ZAMBIA

mNutrition Market Access Document

The Costs and Health Impacts of Mobile Messaging for Nutrition

JULY 2015

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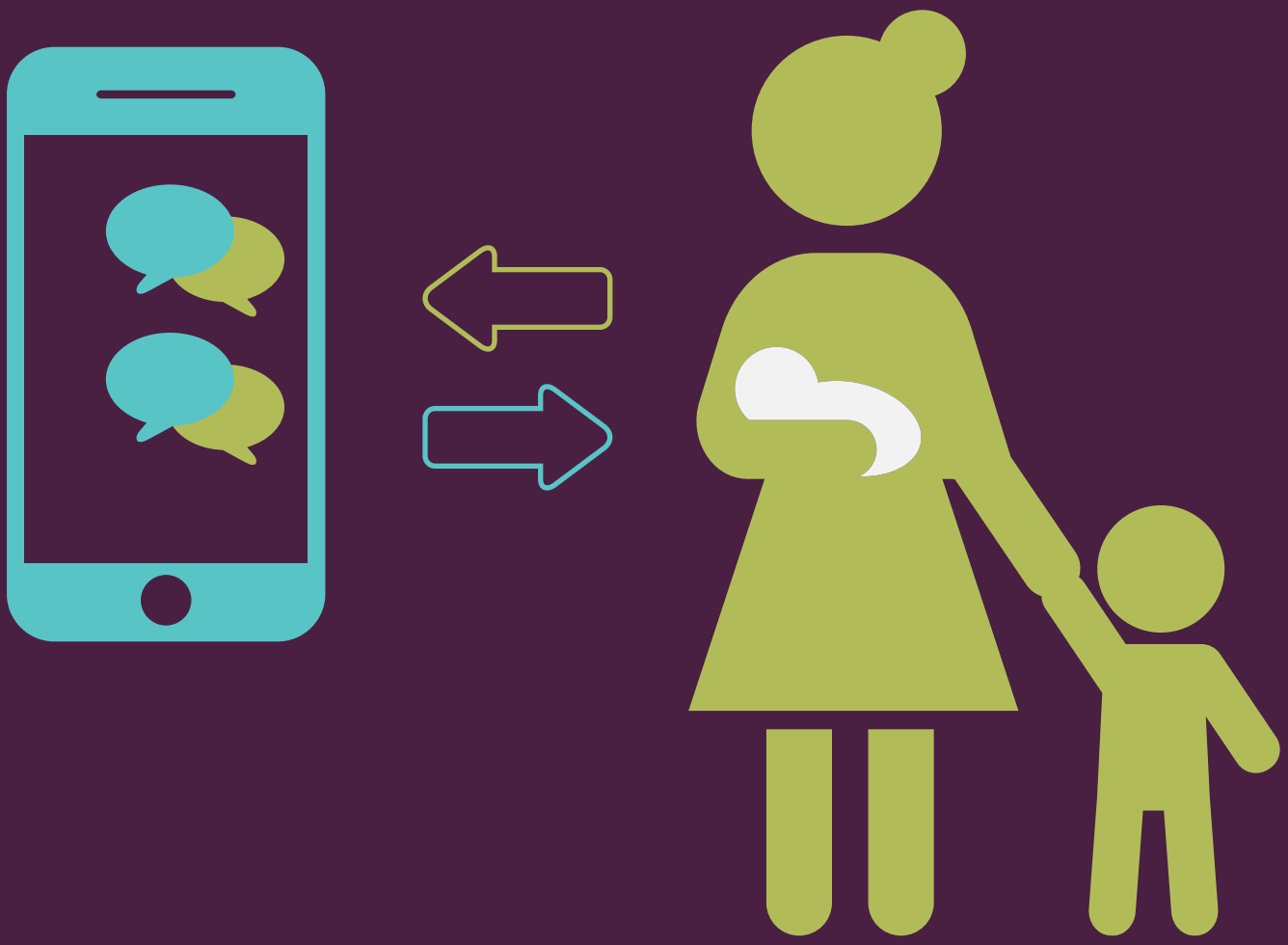
ACRONYMS

BCC	Behaviour Change Communication
BOP	Base of the Pyramid
CHW	Community Health Worker
CSR	Corporate Social Responsibility
FFM	Financial Forecast Model
GSMA	Groupe Speciale Mobile Association
IVR	Interactive Voice Response
LiST	Lives Saved Tool
MAD	Market Access Document
MNCH	Maternal, Newborn and Child Health
MoF	Ministry of Finance
MoH	Ministry of Health
NFNC	National Food and Nutrition Commission
NFP	Not for Profit
NGO	Non-Governmental Organisation
PPP	Public-Private Partnership
SMS	Short Messaging Service
SUN	Scaling Up Nutrition
USSD	Unstructured Supplementary Services Data
VAS	Value Added Services
VfM	Value for Money
ZMW	Zambian Kwacha

EXECUTIVE SUMMARY



BACKGROUND

The rapid expansion of mobile phone access to base of the pyramid (BOP) populations presents an unprecedented opportunity to increase coverage of consumer health services to this traditionally overlooked market. Moreover, free (or very low cost) health services or information delivered via mobile have the potential to serve as a new way to increase mobile user satisfaction and increase usage of other low-cost mobile services. The Groupe Speciale Mobile Association (GSMA) has partnered with UK aid from the Department for International Development (DFID) to support the scale-up of mobile nutrition (mNutrition) services. The overarching aim is to create long-term sustainability of mNutrition services by facilitating the development of localised nutrition content, working to incorporate that content into consumer-facing mobile services, and thereafter supporting the launch and scale-up of those services.

Palladium is supporting this effort by strengthening the case for sustainable mNutrition in Zambia through the application of quantitative cost and health impact modelling techniques, and targeted stakeholder interviews.

mNutrition FINANCIAL FORECAST

Understanding the true cost of the mNutrition service is essential for long-term sustainability. In consultation with the GSMA,Palladium developed the mNutrition Financial Forecast Model (FFM) to calculate the potential uptake and cost of a national messaging service that is based on short-messaging service (SMS) and interactive voice response (IVR). The FFM was adapted to the Zambian context using the proposed product concept, data from stakeholder interviews, and national demographic data sources.

Demographic analysis reveals that in 2015, an estimated 2.67 million Zambian women of reproductive age (WRA) live in households with access to mobile. Of these women, 1.16 million are either pregnant or have children under the age of 24 months—the "addressable population."

The Palladium team developed two programmatic scenarios to represent different possible versions of the mNutrition product concept. "Scenario 1: SMS Only" represents the costs and uptake of a stage-based mNutrition messaging service in which women have the choice of receiving information only via SMS. In this scenario, registration can occur either via SMS or unstructured supplementary services data (USSD). Alternatively, in "Scenario 2: SMS and IVR," subscribers also have the choice of receiving messages via interactive voice response (IVR) instead of SMS. Both literate and illiterate women could opt to receive either SMS or IVR messages. However, for the purposes of this model, only literate women can effectively register and understand SMS messages. The addition of the IVR channel extends the reach of the programme to illiterate women. It is impossible to know in advance the proportion of each group that would opt for the SMS or IVR service. Therefore, in this application of the model, literate women will opt for SMS-based messaging and illiterate women for IVR. Based on a review of the literature and stakeholder interviews, we assume 5 percent of the addressable population can be persuaded to join the mNutrition service in any given year. We gathered costing inputs from key stakeholder interviews and reported results in 2015 US dollars.

Under the conditions of Scenario 1: SMS Only, in which only the literate population can be effectively reached with health information, the mNutrition service can expect as many as 175,548 registrations within the first 5 years, for a total programme cost of US$703,000 (5.3 million Zambian Kwacha, or ZMW). If an IVR option is added, expanding the addressable population to include illiterate women, as in Scenario 2: SMS and IVR, registrations

could grow to 289,153, for a 5-year cost of US$3.0 million (23.2 million ZMW). In Scenario 1, the dominant driver of total programme cost is SMS connectivity, at 61 percent of total costs, and in Scenario 2, the majority of cost is due to voice connectivity, at 70 percent of the 5-year total.

