

External evaluation of mobile phone technology-based nutrition and agriculture advisory services in Africa and South Asia

Mobile phones, nutrition and health in Tanzania: Qualitative midline study report

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Executive summary

This report constitutes the qualitative midline report of the evaluation of the mNutrition intervention in Tanzania. The mNutrition intervention in Tanzania

mNutrition is a five-year global initiative supported by the Department for International Development (DFID) since 2013, organised by Groupe Spéciale Mobile Association (GSMA), and implemented by in-country mobile network operators (MNOs) to use mobile technology to improve the health and nutritional status of children and adults in low-income countries around the world. The nutrition content of the programmes aims to promote behaviour change around key dietary and child feeding practices that are likely to result in improved nutritional health within a household.

In Tanzania mNutrition is implemented through the ‘Healthy Pregnancy, Healthy Baby’ (HPHB) SMS (text messaging) programme, which is part of the Wazazi Nipendeni m-Health platform (WN). The programme is run by the m-Health Tanzania public-private partnership, which was initiated in 2012 by the Ministry of Health and Social Welfare, with financial support from the US Government Centers for Disease Control and Prevention (CDC). WN is targeted at pregnant women and mothers of young children and their partners (husbands, etc). It is available nationally and on all phone networks.

The HPHB SMS Service sends free text messages in Swahili on a range of pregnancy and early childhood issues. Nutrition was a small component of the original HPHB SMS Service but was extended substantially with the addition of the mNutrition content (approximately 300 nutrition messages). The resulting product will be referred to as Wazazi Nipendeni plus mNutrition in this report.

Evaluation design

The aim of the impact evaluation is to assess the impact, cost-effectiveness and commercial viability of mNutrition. The evaluation is being conducted by a consortium of researchers from Gamos, the Institute of Development Studies (IDS) and the International Food Policy Research Institute (IFPRI).

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The team uses a mixed methods approach with three interlinked components to gather evidence about the impact of the mNutrition intervention in Tanzania, including:

- A **quantitative impact evaluation**, employing a randomised control design to determine the causal effect of the programme on the impact on dietary diversity, infant and young child feeding (IYCF) practices and child anthropometry. The quantitative team will conduct large-scale household surveys at the start of the programme implementation and two years later in both the treatment communities, which will receive door-to-door offers to sign up to the service, and the control communities, which will not receive such offers but will still be able to access the mNutrition intervention.
- A **qualitative impact evaluation**, which consists of three qualitative data collection rounds (i.e. an initial qualitative exploratory study, in-depth case studies at midline and rapid explanatory qualitative work after the quantitative endline survey data collection) and aims to provide understanding of the context, underlying mechanisms of change and the implementation process of mNutrition.
- A **business model and cost effectiveness evaluation**, employing stakeholder interviews, commercial and end user data, document analysis and evidence from the quantitative and qualitative evaluation to generate a business model framework and estimate the wider imputed benefits from the value-added service for the range of stakeholders involved.

This report

This midline report presents the findings of the second round of qualitative data collection conducted in October and November 2017 in Iringa region, Tanzania. Data collection was conducted across four villages that were selected as part of the quantitative treatment group.

The qualitative midline aims to address the overarching question of how and why WN plus mNutrition messages triggered (or not) behaviour change related to child feeding and maternal nutrition in Tanzania. To achieve this, the midline has the following objectives:

1. **Document the implementation of WN plus mNutrition at community level**
2. **Explore acceptability of WN plus mNutrition at household level**
3. **Explore potential changes in key behaviours related to child and maternal nutrition**

Findings from the qualitative midline study will be combined and triangulated with the quantitative endline and business model/cost-effectiveness endline in 2019.

Midline findings

Key findings from the assessment of implementation processes

WN plus mNutrition is only effective in changing mothers' infant and young child feeding practices when mothers have access, take up and actively engage¹ with the service. The qualitative midline

¹ Uptake describes the processes of receiving and comprehending the message content.

Engagement is the next desirable step after up take and describes the process of actively processing, thinking and potentially discussing the content of the messages.

found that a considerable number of subscribers either never received a WN plus mNutrition messages (21 of 70 households) or only received messages for a few months (15 of 70 households). Only 26 of 70 treatment households contacted for the qualitative midline currently still receive the WN plus mNutrition messages.

- Changing SIM cards or MNOs or losing the mobile phone were common reasons for dropping out.
- A recent change in the regulations for mobile number portability (MNP) in Tanzania allows customers to retain their numbers when switching from one service provider to another. As subscription to WN plus mNutrition is linked to a specific SIM and MNO (i.e. the SIM and MNO the subscriber used at the registration stage), subscribers who change the MNO will lose access to the WN service (even if the user still has the same mobile phone number).
- Access to mobile phone-based messages is determined by who in the household receives the messages. Access was less reliable if husbands received them as they often did not share with their wives. Sending messages to women may be more effective than to husbands/fathers and asking them to share. This may limit the reach of WN plus mNutrition services considerably as many women in Tanzania did not own a mobile phone.
- The frequency with which subscribers received WN messages varied substantially and as mNutrition messages just constitute one of several types of messages delivered through the WN platform, exposure to mNutrition messages is likely to be low.

Other barriers including running out of battery and turning off the phone, mistaking WN plus mNutrition messages as spam or being too pre-occupied with work or family commitments to engage with the messages and gender disparity in mobile phone ownership and access. Given that exposure to mNutrition messages was generally low and often short term, the effectiveness of the messages on behaviour change and child and maternal nutrition may be limited.

The findings also suggest how mothers' uptake of and engagement² with WN plus mNutrition could be improved.

- Interpersonal contact with the quantitative survey team was perceived as important for building trust and convincing households to sign up. This suggests that an interpersonal component during the promotion may increase both uptake and sustained use.
- To prevent WN plus mNutrition messages perceived as spam the sender number should be changed to a clearly identifiable name (e.g. WN plus mNutrition)
- Highlight to WN plus mNutrition subscribers that they will lose access to the service when changing their service provider, but that they can re-subscribe with any provider and at any time free-of charge.

Key findings from the acceptance assessment of WN plus mNutrition

High levels of acceptance of both content and delivery mode are critical for initial uptake and sustained engagement with the service and are a precondition for the adoption of new behaviours and practices in response to it. The qualitative data found:

² Up-take describes the processes of receiving and comprehending the message content.

Engagement is the next desirable step after up take and describes the process of actively processing, thinking and potentially discussing the content of the messages.

- Subscribers valued the WN plus mNutrition messages as a personalised guide through various stages of pregnancy and early childhood, as a reminder of existing knowledge, and as a provider of practical advice that complemented theoretical advice from health workers.
- Mobile phone-based messages were preferred over other communication channels (such as radio, TV, health workers) because of their convenience, individual targeting, and privacy.
- Currently, WN plus mNutrition is a one-way mobile phone-based intervention. The lack of interpersonal contact is perceived as a major limitation of WN plus mNutrition. Mothers miss personal rapport, dialogue, and support from human beings. Over time the lack of interpersonal contact can also negatively affect mothers' trust in the credibility of the information. Introducing occasional interpersonal interactions (e.g. community-based WN plus mNutrition meetings) may help to address this shortcoming and ensure sustained engagement.
- Health workers are the most trusted source for information related to pregnancy, child birth and early childhood. Embedding WN plus mNutrition into the existing health service delivery may help to build trust in the messages and promote sustained engagement.
- Lack of detail in a short text message limited the usefulness of the messages for some parents and highlights the importance of effective content design and personalised messages towards subscribers' time-sensitive information needs during pregnancy and early childhood. The WN plus mNutrition service is not a stand-alone nutrition intervention and should not attempt to replace nutrition and health training by health workers. Nevertheless, the messages might play an important role in reinforcing and supporting health workers' efforts.

Key findings on contextual barriers to adoption of WN plus mNutrition advice

Successful uptake and high levels of acceptance of WN plus mNutrition are critical for parents' engagement with the service. However, contextual barriers may impede the translation of the advice into practice. The following key barriers emerged:

- Lack of financial resources emerged as the key barrier to following some advice in the messages (i.e. food choice recommendations for children). This highlights the importance of considering households' economic realities when designing the messages. The mNutrition messages currently focus on how the health and nutritional status of children could be improved. However, literature suggests that behaviour change messages may be more effective when framed to fit the characteristics of the intended recipient. Poverty and worries about money were major concerns for many households compared to the family's nutritional well-being. Messages that highlight the economic incentives of changing child care practices could be particularly effective; for example, messages could stress that breastfeeding saves money.
- Another option would be to link WN plus mNutrition services with other programmes (e.g. social protection programmes that provide cash transfers) or financial services that aim to improve the households available financial resources.

Recommendations for policy and practice

Mobile phone-based advisory services such as WN plus mNutrition are unlikely to be effective as a stand-alone channel for behaviour change; however, they may perform best when integrated with traditional media and channels as part of a multi-level strategy (as already the case in Wazazi Nipendeni). Mobile phone-based information could thereby be one part of a broad many-pronged policy, and not the only component aiming to change behaviours and practices.

Mobile phone-based interventions may generate new inequalities, as not everybody can afford or has access to a mobile phone. The qualitative midline found that especially young women (including adolescent girls) who may benefit most from the information may be excluded. A blended approach combining different technologies and approaches to disseminate information

may increase inclusiveness and address some of these newly-generated inequalities (e.g. mobile phone and radio; mobile phone and community meetings that are open to non-subscribers).

The transmission of information to passive audiences without an element of interactive engagement has limited effectiveness in changing behaviour and practices. WN plus mNutrition currently does not include any interactive components (e.g. call centres). Consequently, parents did not experience any peer, social, or emotional support when attempting to adopt the advice WN plus mNutrition provided.

With regards to content, parents are interested in and receptive to messages that may help to improve the health and well-being of their children, however, information needs varied depending on the specific situation and context of the parents. For example, inexperienced first-time parents had other needs, fears and concerns than experienced parents who already had several children. Content needs to be tailored, context-specific and relevant to parents very time sensitive needs. Parents whose children faced acute nutritional or health problems frequently look for specific information that can help them to address the problems (e.g. failure to thrive; acute illness). Introducing two-way channels (i.e. a call centre) as part of WN plus mNutrition could enable parents to actively source the information they need, rather than merely being the recipient of information experts perceive to be relevant.

Sharing of the content of the messages could be a way of increasing the reach of WN plus mNutrition (including to parents/mothers who do not own a mobile phone). However, our data suggest that sharing with people outside the own household was uncommon. One reason for this was that messages related to pregnancy and early childhood very perceived as very private ('family issue') and not to be shared with others. Experimenting with approaches to encourage parents to share the content might increase the reach of mobile phone-based interventions.

WN plus mNutrition provides highly relevant information to pregnant women and mothers, however, it currently does not support the generation of an enabling environment that supports mothers to act and adopt new practices. To increase impact, mobile phone-based services could be joined up with other ongoing interventions (e.g. social protection programmes, access to financial services).

Table of contents

Acknowledgements	ii
Disclaimer	iii
Executive summary	iv
The mNutrition intervention in Tanzania	iv
Evaluation design	iv
This report	v
Midline findings	v
Key findings from the assessment of implementation processes	v
Key findings from the acceptance assessment of WN plus mNutrition	vi
Key findings on contextual barriers to adoption of WN plus mNutrition advice	vii
Recommendations for policy and practice	vii
List of tables and figures	xi
List of abbreviations	xii
1 Introduction	13
1.1 mNutrition intervention in Tanzania	13
1.2 Overview of the evaluation design	14
1.3 Purpose and scope of the qualitative midline study	166
1.4 Organisation of the report	16
2 Methodology	17
2.1 Aims of the midline qualitative study	17
2.1.1 Data collection methods	17
2.1.2 Development and pilot-testing of the tools	18
2.1.3 Training of data collection team	19
2.1.4 Data collection implementation	19
2.2 Sampling strategy	19
2.2.1 Community selection	19
2.2.2 Participant selection	21
2.3 Data management and analysis	24
2.4 Ethical approval	26
2.5 Limitations	27
3 Village profiles	28
4 Experiences with implementation of WN plus mNutrition at community level	32
4.1 Implementation	32
4.1.1 Key motivators for treatment households to sign up	32
4.1.2 Time between signing up and receiving first messages	33
4.1.3 Challenges with the implementation of WN plus mNutrition messages	333
4.1.4 Frequency of WN plus mNutrition message	34
4.1.5 Spam and desire to unsubscribe from service	35

4.1.6	Message reading and storage	35
4.2	Technical issues and barriers	36
4.2.1	Access to electricity to charge mobile phone	366
4.2.2	Multiple SIM cards and changing numbers	366
4.2.3	Implications for intervention uptake and recommendations for programme design	38
5	Acceptability of WN plus mNutrition messages	40
5.1	Perceived usefulness	40
5.1.1	Perceptions of personal relevance of the message content	40
5.1.2	Perceived added usefulness of mobile phone- based messages over other communication channels	45
5.2	Perceived ease of use	48
5.2.1	Ease of comprehending the content of the messages	488
5.2.2	Ease of accessing the messages	49
5.3	Trust in the credibility of WN plus mNutrition messages	52
5.3.1	Reasons for trust in WN plus mNutrition	52
5.4	Social influences on uptake of WN plus mNutrition	56
5.5	Unintended consequences	577
5.6	Potential implications for the effectiveness of WN plus mNutrition and lessons	588
6	Behaviour changes related to maternal and child nutrition and the role of WN plus mNutrition	63
6.1	Pathways to behaviour change in response to WN plus mNutrition	633
6.2	Initial hypotheses on how WN plus mNutrition may work in different contexts	67
6.3	Barriers to behaviour change in response to WN plus mNutrition	70
6.4	Ideas for improving WN plus mNutrition services	711
6.5	Potential implications for the design of WN plus mNutrition services	72
7	Summary of the main findings and potential implications for the effectiveness of Wazazi Nipendeni plus mNutrition	74
7.1	Experiences with implementation of WN plus mNutrition	744
7.2	Acceptability of WN plus mNutrition messages	744
7.3	Behaviour changes related to maternal and child nutrition and the role on WN plus mNutrition	755
7.4	Recommendations for policy and practice	755
	References	77
	Annex A mHealth Theory of Change diagram	79
	Annex B Terms of Reference	80
	Annex C Timeline for the mNutrition impact evaluation	91
	Annex D Detailed description of the entire qualitative sample for the midline	92
	Annex E Midline topic guides	101
E.1	Topic guide for in-depth interview with mothers who have received mNutrition messages (directly or via sharing)	101

E.2	Topic guide for in-depth interview with fathers for households where both men and women own phones and both receive mNutrition messages	110
E.3	Topic guide for in-depth interview with fathers who were not sharing messages with their wives or were deleting messages	117
E.4	Topic guide for in-depth interview with local health expert (e.g. midwife, community health worker)	120
E.5	Topic guide for in-depth interview with village chairman and local expert	125
E.6	Topic guide for in-depth interview with national-level mNutrition programme stakeholders	128
E.7	Topic guide for focus group discussion with mothers in the treatment group who receive messages	130
E.8	Topic guide for focus group discussion with fathers from households who are active users of mNutrition service	1333
E.9	Topic guide for focus group discussions with elderly women and non-treatment mothers (do not need to own a phone)	138
Annex F	Coding scheme used for the midline data analysis	145

List of tables and figures

Table 2.1:	Villages selected for qualitative midline study data collection for each district	21
Table 2.2:	Qualitative sample and interviews conducted for the midline	23
Tale 3.1:	Characteristics of the villages included in the qualitative midline evaluation	29
Table 4.1:	Key findings from the implementation assessment of WN plus mNutrition	39
Table 5.1:	Results from ranking exercise conducted during FGDs with treatment mothers	42
Table 5.2:	Sharing patterns of WN plus mNutrition messages sent to the father's phone	50
Table 5.3:	Potential implications of acceptability assessment of WN plus mNutrition and future lesson	Error! Bookmark not defined. 9
Table 6.1:	Initial context-mechanism-outcome (CMO) configurations	67
Table 6.2:	Key findings and implications for design and implementation of WN plus mNutrition	72
Figure 2.1:	Map of Iringa Region showing the three study districts	21
Figure 2.2:	Illustration of CMO configuration	26

List of abbreviations

CDC	Centers for Disease Control and Prevention
CMO	Context-mechanism-outcome
DFID	Department for International Development
GSMA	GSM Association
FGD	Focus group discussion
HPHB	Healthy Pregnancy, Healthy Baby
IDI	In-depth interview
IDS	Institute of Development Studies
IFPRI	International Food Policy Research Institute
IYCF	Infant and Young Child Feeding
KII	Key informant interview
M&E	Monitoring and evaluation
MNO	Mobile network operator
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
NBS	National Bureau of Statistics
NGO	Non-governmental organisation
OCGS	Office of Chief Government Statistician
OPM	Oxford Policy Management
OPM-T	Oxford Policy Management-Tanzania
SI	Stakeholder interview
SMS	Short Messaging Service
TAM	Technology Acceptance Model
TDHS-MIS	Tanzania Demographic and Health Survey and Malaria Indicator Survey
TFNC	Tanzania Food and Nutrition Centre
WN	Wazazi Nipendeni

1 Introduction

1.1 mNutrition intervention in Tanzania

mNutrition is a five-year global initiative that has been supported by the Department for International Development (DFID) since 2013. It is organised by the GSM Association (GSMA) and implemented by in-country mobile network operators (MNOs) to use mobile technology to improve the health and nutritional status of children and adults in low-income countries around the world.

mNutrition has two major anticipated objectives. The first is developing cost-effective, sustainable business models for mobile phone-enabled nutrition and agriculture services for one million households in Africa and Asia that can be replicated in other countries. The second is to promote behaviour change around key farming practices and around dietary and child feeding practices that are likely to result in improved nutritional health within a household (see Annex A for GSMA's mHealth Theory of Change).

The potential of mobile technology to change attitudes, knowledge, behaviours and practices around health and agriculture for improved nutritional status has been recognised for some time, but to date there have been no rigorous evaluations of m-services at scale. In addition to internal programme monitoring and evaluation (M&E) processes, DFID has committed to conducting a rigorous independent evaluation of mNutrition to generate high-quality evidence on the impact, cost effectiveness and sustainability of mobile phone-based advisory services in nutrition and agriculture.

mNutrition is implemented through 14 mAgri and mHealth programmes in 12 countries throughout sub-Saharan Africa and South Asia. Given the budgetary limitations of the mNutrition programme, the decision was made to select two countries for inclusion in the evaluation: the mHealth programme in Tanzania and mAgri programme in Ghana.

In Tanzania, mNutrition is implemented through the 'Healthy Pregnancy, Healthy Baby' (HPHB) SMS (text messaging) service. The mass media programme accompanying the service is called Wazazi Nipendeni (WN). The WN programme is a project funded by the US Center for Disease Control and Prevention (CDC) bringing together multiple partners contributing towards shared goals. Phase 1 of the programme, launched in 2012, was initially developed in coordination with the Tanzania Capacity Communication Project, a USAID-funded programme led by Johns Hopkins Center for Communication Programs. WN was one of several behaviour change communication programmes using methods as diverse as TV drama series, radio distance learning for community health volunteers and several integrated mass media campaigns. The public-private partnership was initiated by the Ministry of Health and Social Welfare³ with financial support from CDC.⁴ WN is available nationally and on all phone networks.

The HPHB SMS service sends free text messages with health care information to pregnant women, mothers with newborns, male supporters and general information seekers in Tanzania to

³ MoHSW has since been renamed the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC).

⁴ The Wazazi Nipendeni campaign and text messaging service is funded by the US government through USAID, the CDC, the US President's Malaria Initiative, and US President's Emergency Plan for AIDS Relief (PEPFAR). It is run in coordination with the National Malaria Control Program, National AIDS Control Program and Health Promotion and Education Section. On the ground, health facility orientation support is also provided by the US government, Aga Khan Health Services and Canadian International Development Agency. Other implementing partners include Jhpiego, EGPAF, the Mwanzo Bora Program, CCBRT, Tunajali Project, PLAN International, Aga Khan Foundation and others.

drive health-seeking behaviour. The SMS messages are sent in Swahili; originally, they were sent to women up to 16 weeks post-partum on a range of pregnancy and early childhood issues. Anyone interested in receiving healthy pregnancy information and appointment reminders can text the word 'MTOTO' (child) to the short code 15001. Registrants receive instructional messages, allowing them to indicate the woman's current week or month of pregnancy (or the age of the newborn baby) during the enrolment process. This process allows recipients to receive specific text messages relevant to the time and stage of their pregnancy and age of their child.

