which the HPHB service is embedded, for broader health priorities. Over time, the MoHCDGEC aims to move towards a more coordinated portfolio of integrated and interoperable mHealth services. The government benefits from access to data on all mHealth service users (including HPHB users) through a centralised, secure database.

2. In addition to providing network connectivity, MNOs allow end-users to receive content for free by zero rating messages and offsetting the cost of message delivery through CSR budget. Airtel was the first to make this commitment to zero-rate messages in 2012, with Vodafone, Tigo and Zantel[28] following suit in 2014. This commitment from the MNOs has resulted in the reduction of the overall service operational costs by an estimated 63 per cent (see table 2). Each MNO supports the service for different reasons, all related to enhancing the brand reputation amongst consumers and driving customer loyalty.

"Our subscribers know that they can get this information for free at any time on our network and this presents longer term opportunities to build customers' loyalty to their number, to our network, to our brand and stick with us."
- Airtel, Tanzania

"It [HPHB] has a clear impact on our brand, to make sure we are a trusted brand. We expect a better retention rate, we expect a better top-of-mind awareness for our brand and this will basically build the foundation for our mobile health and digital health strategy for the next few years"
- Tigo (Millicom), Tanzania

An added incentive for MNOs when partnering with HPHB is the opportunity of collaborating with the government, donors and other organisations with the potential of improving relationships with these stakeholders.

"A very exciting thing about this initiative is the public-private partnership. The leadership demonstrated by the Ministry of Health is very impressive. We were delighted to collaborate both with the mHealth foundation [mHealth Tanzania PPP], the CDC and especially the government partners and the network of other MNOs to really drive value."
- Vodafone Foundation, Tanzania

3. For NGO partners who support implementation and promotion of HPHB at the health facility and community level, HPHB offers significant scope to simplify the tasks of their workforce, enhance their contribution to the community and ultimately improve job satisfaction of their workforce.

"I find it [HPHB] very important because it tells women what to do and when… It also makes our work easier. We want to promote the information to the mother and the service is helping us with that. The women now get the messages and then they come to us with some information in their head and most of them ask questions. They are asking 'I got this message I need something, are you going to give it to us?' Those who receive messages early and then come for delivery, they make it so easy for us. They are prepared and are cooperating well with us. This cooperation between mother and nurse during delivery is so important."
- Nurse and midwife, Aga Khan Hospital

Given the benefits of the service to the workforce, NGOs willingly cover the cost of training the health facility workers and CHWs. This training covers service content, promotion of the service and assisting users with registration.

28. Zantel was acquired by Tigo in June 2015; Existing MNO partners as of November 2017.

Sustainability

As of September 2017, the HPHB service has reached over 1.8 million users with an active user base of over 300,000, 16 per cent of the target market in Tanzania.[29] This user base is growing by an average of 33,000 users per month.

HPHB is funded by donors through direct funding (e.g. the CDC) or in-kind contributions (such as those made by MoHCDGEC[30], MNOs and NGO implementation partners amongst others). The sustainability of the service hinges on the sustained contribution from these partners to cover the costs of delivering the service. In view of this, the mHealth Tanzania PPP needs to continue to demonstrate that HPHB delivers value for these partners aligned to their program or business objectives. This needs to be prioritised for cases where discontinued support from a specific partner poses a considerable risk for the service (e.g. MNOs).

In addition to efforts to secure existing funding, the mHealth Tanzania PPP needs to prioritise the investigation into alternative B2B models. Sustainability is further ensured through the addition of other payers or investors, reducing the risk of overdependence on existing donors. HPHB's sizeable and continuously growing user base presents an appetising opportunity for other organisations to derive indirect or possibly even direct benefit from the service. For example, sponsorship of specific messages to targeted segments of the HPHB user base could be a form of advertising that some organisations might be willing to pay for.[31] Sponsored messages with soft brand marketing were trialled with users and it was found that these messages were perceived as trustworthy and created a positive brand halo for the sponsoring company (see page 23).

The majority of the setup costs were covered by the CDC, but there are growing opportunities to reduce operating costs. The reduction of prohibitive marketing and promotion costs[32] is achieved by adding partners to promote the HPHB service, such as D-tree International (D-tree). D-tree operates an mHealth service in Tanzania that provides decision support and community case management tools to healthcare workers. When clients are registered into the D-tree service they consent to receive health content and are then auto-enrolled via an application programming interface (API) to receive HPHB messages.