HEALTH IMPACTS OF mNutrition

In addition to estimating the overall costs of the mNutrition product, the Palladium team adapted and applied the established Lives Saved Tool (LiST) to estimate the potential impact of the service on morbidity and mortality at the national level.

Using the FFM uptake scenarios, we estimated the potential changes in coverages of key nutrition interventions for pregnant women and children, such as antenatal supplementation and breastfeeding. A review of studies of SMS-based messaging services with target outcomes found that SMS reminders resulted in an average 32 percent reduction in the number of people not covered by medical checkups and testing. Applying this same effect to mNutrition subscribers, we used the LiST model to calculate the overall health impact in children's lives saved and avoided stunting and wasting among children.

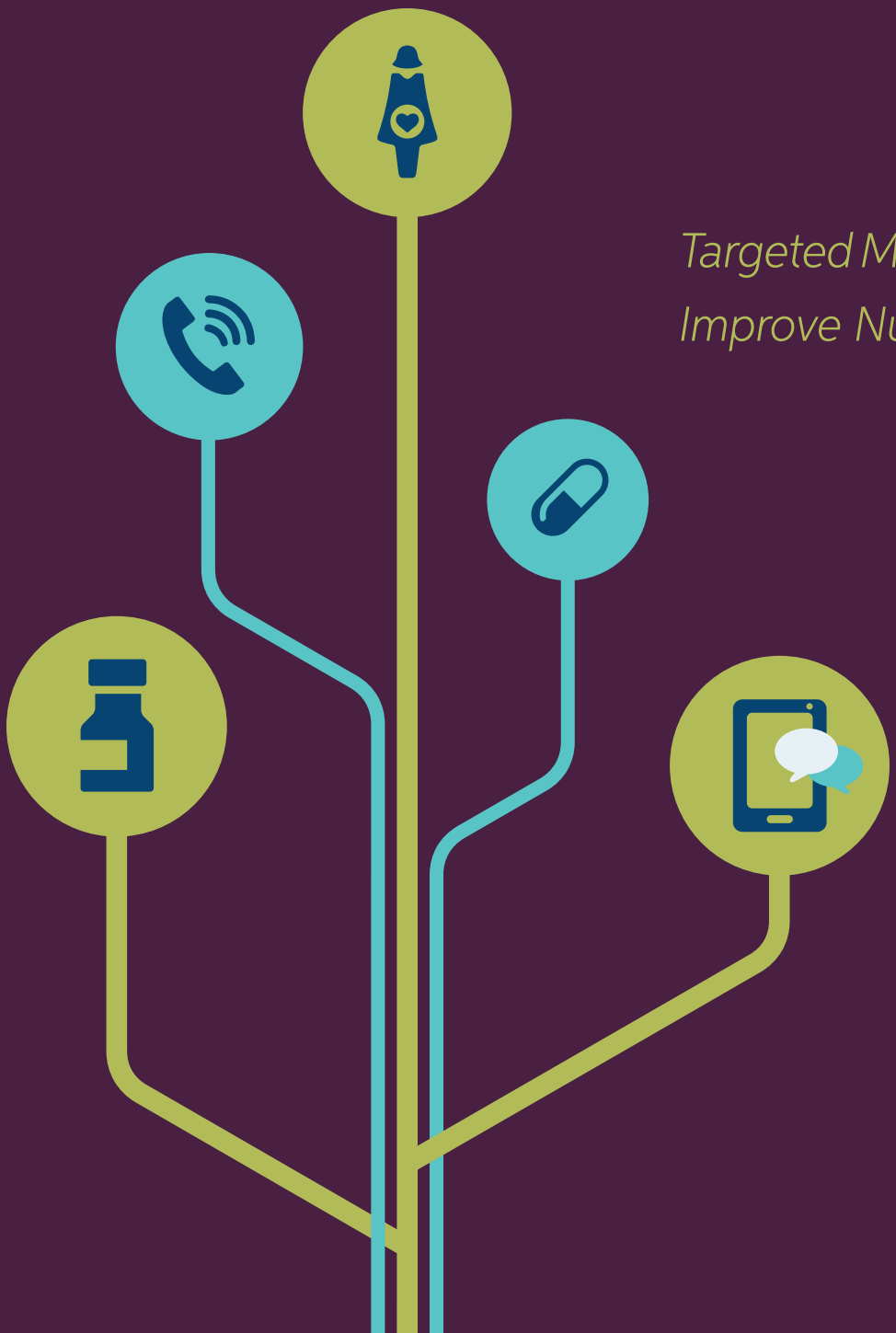
Under the assumptions of Scenario 1: SMS Only, the mNutrition service results in 784 fewer child deaths in Zambia during the 2015–2020 timeframe. Moreover, the service results in 22,388 fewer years of stunting and 10,509 fewer years of wasting in children under 5 in that same time span. However, in Scenario 2: SMS and IVR, 1,291 child deaths are prevented. Likewise, 36,934 years of stunting and 17,598 years of wasting are prevented in Zambian children by 2020

VALUE FOR MONEY OF THE mNutrition PRODUCT

By combining the cost and impact estimates, we can start to truly understand the potential value for money (VfM) of the proposed mNutrition product. For example, for every US$10,000 spent under Scenario 1: SMS Only, 11.2 deaths, 150 years of wasting, and 318 years of stunting are prevented in children under 5. If IVR also is offered, as in Scenario 2: SMS and IVR, 4.2 deaths, 58 years of wasting, and 121 years of stunting are prevented in children for every US$10,000. In this latter scenario, however, the addition of the IVR service expands the service to illiterate women and results in a greater number ultimately being reached at the BOP.

mNutrition
PRODUCT CONCEPT

Targeted Mobile Messaging to Improve Nutrition Knowledge and Behaviour



PROJECT BACKGROUND & JUSTIFICATIONS

The rapid expansion of mobile phone access to base of the pyramid (BOP) populations presents an unprecedented opportunity to increase coverage of consumer health services to this traditionally overlooked market. Building on market growth observed from mobile banking and other mobile services, there is a growth opportunity for mobile operators to expand business offerings while providing a valuable health service to BOP communities. mHealth services have largely been the purview of not-for-profit (NFP) organisations and donors, with few projects achieving sustainable financing and national scale. Mobile operators' significant market penetration and existing revenue models make them well positioned to deliver sustainable and impactful mHealth services.

With that in mind, the Groupe Speciale Mobile Association (GSMA) mHealth programme has developed a product concept for an mNutrition maternal messaging service. Referred to as the "mNutrition product" in this report, it has the potential to positively affect health at the BOP while achieving sustainability through a "freemium" approach to offering personalised mNutrition messaging. In collaboration with global and regional nutrition experts, the GSMA is developing stage-based nutritional messages for pregnant women and mothers of young children (under 24 months) targeting specific health improvements to reduce child morbidity and mortality rates. These messages will be delivered directly to a participant's (or household's) mobile phone at very low to no cost via short-messaging service (SMS) or interactive voice response (IVR).

This most basic mNutrition messaging service seeks to promote healthy nutrition behaviours during pregnancy while simultaneously driving users towards premium services. These services are intended

to generate revenue for the mNutrition partners, making the product sustainable. Programme advertising and marketing may be accomplished through multiple channels, possibly including SMS blasts to targeted populations. Customers interested in the mNutrition service will register via SMS or unstructured supplementary services data (USSD).