The mNutrition programme has supported mHealth projects in eight countries through the development of nutrition content, and GSMA has assisted projects with product development primarily through subscriber experience research business intelligence support. Nutrition-related content was a small component of the original HPHB SMS Service but was extended substantially with the addition of content contributed by GSMA under the mNutrition programme. mNutrition adds roughly 120 nutrition messages delivered to caregivers of children up to five years old. Messages provide information on diet/micronutrient intake during pregnancy, breastfeeding, complementary feeding practices, young child care and feeding. The resulting product will be referred to as 'Wazazi Nipendeni plus mNutrition' in the following sections of this report.

1.2 Overview of the evaluation design

The mNutrition evaluation is intended to understand and measure the impact, cost effectiveness and commercial viability of the mNutrition product using a mixed-methods evaluation design. The evaluation includes a quantitative component, a qualitative component and a business model analysis.

The evaluation will address the following research questions, as stated in the DFID terms of reference (see Annex B):

1. What are the impacts and cost effectiveness of mobile phone-based nutrition services on nutrition, health and livelihood outcomes, especially among women, children and the extreme poor?
2. How effective are mobile phone-based services in reaching, increasing the knowledge of and changing the behaviour of the specific target groups?
3. Has the process of adapting globally agreed messages to local contexts led to content that is relevant to the needs of children and pregnant women and mothers in their specific context?
4. What factors make mobile phone-based services effective in promoting and achieving behaviour change (if observed), leading to improved nutrition and livelihood outcomes?
5. How commercially viable are the different business models being employed at country level?
6. What lessons can be learned about best practices in the design and implementation of mobile phone-based nutrition services to ensure (a) behaviour change and (b) continued private sector engagement in different countries?

The mNutrition intervention is being externally evaluated in two countries: in Ghana, where the intervention is implemented via an existing mAgriculture programme; and in Tanzania (the focus of this report), where the intervention is implemented via an existing mHealth partnership. The evaluations are being conducted by a consortium of researchers from Gamos, the Institute of

Development Studies (IDS) and the International Food Policy Research Institute (IFPRI). The team draws on several methods and interlinked work streams to gather evidence about the impact of the mNutrition intervention in Tanzania. These include:

- A **quantitative impact evaluation**, employing a randomised control trial to determine the causal effect of the programme on increasing the knowledge and changing the behaviour of mothers and pregnant women with regard to their dietary diversity, the dietary diversity of their children (under three years old) and infant and young child feeding (IYCF) practices. The quantitative evaluation will focus on the estimation of the impact on dietary diversity, IYCF practices and child anthropometry. The quantitative team will conduct large-scale household surveys at the start of the programme implementation and again two years later (i.e. at the baseline and endline of the evaluation) in the treatment communities, which will receive door-to-door offers to sign up to the service, and also in the control communities, which will not receive such offers but will still be able to access the Wazazi Nipendeni plus mNutrition intervention. The quantitative evaluation will be conducted in the Iringa region where WN has no existing relationships with health clinics or other non-governmental organisations (NGOs). Therefore, it can be assumed that the use of the basic WN product is extremely low, thus limiting the potential uptake of the Wazazi Nipendeni plus mNutrition programme in control group areas.⁵
- A **qualitative impact evaluation**, which consists of three qualitative data collection rounds (i.e. an initial qualitative exploratory study, in-depth case studies at midline and rapid explanatory qualitative work after the quantitative endline). The qualitative evaluation workstream aims to broaden understanding of the context within which Wazazi Nipendeni plus mNutrition is embedded and which might either facilitate or hinder uptake of the intervention. The qualitative impact evaluation also explores the underlying mechanisms of change in response to the intervention and assesses implementation processes. Qualitative data collection will be conducted in a sub-sample of the quantitative communities in the Iringa region. Qualitative data collection will only be conducted in treatment communities to provide in-depth information on the effects of the intervention.
- A **business model and cost-effectiveness evaluation**, employing stakeholder interviews, commercial data and document analysis to estimate the wider imputed benefits from the value-added service for the range of stakeholders involved. It will relate the model to the GSMA Theory of Change (Annex A) and consider the effectiveness of the customer journey.

The primary target audience of the evaluation results is DFID, along with other key stakeholders including GSMA and its national members (including local MNOs implementing mNutrition services), national governments (the Ministry of Health and Ministry of Agriculture), international agencies and donors, as well as community-level health and agriculture extension workers. Findings will be shared with GSMA by circulating all draft and final reports, regular calls and email exchange, a newsletter and two external stakeholder events per country. GSMA provided feedback on the initial drafts of this report and will receive a copy of the final report.

⁵ For further details see Barnett, I., Batchelor, S., Gilligan, D., Haddad, L., Hidrobo, M., Ledlie, N., Palloni, G., Scott, N. and Shyam, T. (2017) 'External evaluation of mobile phone technology based nutrition and agriculture advisory services in Africa and South Asia: Inception Report'. (revised version) Brighton: IDS.

1.3 Purpose and scope of the qualitative midline study

This midline report presents the findings of the second round of qualitative data collection conducted in October and November 2017. Data collection was conducted only in villages randomly allocated to be treatment villages in the quantitative baseline. Four villages were purposefully selected in Iringa Rural (1 village), Kilolo (1 village) and Mufindi (2 villages, constituting 1 case study). Data collection was carried out by Oxford Policy Management Tanzania (OPM-T) in close coordination with the IDS qualitative team led by Dr Inka Barnett.

The qualitative midline is designed as three qualitative case studies aiming to address the overarching question of how and why WN plus mNutrition messages triggered (or not) behaviour change related to child feeding and maternal nutrition in Tanzania. To achieve this, the midline has the following objectives:

- 1** Document the implementation of WN plus mNutrition at community level
- 2** Explore acceptability of WN plus mNutrition at household level
- 3** Explore potential changes in key behaviours related to child and maternal nutrition

Findings from the qualitative midline study will be combined and triangulated with the quantitative endline and business model/cost-effectiveness endline in 2019 (see Annex C for a timeline of the different components of the evaluation). All findings will be shared with the WN mNutrition programme teams as part of ongoing regular communication between evaluation and programme staff to support and inform programme decision making.

1.4 Organisation of the report

Following the description of the methodology in Section 2, profiles of villages selected for the qualitative data collection will be given in Section 3. That section will highlight differences in health and nutrition that may be relevant for the uptake and effectiveness of the WN plus mNutrition interventions. Sections 4, 5 and 6 present the thematic findings of the analysis structured around the three aims of the qualitative midline study (see Section 2.1). For each aim, potential implications of the findings are presented at the end of the section. Section 7 draws together the findings of the qualitative midline.

2 Methodology

2.1 Aims of the midline qualitative study

The qualitative midline study has three objectives, which are briefly explained below:

1. **Document the implementation of WN plus mNutrition at community level:** to explore how WN plus mNutrition is working in practice and how subscribers are experiencing the service. This focuses on key implementation processes and experiences. It also aims to explore engagement with the messages, for example, whether people read them in full, message sharing practices and issues related to programme implementation including how frequently messages are received and gaps in service.
2. **Explore acceptability of WN plus mNutrition at household level:** the qualitative acceptability assessment will explore perceived usefulness, perceived ease of use, trust and social influences on the use of WN plus mNutrition. Drawing on the Technology Acceptance Model (TAM) we explore different elements of subscriber acceptability including perceived usefulness, perceived ease of use, trust and social influences on use (Davis, Bagozzi et al. 1989, Venkatesh and Davis 2000, Venkatesh and Bala 2008). In this section we will also present unintended consequences of the WN plus mNutrition services.
3. **Explore potential changes in key behaviours related to child and maternal nutrition:** this will focus on changes brought about by the WN plus nutrition services and explore how WN plus mNutrition messages contributed to the change process. It will also include a documentation of key barriers (at individual, household and community level) to change.

The qualitative evaluation work stream is closely integrated with the quantitative and business model/cost-effectiveness evaluation at all stages of the evaluation to inform, enhance and triangulate the design, data collection and analysis within the overall mixed-methods design framework. The midline qualitative study aims to build on findings and questions raised from the quantitative, qualitative and business model baseline analysis, and to inform the design of the quantitative endline survey, ongoing business model analysis and follow-up qualitative study planned for early 2019.

2.1.1 Data collection methods

Multiple data collection tools were used to obtain qualitative data from different sources and perspectives. The use of different data sources is important, as it allows for triangulation of different qualitative findings. At community level, the main data collection tools were semi-structured in-depth interviews (IDIs) with treatment mothers and fathers (i.e. mothers and fathers who were signed up to receive WN plus mNutrition messages by the OPM-T team during the quantitative baseline survey), key informant interviews (KIIs), and focus group discussions (FGDs) with treatment mothers and fathers and elderly women. Elderly women were interviewed as they are an important information source in relation to child nutrition in rural Tanzania. At national level, stakeholder interviews (SIs) were conducted with programme stakeholders involved in implementing the mNutrition programme. As part of the treatment group we also interviewed nine couples within which both spouses received WN plus mNutrition messages.⁶

⁶ This is also a sub-group (n=138 couples) in the quantitative impact evaluation.

In-depth interviews – these were conducted with mothers who had signed up to receive the WN mNutrition service on their phone or their partners' mobile phone as part of the baseline survey.⁷ IDIs were also conducted with fathers whose partners were signed up to the service, and fathers who received messages on behalf of or in addition to their wives. In-depth interviews were considered the most suitable method of capturing mothers' and fathers' personal experiences of the service and changes in knowledge and practices in response to the service. IDIs were guided by a semi-structured topic guide to ensure that the same themes were covered in each interview.

Key informant interviews – these were conducted with influential and knowledgeable people in each village, including village chairmen and community health workers. The purpose was to explore their knowledge, awareness and opinion of the mNutrition messages that people in the community had been receiving, and to capture information on current contextual issues relating to maternal and child nutrition. Interviews were guided by a semi-structured interview schedule.

Programme stakeholder interviews (SI) – these were conducted with four national Ministry of Health and other programme staff involved in managing and implementing mNutrition in Tanzania. The main purpose of these interviews was to examine partners' specific role in, and perspectives on, the programme's original design, developments and ongoing implementation, including successes and challenges encountered as well as the wider policy context. SIs followed a topic guide and were audio-recorded and conducted by members of the IDS and Gamos Research teams.

Focus group discussions – these were carried out with treatment mothers and fathers who received WN plus mNutrition messages. The FGDs were designed to openly explore users' likes and dislikes about the content and channel of the mNutrition messages and suggestions for improvements. The FGDs also used a participatory ranking methodology to further facilitate discussions about the different features of the service (see Annex D for further details on the participatory ranking). We also conducted two FGDs with elderly women to explore beliefs and practices around child nutrition and care in the community. Topic guides led all FGDs and provided sufficient flexibility to allow participants to raise and discuss matters that they felt were relevant and important.

To examine the underlying mechanisms that influence whether behaviour change messages are translated into actual behaviour change and for whom and under what circumstances this may happen, a realist evaluation approach was used as part of the qualitative midline. Data for the realist analysis were extracted from the IDIs, FGDs and other data collection tools described above.

2.1.2 Development and pilot-testing of the tools

The qualitative fieldwork was conducted by OPM-T in close collaboration with IDS. IDS drafted the data collection tools (topic guides with lists of questions and probes with specific modules designed for target groups). These were informed by findings from the baseline phase of the evaluation conducted in 2016/17, including the Initial Exploratory Qualitative Study (Barnett, Srivastava et al. 2018), the Quantitative Baseline Report (Gilligan, Hidrobo et al. 2018) and Business Modelling Baseline Report (Batchelor, Scott et al. 2018). The tools were also informed by external evidence from other existing literature, including on behaviour change models and realist evaluation methods.

⁷ Carried out between October and December 2016

The topic guides were piloted with treatment households in a village in Iringa Rural district on Wednesday 1 November 2017. Following the piloting process, the tools were further discussed and modified by the IDS/OPM-T research team, which included making changes to the wording and structure of some of the questions to enable them to flow better and maintain the engagement of participants. The final set of topic guides (in English and Swahili) are included as Annex E.

2.1.3 Training of data collection team

The OPM-T core research team comprised five experienced qualitative researchers, four of whom were involved in the baseline data collection so had a good prior knowledge of the regional context, programme and evaluation design and expectations. As per the baseline phase, training of the midline data collection was led by IDS and carried out jointly by the IDS team and OPM staff. A nutritionist based in the TFNC Maternal, Infant and Young Child Nutrition Department contributed to the first two days of training activities. A member of the Gamos research team also joined the training, providing important insights and learning from the Business Model evaluation component. The training was conducted in Iringa town in the selected study district of Iringa from 30 October to 4 November 2017.

2.1.4 Data collection implementation

The midline data collection took place from 6 to 24 November 2017. Data collection was conducted by two teams in addition to a two-member OPM-T core staff team (the team leader and qualitative field research lead), both of whom have extensive experience in qualitative evaluation, who regularly monitored the data collection process and quality. Each team was made up of one male and one female researcher to allow the team to take gender considerations into account and switch the role of note taker and facilitator to adjust to participants' preferences. This approach was adopted to ensure that different groups of respondents would be able to work with the researchers they felt most comfortable with. Researchers worked in pairs, with one adopting the role of interviewer/facilitator and the other the role of a note taker.

2.2 Sampling strategy

2.2.1 Community selection

Selection of sites for qualitative midline The sample selection for the midline qualitative study was purposive and based on the quantitative baseline data⁸. The aim was to select three sites from the sample of 90 treatment villages selected for the quantitative baseline survey in Iringa Region, which covered the districts of Iringa Rural, Kilolo and Mufindi (see Figure 2.1). Two sites were thereby selected to represent 'typical communities' and the third was selected to present an 'extreme community'. Conducting in-depth qualitative research in typical communities aimed to provide deeper insights into the use and impact pathways of the WN plus mNutrition services on average communities. Qualitative research in the extreme case community aimed to help to understand the use and effectiveness of the WN plus mNutrition among poorer and/or more excluded populations.

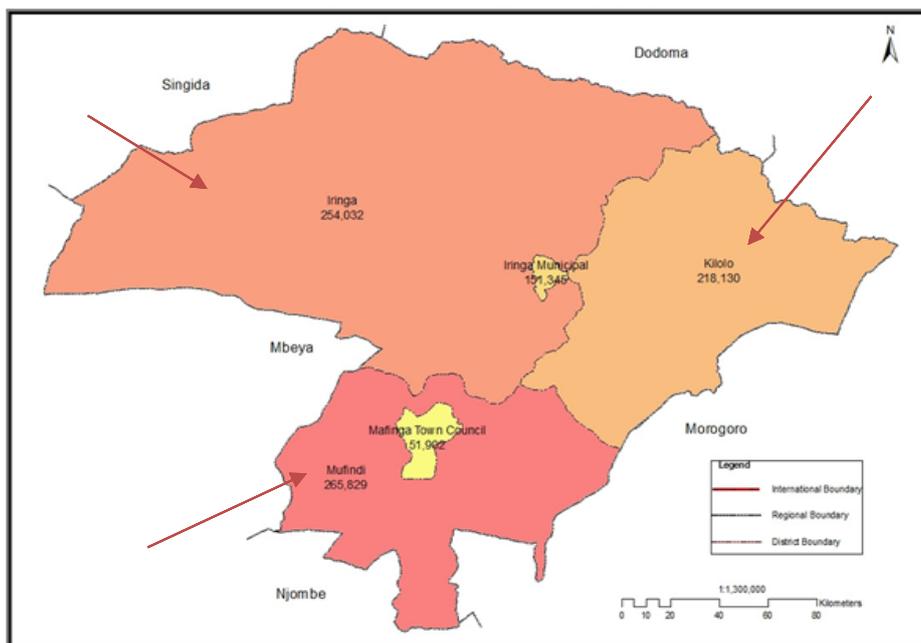
Criteria for the community selection were extracted from the quantitative baseline survey and included access to services, average nutritional status of children and household poverty level in the community and geographical location based on GPS mapping (to determine proximity to major roads, towns, etc.). Based on these criteria all 90 treatment villages were ranked and approximately 10 typical communities located in the middle third (i.e. communities with average

⁸ It should be noted that the qualitative impact evaluation is not based on a longitudinal qualitative sample but rather that in each qualitative data collection round communities were purposive selected based on the specific aims of the respective round.

conditions based on the selection criteria) and 5 communities located in the bottom third (i.e. communities with poorer conditions that were all more remote) were selected. An important criterion for the selection of these 15 communities was the number of WN plus mNutrition users based in the community. To enable us to conduct both IDIs and FGDs with users a community needed to have at least 15 WN plus mNutrition subscribers⁹.

⁹ Approximately one third of the communities have less than 15 WN plus mNutrition subscribers.

Figure 2.1: Map of Iringa Region showing the three study districts



Source: United Republic of Tanzania (2015)

The final selection of the communities for the qualitative midline was based on these 15 communities and was carried out jointly by the OPM-T field team and IDS team. The selection was informed by considerations around logistics, the desire to include communities in all three districts included in the quantitative impact evaluation and potential prior relationships with the communities from the initial qualitative work. See Table 2.1 for the final selection. The two typical sites were based in Iringa Rural and Mufindi and consisted both of villages that were also part of the initial qualitative study. Working in the same villages allowed the field team to draw on existing rapport with village chairmen and community members and in the analysis to draw on existing qualitative baseline data about the context. The site in Mufindi consisted of two villages (Bolira and Lomola) that merged into each other.

Table 2.1 Villages selected for qualitative midline study data collection for each district

District	Village(s) name	Sampling category	Included in qualitative baseline?
Iringa Rural	Oloro	Typical site	Yes
Kilolo	Erula	Extreme site	No
Mufindi	Bolira and Lomola (two villages treated as one site)	Typical sites	Yes

2.2.2 Participant selection

At village level all treatment women (i.e. women who were pregnant or had a child aged below 12 months at the quantitative baseline and who were signed up for WN plus mNutrition by the quantitative team) were included in the qualitative sample (n=70) (Table 2.2). Of these 70 women 51 women signed up using their own mobile phone. The remaining 19 women did not own a mobile phone and were signed up through their husbands.

In each community site, the fieldwork team attempted to conduct IDIs with the following key target groups: (1) treatment mothers; (2) fathers whose partners received SMS; (3) fathers who received SMS on behalf of their wives; (4) fathers who received SMS in parallel to the mother; and (5) local key informants (e.g. village chairman, health workers). The team also planned to conduct FGDs with (1) treatment mothers; (2) fathers who receive SMS messages and fathers whose partner receive SMS messages; (3) elderly community members. However, on commencement of fieldwork it became clear that only 41 of the 70 treatment households reported to have ever received a WN plus mNutrition message (we refer to households here as some mothers received messages through their husbands' phones). There were also 8 households that could not be interviewed because they had moved away and were no longer contactable through the telephone numbers they had provided at the quantitative baseline (n=6) or refused to be interviewed (n=2). The remaining 21 households said that they had never received a message. Given the lower sample size of WN plus mNutrition users the team decided not to conduct FGDs with treatment mothers/fathers in Oloro and Erula but only to conduct IDIs in these sites. For the FGDs the team purposefully selected varied groups based on age and number of children to facilitate a broad discussion. Elderly women were selected using snowball sampling and based on recommendations of the village chairmen for women most knowledgeable about child health and nutrition in the village. See Table 2.2 for the qualitative interviews conducted and see Annex D for a detailed description of the qualitative sample.