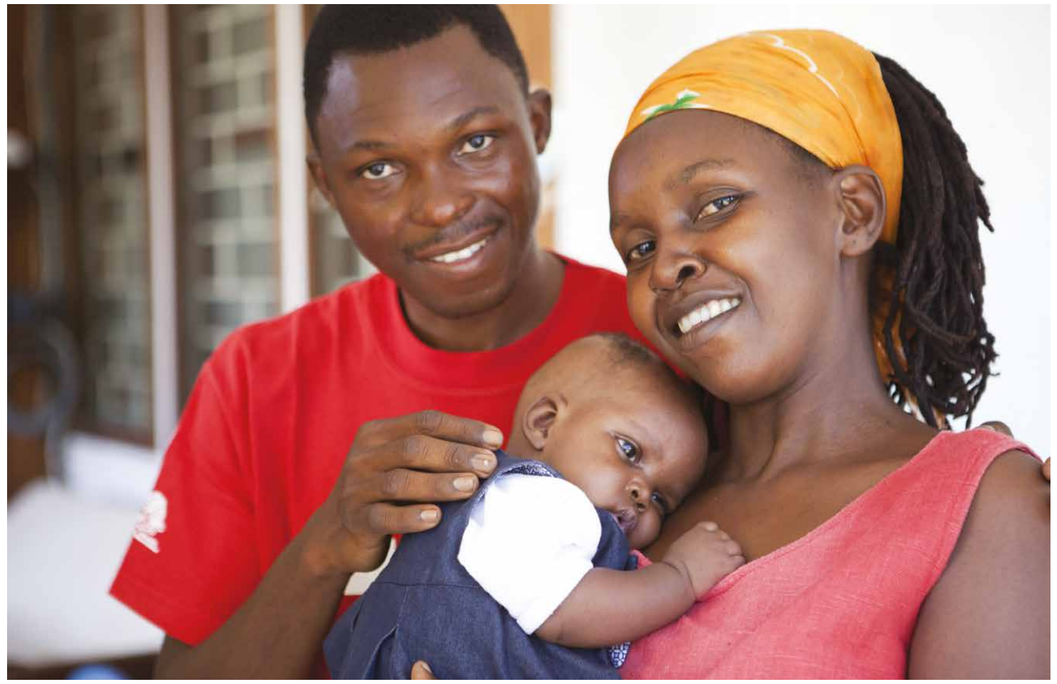
The integration of HPHB onto the MoH owned mHealth platform presents additional opportunities for cross-promotion within other mHealth services embedded on the platform. In addition, there is potential for certain costs (e.g. technical platform maintenance costs, the short code license, cloud server and aggregator fee; See table 2) to be shared between all mHealth platform services, thus reducing overall operating costs for each individual service.

29. Target market is defined as the number of number of pregnant women and new mothers who have access to a mobile phone and are literate – estimated at around 1.87 million using data from the Tanzania DHS, 2015-16.
30. MoHCDGEC funded the development of the MoH mHealth platform upon which the HPHB service is embedded.
31. Within the health space, this option potentially holds some ethical challenges and would need to be investigated, with guidance and support from the Tanzania MoH.
32. The GSMA marketing campaign (detailed on page 21) had a cost of acquisition of £1.52 per user.

TABLE 2

Primary operating costs for the HPHB service

Primary operating costs[33]	Details	Funder	Cost estimate (per year)
Management / personnel	mHealth Tanzania PPP team (30% capacity of 4 individuals), government staff (20% capacity of 3 individuals), human resource requirements for content and technical platform maintenance	CDC	£123,643
Marketing and promotion[34]	Training of NGO personnel (Healthcare workers and CHWs) and other NGO implied extra costs	NGO implementing partners	£25,715
Message delivery	SMS cost[35]	MNOs	£334,286
	Aggregator fee, short code licence fee, cloud server fee, annual systems administration fee	mHealth Tanzania PPP & MoHCDGEC (with CDC funding)	£48,739
Total operating costs			£532,383



33. HPHB office rental and related costs are not included in operating cost estimate.
34. Above-the-line (ATL) mass media marketing campaign costs have not been included. ATL Marketing campaigns only take place when funding is made available. At the time of the case study no ATL marketing campaigns were planned and costs for previous campaigns had already been covered by funders.
35. As of March 2017 the SMS delivery cost was estimated based on an assumed user base of 200,000 per year, with a conservative estimate of 6 SMS' delivered per user per month, a weighted average cost of TSh 65 per SMS across all networks and an exchange rate of TSh 2800 / GBP; mNutrition Business Model Baseline Assessment, GAMOS

Content

At launch, the HPHB service offered open source content from the Mobile Alliance for Maternal Action (MAMA). This content catered to the needs of pregnant women, and mothers with children up to five years old, as well as supporters of pregnant women and new mothers (partners, friends and relatives). The initial offering covered a broad range of topics including some basic messages on nutrition, mainly focusing on appropriate breastfeeding practices.

The creation of localised and validated mobile-ready nutrition content was completed under the GSMA mNutrition Initiative. The Centre for Agriculture and Biosciences International (CABI) was contracted to lead and manage the Global Content Partners (GCP), a consortium of partners responsible for content development, across several markets, including Tanzania.[36]

In total, 990 SMS messages and 312 voice transcripts were developed based on initial nutrition landscape and validated,[37] of which a total of 128 SMS messages were selected, with support from the MoHCDGEC and The Tanzania Food and Nutrition Centre (TFNC),[38] to be integrated into the existing HPHB service. From February 2016 (initial nutrition content launch) to November 2017 over 2.8 million nutrition messages were sent to users.

Key learnings on the process of developing quality content

Key learnings on the process of developing quality content for the HPHB service include:[39]

- **Factually correct content is essential, but a user-centric design approach to content development is key.** Content was developed on nutrition factsheets,[40] which resulted in high accuracy. However such content was not suitable for key target audiences. Upon integration of earlier content batches, additional stylisation was necessary to ensure that messages were accurate, actionable, clear, useful and relevant for HPHB target audiences.[41]

- **User personas (Figure 2) based on insights around the needs, concerns, motives, values and aspirations of the key target audiences were critical when tailoring messages for different audiences.** User personas were used in the development of later batches of content, which resulted in improved quality and ease of integration of these content batches into the service.