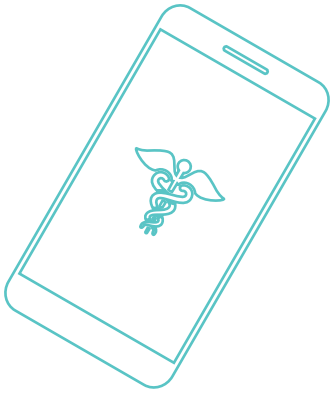
Based on extensive stakeholder interviews, this report documents and synthesises identified opportunities to introduce the proposed mNutrition product into the Zambian mHealth ecosystem. The Palladium team modelled costs and health impact of several implementation scenarios to inform the adaptation of the product concept and implementation strategies for Zambia.

mNutrition PRODUCT DESCRIPTION-CORE COMPONENTS

- Stage-based nutritional information service targeted to pregnant women and mothers of young children under age 24 months
- Offered free of charge to all mobile users
- Marketed through various media, possibly including SMS blast
- Free registration via USSD, SMS, and (potentially) IVR
- Content of health messages developed by global and regional nutrition experts and vetted by national governments to target country-specific nutrition issues.
- Partnerships with existing health programmes to endorse and standardise health content, reducing fragmentation of information
- Partners may offer other revenue-generating services to mNutrition users to promote financial sustainability

THE BUSINESS CASE FOR mHealth

Health and Economic Proof Points



Although mobile technology for behaviour change communication (BCC) may hold promise for targeted delivery of health messages to large numbers of Zambians, the appeal to possible payers ultimately will depend on the strength of the "business case" for mHealth. Will it achieve the desired outcomes in a cost-effective way? Of course, answering this question requires reliable information about both the cost and health impact of the programme as designed. mHealth for BCC is a new and growing field, and programme concepts are constantly adapting to local contexts. Thus, it is difficult to draw direct conclusions using examples of similar programmes. However, these challenges can be addressed through targeting modelling methodologies that take into account unique product adaptations. The following sections provide a high-level summary of modelling analyses to estimate the costs and potential health impacts of a nationwide mNutrition service in Zambia.

FINANCIAL FORECAST MODEL

Estimating the Total Cost of Ownership of the mNutrition Messaging Service

To estimate the total cost of ownership of the proposed product, we developed a new mHealth financial forecast model (FFM) and adapted it to the Zambian context. The FFM is a tool for estimating the resources needed from all programme partners to establish and operate the proposed mNutrition product. Based on demographic data, mobile penetration, and uptake assumptions, the FFM estimates new registrants and active users each year. It then calculates total annual messaging volume using the planned product concept. The FFM also requires that the user specify quantities and unit costs for various capital and operational expenditures associated with a mobile messaging service, such as programming, infrastructure, and connectivity costs. The result is a 5-year cost estimate for a nationwide mNutrition service.

As with any costing exercise, the results of the FFM are heavily dependent on the scope of costing. The Palladium team designed the model to account for the incremental cost of establishing the product concept in a particular target country. For this reason, we deliberately excluded from the cost analysis those costs incurred by the GSMA at the global level (with applications across all target countries). Start-up costs related to country engagement and market research may be included if desired, however.

SCENARIOS

For the purposes of modelling the mNutrition product, the team developed two scenarios from the proposed product concept and stakeholder

feedback. We limited the scope to the core nutrition messaging service to maintain comparability across countries. In Scenario 1: SMS Only, the SMS channel is used as the primary means of communication with users in each phase of the service: registration and messaging. Users also have the option to use USSD menus for registration. In this scenario, the text-based nature of the service restricts its reach and impact to literate women only. In Scenario 2: SMS and IVR, the availability of IVR enhances the service to include the options for voice-based registration and messaging. The potential drawback is that IVR is a more resource-intensive channel, since voice connectivity requires greater bandwidth on the network; however, the addition of the IVR option makes the service far more accessible to illiterate women and mothers.

TABLE 1: mNutrition SCENARIOS FOR FINANCIAL FORECAST AND IMPACT MODELING

Scenario 1

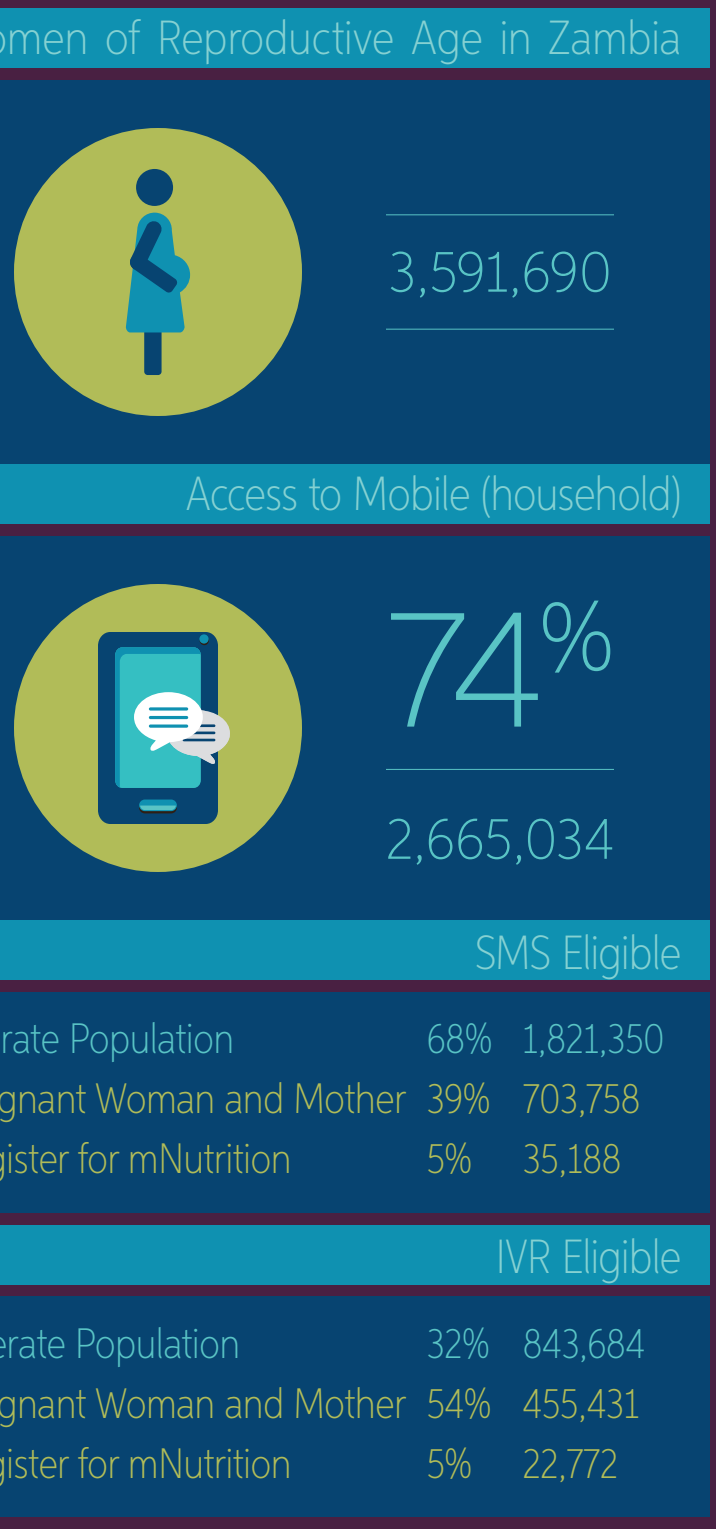
Advertising	Cost excluded
Registration	USSD SMS
Messaging	SMS
Target Population	Literate pregnant women and mothers of children under 24 months

Scenario 2

Advertising	Cost excluded
Registration	USSD SMS
Messaging	SMS IVR
Target Population	Literate and illiterate pregnant women and mothers of children under 24 months

FIGURE 1: Zambia mNutrition target population and registrants (Year 1)[2]

Ultimately, a woman's ability to register for the mNutrition service is limited by her access to mobile and her level of literacy. However, even if a woman meets the necessary criteria, she still must ultimately make the decision to register. During interviews, representatives from mobile operators and value-added service (VAS) providers emphasised the difficulty of estimating registration rates for a new service. A study in South Africa reported a 10 percent registration rate for an SMS service promoting HIV testing in response to a single SMS blast to a population of mobile users who previously had responded to mobile advertising.[1] Therefore, for purposes of this modelling exercise, we made the conservative assumption that 5 percent of the target population would register in a given year in response to all forms of advertising (see Figure 1 below). This registration rate could be improved through targeted marketing efforts and aggressive implementation plans through both the public and private sectors.



1 del Tolley et al., 2012

2 Zambia Demographic and Health Survey data set, 2013

COSTING INPUTS

The Palladium team collected input data for the FFM during the semi-structured stakeholder interviews conducted in June 2015. As currently envisaged, the subscriber will receive 1 SMS message weekly during pregnancy and until the child reaches the age of 24 months. In Scenario 2: SMS and IVR, illiterate subscribers will receive IVR messages with similar content on the same schedule.