Table 2.2: Qualitative sample and interviews conducted for the midline

Interview category	Iringa Rural	Mufindi		Kilolo	TOTAL
	Oloro (typical)	Bolira (typical)	Lomola (typical)	Erula (extreme)	
Number of interviews					
Number of treatment households contacted/Number of treatment households interviewed	18/12	17/9	18/11	17/9	70/41
Father receives messages (as mother does not own a mobile phone)	3	5	3	8	19
Both mother and father receive messages on their phones	0	4	3	2	9
Household is currently receiving messages	8	4	9	5	26
Household received at least one message (excluding households who still receive messages)	4	5	2	4	15
In-depth interviews (IDI)					
Treatment mothers	12	2	5	7	26
Treatment fathers who receive WN plus mNutrition messages	1	6	2	6	15
Fathers whose wives receive WN plus mNutrition messages	3	1	0	0	4
Key informants (chairman, health worker)	2	2	3	2	9
National-level programme stakeholders	N/A	N/A	N/A	N/A	4 (national level)
Total IDIs	18	11	10	15	58
Focus group discussions					
Treatment mothers who received WN plus mNutrition	0	1	1	0	2

Fathers who received WN plus mNutrition messages	0	0	1	0	1
Elderly women	1	0	0	1	2
Total FGDs	1	1	2	1	5

2.3 Data management and analysis

All community-level interviews and FGDs conducted during the fieldwork were conducted in Swahili and transcribed by the OPM-T field researchers using the audio-recordings and handwritten notes. All transcripts were produced according to an agreed template so as to achieve uniformity (the same template that was used during baseline) and were cross-checked by the research lead and translated into English from Swahili during transcription by the research team. Daily debriefings were carried out by the team members after each day of fieldwork. A debriefing workshop for the qualitative field team was conducted immediately following completion of data collection. The aim of the workshop was to discuss the fieldwork experience and challenges encountered, and to discuss and synthesise preliminary findings in relation to the objectives of the midline study. These preliminary findings were written up and shared with the IDS team to complement the detailed interview and focus group transcripts.

The national-level stakeholder interviews conducted by the IDS and Gamos teams in English were audio-recorded and later transcribed by an IDS researcher. Once the full set of community and national-level transcripts were available, data analysis was undertaken by the qualitative research team at IDS led by Dr Inka Barnett and supported by Dr Becky Faith and Jessica Gordon. Qualitative data analysis software (NVivo) was used to manage and code data. As per the baseline phase, the qualitative data were analysed using a directed content analysis approach focused on the main qualitative evaluation questions, the three central midline study objectives and the key themes that emerged from the baseline phase. Data analysis started with open coding of several interviews and the development of an initial coding scheme that guided the coding of the remaining data. To enhance the rigour of the data analysis, coding was carried out by two researchers independently. Their coding schemes were then discussed and modified into one joint scheme (see Annex F for the coding scheme that was used). While the scheme guided the coding, it was flexible enough to allow for unforeseen topics that emerged to be added at any point.

A separate coding scheme and process was undertaken for the realist sub-component to identify specific contexts ('C'), mechanisms ('M') and outcomes ('O') from the data to test and refine the set of initial CMO configurations.

Figure 2.2 illustrates one possible CMO configuration that was identified as part of the analysis. The final report was shared with the OPM-T team to ensure that the IDS team correctly interpreted the findings and to allow for additional details to be added that would enhance the quality of the report.

Figure 2.2: Illustration of CMO configuration

IDS and all sub-contracted partners undertaking data collection have specific arrangements in place for handling data generated from the project in accordance with the Data Protection Act (1998), which includes the processing and storage of any sensitive personal data and maintenance of privacy. All intellectual property rights in any materials produced from the evaluation (including publication of research findings and any associated reports and data) remain the property of IDS and associated sub-contracted collaborators. DFID has unlimited access to any material produced from the evaluation. To promote use and uptake of the evaluation findings and in line with DFID's Enhance and Open Access Policy, the evaluation team is committed to ensuring that all major report outputs and associated data generated from this project are made publicly available in an accessible format.

2.4 Ethical approval

As an overall guiding principle, the research team sought to conduct itself in a professional and ethical manner throughout the initial exploratory study, with respect for integrity, honesty, confidentiality, voluntary participation, impartiality and the avoidance of personal risk. These principles were guided by the OECD (2010) DAC Quality Standards for Development Evaluation and DFID's (2011) Ethics Principles for Research and Evaluation, which will be followed for the duration of the evaluation.

National-level ethical approval that had been granted for the initial exploratory qualitative study by the Tanzania Commission for Science and Technology in July 2016 had to be renewed and was approved prior to the start of the fieldwork. The ethics approval granted for the project by the IDS Research Ethics Committee in 2016 remains in place for the duration of the project. Similarly, the research permissions provided by the Tanzania Food and Nutrition Centre (TFNC) and President's Office – Regional Administration and Local Government obtained in 2016 remain valid until the end of the evaluation. Informed written or oral consent was collected from all participants prior to the start of the interviews. The entire OPM-T field team was trained on ethical data collection and signed an ethical conduct form prior to the start of the fieldwork. For confidentiality, all identifying variables – such as village or community names, district capitals and other locations – have been replaced by pseudonyms in this report. Participants did not receive any reward or financial compensation for their participation in the interviews.

All files containing raw and analysed data are securely stored in password-protected databases.

2.5 Limitations

First, a typical and extreme case sampling approach was employed to ensure the inclusion of varied settings (with regards to access to services, poverty, geographical remoteness). However, the analysis could not reveal any significant differences or specific patterns with which WN plus mNutrition users in the different sites interacted with service. Rather perceived likes/dislikes, perceptions of value etc. varied by the characteristics of the user and not by the location she/he was living in.

Second, all interviews were conducted by a team of young, educated field researchers. The characteristics of the field team might have affected participants' comfort and degree of honesty when answering questions (e.g. introducing social desirability bias). However, the team was very experienced, was familiar with the local customs and dressed appropriately according to local custom and a session was organised at the end of the training to explain to the team on how bias can have an influence on data quality. All these factors helped to make participants feel at ease during interviews.

3 Village profiles

This section provides an overview of the three sites selected for the midline qualitative study data collection with two villages considered as one site (Table 3.1). The description focuses on features and characteristics of each community that might be relevant with regard to the uptake and effectiveness of the Wazazi Nipendeni plus mNutrition intervention.

Table 3.1 Characteristics of the villages included in the qualitative midline evaluation

		Oloro (Iringa Rural)	Bolira (Mufindi)	Lomola (Mufindi)	Erula (Kilolo)
Themes	Characteristics				
Location and demographics	Location	On main road between Iringa town & Mbola	35km from nearest town & within 10km of 2 villages	33km from the nearest town on rough road	Remote; 120km from a town, on foot of a steep hill.
	Population	3,500	Information not available	5,400	3,700
Social amenities	Electricity	Information not available	Four of the five sub-villages have access to electricity. Within sub-villages most households connected to electricity grid.	5 of 6 sub-villages have access to electricity, most households connected to main supply.	Village has electricity but only on main roads connecting shops, guesthouse, bars & institutions (e.g. Mosque, health centre). Few households have electricity with some use of solar, through 'Mokpo Solar'.
	Water	Water only available on alternate days, at night time, or merely for a couple of hours at a time. 11 communal taps in the village as well as some private taps. Villagers travel to neighbouring village for water.	Water problems but villagers now drilling wells at cost of THS 1,000,000	Several wells and multiple springs. Village does not have problems with water.	No taps but villages walk 5-15 minutes to fetch water.
	Health facilities	No dispensary, health worker from a nearby dispensary runs monthly clinic. 2 dispensaries in nearby villages, government hospital 7km away.	Government dispensary staffed by 1 nurse. Unilever has private health facility, to which its staff have access and which	Government dispensary with nurse & person generally referred to as a doctor (it should be noted that this person may not actually be a doctor, as it is conventional to refer to all	Faith-based health centre. Government dispensary is 28km away.

		2 volunteer community health workers in the village, 1 male & 1 female.	others can use for a fee. Mission Hospital 7km away & widely used. 2 community health workers but not as active as community health workers elsewhere.	male health staff as doctors). Private health centre owned by Unilever. Village also uses district hospital in nearest town. 2 community health workers in Lomola, 1 male & 1 female.	
	Phone network	Good but patchy in some areas of village - Halotel network is good in all parts of the villages so some people have switched networks.	Good network coverage.	Good network coverage.	Airtel network bad so people switched to Halotel.
	Schools	2 primary schools, is no secondary school but children attend secondary school at ward level.	Government-run primary school & ward-level secondary school outside the village. Private secondary school owned by Unilever.	2 government-run primary schools & private & government secondary school.	No primary school, high level of illiteracy.
	Shops/businesses	Village office, shops, bars & small businesses	Drug shops.	Several shops.	Two drug shops.
Economic context	Agriculture	Maize (60% of total agricultural land use). Other crops include beans, tomatoes, onions, sunflowers, sweet potatoes & Irish potatoes. Fertile land.	Maize, pears, sorghum, wheat, cabbage & beans.	Food supply supported through preservation of food crops between seasons. Most food, except maize, is bought.	Onion, maize. & seasonal crops like tomatoes, green vegetables, egg plants etc. Government agricultural/extension expert in this village.

	Social issues	Alcoholism is a problem & by-laws prevent the sale of alcohol outside of certain hours or to individuals who are already drunk.	Alcoholism is a problem. HIV significant problem throughout the area. Some wealth in the village, primarily through ownership of trees. Both men & women own plots of land.	Alcoholism is a problem. HIV significant problem throughout the area. HIV prevalence reportedly due to high levels of migrant workers. HIV has killed more men than women & is cited as reason for the higher number of women than men in village.	Alcoholism is a problem. Poor village with low quality housing.
	Employment	Farming main activity plus some small businesses (such as selling vegetables or running wholesale shops), & other economic activities, incl. raising livestock and paid employment in various industries. 5 large industries in the village: a road building company; a meat processing plant), a local factory to produce chili sauce, a wood factory and a concrete & brick industry.	Several large industries including tea farms. Timber industry & paper processing employ many people. Electrification has resulted in villagers setting up businesses sawing wood. Secondary work in subsistence farming or farm cash crops.	Several large industries including large tea farms. Timber industry & paper processing employ many people from the village. Food crops grown for subsistence purposes. No cash crops are grown besides tea & trees. Food crops difficult to farm because land dominated by trees.	Farming main activity.

4 Experiences with implementation of WN plus mNutrition at community level

The following section presents findings regarding subscribers' experiences with implementation of WN plus mNutrition services.

4.1 Implementation

This section focuses on key implementation processes and experiences related to registration and enrolment, up-take of the messages, and experiences of frequency and regularity in accessing the service. It should be noted that there were no significant differences in the findings across the different villages.

4.1.1 Key motivators for treatment households to sign up

All treatment households were initially registered by the OPM field team. The team then handed the details of the treatment households to the MNOs that did the sign up. Households' underlying motives for signing up to the service varied and may influence up-take and likelihood of maintained utilisation. Most mothers and some fathers said that they had signed up as they wanted to learn more about child nutrition and how to stay healthy during pregnancy. For example,

I signed up because I wanted to be receiving various advice. Like the way on how to take care of the child for example on issues concerning nutrition. What I mostly expected was that, these messages would direct me on how to take care of the child, be reminded of what food to feed the child.

(Mother, 20 years, one child, Oloro)

A few parents said the interactions with the quantitative listing team had been very pleasant and that this had motivated them to sign up for the service:

I liked their [quantitative listing team's] explanations about how to take care of our children. In general, they [OPM team] are getting along with us. Also, they helped our children.

(Mother, 25 year, three children, Oloro)

Two mothers explained that they had already been familiar with the WN services from their previous pregnancies. Both women lived in towns in other regions during that time and had signed up themselves after seeing a poster in the health clinic. As they had found the service useful, they were happy to sign up again.

Several mothers said they had provided their husbands/brothers telephone numbers to the listing team during the sign-up process and then later informed their husband. For instance:

No, I don't have a telephone. I just registered his [my husband's] phone number and when I met him I explained all about the programme and why I had used his number. Then I gave him contacts to the lady that registered his number just in case he needed to ask them anything

(Mother, 29 years, one child, married, Erula)

While 2 husbands that were signed up by their wives regularly shared the WN plus mNutrition messages with their partners, the other husbands (n=5) and the brothers that were signed up by the mothers never shared a message.

Most mothers had decided by themselves to sign up. Others had decided together with their husbands (who were present during the sign up) or called their husband to come to a decision about signing up. Five women had first consulted relatives or neighbours. One woman recalled:

I asked my sister and she said I can just sign up for this mNutrition programme so that I can start getting messages with nutrition information. She also signed up.

(Mother, 29 year, two children, Oloro)

Most subscribers understood that they were signing up for text messages with nutrition and health information. However, a few were less clear as the following quote highlights:

When I was registering, I had no idea that I will be receiving the messages, I was just testing to see maybe I will get useful information.

(Mother, 27 years old, two children, Oloro)

4.1.2 Time between signing up and receiving first messages

When asked when they received the first WN plus mNutrition message, responses varied considerably. It should be noted that the quantitative team did the initial registration procedures only; the final sign up was done by the respective MNOs of each subscriber. Timing of the first message depended on when the respective MNO did the sign up.

Several subscribers said that they had received their first message approximately 2 weeks after signing up, others said it took between 1 and 2 months and a few recalled that it took almost 6 months until they received their first message. Others said they had never received message even though they are still using the same number.

A Tigo user described:

After I was registered [in November 2016] I started to receive text messages in July. It took a long time before I started receiving these text messages [...] Count from December, January, February, March, April, May to June. So, it took me about six months before receiving text messages.

(Mother, 19 years, two children, married, Erula)

Some of the subscribers who had to wait a long time until they received their first message, said that they were surprised by the message as they had already forgotten that they had signed up. Long delays between signing up and receiving the service, may negatively affect up-take.

4.1.3 Challenges with the implementation of WN plus mNutrition messages

From the 70 treatment households that had been selected for the qualitative midline study only 59 percent (n=41) reported ever having received messages. (It should be noted that in some households both mother and father were signed up to receive messages; here we only count at household-level). Twenty-one households said they had never received a message, which could be due to implementation issues at provider level (e.g. registered subscribers were not registered for the service by their MNO; or telephone numbers had not been recorded correctly). There could also have been implementation challenges at subscriber level, for example, the treatment mothers/fathers might not have recognised a WN plus mNutrition message and deleted/ignored it, for example, believing it to be a promotional message. For example, a mother recalled:

When I glance at the message and see the heading, if I don't see any name then I ignore thinking these are just promotion messages from Airtel. Even that

message [WN plus mNutrition message] I told you about, I glanced at and I just saw it started with “mother” so I continued reading thinking that my child had sent me a message but I was surprised to see the font which was small. So, I glanced at the words “mother and child” and the last word was “health for the child” and I ignored it also thinking these are just people from Airtel sending me promotion messages. I delete them.

(Mother, 37 years, three children, married, Erula)

Of the people who had received messages, only 37 percent (n=26) were still receiving messages at the time of the qualitative interviews. The remaining households were no longer receiving messages, either because the messages had suddenly stopped (usually around September/October 2017) or because subscribers had lost/changed their phones or SIM cards. The implementation challenges almost certainly will have a considerable impact on the measurable effectiveness of the WN plus mNutrition service.

4.1.4 Frequency of WN plus mNutrition message

When asked how frequently they received WN plus mNutrition messages, subscribers indicated a range of frequencies. Some said that they usually received messages between 1-3 times a week whereby the frequency could vary between weeks. Others said that they only received messages occasionally (e.g. once a month) or irregularly and that they could not discern a specific pattern. While this could indicate an implementation issue, it could also be explained by the fact that subscribers did not always recognise a WN plus mNutrition message and thus might have deleted it by mistake (see 4.1.3).

Interviews with programme implementers shed light on the thinking behind the frequency of messages. We were told that the frequency of mNutrition messages sent per week varied depending on the stage in pregnancy/early childhood and on other health-promoting campaigns that were delivered through the same platform at a given time. Mnutrition messages are part of the WN service package. Subscribers get access to the nutrition messages but also to a variety of other messages as WN is used by multiple stakeholders to send out information (e.g. on HIV/AIDS, TB, family planning).

An interview with an employee of the organisation responsible for sending out the messages explained:

Yeah, so on average every week we are sending 4-5 messages. We have 9 topics. We do a mix—like maybe today you will see a malaria prevention message or a HIV message, the day after tomorrow nutrition. I would say on average like every other week a nutrition message going out. So, especially during pregnancy then after we have a lot of messages related to breast feeding, and then the five years plan is on nutrition and immunization. (Stakeholder interview with employee of organisation responsible for sending out the messages)

Two subscribers recalled that the messages had stopped at one point and then restarted 2-3 months later. Both subscribers said that they still used the same SIM card and that they had not changed anything regarding their mobile phone use. One of them described:

There is a time they [the sender of WN plus mNutrition messages] stopped sending the messages [...] It was for a long time then I was surprised to see the messages again after some time. I don't know why they stopped because I only stopped receiving the messages from your company [i.e. WN plus mNutrition

messages] but I still received other messages from relatives, etc. They stopped sending the messages for almost three months.

(Father, six children, Oloro)

4.1.5 Spam and desire to unsubscribe from service

As already alluded to above, several mNutrition subscribers perceived WN plus mNutrition messages as spam and thus deleted the messages without reading them or only reading them partially. The main reason for mistaking the message was the sender details (i.e. a 15*** number rather than a name; several subscribers said that they usually did not open a message from a sender they did not know). Three subscribers (men only) said that they had attempted to unsubscribe from the service but did not know how. For example:

You cannot refuse this service because you don't know where it comes from. It comes with a number and not a name. It comes with a number that starts with 15001. This is the number that comes with these messages. How can you not receive the messages anymore?

(Father, four children, Erula)

An interview with an individual working responsible for sending the messages clarified both issues. Firstly, on the Spam issue he mentioned that when the Ministry of Health takes on responsibility for the service, the messages will come from what he described as a 'Ministry Shortcut'. Secondly, on the unsubscription issue, he described the process as follows;

If you want to unsubscribe, you send the word SIMAMA- Simama in Swahili is like stop—and then you send the word Simama—the key word—to 1500

(Interview with individual working for company sending out the messages)

What is concerning, however, is that the individuals quoted above did not seem to be aware of this functionality for unsubscribing which might lead to negative perceptions of the service as a form of spam.

4.1.6 Message reading and storage

Most mothers said that they usually read the entire WN plus mNutrition message to understand the content fully. A few said that the message sometimes arrived at an inconvenient time but that they try to make time to read the message later during the day as the content was important to them. This suggests the value of text messages as a channel since they can be referred to at a time convenient for the subscriber. For example:

[...] it happened that I could not read the whole message. If I am in the bus and in a bad position to read it, and even when the child is so stubborn or takes my phone but I get time to read these messages again.

(Mother, 20 years, one child, married, Oloro)

Most fathers described that they read the entire messages to comprehend the content fully. Only few fathers and no mothers explained that they usually did not read the messages in full. Reasons included that they were not interested in the content, did not trust the content or believe it was a promotional message.

Three mothers and several men, recalled that there had been times when they did not have the motivation to read the messages at all. Two of the women experienced marital crises and one had a family death, whereas several men said they had temporarily stopped reading messages when away from home for work.

Most subscribers left the messages in their Inbox and only deleted them once the Inbox was full. A small number of subscribers said they kept all/some of the messages to re-read them at a later point and/or show the messages to relative/friends. For example,

I don't delete the messages [...] If my inbox gets full, we delete some messages that are not important like the ones sent by network companies for advertisement. I keep the messages as I find them important to me. I do re-read them, whenever they send ones I also read the old ones

(Mother, 26 years, two children, married, Lomola)

4.2 Technical issues and barriers

4.2.1 Access to electricity to charge mobile phone

A key technical barrier to the access of mobile phone-based services in resource poor settings is access to electricity to charge the phone (Faith 2018). Most households in Mfundi, Bolira and Lomola had access to electricity and subscribers did not face problems charging their mobile phones regularly.