- **Involving existing working groups in the content development process saves time and also strengthens the capacity of local partners to develop more user-centric content in the future.** In Tanzania, there was no need to create a dedicated working group to oversee content development because the service was able to work with the existing Social and Behaviour Change Communication Technical Working group (SBCC TWG). Involving this group in several steps along the content development process also strengthened its capacity to develop more user-centric content in the future.

FIGURE 2

HPHB user personas

	Health knowledge	Information access	Information need	
	1 = very low ⁞ 5 = very high			
 The rural homemaker	○ ○ ○ ○ ●	○ ○ ○ ○ ●	● ● ● ● ●	Lives in rural community and spends most of time taking care of the family at home. Her husband controls access to the family's basic phone and makes all purchasing decisions.
 The supportive partner	○ ○ ○ ○ ●	○ ○ ● ● ●	● ● ● ● ●	Feels a strong responsibility to be a good father and husband. He acknowledges that he doesn't know much about health and must learn in order to make the right decisions and live up to his ideal.
 The social shopkeeper	○ ● ● ● ●	● ● ● ● ●	○ ○ ○ ● ●	A well respected and connected convenience store owner and mother of 3, she had some formal health training in secondary school. Owns a smartphone and shares gossip regularly with her customers.

36. In each market, the GCP contracted Local Content Partners (LCPs) to oversee the content development process for that market. In Tanzania, Every1Mobile (E1M) was appointed as the LCP for this purpose, supported by the Global Alliance for Improved Action (GAIN) as the GCP country lead.
37. Access the full content database: Health, Tanzania
38. The Tanzania Food and Nutrition Centre (TFNC) played a crucial role from an early stage, not only in the validation of the content but also in content creation.
39. For more learnings on the essentials of content development read a four-part blog series on lessons from the mNutrition programme
40. Factsheets provide information based on the best evidence available related to various nutrition practices as well as the sources of the information
41. Learn more about the five quality principles of behaviour change messaging

Spotlight

The role of content testing

Several investigations were carried out with end-users during the content development process.[42]

Potential pitfalls identified through user testing include:

- **A deep understanding of cultural norms avoids creating content that can develop mistrust in the service.** In one region of Tanzania, a message promoting the practice of expressing milk was a direct violation of cultural practice and was not acceptable behaviour in this region. This kind of advice can result in users not implementing the practice and in the worst case users can develop a distrust towards the service. Although there may often be a desire to overcome cultural misconceptions around certain appropriate nutrition practices, this should not come at the cost of trust in the service.

- **Unclear communication of related nutrition practices can cause confusion amongst users.** When testing content, the promotion of salt iodation was perceived to conflict with the promotion of reducing salt intake in general. The promotion of fortified foods seemingly conflicts with the promotion of consuming "whole" foods and "natural" foods. Similarly, the promotion of iron supplements can be nullified by communicating the possible side effects of iron supplements without reinforcing the benefits.

  "In my understanding we are not advised to use a lot of salt when you are pregnant. So it should not say that."
  - User, rural

- **Use of plain language with simple terms that the local target audience of all education levels can understand is essential. Technical terms and concepts are not always understood by end-users.** Content testing activities showed that some vocabulary (e.g. fortified or iodine) was new to users and resulted in a reduction in overall message comprehension.

  "I don't know what this word [obesity] means, but I would like to know."
  - User, rural

  "I've never heard of this [iodized salt] before. What does it mean?"
  - User, rural

Content strategies that have proved to work well include:

- **Messages tailored for fathers specifically were very well received by both men and women.** Both groups felt that these messages provoked greater ownership and responsibility amongst men for the health and wellbeing of their families.

  "The one for fathers is good. Most of the fathers see the babies belonging to the mother, but this concept can educate them on supporting their wives."
  - Female user, rural

  "It is good to have information of how can I be responsible in taking care of my family, any of us can identify the problem instead of depending on one person."
  - Male user, rural

- **Repetition of information could strengthen the service impact.** Rather than being viewed a nuisance, it was found that messages are more easily trusted when they align with advice already heard before.

- **Reminder notifications delivered high value to end-users:**

  "It reminds us a lot of things, there is a month you get reminded to attend clinic, we are reminded on how the baby is postured, you are advised on the kind of feelings you should expect as a pregnant woman, they tell you exactly what each feeling/symptom translates to, they will keep reminding you on the phone all the time, so nothing comes as a surprise to you at all."
  - Female user, urban

- **Sponsored messages with soft brand marketing are perceived as trustworthy** and provide a positive brand halo for the sponsoring company. Messages sponsored by a private company that stated "we care about your health" were preferred even to messages from the MoH. Messages blatantly advertising for a specific product are less desirable and are not well received amongst users (e.g. a flour company promoting its products). Users also don't trust coupons.

  Message tested: *'Did you know that during pregnancy you need to increase blood tablets to prevent anaemia which may be harmful to the mother and the unborn child. This message is brought to you by Huduma Insurance, we care about your family.'*

  "I've never heard of Huduma before. I feel happy and comforted that they care for us, that they care about our health."
  - User, rural

42. As part of the user testing activities, a selection of SMS messages were sent to two groups of women, each consisting of 25 individuals, who were either pregnant at the time or mothers to children under the age of two. These participants represented 13 different regions in Tanzania. After receiving the messages, the women were asked a series of questions designed to test comprehension and attitude towards the messages as well as the relevance of the messages (likelihood to implement recommended practices served as a qualifier for relevance).