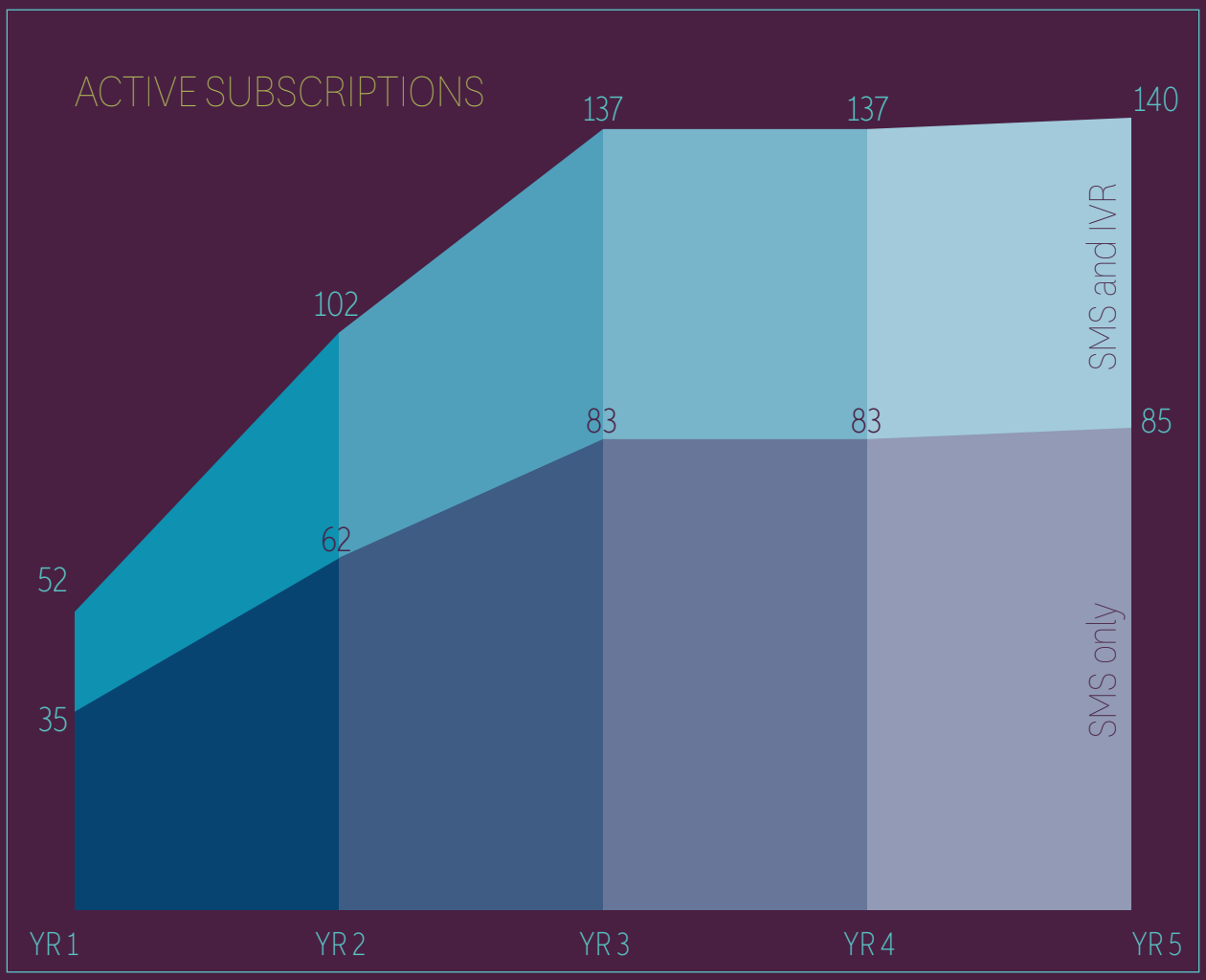
TABLE 2: mNutrition Key Costing Variables From Product Concept and Local Respondents

INPUT	VALUE
mNutrition Messages:	
SMS	1 per week
IVR (if available)	same as SMS schedule
Duration of Service	Pregnancy through 24 months post-delivery
Registration Stage (average)	4th month of pregnancy
SMS Connectivity Costs:	
SMS (per message	US$ 0.034 (0.26 ZMW)
Short Code Setup (one-time)	US$ 5,900 (45,000 ZMW)
Short Code Fee (annual)	US$ 1,300 (10,000 ZMW)
IVR Connectivity Costs:	
Voice (per minute)	US$ 0.026 (2.0 ZMW)
Length of IVR Message	1.0 minutes
E 1 Line	3 lines

FFM RESULTS: Service Volume

Based on the demographics of the Zambian population and the costing assumptions above, the FFM estimates that 175,548 literate women could subscribe to mNutrition messaging over the first 5 years of the programme if SMS only is offered (Table 3). Programme reach increases to 289,153 if illiterate women are given the option of IVR.

TABLE 3: mNutrition SERVICE VOLUME (thousands)



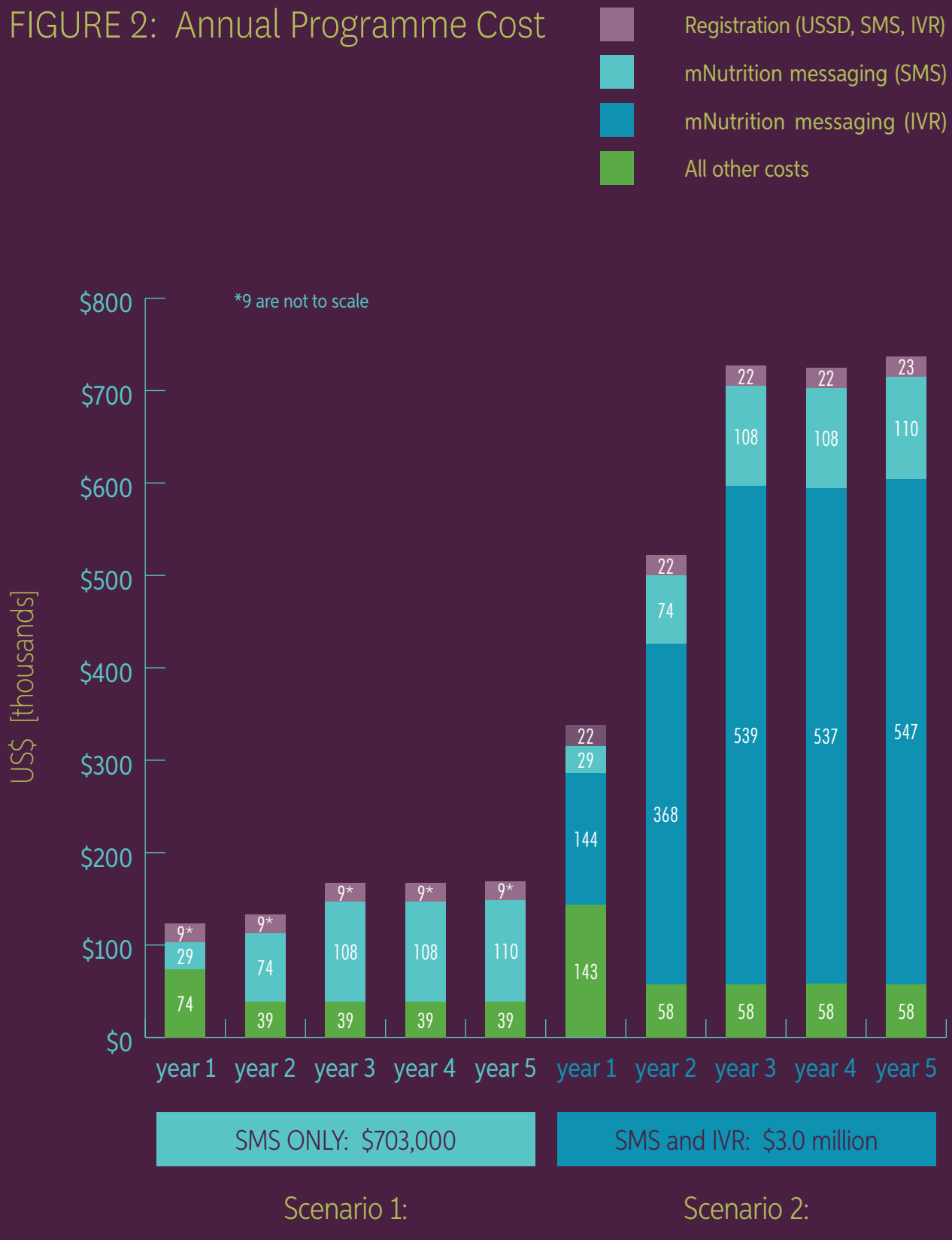
SMS ONLY		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
New Registrations	*(thousands)*	35	35	34	35	36	176
Active Subscriptions	*(thousands)*	35	62	83	83	85	n/a
USSD Sessions	*(thousands)*	21	21	20	21	22	105
SMS Messages	*(millions)*	1.0	2.3	3.3	3.3	3.3	13.2
SMS AND IVR		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
New Registrations	*(thousands)*	58	57	56	58	60	289
Active Subscriptions	*(thousands)*	58	102	137	137	140	n/a
USSD Sessions	*(thousands)*	35	34	34	35	36	173
SMS Messages	*(millions)*	.96	2.3	3.3	3.3	3.3	13.1
IVR Messages	*(millions)*	.59	1.4	2.1	2.1	2.1	8.3