However, access to electricity posed a challenge in both Erula and Oloro. Here many people had to travel to a shop where they would pay to charge their mobile phones. They might have to wait a few days while the phone was being charged before they got it back, resulting in a delay in receiving messages. A mother explained:

Yes. Sometimes you find that the message is sent to me and the phone has no charge, then I don't get message on time. After I take it for charging, I find that there is a queue and it must remain there for about three to four days. After you get it back you find the text messages that have been sent three days ago, that is the time now you are opening the phone to read those messages

(Mother, 30 years, four children, married Erula)

Another additional barrier was finding the money to pay for the charge which respondents quoted as being either 200/=Tshs or 300/=Tshs. For example:

Sometimes I don't have money to charge. I had to wait even for three to four days to get the money to charge my phone

(Mother, 26 years, five children, married, Oloro)

Sometimes you find that the message is sent to me and the phone has no charge, then I don't get message on time. After I take it for charging, I find that there is a queue and it has to remain there for about three to four days. After you get it back you find the text messages that have been sent three days ago, that is the time now you are opening the phone to read those messages. After seeing that I have been losing a lot of information, I have decided to buy and install this small solar panel which you see here

(Father, four children, Erula)

4.2.2 Multiple SIM cards and changing numbers

Another possible barrier to people receiving messages was the common behaviour of changing networks and/or SIM cards frequently. The majority of subscribers said that they owned multiple SIM cards to capture the best tariffs and network depending on location.

The village chairman in Erula reflected on how frequently people changed SIM cards. This may be in part because it is cheaper to change to a different network when a phone or sim card is lost rather than renewing a SIM card with the same network.

Yes there is frequent changing of SIM cards because the cost involved in renewing the same SIM card one had before is 4000 yet if one wants to buy a new SIM card it's one thousand only. So one finds it better to buy a new SIM card and discard the other one. This means that if this person was receiving WN plus mNutrition messages from the SIM card he or she discards, then he or she will no longer receive text messages anymore, even with the same number.

(Chairman, Erula)

In this context a recent change in the regulations for mobile number portability (MNP) in Tanzania should be highlighted. From March 2017 onwards the Tanzania Communication Regulatory Authority (TCRA) allows customers to retain their numbers when switching from one service provider to another with their contacts and other information intact.¹⁰ As subscription to WN plus mNutrition is linked to a specific SIM and MNO (i.e. the SIM and MNO the subscriber mentioned at the registration stage), subscribers who change the MNO will lose access to the WN service (even if the user still has the same mobile phone number). This might explain why many users said they now longer have access to WN plus mNutrition despite still using the same telephone number (see 4.1.3).

Several interviewees pointed out that a new MNO called Halotel had recently entered the market in Iringa but which is not part of the WN programme. Halotel was offering competitive prices and most importantly good network coverage. A father from Erula justified his decision to change his network provider and join Halotel as follows:

Halotel has a good network, Airtel and Tigo's network is not good so I mostly use Halotel now.

(Father, two children, Erula)

Halotel was also the MNO of choice for many as it allowed (potentially only temporarily) sign up without an identity card. For example:

I ve just decided to have Halotel. I started the process of renewing my Vodacom card but the process was too long which is why I decided to change to Halotel. Halotel also could register me on the spot. For Vodacom I needed an identity card which I did not have at that time.

(Mother, 30 years, four children, married, Erula)

Several WN plus mNutrition subscribers told us that they switched to Halotel and no longer use the SIM card they used when registering for the treatment.

WN plus mNutrition services helped to increase loyalty to an MNO. One WN plus mNutrition subscriber described that he had not changed his MNO as he and his wife valued the health and nutrition text messages and did not want to lose them:

¹⁰ <http://www.theeastafrican.co.ke/business/Tanzania-mobile-number-portability/2560-3822012-ecgyqz/index.html>

*I like the messages, that`s the reason that I did not change the SIM card till today,
I thought if I change my SIM card I would have lost the mNutrition text messages
program and I told my wife that we should not change our SIM cards.*

(Father, two children, Erula)

It should be highlighted that this young couple (mother 19 years, father 22 years, 2 children) was highly engaged with WN plus mNutrition. The father shared all messages with his wife and they usually discussed the content of the messages in the morning before he left for work. Both parents felt unprepared for having children and perceived the messages to be a much-needed guide throughout.

4.2.3 Implications for intervention uptake and recommendations for programme design

The Table 4.1 presents the key findings from the implementation assessment of WN plus mNutrition and draws conclusions on the potential implications for the up-take of the service. The last column presents recommendations for the programme design and implementation.

Table 4.1 Key findings from the implementation assessment of WN plus mNutrition

Key finding	Potential effect on message up-take	Recommendations for programme design
Most parents signed up for WN plus mNutrition as they want to learn about nutrition	Active demand for nutrition may increase likelihood of up-take	
Face-to face interaction with the registration team encouraged several households to sign up	Personal interaction may increase the likelihood of up-take	Consider promoting WN plus mNutrition through field teams (e.g. community health workers) who actively engage with the community
Time delays between registration and receiving first WN plus mNutrition message	Time delays between registration and receiving the first message may negatively affect up-take as subscribers may have forgotten about the service and may undermine trust.	Ensure smooth sign-up procedures without long time delays
Challenges with the delivery of WN plus mNutrition service with more than 1/5 of households never receiving the service		Explore the reasons for why household did not receive the messages (e.g. implementation challenges at the MNO level or subscriber level)
In September/October 2017 several households suddenly stopped receiving WN plus mNutrition services	While households have received at least some messages, their effectiveness is likely to be limited due to limited exposure	Explore the reasons for why the programme stopped (e.g. MNO-specific challenge)
Frequency of WN messages varied and included both mNutrition and other messages	<p>Low frequency is likely to limit the effectiveness of the messages on behaviour change</p> <p>Given the range of topics that are covered by WN messages, nutrition messages may get limited/divided attention only, reducing their effectiveness</p> <p>Different WN messages may complement each other and elevated the effectiveness of mNutrition messages on health</p>	Consider increasing the frequency of mNutrition messages to increase the likelihood of impact
WN plus mNutrition messages are perceived as spam as there is no sender name but just a number		Consider changing the sender number to a clearly identifiable sender name (e.g. Wazazi Nipendeni)
Multi-SIM behaviour, frequent changing of SIMs to save costs and changing of MNOs were common practices and could all result in subscribers losing access to the WN plus mNutrition service.	Exposure to WN plus mNutrition services could only be short-lived, reducing the likelihood of impact	Ensure that WN plus mNutrition is advertised continuously and encourage mothers/fathers to re-subscribe free-of-charge whenever they lose access

5 Acceptability of WN plus mNutrition messages

The following section presents findings on the acceptability to subscribers of WN plus mNutrition. A recent systematic review of mHealth interventions in Africa suggests that acceptability of mHealth services by subscribers is a strong determinate of long-term uptake and ultimate success of the service (Aranda-Jan, Mohutsiwa-Dibe et al. 2014). Drawing on the Technology Acceptance Model, we explore different elements of subscriber acceptance, including perceived usefulness, perceived ease of use, trust and social influences on use. In this section we will also present the unintended consequences of the WN plus mNutrition services.

It should be noted that the acceptability assessment only included WN plus mNutrition subscribers who still receive messages (26 of the 70 treatment households contacted for the qualitative midline) and subscribers who had received at least one message (15 households). Of the remaining subscribers, some said they had never received a message despite still using the same telephone number and others had left the village and could not be traced.

5.1 Perceived usefulness

Perceived usefulness has frequently been highlighted as a key determinant for uptake and sustained use of new technologies (Venkatesh and Davis 2000, Venkatesh and Bala 2008). Usefulness is defined as service subscribers' (mother's and father's) belief that WN plus mNutrition services will enhance their/their children's' health and well-being.

Most mothers and fathers who reported receiving at least some WN plus mNutrition messages said they found the service useful. There was no clear pattern emerging with regard to perceived usefulness and the location of the interviewees (i.e. typical or extreme-case village). However, we found that perceptions of usefulness varied slightly by the characteristics of the subscriber, with first-time parents often perceiving WN plus mNutrition more useful than parents with several children already (see below for more details).

Two (not mutually exclusive) themes emerged with regard to perceived usefulness: perceptions of personal relevance of the message content, and perceived added usefulness of mobile phone-based messages over other channels for health and nutrition information.

5.1.1 Perceptions of personal relevance of the message content

Factors that make WN plus mNutrition messages useful:

Messages tailored to specific stages of pregnancy/early childhood are highly valued. When asked about the perceived usefulness of the messages, most interviewees referred to existing WN messages related to pregnancy, child birth and early childhood as well as to more specific mNutrition messages. It was often impossible to disentangle whether interviewees were talking about the usefulness of mNutrition messages or other WN plus mNutrition messages as people perceived it as one single service.

Most mothers/fathers who actively engaged with the WN plus mNutrition messages praised the content of the messages, saying they were very relevant and useful for their specific stage of pregnancy or for their very young child. Many felt that the messages '*guided them really well*'.

One father was complimentary about how the messages were always tailored towards the developmental stage of his child:

We talk about what messages are instructing us to do especially regarding the growth of our child. Another thing is they give progress on how a child is growing, for instance in July they sent me messages on how old my child is, same thing on August and yesterday I received a message instructing me that at this moment a child should have his or her own place and plate to eat and not sharing with other children and adults. Sometimes they send messages which explain exactly the stage of my child.

(Father, two children, Kilolo, Erula)

Several first-time fathers highlighted the fact that messages helped them to support their wives during pregnancy and to prepare themselves for becoming a father:

The messages helped, me to prepare myself and get ready to receive new baby. They gave us information because being pregnant is a mysterious thing, so we wanted to know what is in the mother`s womb, so if you get information that gives you courage to believe that there is a baby and is doing fine and what we can do to help the baby. That is something good and useful.

(Father, one child, Kilolo, Erula)

Messages as a useful reminder and reinforcer of information. Many mothers and fathers said they found the messages useful as they reminded them of information that had been given previously (mainly during antenatal visits). The messages helped to reinforce their existing (but often forgotten) knowledge on child care and feeding practices.

Because as we attend clinic and whatever the health workers explain to us, is the same as we get in the text messages. The information is the same but the messages remind us.

(Father, three children, Oloro)

I know most of the information already but I normally forget but when I receive these messages they normally remind me.

(Mother, two children, married, Bolira)

Messages to complement formal nutrition education with practical advice. While almost all WN plus mNutrition subscribers said they were already familiar with most of the information conveyed in the messages (through nutrition education as part of antenatal visits), several mothers and fathers pointed out that they gained valuable practical knowledge. For example:

Yes, it is true, we learnt a lot of new things for example at the hospital we learnt general issues and not specifying on foods for example types of foods like 1, 2, 3, also we were not advised to keep the child in a good environment and some advice like we should not give them leftovers. I never received that information from the clinic at the hospital. Also, the information was not clear for example how many times that the child should be eating or breastfeeding, so after receiving the messages I learnt new things that the child should be breastfed how many times per hour or eat how many times or which environment is conducive for the child. I learnt new things that the child should be breastfed how many times per hour or eat how many times or which environment is conducive for the child.

(Mother, 42 years, three children, married, Mfundji, Bolira)

I didn't know about nutrition for the child, for example giving soup to the child because I was only cooking porridge and feeding the child, I was saying the child is still too young, so when they sent me a message about giving the child meat soup, beans soup and vegetables I started to realise that they are foods that my child can also eat so I started giving my child.

(Mother, 23 years, two children, Oloro)

This finding was supported by the results of the ranking exercise conducted during FGDs with mothers. Mothers were asked to identify and rank aspects of WN plus mNutrition messages they liked best. Mothers said they particularly valued practical advice related to the types of foods young children could consume, instructions on the necessary frequency of feeding per day and practical advice on maternal diets during pregnancy and diets for early childhood (see Table 5.1).

Table 5.1: Results from ranking exercise conducted during FGDs with treatment mothers

Message content	Votes from FGD in Bolira (n=5)	Votes from FGD in Lomola (n=6)
Types of foods that can be fed as complementary food	10 (20%)	10 (20%)
Child hygiene	4 (8%)	6 (12%)
General health care	3 (6%)	0
Frequency of breastfeeding per 24 hours	4 (8%)	0
Frequency of complementary feeding per 24 hours	4 (8%)	6 (12%)
Vaccination schedule	0	5 (10%)
Nutrition during pregnancy	0	10 (20%)
Nutrition during breastfeeding	0	10 (20%)
Protection of children from environmental hazards	0	3 (6%)
each mother had 10 votes to allocate.		

Messages as a valuable source of new information for young first-time mothers/fathers with limited/difficult access to formal health and nutrition advice. In particular, first-time young mothers (including two unmarried adolescent mothers who are likely to have less family support and contact with health workers) and first-time fathers felt that WN plus mNutrition messages were a valuable source of new information in all areas related to pregnancy, birth, child feeding and caring practice. It is possible that this relates to the fact that unmarried mothers might have less support from their families and contact with community health workers. One young unmarried mother said:

Yes, I do like them [the messages] because if they were not sending me these messages then I wouldn't have known anything.

Interviewer: So, you mean most of the things are new to you?

Yes, they are new.

(Mother, 20 years, one child, unmarried, Oloro)

The same mother continued to explain that access to the health clinic was difficult for her as she often did not have the money to pay the bus fare to the clinic (and could not ask the father of the child to pay for it as he had married someone else). As a result, she had missed several antenatal and postnatal appointments.

In a focus group discussion in Bolira, several young mothers pointed out that some health clinics provide no or only very limited/rushed nutrition education. The women felt that the messages helped to address some of their outstanding questions.

Another young, married, first-time mother (from Oloro) revealed that she had received advice on child care and feeding from the local health worker, but that she struggled to understand the advice. As she was very shy and not used to asking questions of health workers, she had not enquired further. The WN plus mNutrition messages had helped to fill some of the gaps in her knowledge (although she sometimes struggled to understand the message correctly).

Messages may help build new mothers' confidence to ask for health information and services. Some (if limited) qualitative data suggests that the WN plus mNutrition messages helped build new mothers' confidence to ask health workers for advice or to seek clarification on specific issues. As a young mother of two children explained:

I thought that I should give him [my toddler] worm medication after every six months, even when I had my first child I gave medicine after six months. But the messages said after three months. At the clinic, my first child was given these medicines after every six months, so if it is December another dose will be in June.

Interviewer: Then what did you do?

I went to the clinic and asked a nurse and she told me that the child should be given medicine that kills worms after every three months.

(Mother, 23 years, two children, married, Oloro)

Messages enable mothers to more critically interrogate health information they get from peers. A few mothers described how they had become more critical of health and nutrition advice they were offered from peers (i.e. neighbours, friends, elderly). A young mother from Erula said:

I can trust information I get and my trust would be influenced by the very fact that I have already read the text messages with the same information. So, I will be comparing the information that the person is telling me with the information I have read in text messages unlike if I had not received the text messages. I would remain with doubt if I would not have read [the text message] because I have no reference.

(Mother, 19 years, two children, married, Erula)

Perceptions of usefulness of the messages varied among fathers. The qualitative sample included 30 men who received the messages (23 men, most of them the husband of the focus mother, received the messages on behalf of the mother; seven men received the messages in parallel with their wives, who also received the messages on their own phone). More than half of all men perceived the messages as useful, as they 'provided new knowledge that I never knew before' or reminded them of existing knowledge (e.g. information they had learned in school or from health workers).

Men who did not find the messages useful cited different reasons for their lack of interest, including the belief that child rearing and nutrition were women's duties and not their concern, lack of need for new information as they were experienced enough from raising previous children, and lack of time to engage.

Factors that limit the usefulness of WN plus mNutrition messages:

Messages provide information and develop understanding of child nutrition but they cannot develop skills to practise new knowledge (as training would do). Some mothers said they were eager to follow the advice provided in the messages but that they were unsure what to do. This challenge was mentioned several times with regard to breastfeeding practices. One new mother noted:

For example, a message just says you should breastfeed but they [the messages] should say you have to breastfeed this way, not just saying breastfeeding a child for this and that, it should explain more, so that when a person reads the message it says you should breastfeed like this and that.
(Mother, 23 years, one child, married, Mfundu Lomola)

Breastfeeding is considered a learned skill and can be stressful to establish and maintain. While text message-based programmes have been shown to increase breastfeeding rates in the long term, in the early initiation phase more support is often needed (Gallegos, Russell-Bennett et al. 2014).

Messages that lack context-specific adaptations are limited in their usefulness. Several mothers complained that some of the messages are not relevant or feasible to implement in their specific living environment. For example, a few mothers recalled that messages recommended the consumption of foods that were scarce in their village (e.g. soya in Bolira).

Others complained that their living situation made it impossible to follow advice. One mother said:

If you go to work far away in the forest, away from home, it is impossible to get water in these places for washing hands and breasts before breastfeeding the child. So, you find that you are forced to do it in a normal way.
(Mother, 25 years, three children, married, Oloro)

Messages are not perceived as useful by parents who do not have an active demand for new information. At least seven fathers (who received the WN plus mNutrition messages on their phones) and at least four mothers (who received messages on their own phones) said they do not need new information on nutrition and were therefore not interested in the messages. Fathers especially often felt that nutrition and child health were their wives' responsibility and they therefore did not find messages sent to their phone particularly useful.

The number of subscribers who did not find the messages useful might be even higher, as several subscribers had difficulty recalling more than one message, suggesting that the messages did not leave a lasting impression (and thus are unlikely to have triggered any behaviour change).

Some fathers/mothers who did not perceive the messages as useful had at least two children and said they did not need more advice, as they were already experienced:

I have got three children already which means that I have enough experience.
(Father, three children, Lomola)

Others claimed to be too busy or pre-occupied to engage with the text messages, as described by a first-time mother from Erula:

I was busy with farming activities but also, we had family conflicts between me and my husband so I found that even if I read these text messages will be more confusing my mind. So, for sure I paid little attention to them.

(Mother, 30 years, married, Erula)

Messages are useful for some mothers but service exclude others. Several mothers, elderly community members and health workers were concerned that WN plus mNutrition services did not reach every mother in the community, but systematically excluded mothers who did not have access to a mobile phone. As one young mother pointed out:

For sure other mothers in our community have no phones. From the time you visit them and the time you come back you find that they no longer have phones, some use their husband's phone so they cannot get text messages directly. It is better to visit these mothers frequently so as to educate them since they have no mobile phones. It is better to educate them through visiting them.

(Mother, 19 years, one child, married, Erula)

5.1.2 Perceived added usefulness of mobile phone- based messages over other communication channels

Many active WN plus mNutrition service subscribers emphasised the advantages of mobile phone-based nutrition and health information over other communication channels, however this could reflect the fact these are a group who were still reading the messages and therefore implicitly found them useful.

Elderly community members who were interviewed as part of a focus group discussion were supportive of the messages (although none of them had ever seen a message). However, they all worried that mobile phone-based messages might only be relevant for a small proportion of mothers who own or had access to a mobile phone. Community meetings and seminars were generally perceived as more inclusive events that could reach more mothers (including mothers from households that did not own a mobile phone). The desk-based literature review conducted by the IDS qualitative team during the preparatory phase found that only around 38 per cent of the rural adult population in Tanzania owns a mobile phone.¹¹ This suggests that a significant proportion of rural mothers may not have access to a mobile phone and may thus be excluded from the WN plus mNutrition service.

This finding suggests that mobile phone-based services cannot and should not become a substitute for 'traditional' channels for health and nutrition information (such as community-based seminars) but are merely a complement.

Mobile phone-based messages are more convenient. Many mothers and fathers felt that information sent via mobile phones was more convenient, as the information could be read and

¹¹ Barnett, I. and S. Srivastava (2017). External evaluation of mobile phone technology based nutrition and agriculture advisory services in Africa and South Asia: Desk-review: Determinants of undernutrition and existing m-Health services in Tanzania. Brighton, IDS.

accessed whenever they had some time. This was very different to radio or television-based information that was only broadcasted at specific times and thus could easily be missed:

They should just send [health and nutrition information] via our phones because if they use radio or television, you may not get time to listen to the radio or watch television, I think receiving via mobile phones is better because I have it with me all the time.

(Mother, 29 years, three children, married, Lomola)

I will trust more the information sent via my mobile phone because I don't like listening to the radio. Moreover, I don't have the radio to say that I will receive such information in a good time. When the text messages come via my phone, however, I am sure that I will read these text messages even if they entered when my mobile phone is on the charge.

(Mother, 19 years, two children, Erula)

While clinic-based health workers were highly trusted sources of information, many busy mothers struggled to find time to see them (especially if they only wanted to ask a few questions). Community health workers were often easier to access (as they were in the community), but were usually too busy to provide immediate advice, as described by this father:

I am okay with the community health worker on delivering the information but due to time you can carry your phone all the time and you can receive at any time, while the community health worker will deliver the message once she/he has a time.