End-users have high levels of satisfaction in HPHB content

A user feedback phone survey[43] conducted with HPHB users revealed remarkably high levels of satisfaction in the service content. Users rated different aspects of the content yielding an overall content rating of nine out of ten.

TABLE 3

HPHB user satisfaction metrics

	Clarity	Actionable	Relevance	Usefulness
User rating out of 10	8.8	8.6	9.0	9.0

Almost all users reported to read all of the messages they received, and 52 per cent of them reported to read the messages more than once, proving the strength of SMS as a delivery channel in that it allows users to access the information as many times as they want or need to.[44]

"As for me I read alone and understand what is needed. I do not delete them immediately. I will read it again after three days then I will delete it"
- User, rural

Fifty-nine per cent of users have reported to store messages so that they can revisit them when they want to and some users even write messages down when they run out of space on their phones (18 per cent).

"I used to store a lot of messages on my first phone. I did not delete any text because I read them often. When I receive these messages I like to read them with my friends"
- User, rural

"When I receive the messages I do not delete them immediately, I have a book which I use to note down the information. I delete them when my inbox is full"
- User, rural

As many as 73 per cent of users declared that they share the information they learn from the HPHB service in some way with different people. Amongst these users sharing information, 62 per cent are sharing information with their spouse – the majority of which are men sharing information with their wives. Research confirmed men's involvement in childcare and feeding as potentially very influential to drive behaviour change within the household. Only 52 per cent of females in Tanzania own mobile phones[45] and women do not have autonomy around decisions regarding their own or their child's health, especially in terms of spending money on medical advice, treatment and transport to health facilities.[46] With these gender dynamics in mind, the observed behaviour whereby men share content with their partners is encouraging.

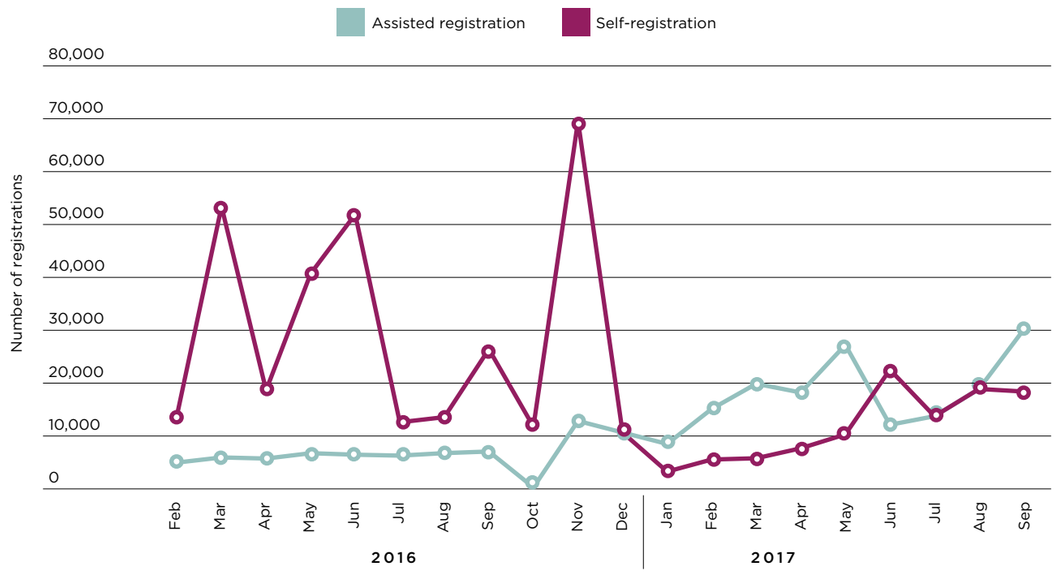
43. Survey conducted with 804 experienced users and 795 non-users; Please contact the mHealth@gsma.com for the full methodology
44. While the possibility to access SMS many times is a strength of the HPHB service, technical literacy amongst the HPHB users and limited phone storage capacity on basic mobile phones is always a challenge and may prevent users to make the most of that possibility. In a survey conducted by IFPRI in early 2017 it was found that in the case where a user is illiterate, other family members can read the message for the person, and that text messages are still preferred over audio because they can be read repeatedly and they can also be shared with friends and family or other community members at any time.
45. Financial Inclusion Insights, Data Fiinder
46. GAIN, 2016

Marketing

The HPHB service initially formed part of the Wazazi Nipendeni ("My parents love me") mass media campaign. Launched in 2012, the campaign delivered behavioural change messaging via different media channels, including HPHB, to encourage pregnant women and their partners to take steps for a healthy pregnancy and safe delivery.[47] The Wazazi Nipendeni campaign proved to be effective in driving a high volume of self-registrations to the HPHB service up until December 2016 when it came to an end (see Figure 3).

FIGURE 3

Monthly comparison of assisted-registrations and self-registrations for the HPHB service



47. The campaign was developed, managed and funded by Johns Hopkins Centre for Communication Programs (JH CCP) in coordination with the Tanzania Capacity and Communication Project (TCCP). Wazazi Nipendeni's radio and television spots were broadcast widely on national and regional stations, and client and provider-targeted brochures, posters, reminder cards, pregnancy wheels, and promotional materials were distributed to health facilities across the country.