FFM Results: Programme Cost

The estimated total cost of the programme for the first 5 years, excluding the GSMA contributions, is US$703,000 (5.3 million ZMW) in Scenario 1, in which only the SMS service is offered. In Scenario 2: SMS and IVR, the cost increases to US$3.0 million (23.2 million ZMW) due to the addition of the IVR option and greater number of registrants. Figure 2 presents an estimate of the total programme costs for the first 5 years in both scenarios. In both cases, the primary driver of mNutrition programme cost is messaging volume. Detailed costing results are available in Annex 1.

Using these registration estimates, the costs per person reached in Scenarios 1 and 2 are estimated to be US$3.81 (29 ZMW) per SMS registrant and US$20.96 (159 ZMW) per IVR registrant over the first 5 years. In Scenario 2, this equates to an average cost per registrant of US$10.55 (80 ZMW). In Scenario 1, the dominant driver of total programme cost is SMS connectivity, at 61 percent of total costs, and in Scenario 2, the majority of cost is due to voice connectivity, at 70 percent of the 5-year total.

FIGURE 2: Annual Programme Cost



THE HEALTH IMPACTS OF mNutrition

The core value of the mNutrition product concept lies in its potential to positively impact the health of large numbers of Zambian children. Previous mHealth studies support this idea; however, the interventions in previous assessments differed in various ways from the mNutrition product concept, making direct comparisons difficult. Therefore, we applied established modelling techniques to estimate the potential mNutrition product benefits in terms of child health indicators.

The Lives Saved Tool (LiST) is a module within Spectrum, a suite of computer-based models of demographics and health outcomes. LiST is used to estimate the impact of changes in community-based interventions on child mortality. The tool works by comparing the total coverage of maternal, neonatal, and child health (MNCH) interventions under different possible scenarios and calculating the resulting morbidity and mortality in the target populations. When compared, these scenarios demonstrate the differences in mortality due to changes in coverage of particular MNCH interventions, accounting for the presence of all other interventions occurring in the same population.

SCENARIOS

To coincide with the FFM, the LiST analysis used the same two programmatic scenarios as above. Both scenarios (Scenario 1: SMS Only and Scenario 2: SMS and IVR) were compared to a hypothetical baseline scenario in which the coverages of all MNCH interventions were held constant for the modelled period, representing maintenance of the status quo. The programmatic scenarios, on the other hand, expanded coverage of key nutrition interventions

among pregnant women and mothers of young children, representing the potential impact of targeted nutrition messaging via mobile. As before, the true reach of the programme is dependent on several demographic factors, including access to mobile, literacy, and maternal status (Figure 1).

The LiST model has the ability to estimate the impact of many maternal and early childhood health interventions but only those directly related to nutrition increase as a result of the mNutrition product. Annex 2 contains a detailed list of interventions and coverages in the mNutrition scenarios.

One of the most difficult parameters for estimating the impact of the mNutrition product is the effectiveness of mobile messaging for achieving the desired behaviour change. To establish a plausible range of potential programme impact, we conducted a broad review of the mHealth literature for studies in sub-Saharan Africa that report the magnitude of the behaviour change due to a mobile messaging intervention. Table 4 summarises the results of the literature search. In the studies that quantitatively report programme impact, the uptake among women not previously engaging in the behaviour (reduction in non-coverage) fell by between 19 and 50 percent, with an average 32 percent reduction. For purposes of calculating the health impact of the mNutrition service in the LiST model, we assumed that non-coverage of all nutrition-related services would decrease by 32 percent among users who received any nutrition messages in a given year.

TABLE 4: Literature Review of Impact of SMS Messages on Health Service Uptake

ARTICLE/PROGRAM	SETTING	INDICATOR	REDUCTION IN NON-COVERAGE
Adanikin, et al., 2014	Nigeria	Post natal check-up attandance	50%
Wired Mothers	Tanzania	Skilled birth attendance	40%
Owiti, et al. 2012	Kenya	Tuberculosis clinic attendance	42%
Tamrat and Kachnowski, et al. 2012	Thailand	Antenatal check-up attendance	26%
Lund, et al. 2014	Zanzibar	Antenatal check-up coverage	19%
		Tetanus vaccination coverage in pregnancy	36%
		Preventive malaria treatment coverage in pregancy	27%
Pop-Eleches, et al., 2011	Kenya	Antiretroviral therapy adherence	22%
Lester, et al., 2010	Kenya	Antiretroviral therapy adherence	23%
AVERAGE CHANGE			32%

IMPACT MODELLING RESULTS

Under these assumptions of programme effect, Scenario 1 is estimated to prevent 784 child deaths by 2020. However, prevented mortality is only a small part of the story. Improved coverage of key nutrition interventions could prevent 22,388 years of stunting and 10,509 years of wasting among children under 5. Expanded coverage under Scenario 2 means those numbers could be even greater, saving 1,291 children's lives in the same timeframe. In this case, up to 36,934 years of stunting and 17,598 years of wasting could be prevented in children (see Table 5).

TABLE 5: HEALTH IMPACTS OF mNutrition COMPARED TO STATUS QUO

SMS ONLY	2016	2017	2018	2019	2020	TOTAL
Children's Lives Saved	48	100	154	212	270	784
Years of stunting prevented in children	850	3,820	3,863	6,092	7,763	22,388
Years of wasting prevented in children	578	1,785	1,826	2,809	3,510	10,509
SMS AND IVR	2016	2017	2018	2019	2020	TOTAL
Children's Lives Saved	80	165	255	348	443	1,291
Years of stunting prevented in children	1,416	6,169	6,236	9,737	13,376	36,934
Years of wasting prevented in children	867	3,274	3,351	4,683	5,422	17,598

VALUE OF THE mNutrition PRODUCT

Determining whether the mNutrition product represents value for money (VfM) challenges public officials to evaluate the intervention using the criteria of economy, efficiency, and effectiveness. The end result should be to achieve an optimum combination of whole-life cost and quality to meet users' requirements.[3] In Zambia's context, that may involve comparisons to existing MNCH interventions, reaching Millennium Development Goals (MDGs), and achieving the strategic plan targets or other parallel programmes.

PUBLIC SECTOR VfM

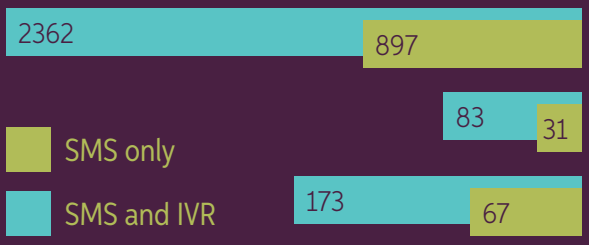
In the absence of specific comparative national public sector MNCH interventions, one of the most basic arguments is the cost per life saved compared to Zambia's gross national income per capita. Put most simply, if an infant death is averted, how does the cost compare to the average income in Zambia? At a total of US$703,000 (5.3 million ZMW), Scenario

[3] Jackson, 2012

1 equates to US$897 per child's life saved, US$31 per year of stunting prevented in children, and US$67 per year of wasting prevented. When IVR is added and coverage increases, as in Scenario 2: SMS and IVR, the cost is US$2,362 per child's life saved, US$83 per year of stunting prevented, and US$173 per year of wasting prevented (see Table 6).