(Father, two children, Erula)

Mobile phone-based messages can be more tailored to personal needs. Many WN plus mNutrition service subscribers appreciated the fact that messages were tailored specifically to their child-related information needs. This was perceived as a huge advantage over less well targeted information delivered via radio programmes, television or community-based nutrition events; this information is not tailored to be delivered to a mother at a specific stage of her child's development, unlike the mNutrition messages. This is highlighted in the following quote from a mother of four:

Because the message is sent and tailored to me and my phone and not for anybody else but me, so when I read the message it is only for me, unlike in the radio where I will be like just learning whether it is targeting the time I need that information or not.

(Mother, 25 years, four children, married, Mfundu, Bolira)

Mobile phone-based messages can be re-read. Several WN plus mNutrition subscribers appreciated the fact that text messages could be re-read as many times as they liked and could be stored for future reference. This was very different to other information sources, as described by a mother of two from Oloro:

I like text messages better because I can read and if I did not understand it is easy for me to read again, while on the radio I cannot repeat the programme and the health worker if I meet her today there is the possibility of meeting again in the coming year while the messages on my own phone I can read and re-read.

(Mother, 29 years, two children, Iringa, Oloro)

Mobile phone-based messages are more private. A few subscribers praised mobile phone-based messages for being a more private approach to conveying information on health and nutrition issues. In particular, topics related to pregnancy and young children were often perceived as 'family concerns' not to be discussed in public, as highlighted below:

Not all information is supposed to be listened to by everyone. It is not good for the information concerning a specific household to be overheard by other people. The messages give information in private within a specific household.

(Father, two children, Lomola)

Concerns about preserving a family's privacy were also mentioned by two fathers as a reason why they felt that voice-based messages were less attractive (as they could easily be overheard).

However, there were also some critical WN plus mNutrition subscribers who were not convinced that mobile phone-based information messages are particularly useful.

Text messages are too short and therefore not detailed enough to be useful. A few subscribers felt that text messages (with only 160 characters) were simply too short to communicate enough details on health and nutrition issues. For example, a first-time father from Erula felt that:

The message should be more detailed and longer, for example, they should mention the number of clothes to bring to the clinic [for birth], all in all the message should mention everything.

(Father, one child, Erula)

In this context it is important to remember (as pointed out by three of the four stakeholders interviewed) that WN plus mNutrition messages were never designed to be stand-alone sources of information but rather to complement other efforts to promote the better health and nutrition education of parents (e.g. through nutrition advice from health workers).

mNutrition messages are only one among many sent through the WN platform. Another potential limitation to the usefulness of the mobile phone-based mNutrition messages was identified by one stakeholder who said that mNutrition messages are delivered through the well-established WN platform. WN attracts many stakeholders who all use the platform to send out a range of health-related information (e.g. HIV/AIDS, TB). Consequently, the stakeholder sees a risk that nutrition messages might 'get lost' among other messages. Messages on other health-related topics could also cloud perceptions of the mNutrition messages and potentially affect their uptake negatively.

For example, during the piloting of the topic guide, several women said that their husbands had stopped sharing WN plus mNutrition messages with them. The reason was that the men had received WN messages on HIV/AIDS and family planning which they felt were inappropriate for their wives. The messages also affected the men's perceptions of the entire WN service and they consequently decided to completely stop sharing messages with their wives.

On the other hand, messages on different health topics could complement each other and thus contribute to an overall improvement in the health and well-being of subscriber households.

5.2 Perceived ease of use

Perceived ease of use is defined as the degree to which the use of WN plus mNutrition services will be free from additional effort for mothers (and other subscribers) (Ketikidis, Dimitrovski et al. 2012). Perceived ease of use has been identified as one of the key predictors of sustained engagement with new technologies and services such as mobile phone-based advisory services (Ketikidis, Dimitrovski et al. 2012).

Two key themes emerged with regard to perceived ease of use of WN plus mNutrition: ease of comprehending the content of the messages and ease of accessing the messages.

5.2.1 Ease of comprehending the content of the messages

The majority of WN plus mNutrition subscribers said they found the messages easy to understand and that most of the messages were self-explanatory. Subscribers also liked the short and simple-to-understand language. Comprehension of the messages was further improved by the fact that most mothers (and many fathers) had heard the same information previously, e.g. at their antenatal and postnatal clinics.

Occasionally, subscribers misunderstood or were unsure about specific terms used in the messages, as the following quote highlights:

Respondent: ...there is a message that was difficult to understand, the message mentioned waste disposal the word waste disposal confused us because my partner thought waste disposal is a type of body moisture but I told her that waste disposal are dirty things, we then thought that the messages meant dirty body moistures, but finally we agreed that waste disposal are dirty things that are not good for the children.

Interviewer: Can you please tell me what was the language used on those messages?

Respondent: It was Swahili, but we should not blame the senders of the message because they are human beings too and sometimes they can use two languages at the same time.

(Father, one child, Kilolo, Erula)

Several messages caused confusion among many subscribers in all four villages. The messages recommended feeding meat as a complementary food to infants over the age of six months:

Message 51: The sauce does not have as much nutrients as the food itself. Children should also be given fish, poultry, beans, vegetables and fresh meat and not just sauce.

Message 98: Foods of animal origin contain many nutrients. Dear mom, remember to add meat, fish, poultry, eggs, dairy or seafood to food of your baby.

Message 101: The sauce does not contain many nutrients. Children should also be given fish, chicken, beans, vegetables and meat and not just the sauce.

Message 102: Foods of animal origin contain many nutrients. Dear mom, remember to add meat, fish, poultry, eggs, dairy or seafood to baby foods.

Message 104: Build the practice of giving your baby natural animal foods like meat, fish, poultry, seafood, dairy products and eggs because it is important for the growth of their body and mind.

(WN plus mNutrition messages)

As highlighted in the messages above, common practice was to feed infants broth or sauce in which meat had been cooked but not to give them the actual meat. However, as meat is an excellent source of highly bio-available iron which is important for child growth, promoting meat consumption is beneficial for child health and nutrition. Confusion about how to follow these messages stemmed mainly from the fact that infants would not be able to chew meat, as explained in the following:

Respondent: We receive the message that advised us to give the child meat and not the soup, so we asked ourselves how the child can eat meat without soup? We [mother and father] discussed and there was no option that we can reply to that message by asking our sender how can the child eat meat while he do not have teeth, how can this happen?

(Mother, 24 years, one child, Mfundu, Bolira)

One of the WN plus mNutrition messages explains the practicalities of this recommendation further and subscribers that had received this message (rather than one of the above) indicated that information was new and helpful to them:

Message 49: It may not be easy for a baby to eat meat. Make sure the meat is crushed so the baby can eat and swallow. The sauce does not have much nutrients unlike the meat.

(WN plus mNutrition message)

The importance of designing messages in a practical way was also stressed with regard to other practices, including breastfeeding. These examples suggest that messages formulated in a practical way may be more effective in promoting behaviour change than messages that simply convey high-level recommendations. However there are limits to this; firstly some information, such as the optimal positioning of a baby during breastfeeding, simply cannot be conveyed by text message and secondly, other advice might simply be unfeasible to follow because of contextual factors, such as a mother's need to work whilst a baby is still being breastfed.

5.2.2 Ease of accessing the messages

Mother receives message on her own phone. Apart from various potential technical barriers to access (e.g. broken phones, lost SIM card, poor battery life, limited network coverage – see Section 4) perceived ease of access varied depending on who in the household received the messages.

Women who received the WN plus mNutrition messages on their own phone usually did not face any challenges with accessing the messages. A few said they had shown the first message/s to their husbands to get their approval, but usually husbands were happy with the content and did not restrict their wives' access.

However, several younger women faced no technical challenges in terms of the intra household dynamics; explaining that access to a mobile phone and messages on the mobile phone could pose a challenge in their households as their husbands strictly monitored their mobile phone use. One young mother described this problem:

I owned a mobile phone, my husband grabbed it away and just burnt it in fire, I bought another one and he took it away from me and gave it to his young brother. He wants me to communicate with him alone and does not like to see me communicate with other people. If I tell him that maybe I am communicating with my parents, he wants to prove whether it is true I am talking to them. He will budget for me the minutes I should talk to them. This becomes a very big problem for me taking into consideration that my parents live very far from here. One day I was talking to my mother who was sick and he was coming back. He took the phone away.

(Mother, 25 years, one child, Lomola, Mfundu)

Father receives message on his phone. For cases in which messages were sent to the father’s phone only (n=19) different sharing patterns of the messages emerged (see Table 5.2).

Table 5.2: Sharing patterns of WN plus mNutrition messages sent to the father’s phone

Sharing patterns of WN plus mNutrition messages	Factors that may limit the effectiveness of WN plus mNutrition
Father shares messages (n=7)	
Father shares most messages with wife (including lets her read the messages)	3
Father shares most messages (but only orally, he does not let her read them)	3
Father shares messages, but only messages with content he approves	1
Father receives but does not share messages (n=7)	
Father separated from wife and does not share messages with new wife	2
Father does not share messages as he does not think messages are important	2
Father does not read the messages as he believes it is promotion only	3
Father does not receive messages (n=5)	
Father uses same number, but claims to have never received a message	4
Father lost phone or changed number and said that he never received messages	1

Fathers who shared the WN plus mNutrition messages with their wives did so because they believed that the content could help to improve/maintain their child/ren's health and well-being. Some fathers did not actively engage with the messages themselves but felt it was their wife’s task to engage:

I like to share because we men are not care takers of children, the most care taker in the household is the mother that is why I like to share these messages with her. That is why I tell her “these are the messages you should read them because most of the time am not around, they will help you in taking care of our baby”.

(Father, one child, Kilolo, Erula)

Other fathers saw themselves as the household head responsible for the children's health and nutritional well-being. As part of this role they first engaged with the message content themselves and then instructed their wives based on the message content.

Three fathers said they shared the content of the messages mostly orally, one because his wife was illiterate and the remaining two did not like their wives to touch their phones to read the messages. One wife explained her husband's reluctance to show her his phone:

He cannot allow [me to touch his phone to read the WN plus mNutrition messages] and if at all I asked him, he would ask me several questions as to why I want to navigate into his phone. He would think that I have a different intention for opening his phone.

(Mother, married, one child, Mfundu, Lomola)

Based on the data from our initial exploratory qualitative study (Barnett, Srivastava et al. 2018) some men engaged in extramarital relationships and often used their mobile phones to communicate with the other women. These men might be worried that their wives would learn about their affairs when handling their mobile phones. Sharing messages orally only might potentially reduce the effectiveness of the messages if the content is not communicated correctly.

One man explained that he shared only those messages he felt were beneficial or useful for his wife, but that he would not share messages he did not approve of (e.g. messages on family planning, messages on foods he could not afford to buy for his children).

An additional and very common challenge was that men were often absent (e.g. to work in nearby towns, to spend time at the house of a different wife in case of polygamous relationships) or simply forgot to share the messages they had received. None of the wives said they actively reminded their husbands to share the messages with them. One reason for this might be that, as all interviewees explained, the WN plus mNutrition messages came very irregularly (with regard to both frequency and number of messages received per month) and that there was no predictable pattern (e.g. every Wednesday and Saturday at 9am a message comes). Wives therefore did not know when they had to remind their husbands to share.

Of the seven fathers who said they did not share messages, two had separated and remarried and did not share the messages with their new wives as they felt the messages were specifically targeted towards the needs of their previous wives, three had never read an entire message as they believed the messages to be unwanted promotional offers, and two felt the content of the message was not relevant to their wives.

Most fathers in the qualitative sample who were signed up to receive the message on their wives' behalf, said they had never received any messages. Some of these men (n=4) still used the same number and might have not been registered after all (e.g. due to a technical mistake during registration), they might not have recognised the WN plus mNutrition messages (e.g. because they believed the messages were spam because of the 15*** sender number) or they might have missed messages as they used several SIM cards in parallel (very common in the sample).

Overall, these findings suggest that access to WN plus mNutrition messages is likely to be considerably more difficult and less reliable for mothers who receive messages through their husbands' phones.

Both father and mother receive the messages on their phones. Nine couples in the qualitative sample received the WN plus mNutrition messages on both the father's and the mother's phone. Five of these couples still both receive the messages, but only two couples actively discuss the content of the messages, as described by one of the fathers:

R: You know let me tell you, after taking meals then we get to relax, after you rest then one will start the discussion by showing the other on the text message that will have come in that day. We do discuss it and reflect on what to do by making a comparison to what we learned from the clinic.

I: Between you and your wife who starts the discussion?

R: It can be herself or me. Anyone can start the discussion because we have equal rights and the text messages are sent for the benefit of us all. So why should there be a discrimination?

(Father, four children, Kilolo, Erula)

Two couples said they had received messages at one point, but that the messages had stopped several months ago (around September/October 2017) (these couples still used the same mobile phone numbers). Conversations about the content of the messages had been limited/non-existent. In two couples, the wives said they had never received any messages (both had changed their mobile numbers shortly after registration). The fathers still received messages but only one of them shared the messages with his wife (but never read them himself as he said he was not interested in them).

Based on the qualitative findings, sending WN plus mNutrition messages to both mother and father might help to ensure access and improve active engagement with the content of the message among a few couples. However, for most couples sending the messages to both did not seem to have a great impact on the likelihood that they would engage with the content as a couple (one should keep in mind that this findings only draw on a small qualitative sample and need to be further explored in the quantitative evaluation stream)

5.3 Trust in the credibility of WN plus mNutrition messages

Trust has been identified as an important factor in determining behavioural intentions towards adopting new technologies (Bahmanziari, Pearson et al. 2003). In the context of this evaluation, trust refers mainly to trust in the benevolence and credibility of WN plus mNutrition services. Previous literature suggests that mothers (and often fathers) who trust a mobile phone-based service are more likely to actively engage with it (Schnall, Higgins et al. 2015). There are a range of different reasons for why WN plus mNutrition subscribers trusted the service as well as some threats to that trust.

5.3.1 Reasons for trust in WN plus mNutrition

Face-to-face promotion and sign-up for WN plus mNutrition was perceived as very important for building initial trust. Almost all mothers and fathers who actively engaged with the WN plus mNutrition messages said they believed in the credibility of the messages as they had personally met the team responsible for sending the messages. The following quote from a father explains different reasons for why he trusted the team that came to register his household (including the fact that they were in his home, asked very personal questions, used a legal consent procedure prior to the interview, had the village government's approval and had already told him he would receive text messages with health information) as well as the messages he received following the visit:

Of course, I trust [the messages]. If I visited your home and sought for information about your household for instance, the moment you accept giving me the information about your household, this is the start of trust between me and you. Then after you provide the information to me and I tell you that you will be receiving text messages, after I leave your household won't you trust me? Moreover, the text messages come in the way I told you they will be coming. Will I have deceived you or not? Therefore, I had to trust the information in the text messages because I was visited and told by these people that I would be receiving text messages related to health issues. More to that, I cannot say that let me ignore their advice because as you visit me like now, you came with lawful consent, along with government representatives. Even in our normal situations, a policeman cannot just come to convict you without the guide by the sub-village government representative. Even a policeman.

(Father, three children, Kilolo, Erula)

Opinions about the identity of the registration team varied, with some believing they were health researchers from a private organisation, others thinking they were government health workers or health workers from a non-governmental organisation. Mothers who were signed up during their pregnancy often believed the service was part of their antenatal service and that the text messages helped the antenatal nurse to monitor a woman's progress throughout her pregnancy. (No one believed the team was associated with an MNO.)

Yes, I do trust them because they come with the title identifying where they come from since during registration they explained to us what they are here for, so when the message comes we know it's the company which came to register us.

(Mother, 37 years, six children, married, Iringa rural, Oloro)

I trust them [the messages] because I think they were coming from those researchers who visited us to interview us on health and mNutrition issues.

(Mother, 29 years, two children, married (polygamous), Iringa rural, Oloro)

Yes, I trust them [the messages] because there are some people who came to our home during registration, so when I received the message I knew are from them and I thought they are health expert from the government, so I had no doubts.

(Father, two children, Kilolo Erula)

This observation corroborates findings from the health promotion literature that stresses the importance of interpersonal contact to build trust in health promotion (Fry and Neff 2009).

For this impact evaluation all treatment mothers/fathers were actively signed up to WN plus mNutrition services after the household interview. The usual way of registration was through one of the following routes (as described by two stakeholders). One route was assisted registration, whereby community health workers who were trained in how to register subscribers for the service signed up mothers (and sometimes fathers or others). The other route was self-registration, whereby subscribers had to send an SMS to the number *152*05#. Findings from the qualitative midline suggest that assisted registration may increase the perceived trust in the messages due to the personal contact and existing trusting relationship with community health workers.

Messages tailored to specific needs in each stage of pregnancy/early childhood can help to build trust, but also raise suspicions. WN plus mNutrition subscribers valued messages being carefully tailored towards their specific needs in each stage of pregnancy/early childhood. The perfect timing of the messages increased the perceived relevance and thus helped to build trust in the content of the messages as described, for example, in the following:

Yes, I trust them [the messages] because the message is relevant to our situation and sometimes I asked how they knew I am in this situation that is why I do not want to ignore these messages.

(Father, one child, Kilolo, Erula)

While the timing was perceived as important for building trust, it also frequently raised suspicions and even fears among subscribers who could not explain how the message sender could be aware of and familiar with very personal aspects of their lives.

I questioned myself who this person is who knows everything about my child growth and development because I received messages that were relevant to my child and they [the messages] were explaining everything related to my child's growth and development. [...]

(Mother, 25 years, three children, Iringa rural Oloro)

A few subscribers attempted unsuccessfully to find out more, as one father recalled:

I tried to call to clear the doubts that I had, so as I can ask who he/she is and how did she/he know about unborn child but I failed to talk with the sender of the message.

(Father, one child, Mfundu, Lomola)

A small number of WN plus mNutrition subscribers stopped engaging with the messages as they became suspicious of the well-timed content. Others continued engaging after they had discussed their concerns with friend/relatives:

I didn't expect anything but I was just surprised after joining I started to receive messages. I asked my sister why are these 'Mama Nipendeni' sending me these messages? How do these people know that am almost giving birth to my first baby? Then she said these people know because during the time of registry they have been asking you how long you are in your pregnancy, that is why they know your progress and even after birth they will still send you messages that you have given birth to your first baby. So, I was very surprised as in how they knew all this.

(Mother, 20 years, one child, Iringa rural, Oloro)

A few parents said they had received messages that were not well timed but were geared towards older children. For example, a mother described how she received a message on the number of times a child should eat solids while she was still pregnant:

The message talked about how many times my child should eat per day, so they advised me that the child must eat five times, that the child should eat heavy meals three times for example during morning the child must get porridge, at 10:00 am. I was confused as my child was not born yet.

(Mother, one child, unmarried, Mfundu, Lomola)

Badly timed messages could negatively affect subscribers' belief in the credibility of the messages overall. There was also one sad case in the qualitative sample in which the child died during child birth and the mother nevertheless continued to receive WN plus mNutrition messages (as she did not know how to unsubscribe from the service).

Trust gained as the messages reiterate the same information they had been told by health workers

As shown in both the initial qualitative study (Barnett, Srivastava et al. 2018) and quantitative baseline (Gilligan, Hidrobo et al. 2018) health workers are the preferred and most trusted formal source of health and nutrition information in Iringa. Parents usually trusted information they had received from a health worker. As most WN plus mNutrition messages communicate the same information that health workers did, parents recognised the information easily and usually trusted it straight away. For example:

I trust the messages, because we were told at the hospital to make preparation [for birth] too, so the messages insisted on the same thing that we were told from the hospital and that's why I trusted the advice.

(Mother, 30 years, one child, married, Kilolo, Erula)

Written information is more trusted than oral information. A few WN plus mNutrition subscribers said they trusted written information more than oral information. Written information was perceived as more accurate. For instance:

[...] mobile text messages are more direct and detailed unlike a health worker talking to many people, at times she can forget some important details.