Key lessons in effective marketing strategies to support service uptake

Key lessons on effective marketing strategies to support service uptake include:

- **Expanding the network of partners who promote HPHB drives uptake of the service in the absence of mass media marketing campaigns.** Concerted efforts were made by the mHealth Tanzania PPP to explore below-the-line (BTL) mechanisms for service promotion. Promotion by partners has primarily been implemented in three ways. Partners either:

  1. Train their existing workforce (healthcare workers and CHWs) on the HPHB service offering and how to assist users in registering for the service;[48]
  2. Auto-enrol their existing clients into the HPHB service via API[49]; or
  3. Advertise HPHB and the self-registration short code within their service.[50]

  Although there was a significant decline in self-registrations following the end of the *Wazazi Nipendeni* campaign, this was partially compensated by the addition of new promotion partners who facilitated an increasing amount of assisted registrations that made up 61 per cent of all registrations in 2017.[51]

- **Mass media campaigns have greater impact when complemented with face-to-face promotional activities.** Although the majority of interviewed users were familiar with the Wazazi Nipendeni campaign, very few could relate the HPHB service to the campaign and none of them had gone on to register for the service in response to the ads. Some of the interviewed users reported only subscribing to the service when they were prompted by family, friends or healthcare workers. This suggests that although registrations were boosted by the mass media campaign, a stronger focus on community mobilisation through healthcare workers and other champions could have strengthened the campaign. Face-to-face service promotion also allows users to ask questions or raise concerns about the service and improve the overall understanding of HPHB.

  "I've heard of it on the TV and posters but I haven't done the follow up. We haven't learned what it's about and what do they mean. I think it's about having a happy family."
  - User, urban

  "I used to see it on the TV as an advertisement but I did not know about it. When I was pregnant, a lady came to me and I agreed to subscribe"
  - User, rural

- **Equipping CHWs with HPHB branded items and marketing material will give them more credibility and result in better trust and enthusiasm from the users.** Interviews conducted with six CHWs revealed that all of them found it challenging to register new users, because they don't trust CHWs. CHWs do not have any branded items to signify their status and official affiliation with the HPHB service, as a result users are suspicious of their intentions. The CHWs suggested that items like branded t-shirts, hats, printed materials or certificates to indicate their official HPHB agent status could help them to overcome this.

48. Several NGO's including: Elizabeth Glaser Paediatric AIDS Foundation (EGPAF), Aga Khan Health Services Tanzania – Joining Hands Initiative (AKHST– JHI), Afya Connect for Change, PharmAccess, Walter Reed Programme, D-Tree, Pathfinder International, Henry J. Foundation Medical Research International (HJFMRI).
49. D-tree International assist HPHB promotion in this way through their existing, complimentary mHealth service. Clients are only enrolled into HPHB upon their consent.
50. Current partners that promote HPHB in this way include Mwanzo Bora and Human Network International.
51. Up until September 2017.

In July 2017, the GSMA, together with mHealth Tanzania PPP and TFNC commissioned a small-scale campaign to promote the revised HPHB service through radio and TV advertisements.[52] An added feature of the campaign was the provision of branded materials to healthcare workers and health facilities (t-shirt, posters, pull-up banners). In addition to the creation of one new radio ad, two existing Wazazi Nipendeni radio ads were modified to place a greater emphasis on the value proposition of HPHB to end-users. The radio and TV animations that were developed, provided step-by-step registration instructions and a clearer call to action for the end-users. The campaign proved successful as it doubled the weekly registration rates from an average of 6,800 for the weeks preceding the campaign to a weekly average of 13,400 registrations for the duration of the campaign (see Figure 4).