The estimated total cost of the programme for the first 5 years, excluding the GSMA contributions, is in Scenario 1, in which only the SMS service is offered. In Scenario 2: SMS and IVR, the cost increases to US$3.0 million (23.2 million ZMW)

TABLE 6: COST PER HEALTH OUTCOME (US$)



	SMS ONLY	SMS AND IVR
Total Programme Cost (US$)	703,000	3.0 million
Children's Lives Saved	784	1,291
Cost Per Child's Life Saved (US$)	897	2,362
Stunting Prevented in Children (years)	22,388	36,934
Cost Per Year of Stunting Prevented (US$)	31	83
Wasting Prevented in Children	10,509	17,598
Cost Per Year of Wasting Prevented (US$)	67	173

The World Bank estimates that Zambia's gross national income per capita was US$1,760 as of 2014.[4] Given these assumptions of programme impact, we estimate that the mNutrition product is a cost-effective intervention for the prevention of child deaths in both the SMS only and IVR scenarios. Figure 3 depicts the value of a US$10,000 investment in the programme. In addition to lives saved, both intervention scenarios reduce years of child stunting and wasting.

Stunting and wasting also present long-term challenges to productivity and quality of life. Stunting due to nutritional deficiency generally occurs before age 2, and its effects are largely irreversible. These include delayed motor development, impaired cognitive function, and poor school performance. Wasting, or low weight for height, is a strong predictor of mortality among children under 5.[5] The health effects of avoidable stunting and wasting negatively impact Zambia's economy by reducing the population's capacity not only to maintain current levels of productivity but also increase it over time.

FIGURE 3: Health Impact per US$10,000 Spent

4 World Bank, 2015

5 UNICEF, 2015

PRIVATE SECTOR OR MOBILE OPERATOR VfM

Private sector stakeholder interviews indicated that while cost of programmes is a primary consideration in determining value for money, stakeholders also incorporate estimates of health impact in their processes for determining investment. The final determination for mobile operators to sign on to a programme is determined by its cost and service, and the overall benefit to the target population. Although the goal of their overall business model is to produce a profit, mobile operators are willing to make strategic investments in mHealth programmes such as mNutrition as long as it is financially feasible.

Mobile operators in Zambia are currently investigating a combined model, in which paid service revenues are used to support free mHealth programmes like mNutrition, with the goal of improving sustainability. Private sector stakeholders recognise that programmes dependent purely on corporate social responsibility (CSR) funding do not provide long-term sustainability.

Mobile operators may elect to use the FFM tool to further investigate the breakdown of the total cost of ownership for the mNutrition programme and determine at what point they could support and benefit from it. Further modelling by the mobile operators using predicted uptake of "freemium" services, increased stickiness through a combined service (using mHealth as a retention method), and applicable profit margins through incremental upsell could determine whether this cost-shifting concept will be sufficient for mobile operator business models. Note that the overall VfM assigned by the mobile operator to the mNutrition product may be a combination of CSR and estimated profit margins, breakeven points, or potential losses.

THE VfM OF PUBLIC-PRIVATE PARTNERSHIP

Ideally, the VfM of the mNutrition product would be assessed under a public-private partnership (PPP) model, with contributions from both sectors to achieve the desired health impacts. A structured memorandum of understanding (MOU) between the parties would provide a framework of negotiation and decision points surrounding the mNutrition product. A PPP arrangement would be particularly valuable in the scale-up period, providing the mobile operators with an opportunity to properly structure their overall mHealth strategies and freemium products. Granted the findings of the Market Access Document (MAD) and the realities of both private and public sector motivations and goals, the VfM partnership may best serve the interests of all stakeholders. The GSMA is perfectly situated to broker these partnerships to create sustainable mNutrition products, delivered at scale across Zambia's full socio-economic spectrum.

STAKEHOLDER INTERVIEWS

Overview and Methodology

In June 2015, the GSMA, in collaboration with Palladium, conducted semi-structured interviews with Zambian stakeholders in the governmental, telecommunications, and NFP sectors. The interviews focused on ascertaining stakeholder interest in the proposed mNutrition product and identifying key opportunities and obstacles to successful product implementation. The interview team conducted 9 interview sessions: 2 in government, 2 in the telecommunications sector, and 5 with NFP organisations. Interviews often included more than one representative from a designated organisation or government unit.

Each interview was approximately 1 hour long and held in the stakeholder's office using an interview guide comprising a basic framework of mHealth themes. Interview questions addressed mHealth strategy and organisational priority in Zambia, applicability of the proposed mNutrition product to the Zambian context, and government and health system procurement processes. The team also asked questions using a Likert scale to gauge informants' overall mHealth familiarity, interest in the specific mNutrition product, interest in funding the mNutrition product, and the relative priority of this product in comparison to other MNCH interventions. (See Annex 3 for an overall summary of Likert results.)

mHealth initiatives are still new in Zambia, so although Zambian stakeholders recognise mHealth as a valuable tool, they are more familiar with the

COMMON STAKEHOLDER THEMES

- Malnutrition is a national health problem and a government priority.
- mHealth is in the nascent stages— mHealth initiatives must address known health gaps so the government can own the agenda and promote scale.
- The mNutrition initiative and messaging content must be linked with existing nutrition programmes, the health system, and broader eHealth initiatives.
- A "human touch" is necessary within the mNutrition product's enrollment and/or messaging process.
- Stakeholders were concerned about the product's commercial viability.
- Public funding proposals would need strategic placement, respected champions, a solid advocacy plan, along with hands-on follow-through.

concept of eHealth. All interviewees recognized malnutrition as a national health problem in Zambia. They viewed the mNutrition product as a good fit with government priorities, although some stakeholders expressed concern that more basic health needs might trump nutrition as a priority.

All stakeholders regarded the government as a critical actor in the development of new mHealth initiatives, not only for awareness and promotion, but also for the planning and content review stages. Some stakeholders felt that it was especially important for the government to own the agenda for a new mHealth initiative to achieve scale. Respondents anecdotally linked insufficient government engagement with the fact that previous mHealth pilots simply failed to thrive or grow towards national scale.

Funding was a concern across stakeholders. Although telecommunications stakeholders saw SMS as a cost-effective platform for both client and operator, they expressed doubt about the commercial viability of the mNutrition product, stating that CSR support would likely be necessary. Several stakeholders suggested that small charges could help maintain client interest. Public funding offers an alternative, and on the Likert scale, government stakeholders signaled an interest in using public funds to support the mNutrition product. NFP stakeholders recommended that any proposal for public funding would need strategic placement, respected champions, and a solid advocacy plan with hands-on follow-through.

Above all, stakeholders from all sectors felt that the mNutrition product would need to coordinate message content and enrollment with other nutrition programmes and align with the broader health system and eHealth initiatives. Stakeholders recommended using local care providers, community health workers or other community-based health personnel to enroll subscribers and thereby increase the mNutrition Service's reach.

GOVERNMENT STAKEHOLDERS

INTERVIEWS CONDUCTED

- Ministry of Health (MoH), Information & Communications Technology Division (ICT)
- National Food and Nutrition Commission (NFNC)

MAJOR THEMES

- Nutrition is high on the health priority list.
- There needs to be a greater understanding of mNutrition product details, including integration of behaviour change, content, and coverage.
- Government is in the nascent stages of mHealth; GSMA's efforts are helping to move the discussion forward.
- Linkages need to be made between the mNutrition initiative and existing nutrition programmes, the health system, and broader eHealth initiatives.