(Mother, 29 years, one child, married, Kilolo, Erula)

Another mother pointed out that text messages were more reliable, as there was no risk of translation or recall error:

Because the information coming via the text messages, is different if another person was telling me about the information. Here the trust is low as she might not tell correctly, but by opening the text message and read it by yourself, then directly you must trust.

(Mother, 26 years, one child, married, Bolira)

Threats to the trust in WN plus mNutrition messages:

Perception that the messages were sent by mobile network operators. Six treatment mothers/fathers said they were reluctant to engage with the WN plus mNutrition messages as they believed the messages were sent by mobile phone operators and thus were unwanted promotional messages. All five subscribers said they had never read a message in full and several just deleted all messages coming from a 15*** number:¹²

[...] I thought the messages were coming from Vodacom as any other promotion message. I don't believe them because they are from Vodacom so I read them partially and ignore them.

¹² Spam text messages often use a 15*** number in Tanzania. Therefore, people are often cautious around messages sent by a number starting with 15***. WN plus mNutrition is sent by 15001.

(Mother, 25 years, married, one child, Kilolo, Erula)

She (my wife) is not aware of when she started receiving the messages because she never accessed them due to the number used to send them thinking that the messages are from Airtel, therefore she ignored the messages and never opened them except for one text message which she accessed recently but only glanced at it and ignored it too.

(Father, one child, Mfundu, Lomola)

The qualitative field team speculated (based on discussions they had with treatment households in the recruitment phased for this study) that at least some of the 15 treatment mothers/fathers who said they had never received a message from WN, had in fact received messages but had deleted them immediately assuming they were unwanted promotional text messages.

Not expecting the messages often resulted in distrust of the content. A few mothers/fathers said they had not expected to receive WN plus mNutrition messages on their mobile phones (e.g. because their partner had provided their mobile phone number during the registration or because they had simply forgotten or not fully understood that they had signed up for a mobile phone-based service). Consequently, they were surprised when they received the first message and often did not trust the message content as they had no idea how or why the messages had been sent to them.

A health expert from Erula corroborated this observation:

It depends whether people trust [the messages]. If they were first educated about the messages and that they will be receiving messages about how to feed a baby or breastfeeding there will be no problem; but if the messages just come unexpectedly, they may not be received well and just end up doing nothing; but if educated that they will receive 1, 2, 3...messages and the purpose of the messages, it might help a person.

(Health expert, Kilolo Erula)

This finding suggests it is important to carefully explain to new subscribers that they will be receiving (tailored) messages and where the messages will come from. Automatic sign-up of mothers (e.g. during their first antenatal visit) is unlikely to be very effective if not combined with detailed explanations of the service.

5.4 Social influences on uptake of WN plus mNutrition

Social influence has been identified as an important determinant of an individual's acceptance, adoption and maintained utilisation of new technological interventions (Malhotra and Galletta 1999). The qualitative data showed that social approval of the sender as well as the content of WN plus mNutrition messages was an important predictor of mothers' decisions to continue to engage with the messages. For instance:

Yes, I do trust the sender, you know at first, I didn't know who was sending these messages, I then went to my neighbour and told her 'I am receiving these messages but I don't know who is sending them' and she told me, the messages are from 'mama nipendeni'. I was reassured then.

(Mother, 34 years, four children, married, Iringa rural Oloro)

My husband and my relatives are all happy with the messages because they teach us on how to take care of the children

Interviewer: Did their response influence you?

Yes, to continue trusting the messages.

(Mother, 34 years, four children, married, Iringa rural, Oloro)

I told my mom and young sister, and one day I received the message and talked with my mom, and my mom replied that we should take the message serious and stop imitating what they were doing before on taking care of the child.

Interviewer: Does this influence you to trust the message then?

Respondent: Yes.

(Mother, 20 years, one child, married, Oloro)

None of the interviewed health workers (n=4) was aware of the WN plus mNutrition messages and they all said that no mother or father had ever talked to them about the service. Nevertheless, all health workers were supportive of the service and believed it could support their own work, as described in the following:

The importance [of the messages] is seen when mothers read the messages and then we visit them to talk more about what was already in the messages, that is when mothers realise their importance [...]. The messages help our work a lot because reading makes it easier to understand and whenever someone is doing anything, they can access them for more knowledge.

(Health worker, Oloro)

However, the use of WN plus mNutrition services was not always met with approval and in one case this was associated with a misapprehension that people were being charged for the messages. One young mother explained:

My husband and most of my relatives think it's time and money wasting because they have no time to read the message

Interviewer: why do they think its money wasting?

Respondent: As we join, they think we are charged.

(Mother, 22 years, one child, married, Oloro)

5.5 Unintended consequences

When asked whether the WN plus mNutrition message (i.e. the content as well as the fact that messages were sent to the mothers' or fathers' mobile phone) had ever been a cause for intra-household tensions or arguments, all WN plus mNutrition subscribers replied that they had not.

Perception of failure, as parents did not have the resources to follow some advice given in the messages

One theme that emerged in several interviews was that both mothers and fathers often felt frustrated and that they had 'failed' because they did not have the resources to follow the advice given in the messages:

The only thing I manage for lishe porridge is maize while the message instructs us to mix a lot of things into lishe porridge, I failed and it is difficult till now to do so because I don't have money to buy these things to make up lishe.

(Mother, 20 years, one child, married, Iringa rural, Oloro)

The feeling of failure and frustration about their inability to follow advice may prompt some parents to start disengaging with the entire WN plus mNutrition service.

5.6 Potential implications for the effectiveness of WN plus mNutrition and lessons

Table 5.3 presents key findings from the acceptability assessment of WN plus mNutrition and draws conclusions about the potential implications for the effectiveness of the service. The last column presents recommendations for the programme design and implementation.

Table 5.3 Potential implications of acceptability assessment of WN plus mNutrition and future lesson

Key findings	Factors that may make WN plus mNutrition effective	Factors that may limit the effectiveness of WN plus mNutrition	Lessons for design and implementation
Perceptions of personal relevance of the messages	Parents may be more receptive towards and willing to act on information that specifically targets their current situation if they fully understand how information used for this tailoring was obtained.		Ensure that most messages are carefully personalised towards subscribers' time-sensitive information needs
	Parents may be more likely to act on information they have heard repeatedly and through different channels	Messages that differ from formal health and nutrition information may confuse parents unnecessarily (resulting potentially in a loss of interest in WN plus mNutrition)	Ensure that messages are harmonised and/or complement official health and nutrition guidance provided by health workers
	Messages may help parents to better put into practice theoretical advice given by health workers	Practical advice needs to be context specific (e.g. based on foods locally available, based on parents' economic capacities), otherwise advice may lead to frustration as parents cannot act on it	Ensure that practical advice is context specific and provides enough practical details within the constraints of the 160-character SMS limit.
	Messages may help to address information gaps related to health and nutrition among first-time parents	To ensure that messages are understood correctly, messages for first-time parents need to be very simple, assuming no prior knowledge or experience More experienced parents may not be interested in the same messages as first-time parents	Consider designing different sets of messages for first-time parents and more experienced parents to address each group's specific needs (e.g. practical nutrition advice for parents who are dealing with several children below five years of age)
	Increased use of health-care services may promote better nutritional well-being	Health-care facilities need to be able to respond to, and have the resources to respond to, increased uptake, otherwise the	

		increased demand will be short lived	
		Parents who do not find the messages useful are likely to disengage or discontinue use very quickly	Initial messages sent to parents may be an important opportunity to create interest in the messages and may help to improve parents' perceptions of the usefulness of the messages Formative research may help to identify specific information needs of experienced and/or busy parents
		If WN plus mNutrition messages are not combined with skill development training they are unlikely to be effective in changing behaviours	Encourage subscribers to seek out health workers for support in the development of necessary skills (e.g. breastfeeding practices)
Added usefulness of mobile phone-based messages over other communication channels	Because of the convenient access to mobile phone-based information, parents' exposure to nutrition information may be increased, which may increase the chance of behaviour change		Ensure that messages are sent frequently to build some momentum for better nutrition and potentially move nutrition higher up on parents' agenda. Ensure that assisted registration (by health facility workers and community health workers) is emphasized to enrol more mothers/parents in the mNutrition service.
	Targeted information may be more effective in conveying health and nutrition-promoting information		Ensure that messages are well targeted to the subscriber's individual needs
	Messages may convey important sensitive information more privately and thus may better engage parents		Text-based messages are often preferred to voice-based messages as text-based information is more private (e.g. cannot be overheard)
		Information provided in the messages may be too limited to be useful	Ensure that messages are carefully designed to include as much detail as possible
Ease of understanding message content	Easy-to-understand messages may facilitate uptake of the information and avoid misinterpretation	Simple messages may not always reflect the complex realities and contexts within	Ensure contextualisation of messages wherever possible, as this may increase the likelihood of information being translated into action

		which many subscribers live, consequently contextual barriers may prevent subscribers from acting on the advice	
		Messages that subscribers are unsure about or that they feel are too abstract are unlikely to be effective	Ensure that messages are formulated in a practical rather than theoretical way Subscribers need to be clear on how to act upon advice given in a message
Ease of accessing messages		If fathers do not share messages with mothers, mothers cannot benefit from the content	Ensure that fathers are frequently encourage and reminded to share messages with their partners (e.g. reminder text message) or tailor messages to the father, based on what men generally see as useful and appropriate information for their wife
		Mothers may receive only a few or no messages, thus making change in response to the messages unlikely	Frequently encourage men to share messages with their partners (e.g. reminder text message) Consider sending messages in a more predictable manner
	Couple interaction about the message content may increase the chance of message uptake	Most couples did not interact and sending the messages to both may not increase effectiveness	Individual subscriptions (especially of the mother) may be more cost effective
Trust in the credibility of the text messages	Registration procedures for the treatment group could increase trust in and uptake of the messages		Employ sign-up strategies that involve face-to-face contact (with health workers if possible) to build trust in the credibility of the messages and support-maintained use of the service
	Trust in messages may increase likelihood of uptake and implementation of the advice given		Ensure that messages are well timed to build subscribers' trust in the credibility of the messages
		Suspicious parents may lose trust in all WN plus mNutrition messages	Forewarn parents during the registration process that they will receive messages tailored to each stage of pregnancy/early childhood (to avoid suspicions)
		Parents may not engage with the messages as they believe the	In the promotion of WN and during the registration process, point out that the content is

		messages are promotional offers from an MNO	<p>independent from MNOs, to increase trust in the service</p> <p>Publicise the number that WN uses to send out messages (i.e. 15001) so that new subscribers are able recognise the sender of the messages</p> <p>Consider whether it might be possible to change the sender number</p>
Social influence on uptake of messages	Parents may trust and accept the messages more easily, as they feel they have social approval since friends and family like the messages.		Promoting the benefits of WN plus mNutrition to the wider social environment can help to maintain an enabling social environment for uptake of the messages
Unintended consequence		Out of frustration with being unable to implement some of the advice, parents may disengage with the entire service	Ensure that messages are context specific and take account of the lack of economic resources of many subscribers (e.g. recommend only inexpensive foods that are widely available, suggest cheaper alternatives)

6 Behaviour changes related to maternal and child nutrition and the role of WN plus mNutrition

This section presents qualitative findings on pathways and processes of behaviour change that are triggered or supported by WN plus mNutrition messages. It will explore ways in which WN plus mNutrition messages can contribute to change processes. The section will also document key barriers to behaviour change and suggestions for how to improve the effectiveness of WN plus mNutrition messages in changing behaviours (based on interviewees' suggestions).

It should be noted that behaviour change processes and barriers could be explored only for the sub-sample of qualitative interviewees who received WN plus mNutrition messages (n= 41 households) and those who actively engaged with the content of the messages. The remaining subscribers did not change behaviours or adopt new behaviours in response to the messages.

6.1 Pathways to behaviour change in response to WN plus mNutrition

Adopting new behaviours is different from changing existing behaviours. Among first-time parents in particular, uptake of WN plus mNutrition messages often meant practising something for the first time in response to the messages (e.g. trying to eat more animal-sourced food during pregnancy, preparing for birth). Many first-time mothers (and fathers) were very receptive to this, as they felt ill prepared and in need of support. A first-time mother recalled:

I did not know a lot of things [when I was pregnant with my first child], so the messages were sent to me when I just gave birth and you cannot get every information from the dispensary so the messages have helped me a lot. For example, messages about breastfeeding often.

(Mother, 21 years, one child, unmarried, Mfundu, Lomola)

For parents who already had one or more children, following the messages often meant changing practices established with their other children. Changing established behaviours was often more difficult and frequently only happened when parents felt that their previous practices were not effective enough, or could be improved.

WN plus mNutrition messages are not stand-alone agents of change but can facilitate change in combination with other information sources. As highlighted in Section 5, most WN plus mNutrition subscribers were already familiar with most of the content of the messages. The messages reminded them and reinforced existing knowledge. Receiving the same information through different communication channels increased parents' trust in the information and convinced many parents to try and implement the advice. For instance:

We made some changes because after receiving these messages and the training in the clinic I only gave food after six months of breastfeeding.

(Mother, 37 years, six children, married, Oloro)

I found these messages were useful, because we were told at the hospital to make preparation too, so the messages insisted on the same thing that we were told from the hospital and that's why I followed advice.

(Father, one child, Erula)

This observation is consistent with findings from other behaviour-change intervention trials which suggest that change in child feeding practices is more likely if mothers receive the same educational messages through various channels (Bhandari, Mazumder et al. 2005).

WN plus mNutrition messages can trigger discussions with peers/husbands that could facilitate change. Several mothers said they had discussed the content of messages with peers or husbands and that these discussions informed their decision to try and follow the advice. Discussions could thereby facilitate decision-making processes in different ways.

Some mothers said that discussions improved their trust in the credibility of the messages and thus increased their confidence to try. For example:

I was motivated to try because I talked to my sister and she said to me to do the same things as messages were saying.

(Mother, 17 years, one child, unmarried, Oloro)

Four mothers said that after discussions, their husbands offered to provide practical support (e.g. giving them money for food) which enabled them to follow the advice, as described in the following quote from a father:

Most of the time my wife starts the conversation [about the messages] because most of the time she is the one who is taking care of children at home, she is the one who can identify anything easily, though fathers play a great role at home but we do not spend many hours at home. I can give her money if needed.

(Father, two children, Erula)

WN plus mNutrition messages provide practical support to parents who are seeking to address specific health concerns. Several parents reported that they had been concerned about health problems their children were experiencing (e.g. failure to thrive/gain weight, sudden weight loss, constipation, lack of appetite, frequent illness, being too weak to play). Some of these parents had started to seek solutions for the problems (e.g. by contacting a health worker) while others were unsure what to do. The messages provided valuable practical advice regarding what parents could do to address current health problems. For example:

During that time when I received these text messages my child had totally dropped in weight and I was worried. Immediately I started to feed him differently [as advised by the messages and the hospital] with the lische porridge, fruits especially oranges and the groundnuts that I was provided with in the hospital. The child's health improved as you can see now his health is getting better and better.

(Mother, 19 years, two children, married, Erula)

Most of the time my child did not like to eat. The message says it is because we give them juice and sweets. There are also this kind of juice in a packet that children mix with water called Juice-cola. I stopped giving the child those sweet things and his appetite increased. [...] Their father is the one who most of the time brings them sweets, so I told him that he should not bring these sweets to the children because I have read a message sent to me saying that the sweets are not good. He should bring fruits like oranges instead.

(Mother, 26 years, five children, married, Oloro)

A few mothers also said they had experienced health problems with one or several of their older children and they were therefore eager to prevent the same happening to their new child. This motivated them to implement as much of the advice as possible.

The messages came when I was in a difficult situation, my first born was weak from birth onwards, we went to the hospital and used all the medication, but we had never got any advice [...]. With this child I give him tea with rice or buns in the morning, in the afternoon I buy fish or pounded groundnuts, giving him milk, he is doing great. We do the same for my first born and he is healthier now, he has never gotten ill for almost 12 months now.

(Mother, 19 years, two children, married Erula)

Behaviour changes that result in immediate positive benefits may be maintained. If following the advice in a message resulted in immediate positive benefits for a child, parents were more likely to maintain the new behaviour.

For example, two mothers explained that they had reduced their children's intake of sweets, as advised in several mNutrition messages. They immediately observed an improvement in their children's appetites at meal times. This motivated them to continue following the advice and to ask their husbands and elderly relatives not to bring sweets for the children anymore.

I continue because it teaches me well, most of the time when you give your child something that makes him lose appetite is not good, as a parent also you don't feel good because the child cannot eat.

(Mother, 26 years, five children, married, Oloro)

Other examples:

Mother 1: [...] if the child eats frequently then he/she become active for example if you give your child tea in the morning but around 10am you do not give him/her another meal you may notice that the child becomes weak.

Mother 3: I did not know this before, my first child is 24 years old, when he was small I used to feed him before I went to the farm and then when I came from farm at 3 pm, so you may find that the child is so stubborn and cries a lot, you breastfeed the child for a short time, from the information that we get and learned that if the child eats many times then he/she can become active.

(Two mothers, FGD, Bolira)

We are still practising because the messages are still coming, and the better our baby is growing the more we keep following these messages by giving the foods that are recommend in the messages.

(Father, one child, Erula)

Yes, I have seen the changes not only to my youngest child but also to my first child, my first child's health has changed after receiving these messages, before that he was very weak, during registration he was sick but after following the advice from the messages he is healthier and doing well now, while before he was very weak, so I am trying my level best to follow the advice

(Mother, 19 years, two children, married, Erula)

WN plus mNutrition messages regularly remind mothers to use health-care services, which could result in increased uptake and improved child health outcomes. Eight WN plus mNutrition messages encouraged parents to bring their child to a clinic for health and nutrition advice and services (NUT 43, 57, 61, 73, 91, 107, 109 and 110) and six further messages urged mothers to seek services and advice from health workers (NUT 20, 56, 58, 82, 94, 112). One mother described how the messages regularly prompted her to visit the clinic for antenatal check-ups.

The messages insisted that I had to attend the clinic every month [during my pregnancy] so as to get more advice, do checking in general, blood checking, weight. This will help during birth.

(Mother, 20 years, one child married, Oloro)

Repeated promotion of the use of health services could result in improved uptake and, ultimately, better child health outcomes.

Changing behaviours of others: spill over. Several WN plus mNutrition subscribers said they regularly shared the content of the messages with other parents. One mother said:

I normally share the messages so that the neighbours also can get influenced by these text messages.

(Mother, 29 years, two children, married, Oloro)

Others said they only provided specific advice from the messages with those peers they felt would benefit from the advice (e.g. to address specific nutritional problems). Sharing messages could increase the reach and effectiveness of WN plus mNutrition messages.

Most parents, however, were reluctant to share or discuss the messages with people from outside their household and said they had never done so. One reason for this seemed to be misunderstanding of the consent procedures and the treatment allocation during the quantitative baseline survey. A father from Erula explained:

The truth is that this is a secret for my household. So, I normally only show the message to my wife [who also gets the messages on her own phone]. I will ask her, have you seen this text message? I think this is a household secret because the programme cannot give benefits to everyone. The people who visited us [at baseline] told us that whatever they talked about will remain as a secret between our households and themselves.

(Father, four children, Erula)

Behaviour change is often only short lived. Whilst many mothers experimented with advice as soon as they got a message, many practised the new behaviour only for a short time and then fell back into their old habits because of contextual constraints, usually associated with being unable to afford the recommended food. This is explored below in greater depth. For example

Interviewer: Did you try preparing the porridge recommended in the message frequently?

No, just for few days. I go to work far away in the forest, away from home, and don't have time.

(Mother, 27 years, two children, married, Oloro)

We follow the advice [on foods that should be fed as complementary food] only a few times because the food is often not available as we do not have the money. Other times we eat like usual.

(Mother, 37 years, six children, married, Oloro)

Following the advice only temporarily is likely to have no or only very limited positive impacts on child nutrition (if there are no other inhibiting contextual factors).

Messages do not trigger any change in behaviour among several mothers/fathers. A few parents revealed that they read the messages but have never felt motivated to change or try anything in response to the message. The main reason for this was that they felt the messages did not provide them with any new information and either they were already practising the advice or they had previously decided not to.