FIGURE 4

Weekly user registrations before and during the 2017 marketing campaign

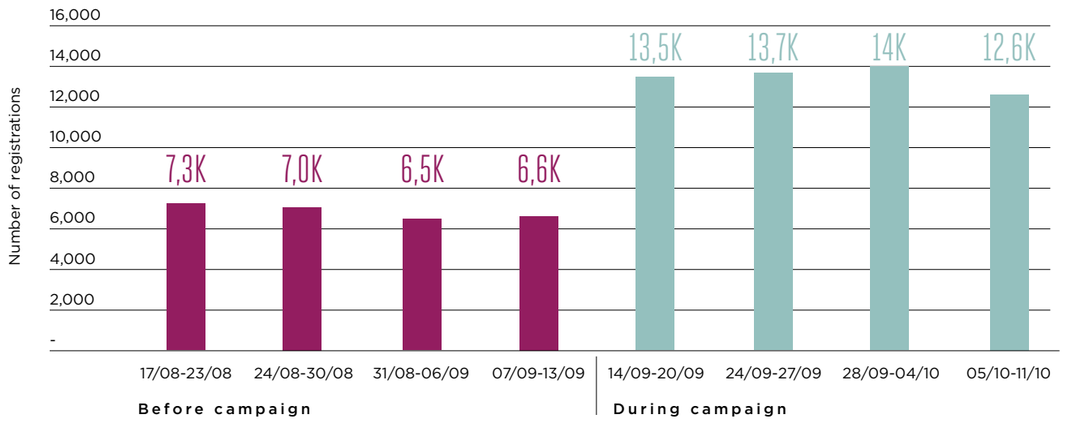


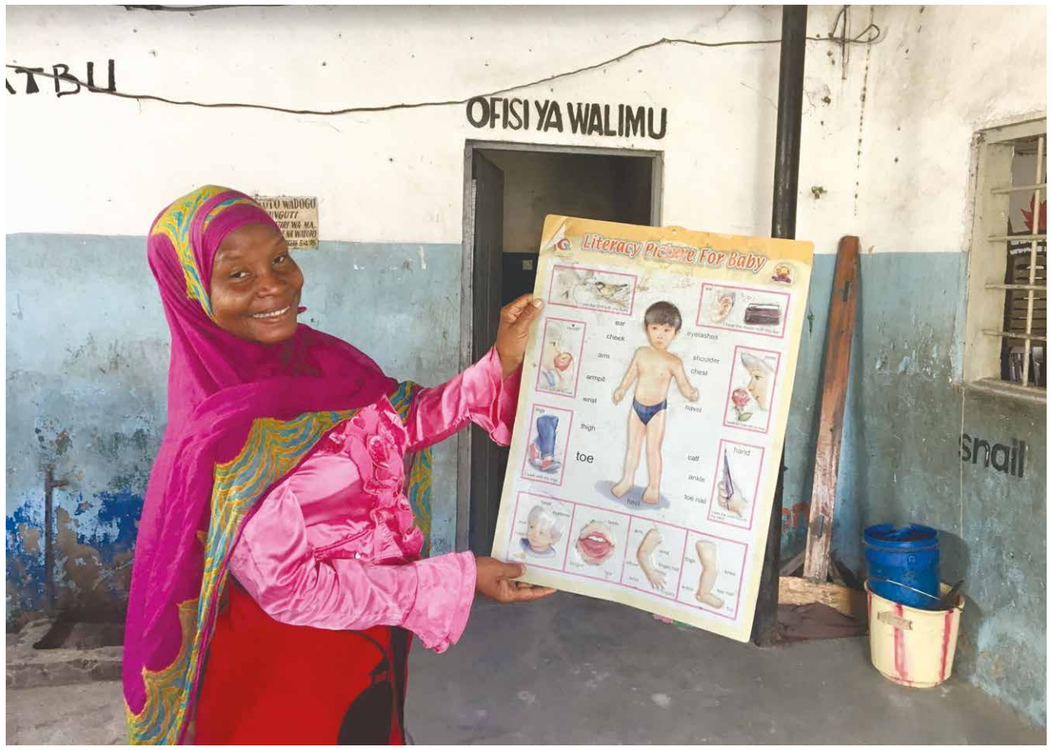
FIGURE 5

mHealth Tanzania PPP staff in t-shirts produced as part of the media campaign. Pictured also (R) is Tanzania's Minister of Health, Community Development, Gender, the Elderly and Children

52. Sixty-five national radio spots, 100 community radio spots and 10 TV spots

Behaviour change outcomes

In May 2017, GSMA, together with Altai Consulting, conducted phone surveys and field research to explore the impact of nutrition-related messages on nutritional knowledge and practices of targeted populations.[53] Call centre interviewers spoke with experienced users[54] and non-users.[55] The non-user group was selected based on the likelihood that they would have similar profiles to the experienced user group, but would not have benefitted from the service prior to participating in the survey. Focus group discussions were conducted with 40 additional participants, each selected to provide a range of perspectives from different service users as well as non-users.[56]



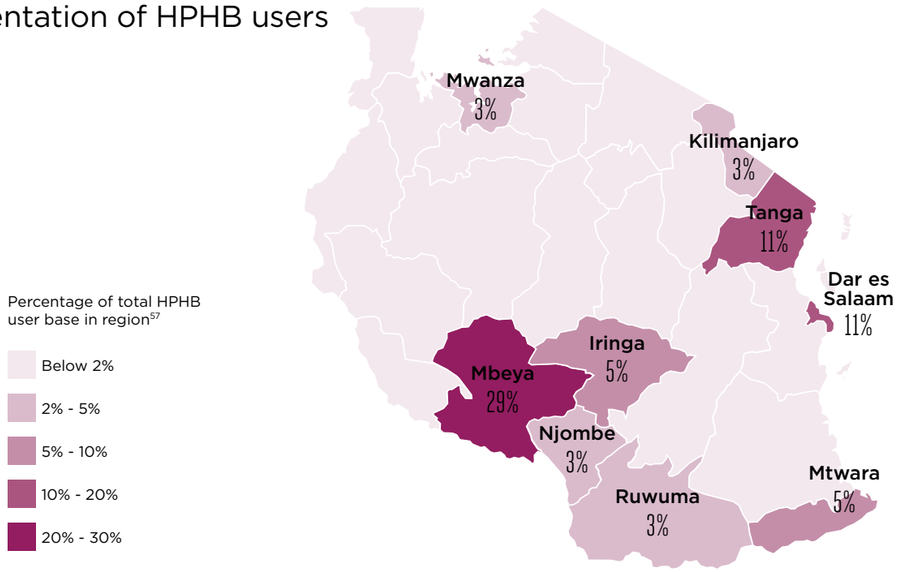
53. Survey conducted with 804 experienced users and 795 non-users; please contact the mHealth@gsma.com for the full methodology.
54. Experienced users are users who had been subscribed to the service for more than six months at the time of the user feedback survey and had therefore been exposed to a comprehensive set of nutrition information; The final sample included 415 experienced users.
55. Non-users are new users who had been subscribed to the service for less than 1 month at the time of the user feedback survey; The final sample included 814 non-users.
56. A selection of female, male, urban and rural users as well as a group of non-users (male and female) were included in the focus group discussions.