Government stakeholders in Zambia were somewhat familiar with nationwide mHealth initiatives, but were more familiar with the broader concepts of eHealth as part of their overall eGovernment initiative. They welcomed the conversation regarding the GSMA mNutrition product as a continued educational process on mHealth, its drivers, potential health impacts, and Zambia's way forward. They recognised mHealth as a valuable tool, one that simply needs to be refined and developed in conjunction with Zambia's overall nutrition strategy.

As part of a broader stakeholder consortium represented in this research, government stakeholders recognise that the private sector moves at a much faster pace. One respondent stated, "They (NGOs) clearly want to speed up the delivery of innovative health services, which makes for a good partner." If managed incorrectly, this difference can impede

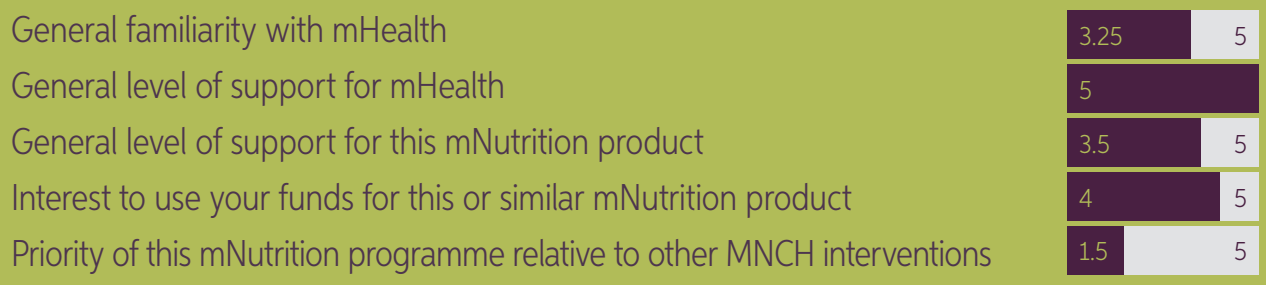
mHealth's progress; conversely, if properly nurtured, it can accelerate progress for mHealth. An eHealth/mHealth technical working group includes the majority of NGOs working in Zambia's health arena, but the NFNC stakeholder was unaware of this activity.

As to funding, government stakeholders did not rule out the possibility of having the mNutrition product integrated with ministry budgets. To do so, they suggested several steps or actions:

- Provision of a sustainability plan and benefit demonstration
- Preparation of comparative effectiveness analysis for the mNutrition product versus other means (the example provided was "nutrition counselling cards")
- Ensuring a fit within eGovernment and the overall dashboard development

Government stakeholders cited illiteracy, language variations, and behaviour change as particular challenges to the product concept. Once the full concept is complete, they stressed the importance of a well-thought-through advocacy plan for use in implementation, including the use of basic case studies for similar mNutrition projects.

LIKERT SCORES: GOVERNMENT STAKEHOLDERS



TELECOMMUNICATION STAKEHOLDERS

INTERVIEWS CONDUCTED

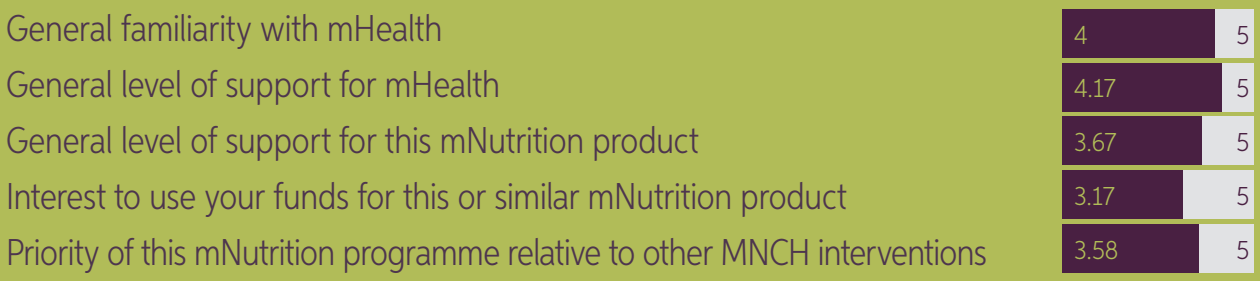
- MTN
- Airtel

MAJOR THEMES

- Malnutrition is a key government issue and national health problem.
- The mNutrition product could create greater brand loyalty to a mobile operator bonding with clients in pregnancy.
- Government is critical to scalability and should own the agenda.
- Messaging content must be coordinated among all partners and nutrition advisors/programmes.
- Concerns over support costs will arise should the mNutrition messaging create questions among subscribers.

mHealth is in its early development stages for Zambia's mobile operators, although there are some health programmes running via CSR actions. Telecommunications stakeholders felt that "health does well in terms of interest among clients" but, given their limited experience, this observation may be anecdotal. Stakeholders had encouraging perceptions of the mNutrition product and its ability to promote brand loyalty or "stickiness" among subscribers. Some doubt was expressed as to the commercial viability of the mNutrition product, with mobile operators stating that CSR support would likely be necessary but small charges might help maintain client interest.

LIKERT SCORES: TELECOMMUNICATION STAKEHOLDERS



With respect to the product design, these stakeholders saw SMS as a cost-effective platform for both clients and operators. Given the language variations, mobile operators questioned how the various characters could be supported through the SMS systems. The addition of IVR would be necessary to address illiterate subscribers, but mobile operators also realised that this would add another dimension of cost and implementation challenges. Some raised the issue of support costs for those clients who called or texted back with questions regarding messaging content; they observed that mobile operator call centres are not competent in nutrition counselling. They felt that the eventual content/messaging must be tailored not just to individual needs, but also oriented towards behaviour change and easily understood by subscribers.

The government's role was seen as critical, not only in awareness and promotion, but in the planning and content review stages. Stakeholders encouraged the idea of extending partnerships to the Medical Doctor's Association and other private sector health professional associations. Mobile operators emphasised the need to involve CHWs in the enrollment processes, stating that "uptake will drive the value of this product."

NOT-FOR-PROFIT STAKEHOLDERS

INTERVIEWS CONDUCTED

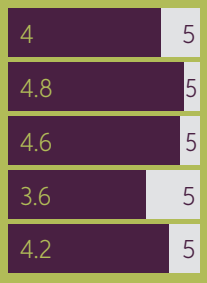
- Zambia Center for Applied Health Research and Development (ZCAHRD)
- CARE
- UNICEF
- SUN CSO
- Barclays

MAJOR THEMES

- The mNutrition product must have a "human touch" within its enrollment and/or messaging process, so as to include CHWs or other community-based health personnel.
- Any proposal for public funding would need strategic placement, respected champions, and a solid advocacy plan with hands-on follow-through.
- Government cooperation is most easily achieved when addressing known gaps.
- Private sector linkages should be expanded through the SUN business network.
- Previous mHealth programmes have not sufficiently engaged with government.

NFP stakeholders were generally supportive of the mNutrition product concept, stating that nutrition is high on the government's priority list but also questioning whether access to basic health services may trump that ranking. They questioned whether the product could be promoted as potentially reducing the burden on Zambia's health system. One respondent stated, "Zambia's First 1,000 Days is a good wish. This comes as a good strategy and we need a thousand more of such investments. My wish is for you to speed up!"

LIKERT SCORES: NOT-FOR-PROFIT STAKEHOLDERS



Regarding interactions with mobile operators, NFP stakeholders expressed an acute awareness that operators are frequently approached to act as partners in NFP projects. With just two predominant mobile players, they recommended that the approach to mobile operators utilise tested business models and robust private sector partnerships.

When explaining the product concept, NFP stakeholders noted several challenges, including a need for a minimum of seven languages, a lack of community/health provider involvement, absence of a gender strategy (for male household phone ownership), and mobile geographic coverage. On the positive side, they noted the following as contributing to the mNutrition product's potential success: a keen interest in SMS among pregnant teens, good traction in working with mobile operators, and the GSMA's support.

They considered the idea of an SMS blast for marketing and registration requests to be a very minimal approach. NFP stakeholders suggested specific involvement of the local Safe Motherhood Action Groups, which could help promote the mNutrition product and possibly act as translators or readers to enrolled women. Another suggestion was including the engagement of the Ministry of Community Development and Maternal and Child Health (MCDMCH) and Neighborhood Health Committees.