Experienced parents only considered changing established childcare and feeding practices if they believe their established practices were not effective or if they experienced acute problems. For example:

We have been living accustomed to care for the children in a certain way, why should we change what has worked for such a long time?

(Mother 35, 4 children, married Oloro)

6.2 Initial hypotheses on how WN plus mNutrition may work in different contexts

Based on the midline data analysis, a refined list of context-mechanism-outcome (CMO) configurations considered to be the most plausible theories based on the available evidence gathered so far are shown in Table 6.1.

Table 6.1: Initial context-mechanism-outcome (CMO) configurations

	Context	Mechanism	Outcome
CMO 1	Mothers are knowledgeable about child nutrition from a range of information sources but lack the time or motivation to operationalise knowledge	Regular WN plus mNutrition messages act as reminders	Mothers are more likely to remember to practise positive behaviours
CMO 2	Lack of access to formal sources of health information so mother relies on informal and sometimes inaccurate sources of knowledge, e.g. from friends and family, but is unsure whether to follow advice and sometimes follow inaccurate advice that might be detrimental to their health during pregnancy or to their child's health	SMS messages sent to mother provide access to verified health and nutrition information which they consider to be a more credible and trustworthy source of information than friends and family	Mothers are more likely to practise optimal health and nutrition behaviours and stop following incorrect advice from friends/family e.g. avoiding eggs during pregnancy, giving babies porridge from a few months old
CMO 3	Mothers receive some limited information from health workers and clinics and lack knowledge in some areas but are unaware of these knowledge gaps so are not able to ask for professional advice	New information received via SMS messages on child health and feeding practices prompts mother to think more about the topic and seek further advice from health worker/clinic to provide more information and explanation of advice contained in messages	Some mothers demand greater support and advice from health workers and clinics and can follow advice given
CMO 4	Women receive bits of information on health and nutrition from various sources but may not have time to fully absorb the information because they are too busy or distracted	Information sent to mothers on health and nutrition practices via SMS can be read and reread many times when it is convenient so that the information can be absorbed and understood properly in their own time	Women's knowledge of child and maternal health and nutrition practices increases
CMO 5	Households, and women, have limited access to money to purchase foods	Mother receives new information via SMS on what specific foods are best to give to her child or herself during pregnancy but does not have enough money to buy these new foods	Mother is unable to follow advice given in SMS messages on nutritious foods for mother and child so diet remains unchanged
CMO 6	Women visit health clinics during pregnancy and to check on baby and child health and are given information about best practices to follow which they trust but do not always remember to follow	Mother receives SMS advice on health and nutrition practices which is the same as advice received directly from the health clinic /hospital so she trusts it. This reinforces the mother's existing knowledge, her confidence in its accuracy and the importance of following the advice given from both sources	Mother's knowledge is embedded and she is more motivated to act on the advice and improve her health and nutrition practices

CMO 7	Men and women partners in a household share access to a single phone. The man controls access to and use of the phone and women have limited access to use the phone including reading messages. Women have primary caregiving responsibilities	SMS messages sent to a shared phone are received by the man, often when he is away from the home at work, but he rarely remembers to read or share the information with the woman. The woman is eager to learn new information on child health as the primary caregiver but is not informed of the content of the messages received and is not allowed to check the phone herself to read them	Information on health and nutrition is not absorbed by either man or woman and knowledge and practices are not affected. There is increased conflict between partners over the use of the phone
CMO 8	Women prefer to receive advice and information directly from human sources, which they can check, discuss and adapt to their personal situation before deciding how to act.	SMS messages sent to mothers provide generic advice and information on what foods to eat during pregnancy but mothers are unsure how to apply and adapt it to their personal context, or which foods are available, and therefore cannot follow up or ask anyone for additional advice	Mothers are unable to apply the new knowledge gained so they continue to purchase the same foods during pregnancy

6.3 Barriers to behaviour change in response to WN plus mNutrition

Different contextual factors that impeded behaviour change in response to WN plus mNutrition messages emerged, as described below.

Lack of financial resources to purchase food recommended in the messages. Insufficient financial resources to buy foods recommended in the messages was the most commonly cited barrier to behaviour change.

When I have money, I try my best to buy those foods for my child, if I don't have money then I just cook maize porridge.

Interviewer: How many times have you bought the foods?

A few times when my husband sends me money.

(Mother, 23 years, two children, married, Oloro)

Due to financial problem then I do not manage to follow the advice, like to buy fruits, milk, rice, maize, wheat, millet that will be used on preparing lische porridge.

(Mother, 19 years, one child, unmarried, Oloro)

One father added that he is reluctant to buy foods for the baby that he could only afford occasionally. He feared the baby would get used to the food and would suffer if he could not provide the food:

The challenges are on the financial position, whereby sometimes you don't get money to buy these things for instance peanuts, millet so that's where difficulties occur if you don't have money. Also, the problem is you can't stop buying these things because of the baby getting used to them.

(Father, four children, Erula)

When exploring further, we found that mothers/fathers often had to carefully consider how to best allocate their limited resources between food purchases, health care, school expenses, and agricultural inputs or other productive assets. Spending more money for one household's member (and here the youngest and least productive member) was not seen as a good investment.

Limited availability of fresh and varied food. Especially in the extreme case village (Erula) but also in the other three villages, lack of access to fresh fruits and vegetables was a common problem and often prevented parents from following child feeding recommendations provided in the WN plus mNutrition messages. A young mother from Erula reported:

In the village it is difficult. I might be having money to buy fruits and at that time these fruits are not available in the village. They are available at Ilula and Rwamduni but at Erula there is only one shop where they sell fruits and once you miss them here, that is all. This is why it was difficult to practise it well.

There was scarcity of goods needed to prepare nutritious porridge flour too. For example, the soya beans, millet and wheat are so scarce in the village. So we are forced to go finding these items at Iluula, the big centre which is 40 minutes from Erula. Here you have to pay for transport.

(Mother, 19 years, two children, married, Erula)

Work outside the home is a barrier to exclusive breastfeeding and frequent feeding of young children. Mothers' work obligations outside the home (e.g. on farm, tea plantations) were a huge barrier to exclusive breastfeeding. Mothers received different levels of support depending on their work arrangements. Women with formal employment and work contracts (e.g. women employed with Unilever in Mfundi) usually had three months' maternity leave before they had to return to work. Once back at work they had an extended lunch break that allowed them to go home and breastfeed. Women in informal employment or who worked as paid labourers on farms often did not have these benefits, making it very difficult to follow the advice.

It should be noted that non-working mothers also struggled to find time to exclusively breastfeed:

A child is supposed to breastfeed on time for an hour. This does not give the mother enough time to take care of her daily duties so until the child is hungry that is when mother feeds the baby again.

(Mother, 27 years, two children, married, Oloro)

Women who worked outside the home also struggled to follow the advice regarding the recommended meal frequency for children:

Concerning the feeding a baby five times in a day it may happen that you can boil an egg and give it to the baby or porridge in the afternoon, ugali in the evening and other different types of food. But this timing becomes easy when you are at home but most of the times we are in the farm so sometimes becomes difficult.

(Mother, 37 years, six children, married, Oloro)

Other contextual barriers that emerged included alcoholism and HIV/AIDS in the extreme-case village.

6.4 Ideas for improving WN plus mNutrition services

Helpline to ask additional questions and get clarification. Many WN plus mNutrition subscribers said they occasionally wanted to follow up specific messages and ask for additional details or clarification. Many subscribers were strongly in favour of a free-of-charge WN plus mNutrition helpline:

As text messages get in, there is not someone to explain more. Then what do you do? It would be good if there is a number so that in case you don't understand then you can call and seek clarification.

(Father, four children, Erula)

A mechanism to call back would also help those who fear where the information came from, are suspicious about the information being targeted to baby life stage, and those who want to unsubscribe.

Additional information needs. Different information needs were highlighted, including: nutrition advice for older children, more details about child growth and how to promote it, more details about vaccinations and why they are important, more practical details, and options for booster messages on specific topics if mothers wanted additional details or support.

6.5 Potential implications for the design of WN plus mNutrition services

Table 6.2 presents key findings from the exploration of pathways of change and barriers to change. The second column in the table suggests learning for future programme design and implementation.

Table 6.2 Key findings and implications for design and implementation of WN plus mNutrition

Key findings		Lessons for design and implementation
Pathways to behaviour change	First-time parents are often very receptive to information as they lack knowledge, experience and are in need of support	Consider formulating some messages specifically tailored towards the specific needs of first-time parents (e.g. worries around being able to breastfeed)
	Experienced parents are likely to change established childcare and feeding practices only if they believe their established practices are not effective	Consider formulating some messages specifically tailored towards the specific needs of experienced parents (e.g. provide more justifications or incentives for why change would be beneficial for child health)
	WN plus mNutrition messages are only one channel among several channels that convey the same information, and together may trigger change or adoption of new behaviours	Ensure that WN plus mNutrition messages are consistent with information provided by other formal information sources (e.g. health worker)
	WN plus mNutrition can prompt supportive discussions about the message content with peers and partners	Encourage subscribers to discuss the content of the messages more widely by working with CHWs (this will also help to increase the reach of the messages)
	Parents whose children face nutritional or health problems may be more receptive to changing behaviours to improve their children's well-being	Ensure that messages provide plenty of practical advice to help parents address nutritional and health problems (this may also be an entry point to promote other health-promoting behaviours)
	Behaviour change that shows an immediate positive impact is valued and might be maintained	Ensure that messages include advice that results in immediate improvements if practised and possibly promote community-based sharing of positive outcomes (this can also help to increase subscribers trust in the effectiveness of the service)
	Improvement in child health and nutrition through increased use of formal health-care services, which is promoted by the messages	Continue promoting utilisation of health-care services (and ensure that the health-care facilities have the capacity and resources to respond to increased demand)
	Messages have the potential to influence health behaviours of non-subscribers, thus increasing the reach of WN plus mNutrition	Encourage sharing of the content of the messages
Barriers to behaviour change	Lack of financial resources to follow food recommendations	Ensure that only inexpensive foods are promoted (find inexpensive alternatives)
	Limited availability of fresh food and varied items	Carefully contextualise food consumption recommendations

	Work outside the home is a barrier to exclusive breastfeeding and optimal child feeding practices	Consider designing messages that specifically target mothers who work outside the home
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7 Summary of the main findings and potential implications for the effectiveness of Wazazi Nipendeni plus mNutrition

The findings presented in this report have several potential implications for the uptake of Wazazi Nipendeni plus mNutrition messages and for the effectiveness of the messages in triggering behaviour change. Detailed presentations of the findings and their potential implications have been presented at the ends of section 4, 5 and 6. In this section we provide a summary of the key findings for each section only

7.1 Experiences with implementation of WN plus mNutrition

- Various implementation challenges that may be caused by providers and/or subscribers were identified. These included a considerable number of subscribers who either never received any WN plus mNutrition messages or only received messages for a few months. Changing SIM cards or MNOs or losing the mobile phone were other common reasons for attrition. Short-term exposure to WN plus mNutrition is likely to reduce the potential effectiveness of the service on child and maternal nutrition considerably.
- The frequency with which subscribers received WN message varied (ranging from 1-3 a week to once every few months or occasionally). As mNutrition messages just constitute one of several types of messages delivered through the WN plus mNutrition platform, exposure to mNutrition messages is likely to be low. There were also other reasons that might result in WN plus mNutrition messages being occasionally missed including running out of battery and turning off the phone, mistaking WN plus mNutrition messages as spam or being too pre-occupied with work or family commitments to engage with the messages, as well as gender disparity in mobile phone ownership. Previous literature suggests that frequency of exposure to mobile phone-based behaviour change messages may be an important determinant for the effectiveness of the intervention (Naugle and Hornik 2014). Given that exposure to mNutrition messages was generally low, the effectiveness of the messages on behaviour change may be limited.

7.2 Acceptability of WN plus mNutrition messages

- A broad range of parents with different characteristics experienced the service as acceptable. Acceptability has been shown to increase the likelihood of use and maintained use in previous literature (Venkatesh 2000, Venkatesh and Davis 2000, Venkatesh and Bala 2008).
- WN plus mNutrition subscribers perceived the content to be useful (e.g. as a personalised guide through various stages of pregnancy and early childhood, as a reminder of existing knowledge, and as a provider of practical advice that complemented theoretical advice from health workers).
- A sub-group that valued WN plus mNutrition services most seemed to be first-time parents who were often in need of guidance. Experienced parents often perceived the messages as less novel and useful. Tailoring messages more towards the needs for each sub-group might be more effective.

- Mobile phone-based messages were preferred over other communication channels (such as radio, TV, health workers) because of their convenience, individual targeting, and privacy.
- Lack of detail in a short text message limits its usefulness. This highlights the importance of effective design of the message content.
- Messages were generally perceived by subscribers as easy to understand which makes them accessible for a wide audience.
- Access to mobile phone-based messages is determined by who in the household receives the messages. Access was less reliable if husbands received the messages, as they often did not share with their wives. Consequently, sending WN plus mNutrition messages to women may be more effective than sending the messages to husbands/fathers and asking them to share. This may limit the reach of WN plus mNutrition services considerably, as many women in Tanzania did not own a mobile phone.
- High levels of trust in the credibility of messages thanks to well-timed and tailored content and face-to-face registration may promote more effective up-take of the messages.
- The WN plus mNutrition service is not a stand-alone nutrition intervention and should not attempt to replace nutrition and health training by health workers (e.g. during antenatal or postnatal classes). Nevertheless, the messages might play an important role in reinforcing and supporting health workers' efforts.

7.3 Behaviour changes related to maternal and child nutrition and the role on WN plus mNutrition

- Lack of financial resources emerged as the key barrier to following some advice in the messages (i.e. food choice recommendations for children). This highlights the importance of considering households' economic realities when designing the messages. In this context it should be mentioned that the mNutrition messages currently focus on how the health and nutritional status of children could be improved. However, literature suggests that behaviour change messages may be more effective when framed to fit the characteristics of the intended recipient (Pelletier and Sharp 2008). Poverty and worries about money were major concerns for many households (usually a bigger concern than the family's nutritional well-being of the family). Therefore, messages that highlight the economic incentives of changing child care practices could be particularly effective for mothers and fathers preoccupied by financial worries; for example, messages could stress that breastfeeding saves money.

7.4 Recommendations for policy and practice

- Mobile phone-based advisory services such as WN plus mNutrition are unlikely to be effective as a stand-alone channel for behaviour change; however, they may perform best when integrated with traditional media and channels as part of a multi-level strategy (as already the case in Wazazi Nipendeni). Mobile phone-based information could thereby be one part of a broad many-pronged policy, and not the only component aiming to change behaviours and practices.
- Mobile phone-based interventions may generate new inequalities, as not everybody can afford or has access to a mobile phone. The qualitative midline found that especially young

women (including adolescent girls) who may benefit most from the information may be excluded. A blended approach combining different technologies and approaches to disseminate information may increase inclusiveness and address some of these newly-generated inequalities (e.g. mobile phone and radio; mobile phone and community meetings that are open to non-subscribers).

- The transmission of information to passive audiences without an element of interactive engagement has limited effectiveness in changing behaviour and practices. WN plus mNutrition currently does not include any interactive components (e.g. call centres). Consequently, parents did not experience any peer, social, or emotional support when attempting to adopt the advice WN plus mNutrition provided.
- With regards to content, parents are interested in and receptive to messages that may help to improve the health and well-being of their children, however, information needs varied depending on the specific situation and context of the parents. For example, inexperienced first-time parents had other needs, fears and concerns than experienced parents who already had several children. Content needs to be tailored, context-specific and relevant to parents very time sensitive needs. Parents whose children faced acute nutritional or health problems frequently look for specific information that can help them to address the problems (e.g. failure to thrive; acute illness). Introducing two-way channels (i.e. a call centre) as part of WN plus mNutrition could enable parents to actively source the information they need, rather than merely being the recipient of information experts perceive to be relevant.
- Sharing of the content of the messages could be a way of increasing the reach of WN plus mNutrition (including to parents/mothers who do not own a mobile phone). However, our data suggest that sharing with people outside the own household was uncommon. One reason for this was that messages related to pregnancy and early childhood very perceived as very private ('family issue') and not to be shared with others. Experimenting with approaches to encourage parents to share the content might increase the reach of mobile phone-based interventions.
- WN plus mNutrition provides highly relevant information to pregnant women and mothers, however, it currently does not support the generation of an enabling environment that supports mothers to act and adopt new practices. To increase impact, mobile phone-based services could be joined up with other ongoing interventions (e.g. social protection programmes, access to financial services).

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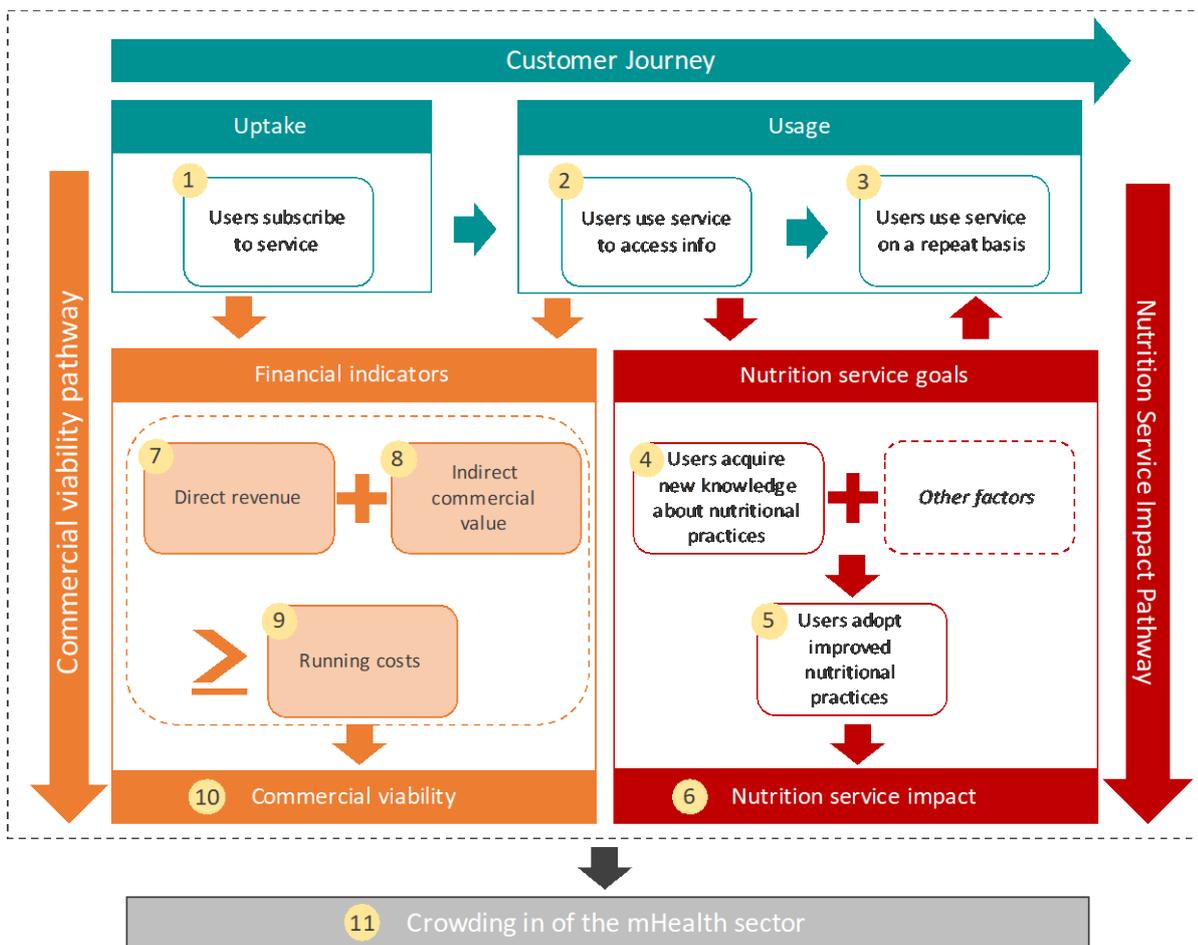
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Annex A mHealth Theory of Change diagram



Source: Draft TOC created for mHealthi programme at programme design stage 2015

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Annex B Terms of Reference

Section 4, Annex A

Call-down Contract

Terms of Reference

PO 6420: External evaluation of mobile phone technology based nutrition and agriculture advisory services in Africa and South Asia

Introduction

DFID (Research and Evidence Division) wishes to commission an external impact evaluation of mNutrition, a mobile phone technology based nutrition and agricultural advisory service for Africa and South Asia. mNutrition is a programme supported by DFID that, through business and science partnerships, aims to build sustainable business models for the delivery of mobile phone technology based advisory services that are effective in improving nutrition and agricultural outcomes.

mNutrition is primarily designed to use mobile phone-based technologies to increase the access of rural communities to nutrition and agriculture related information. The initiative aims to improve knowledge among rural farming communities especially women and support beneficial behaviour change as well as increasing demand for nutrition and agriculture extension services. The mNutrition initiative launched in September 2013 will work in 10 countries in Africa (Cote d'Ivoire, Ghana, Malawi, Mozambique, Nigeria, Tanzania, Kenya, Rwanda, Uganda, Zambia) and four countries in South Asia (Bangladesh, India, Pakistan and Sri Lanka). The desired impact of mNutrition will be improved nutrition, food security and livelihoods of the poor.