The HPHB service is delivering nutrition content to populations that need it most

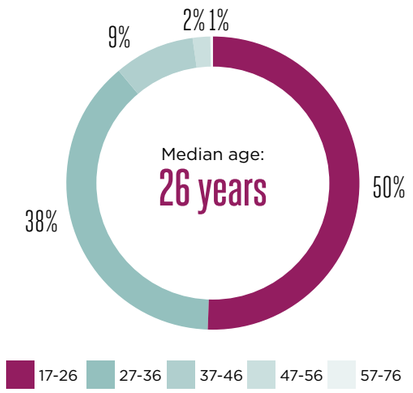
The service has a 68 per cent female user base. Approximately 45 per cent of users are living below the basic needs poverty line. Forty-six per cent of the user base resides in rural areas, considerably less than the general population demographics.

FIGURE 6

Segmentation of HPHB users



	HPHB users	Tanzania population
	68% female	51% female[58]
	46% rural	70.4% rural
	45% below basic needs poverty line[59]	28.2% below basic needs poverty line[60]



57. Percentage does not indicate regional coverage of the HPHB service, but rather the proportion of all HPHB users that live in that region.
58. Tanzania DHS, 2015-16
59. Poverty figures are estimated using the national basic needs poverty line of T Sh 36,482 per adult per month, with average household size at 4.8 persons per household. 45 per cent of HPHB survey participants report a monthly household income of less than T Sh 100,000; UNFPA
60. Tanzania mainland poverty assessment, World Bank Group

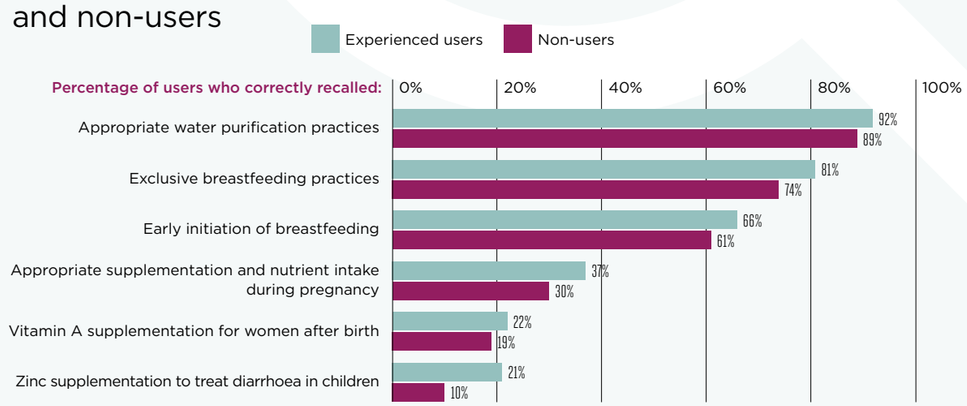
Spotlight

HPHB improves nutrition knowledge and behaviours amongst its users

Eighty-one per cent of experienced HPHB users could correctly recall that babies under the age of six months should be given no other food or drink except breast milk. This high knowledge level translated well into appropriate behaviours with 76 per cent of experienced HPHB users reporting to exclusively breastfeed their babies up until six months of age. This correlation between knowledge levels and behaviours was evident across all investigated nutrition practices. Only 68 per cent of non-users reported to exclusively breastfeed their babies (eight per cent less than experienced users). This is however still an improvement on the national average exclusive breastfeeding rate. In Tanzania only 59 per cent of infants under six months are exclusively breastfed.[61] This suggests that HPHB users who were classified as non-users may still have benefitted through consultations with healthcare workers.[62] However, experienced users who had the additional benefit of the mobile content demonstrated further improvements in nutrition outcomes. Experienced users outperformed non-users across all investigated nutrition topics for both knowledge and behaviour.[63]

FIGURE 7

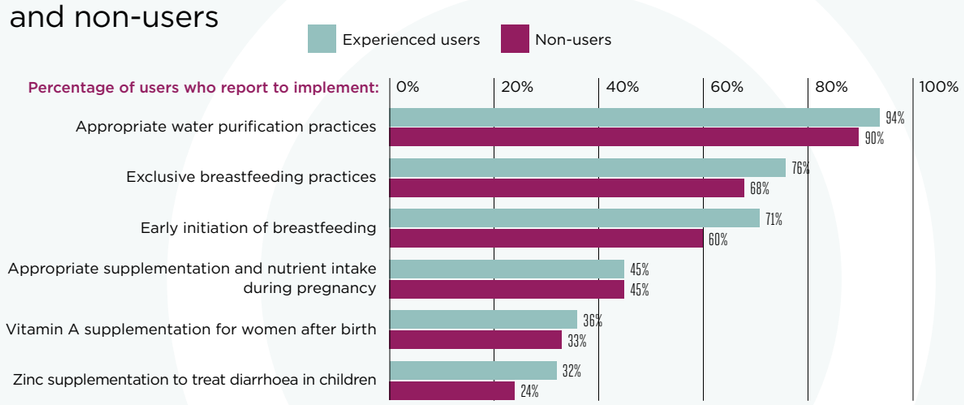
Nutrition knowledge levels of experienced HPHB users and non-users