ZAMBIAN

GOVERNMENT PROCUREMENT PROCESSES

One important pathway to sustainable funding is to incorporate the mHealth product into the government's annual budget. This section describes the standard government procurement process (Figure 4).

FIGURE 4: Standard Government Procurement Process

The fiscal year is 1 January –31 December

ZAMBIAN GOVERNMENT PROCUREMENT PROCESS

There are many potential pathways to sustainable funding for mHealth. An important one is to incorporate the mHealth programme into the government's annual budget.

Government budgets run for the calendar year 1 January through 31 December, with July usually seeing the initiation of the internal data collection processes and discussions. Across the five key Zambian ministries, internal (i.e., each division within the MoH) negotiations occur in July and into August, often including NGOs such as UNICEF, WHO, Barclays, and other active programme funders. By the end of August, each division submits to the MoH, which then consolidates the budgets for presentation to the Ministry of Finance (MoF) in September. In the November/December timeframe, the MoF releases its "yellow book," detailing the approved budgets for each ministry and divisions within them. Per the stakeholder interviews, the yellow book budgets can be vastly different from the version submitted by divisions and/or the MoH.

CONCLUSION

mHealth has great potential as a cost-effective tool to reach BOP populations in Zambia. This is the case with the proposed mNutrition programme, which will deliver lifesaving health nutrition messages to improve maternal and child health. To optimise impact, the design of any mHealth service must be context sensitive as to socio-economic characteristics, access to mobile, and functional literacy; it also must be a collaborative effort among the public and private sectors.

Through this research, we have investigated and contributed to the evidence base of health and economic proof points to provide the basis for continued exploration of sustainable models to deliver sustainable mHealth services at scale. The results of the health impact modelling give public officials solid evidence to allocate a definitive value to the mNutrition product, while mobile operators can use the financial forecasts to build sustainable business plans. Implemented wisely, all of the mNutrition stakeholders can benefit, but none as much as the target population of mothers and young children. Unprecedented access to health and nutrition information can result in lives saved, healthier mothers, and healthier children.

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ANNEX 1: Detailed Financial Forecast Results in US$

SMS ONLY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Programme Design and Content	10,843	-	-	-	-	10,843
Infrastructure and Setup	283,000	-	-	-	-	283,000
Advertising (USSD and SMS)	-	-	-	-	-	-
Registration (USSD and SMS)	68,265	67,151	66,057	68,430	70,661	340,563
mNutrition messaging (SMS)	219,573	560,597	821,874	819,571	834,390	3,256,004
mNutrition messaging (IVR)	-	-	-	-	-	-
Service fees and upgrades	25,000	45,000	45,000	45,000	45,000	205,000
Supervision and maintenance	240,000	240,000	240,000	240,000	240,000	1,200,000
Content management	-	10,500	10,500	10,500	10,500	42,000
TOTAL	846,681	923,248	1,183,431	1,183,500	1,200,550	5,337,410

SMS and IVR	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Programme Design and Content	21,138	-	-	-	-	21,138
Infrastructure and Setup	74,147	-	-	-	-	74,147
Advertising (USSD, SMS, IVR)	-	-	-	-	-	-
Registration (USSD, SMS, IVR)	22,289	21,925	21,568	22,343	23,072	111,198
mNutrition messaging (SMS)	28,918	73,831	108,241	107,938	109,889	428,816
mNutrition messaging (IVR)	143,956	367,526	538,815	537,306	547,039	2,134,642
Service fees and upgrades	15,936	25,023	25,023	25,023	25,023	116,028
Supervision and maintenance	31,608	31,608	31,608	31,608	31,608	158,040
Content management	-	1,383	1,383	1,383	1,383	5,531
TOTAL	337,991	521,296	726,638	725,601	738,014	3,049,540

ANNEX 2: Nutrition Interventions Included in Lives Saved Tool and Coverage (percentage of intervention target populations)

SMS ONLY	2015	2016	2017	2018	2019	2020
Folic acid supplementation/ fortification	0.00	0.69	1.37	2.04	2.72	3.38
Calcium supplementation	0.00	0.69	1.37	2.04	2.72	3.38
Iron folate supplementation	59.10	59.38	59.66	59.94	60.21	60.48
Multiple micronutrient supplementation	0.00	0.69	1.37	2.04	2.72	3.38
Balanced energy supplementation	0.00	0.69	1.37	2.04	2.72	3.38
Promotion of breastfeeding	55.95	56.23	56.51	56.78	57.05	57.32
Complementary feeding—education only	37.30	37.70	38.09	38.48	38.87	39.26
Complementary feeding——supplementation and education	37.30	37.70	38.09	38.48	38.87	39.26
Vitamin A supplementation	93.00	93.04	93.09	93.13	93.18	93.22
Zinc supplementation	0.00	0.63	1.26	1.88	2.50	3.12
Zinc—for treatment of diarrhea	64.10	64.33	64.55	64.78	65.00	65.22
Therapeutic feeding—for severe wasting	0.00	0.63	1.26	1.88	2.50	3.12
Treatment for moderate acute malnutrition	0.00	0.63	1.26	1.88	2.50	3.12

SMS and IVR	2015	2016	2017	2018	2019	2020
Folic acid supplementation/ fortification	0.00	1.11	2.20	3.29	4.36	5.42
Calcium supplementation	0.00	1.11	2.20	3.29	4.36	5.42
Iron folate supplementation	59.10	59.55	60.00	60.44	60.88	61.32
Multiple micronutrient supplementation	0.00	1.11	2.20	3.29	4.36	5.42
Balanced energy supplementation	0.00	1.11	2.20	3.29	4.36	5.42

Promotion of breastfeeding	55.95	56.41	56.87	57.33	57.78	58.22
Complementary feeding—education only	37.30	37.96	38.61	39.26	39.90	40.54
Complementary feeding——supplementation and education	37.30	37.96	38.61	39.26	39.90	40.54
Vitamin A supplementation	93.00	93.07	93.15	93.22	93.29	93.36
Zinc supplementation	0.00	1.05	2.10	3.13	4.15	5.16
Zinc—for treatment of diarrhea	64.10	64.48	64.85	65.22	65.59	65.95
Therapeutic feeding—for severe wasting	0.00	1.05	2.10	3.13	4.15	5.16
Treatment for moderate acute malnutrition	0.00	1.05	2.10	3.13	4.15	5.16

BASELINE SCENARIO	2015	2016	2017	2018	2019	2020
Folic acid supplementation/ fortification	.0	.0	.0	.0	.0	.0
Calcium supplementation	.0	.0	.0	.0	.0	.0
Iron folate supplementation	59.10	59.10	59.10	59.10	59.10	59.10
Multiple micronutrient supplementation	.0	.0	.0	.0	.0	.0
Balanced energy supplementation	.0	.0	.0	.0	.0	.0
Promotion of breastfeeding	55.95	55.95	55.95	55.95	55.95	55.95
Complementary feeding—education only	37.30	37.30	37.30	37.30	37.30	37.30
Complementary feeding——supplementation and education	37.30	37.30	37.30	37.30	37.30	37.30
Vitamin A supplementation	93.00	93.00	93.00	93.00	93.00	93.00
Zinc supplementation	.0	.0	.0	.0	.0	.0
Zinc—for treatment of diarrhea	64.10	64.10	64.10	64.10	64.10	64.10
Therapeutic feeding—for severe wasting	.0	.0	.0	.0	.0	.0
Treatment for moderate acute malnutrition	.0	.0	.0	.0	.0	.0

ANNEX 3: Results of Likert Scale Questions

LIKERT SCALE QUESTION	SCALE	GOVERNMENT	TELECOMMUNICATIONS SECTOR	NOT-FOR-PROFIT SECTOR
Familiarity with mHealth	0: not at all familiar 5: very familiar	3.25	4	4
General level of support for mHealth	0: not supportive 5: very supportive	5	4.17	4.8
General level of support for mNutrition product	0: not supportive 5: very supportive	3.5	3.67	4.6
Interest to use your funds for this or similar mNutrition product	0: no interest 5: very interested	4	3.17	3.6
Priority of this mHealth programme relative to other MNCH interventions	0: not a priority 5: high priority	1.5	3.58	4.2

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