61. Tanzania DHS, 2015-16
62. An assumption based on the fact that many HPHB users are on-boarded by healthcare workers and learn about the service through promotion campaigns at health facilities
63. The only practice where experienced users matched non-users in levels of appropriate behaviour is supplementation and nutrient intake during pregnancy

FIGURE 8

Nutrition behaviours of experienced HPHB users and non-users



"Personally I used to feed porridge to all my children after one month, then immediately after forty days they start eating substitute food, but later when I conceived this last pregnancy I tried so much to follow the six months rule, I have done that and things went very okay and I have continued sharing the knowledge."
- User, urban

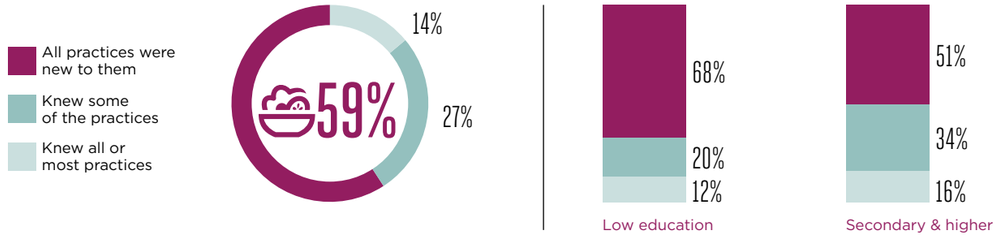
HPHB SMS reminder notifications are highly valued and adhered to. Seventy-three per cent of the experienced user group recalled receiving messages reminding them to go to the clinic. Of this group, 78 per cent reported that they did in fact go to the clinic in response to receiving this reminder message.

HPHB brings new nutrition knowledge to its users

Twenty-two per cent of the user base declare that they have no other source of nutrition information. Fifty-nine per cent of users declared that all of the nutrition practices advocated by the service were new to them.[64] Users who reported lower education levels[65] appear to be deriving more value from the service. As much as 68 per cent of lower educated users declared that all of the nutrition practices advocated by the HPHB service were new to them.

FIGURE 9

Prior nutrition knowledge of HPHB user survey respondents



Female users appear to be gaining notably more knowledge than male users, with female users demonstrating improved knowledge levels as much as 11 per cent higher than male users for certain nutrition practices. This is encouraging since literacy rates for women in Tanzania are 20 per cent lower than men,[66] and roughly 28 per cent of Tanzanian women still rely solely on oral means of communication[67] In spite of the gender gap in technical literacy,[68] simple SMS services such as HPHB are able to drive improved nutrition outcomes amongst a female user group.

"They educate on issues that you are not aware of. They send texts to remind you what to do on each month. They also send texts advising that you should visit the doctor in case of any problem. Other texts tell you what to do before giving birth. These messages are good and educative; you will know the time to visit the hospital, time to give birth and how to prepare."
- Female user, rural

"We easily get useful information like how the baby should sleep, your pregnancy's age, if you have any complications, if your pregnancy is too big, if there is anything to do with the baby. It just gives you confidence and peace of mind as you realize that you are not too far from the truth that is why we trust them a lot"
- Female user, urban

These results demonstrate the value of mobile and the HPHB service in driving health outcomes amongst its users. Experienced HPHB service users achieved comparatively better results in correctly recalling appropriate nutrition practices and implementing these practices in their households over non-users. Ensuring that service users are actively engaged with the mHealth service and remain subscribed to the service for the full duration of the content offering[69] is critical to achieving desired health outcomes amongst these users.

64. 59 per cent of respondents declared that all nutrition practices advocated by the service were new to them.
65. Lower education includes those with no education, primary education or non-standard curriculum.
66. UNICEF – Tanzanian women are 20 per cent less literate than males.
67. Consumer research conducted by TNS in Tanzania under the mNutrition initiative.
68. Bridging the gender gap: Mobile access and usage in low and middle-income countries.
69. The duration of the pregnancy bundle is 42 weeks and the postnatal content bundle provides content for five years.

Future roadmap

mHealth Tanzania PPP will be prioritising several activities to ensure the sustainability of the HPHB service. As MNO funding is essential to continued service delivery, mHealth Tanzania PPP, with support from the GSMA, are building customer retention monitoring into the automated reporting dashboard to continue demonstrating the value of HPHB for MNO partners. mHealth Tanzania PPP are engaged in negotiations with additional MNO partners and are also exploring other B2B revenue generation options.

Whilst HPHB users are highly satisfied with the service content, ongoing content maintenance and refreshing will ensure content remains relevant and up to date. mHealth Tanzania PPP will improve technical delivery of the service to end-users, with focus on optimising the service registration process (for both CHWs and end-users) and working towards a proactive approach in communicating basic service administration information (such as how to re-subscribe for the service if accidentally unsubscribed) to end-users. mHealth Tanzania PPP will need to monitor product performance KPIs in a real-time dashboard to improve visibility into issues along the HPHB user journey and ensure timely resolution of problems.

Continuous efforts to improve the service experience are likely to drive improved nutrition outcomes, thereby ensuring that HPHB continues to deliver value for all stakeholders.

For more information please visit the
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