Mobile phone-based services have been endorsed by WHO as an effective strategy for behaviour change and for driving adherence to anti-retroviral treatment protocols (Horvath, Azman, Kennedy and Rutherford 2012). There is currently scant evidence on the impact and cost-effectiveness of mobile phone technology based services for nutrition and agriculture and on the sustainability of different business models for their provision. A rigorous evaluation of mobile phone technology based nutrition services would add significantly to the current evidence base. An external evaluation team managed by the Evaluator, independent of the programme delivery mechanism, will conduct an assessment of the impact, cost-effectiveness and sustainability of mobile phone technology based information and behaviour change messages for nutrition and agriculture.

Background to mNutrition

Introduction

Undernutrition is a major challenge to human and economic development globally. It is estimated that almost one billion people face hunger and are unable to get enough food to meet their dietary needs. Agriculture is a major source of livelihood in many poor countries and the sector has a potentially critical role in enhancing health, specifically maternal and child health and nutritional status. A well-developed agriculture sector will deliver increased and diversified farm outputs (crops, livestock, non-food products) and this may enhance food and nutrition security directly through increased access to and consumption of diverse food, or indirectly through greater profits to farmers and national wealth. Better nutrition and health of farmers fosters their agricultural and economic productivity. Current agricultural and health systems and policies are not meeting current and projected future global food, nutrition and health needs.

Despite major investment in agricultural and nutrition research and its uptake and application, there is significant social and geographic inequality in who benefits from these investments. Furthermore, in many developing countries, public extension systems for agriculture, health and nutrition are inefficient, have limited capacity and have a poor track record of delivery, especially in terms of supporting women and girls and the most marginalised populations (Alston, Wyatt, Pardey, Marra, and Chan-Kang 2000; Anderson 2007); IFPRI 2010; Van den Berg and Jiggins 2007).

Several research and mobile network operators (MNOs) are testing a range of information and communication technology (ICT) solutions for improving access to a wide range of information and advisory services. Mobile phone-based technologies are among the most promising ICT strategies, although current initiatives in nutrition are relatively small and fragmented.

What is mNutrition?

Enhancing access to the results of nutrition and agricultural research and development is potentially critical for improving the nutrition, health and livelihoods of smallholders and rural communities. mNutrition will harness the power of mobile phone-based technologies and the private sector to improve access to information on nutrition, health and agricultural practices especially for women and farmers (both male and female). Specifically, mNutrition will initiate new partnerships with business and science to deliver a range of services including:

- An open-access database of nutrition and agriculture messages for use in mobile phone-based communication (for example, information and behaviour change messages on practices and interventions that are known to have a direct impact on nutrition or an indirect impact via for example agriculture);
- A suite of mobile phone-based nutrition and agriculture information, extension and registration services designed to: improve knowledge and generate beneficial behaviour change in nutrition and agriculture; increase demand for nutrition, health and agriculture goods and services; register and identify target populations for support; and, using real-time monitoring, support the conduct of nutrition risk assessments by community health workers.

The impacts of mNutrition are expected to include improved nutrition, food security and livelihoods of the poor, especially women in 10 countries in Africa (Cote d'Ivoire, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Uganda and Zambia) and 4 countries in South Asia (Bangladesh, India, Pakistan and Sri Lanka). This impact will result from the increased scale and sustainability of mobile phone-based nutrition and agricultural-based information services, delivered through robust public private partnerships in each country.

mNutrition has two major outcomes. One outcome will be cost-effective, sustainable business models for mobile phone enabled nutrition and agriculture services to 3 million households in 10 countries in Africa and 4 countries in South Asia that can be replicated in other countries. Linked to this outcome, the second outcome will expect these services to result in new knowledge, behaviour change and adoption of new practices in the area of agriculture and nutrition practices among the subscribers of these mobile phone-based services.

These outcomes will be achieved through four outputs:

- Improved access to relevant mobile based health, nutrition and agricultural advisory services for 3 million poor people and community health workers across 10 SSA and 4 Asian countries;
- Launch and scaling of mobile phone-based health, nutrition and agricultural advisory services targeted to poor people and community health workers;
- Generation and dissemination of high quality research and evidence on the impact, cost-effectiveness and sustainability of mobile phone-based advisory services in nutrition and agriculture in South Asia and SSA; and
- Development of locally relevant content for mobile phone technology based agriculture and nutrition services meeting demands from subscribers and community health workers.

In terms of promoting behaviour change and/or adoption of new practices, mNutrition will seek to achieve changes in one or more of the following areas:

- Adoption of new agricultural practices that are nutrition sensitive, improve agricultural productivity and utilise post-harvest technologies
- Changes in nutrition practices in either one or several knowledge domains including improved maternal nutrition practices during pregnancies; infant and young child feeding practice; and micro-nutrient supplementation to children at risk (i.e. Vitamin A, Zinc and Oral Rehydration Solution (ORS)).

mNutrition has started implementation from September 2013. For the 2 countries selected for the impact evaluation (Tanzania and Ghana), mobile network operators and content providers have been identified through a competitive process during the first half of 2014. The MNOs and content providers started developing and launching their services during the 4th quarter of 2014 and early 2015. The mobile phone-based advisory services are expected to run at least till 3rd quarter of 2018.

mNutrition Project Coordination

DFID support to mNutrition will be channelled to GSMA, as well as directly to this associated independent external impact evaluation. GSMA is a global body that represents the interests of over 800 mobile operators. GSMA already works with the major mobile operators across Africa, (including Airtel, MTN, SafariCom/VodaCom) with a collective mobile footprint of more than 67% of total African

connections. GSMA has a number of existing development initiatives, including mHealth and mFarmer, that are part of GSMA's Mobile for Development which brings together mobile operator members, the wider mobile industry and the development community to drive commercial mobile services for underserved people in emerging markets. GSMA will provide technical assistance to mobile phone operators, and support new partnerships with content providers to develop and scale up new nutrition and agriculture message services. GSMA will ensure sharing of best practices and promote wider replication and uptake of effective business models.

Objective and Main Questions

The objective of this work is to conduct an external evaluation of the impacts and cost-effectiveness of the nutrition and agriculture advisory services provided by mNutrition compared to alternative advisory services available in the two selected countries (Ghana and Tanzania), with particular attention paid to gender and poverty issues. The impact assessment is required to answer the following questions that relate to impact, cost-effectiveness and commercial viability:

- What are the impacts and cost-effectiveness of mobile phone-based nutrition and agriculture services on nutrition, health and livelihood outcomes, especially among women, children and the extreme poor?
- How effective are mobile phone-based services in reaching, increasing the knowledge, and changing the behaviour, of the specific target groups?
- Has the process of adapting globally agreed messages to local contexts led to content which is relevant to the needs of children, women and poor farmers in their specific context?
- What factors make mobile phone-based services effective in promoting and achieving behaviour change (if observed) leading to improved nutrition and livelihood outcomes?
- How commercially viable are the different business models being employed at country level?
- What lessons can be learned about best practices in the design and implementation of mobile phone-based nutrition services to ensure a) behaviour change and b) continued private sector engagement in different countries?

Further evaluation questions related to other aims of mNutrition will be addressed in at least 1 country (either Ghana and/or Tanzania):

- Are mobile phone-based services a cost-effective way to register and identify at risk populations to target with nutrition support?
- Are mobile phone-based services a cost-effective way for community health workers to improve the quality and timeliness of data surveillance (a core set of nutrition-related indicators)?

The content for the mobile phone-based advisory services will be based on international best practices and widely endorsed protocols (i.e. by the World Health Organisation) and evidence-based nutrition-sensitive agricultural practices identified by international experts. Through an iterative multi-stakeholder process, international and country experts will localise and adapt the content to make it relevant to the specific target audience in the 14 countries. The adapted content and nature of messages is expected to vary across specific target audiences within and across countries. The main purpose of assessing the relevance of the content is not to evaluate the overall health and nutrition content but on how this content has been localised and adapted and to what extent the needs of the specific target groups within their particular context have been met.

In assessing the commercial viability, it is recognised that evaluating the sustainability/long-term financial viability of the mobile phone-based advisory services will be difficult as mobile network operators may not be willing to provide this potentially commercially sensitive information. Therefore, GSMA will provide support through its access to aggregated confidential financial results of the mobile network operators providing the service. GSMA will provide a financial summary report on the commercial viability of the business models without compromising the commercial sensitivity of the data for the mobile network operators. The evaluator will assess and validate commercial sustainability through an analysis of the aggregated information provided by GSMA and additional qualitative business analysis approaches.

The Evaluator has the option of proposing refinements of the existing evaluation questions during the inception phase as part of developing the research protocol. These suggestions will be considered by the Steering Committee and an independent peer review during the review of the research protocol as part of the inception phase.

Output

The output of this work will be new and robust evidence on the impact, cost-effectiveness and commercial viability of mobile phone-based advisory services focusing on nutrition and agriculture delivered by public and private partners, and including the development of robust methodological approaches to impact assessment of phone-based advisory services.

Recipient

The primary recipient of this work will be DFID, with the beneficiaries being GSMA, governments, international agencies, foundations, MNOs and other private companies and civil society involved in policies and programmes in nutrition and agriculture that are aimed at improving nutritional, health and agricultural outcomes. The findings of this impact evaluation are intended as global public goods.

Scope and timeline

The scope of this work is to:

- Develop a research protocol for the external evaluation of mNutrition;
- Design and undertake an external evaluation of mNutrition in two countries: Ghana and Tanzania;
- Contribute to the communication of the learning agenda, evaluation strategy and evaluation results.

The evaluation will be in two of the 14 mNutrition target countries; Ghana and Tanzania. These countries have been selected based on the phased start-up of mNutrition programme activities. The focus and approach in the two respective countries will be different allowing for a comparison of the effectiveness of approaches applied. In Tanzania, mNutrition will focus on mobile phone technology

based nutrition and health services and registration and identification of target population. In Ghana, the mobile phone technology will focus on nutrition and agriculture sensitive services.

In terms of coverage in number of people being targeted for these services, in total 3 million people will be reached through mNutrition; including 2 million for nutrition sensitive agriculture advisory messages in 4 Asian and at least 2 African countries and about 1 million beneficiaries for mobile phone-based nutrition services in 10 countries in SSA.

The evaluation contract period will be September 2014 to 31st December 2019. The development of the research protocol must be completed by month 4 for review and approval by DFID. Full details on tasks and deliverables are provided in sections below.

Statement on the design of the mNutrition evaluation

The evaluation design is expected to measure the impact, cost-effectiveness and commercial viability of mNutrition, using a mixed methods evaluation design and drawing on evidence from two case study countries and the M&E system of the programme. Overall, the proposed design should ensure that the evidence from the two case study countries has high internal validity and addresses the priority evidence gaps identified in the Business Case. Being able to judge the generalisability/replicability of lessons learned from the programme is of equal importance and so a credible approach to generalization and external validity will be an important component of the overall evaluation design. The final evaluation design and methodology to generate robust evidence will be discussed in detail with DFID and GSMA before implementation.

For assessing cost-effectiveness, the Evaluator will further fine-tune their proposed evaluation approach and outline their expectations in terms of data they will require from implementers. A theory based evaluation design, using mixed methods for evaluating the impact has been proposed. During the inception phase, the Evaluator will put forward a robust evaluation design for the quantitative work, either an experimental or a quasi-experimental method, with a clear outline of the strengths and limitations of the proposed method relative to alternatives. During the inception phase, the Evaluator is also expected to identify clearly what will be the implications of the design for implementers in terms of how the overall programme would be designed and implemented and for evidence to be collected in the programme's monitoring system. The Evaluator will also assess the degree to which it is realistic to assess impacts by early 2019 for a programme where implementation started mid 2015 and, if there are challenges, how these would be managed.

The Evaluator, in its 6 monthly reports, will be required to provide information to feed into the DFID Annual Review and Project Completion Report of mNutrition.

Gender and inclusiveness

The impact evaluation will pay particular attention to gender and other forms of social differentiation and poverty issues. From current experiences, it is clear that access to and use of mobile services

is differentiated along a range of factors, including gender, poverty, geographic marginalisation, education and illiteracy levels. Therefore, the impact evaluation will look at and analyse differentiated access to and potential utilisation of mobile phone-based services for improved nutrition and agricultural production. Based on the findings, it will identify opportunities and challenges in having an impact on women in general and more specifically the poor and the marginalised.

Tasks

The Evaluator will perform the following tasks:

A. Finalise a coherent and robust evaluation approach and methodology based on their proposal (inception phase)

- Conduct landscape analysis of existing experiences in mobile phone-based services for nutrition and agriculture based on available publications and grey project documents to identify additional critical lessons and priorities for evidence gathering and programme design and implementation;
- Ensure that gender issues and poverty issues are well integrated into the impact evaluation design;
- Develop robust sampling frameworks, core set of indicators and research protocols that allow the consistent measurement and comparison of impacts across study countries, taking into account differences in business models and programmes as needed;
- Work closely with mNutrition programme team in GSMA to familiarise them with impact assessment methodology, discuss evaluation approaches, identify and agree on data provided by programme monitoring system and possible modifications to design;
- Identify risks to the evaluation meeting its objectives and how these risks will be effectively managed;
- Review existing evaluation questions and if deemed relevant propose refinement of existing questions and/or add other questions;
- Prepare a research protocol, including an updated workplan, project milestones and budget. The research protocol will be subject to an independent peer review organised by DFID; and
- Develop a communication plan.

B. Implement and analyse evaluations of impact, cost-effectiveness and commercial viability in accordance with established best practices

- Based upon the agreed evaluation framework, develop and test appropriate evaluation instruments which are likely to include data collection forms for households, community health workers, service providers including health and agricultural services, content providers and private sector stakeholders including mobile network operators. Instruments will involve both quantitative and qualitative methods;
- Register studies on appropriate open access study registries and publish protocols of studies where appropriate;
- Conduct baselines and end-lines, qualitative assessments and business model assessments in both of the two impact evaluation countries;
- Conduct and analyse the evaluations and present findings in two well-structured reports addressing the evaluation questions. The reports should follow standard reporting guidelines as defined by, for example, the Equator Network. Primary findings should be clearly presented along

with a detailed analysis of the underlying reasons why the desired outcomes were/were not achieved;

- The Evaluating Organisation or Consortium may sub-contract the administration of surveys and data entry, but not the supervision of those tasks, study design, or data analysis; and
- The country-specific mixed methods evaluation reports, cost effectiveness and business models studies and final evaluation report will be subject to an independent peer review organised by DFID.

C. Contribute to the communication of the learning agenda, impact evaluation strategy, and evaluation results.

- Develop a communication plan outlining the main outputs and key audiences;
- Conduct lessons learnt workshops in each of the 2 impact evaluation countries and key dissemination events; and
- Assist in communicating the results of the evaluation and contribute to the development and communication of lessons learnt about mobile phone-based extension approaches in nutrition and agriculture.

Deliverables

The Evaluator will deliver the following outputs¹³:

During the design and study inception phase of maximum 4 months:

- A publishable landscape analysis report highlighting lessons learnt from existing initiatives on mobile phone-based advisory services related to nutrition and agriculture by month 4;
- A updated work plan with project milestones and budget by end of month 1 (possibly adjusted based on the approved research protocol by month 4);
- A communication plan outlining the key outputs, audience and timeline for review and approval by month 4; and
- A full research protocol by month 4 for review and approval. The research protocol should be registered with appropriate open access study registries;

Interim reports:

- 4 biannual progress reports for the External Evaluation as a whole, and for each country evaluation, against milestones set out in the workplan;
 - Two desk reviews submitted by June 2016
 - Two Baseline quantitative reports submitted by April 2017
 - Two Baseline qualitative reports submitted by February 2017
 - Two Cost-effectiveness reports 1 submitted by March 2017

¹³ The exact timeframe of deliverables will be agreed upon during the design phase as appropriate.

- Two Business Model reports 1 submitted by March 2017
- Two Mixed Methods Baseline reports completed by September 2017
- Two Midline qualitative reports submitted by March 2018
- All survey data collected during the evaluation provided in a suitable format to DFID for public release.

At project's end:

- Two Endline quantitative reports submitted by June 2019
- Two Endline qualitative reports submitted by August 2019
- Two Cost-effectiveness report 2 submitted by July 2019
- Two Business Model report 2 submitted by July 2019
- Two Evaluation reports submitted by October 2019
- At least 1 article, based on the findings from the country evaluation reports, published in a research journal;
- A shared lesson learnt paper published and at least one presentation highlighting key lessons for similar initiatives of promoting mobile based technologies for providing extension services and the promotion of uptake of technologies by December 2019.

Research protocol and all final reports will be independently peer reviewed. This will be organised by DFID. Outputs are expected to be of sufficiently quality so that a synthesis of findings can be published in a leading peer-reviewed journal.

Coordination and reporting requirements

A mNutrition Advisory Group (AG) will be established for the programme which will a) provide technical oversight and b) maximise the effectiveness of the programme. The Advisory Group will meet on a bi-annual basis and comprises of representatives of DFID, NORAD and GSMA representatives and independent technical experts. The Evaluator will be managed by DFID on behalf of the mNutrition Advisory Group. The Evaluator will work closely with the mNutrition programme team in GSMA and its specific country implementing partners. The Evaluator will:

- Ensure coherence and lesson learning across all pilot impact assessments on the key evaluation questions and indicators identified.
- Incorporate a clear code of ethics; incorporate plans for open access publications and public access to data sets.

The Evaluator will work closely with the mNutrition project management team, in particular in the design of the overall evaluation framework and the evaluation plan for the specific project components and the countries selected for the evaluation. Collaboration and regular communication between Evaluator and mNutrition project management team and implementing partners in selected case study countries is crucial as the evaluation design may have implications for project implementation and vice versa. The mNutrition project management team will lend support in communication as requested by the Evaluator or the Advisory Group. The Evaluator will report directly to DFID who will manage the evaluation on behalf of the mNutrition Advisory Group. The main point of contact for technical matters is Louise Horner, Livelihoods Adviser and Hugh McGhie,

Deputy Programme Manager for all other project related issues. The mNutrition Advisory Group will be the arbiter of any disputes between the evaluation function and the overall programme implementation.

At the end of each 6 months, the Evaluator will submit a brief report outlining key achievements against the agreed deliverables. Pre-agreed funding will then be released provided that deliverables have been achieved.

In addition to the 6 monthly reports outlined above, the Evaluator will provide information to feed into the DFID Annual Review of mNutrition. The 6 monthly reports will be a key source of information used to undertake the Annual Review and Project Completion Report for the programme. These reviews will be led by the Livelihoods Adviser and Deputy Programme Manager, in consultation with the mNutrition AG. All reviews will be made available publicly in line with HMG Transparency and Accountability Requirements.

Mandatory financial reports include an annual forecast of expenditure (the budget) disaggregated monthly in accordance with DFID's financial year April to March. This should be updated at least every quarter and any significant deviations from the forecast notified to DFID immediately. In addition the Evaluator will be required to provide annual audited statements for the duration of the contract.

Contractual Arrangements

The contract starts in September 2014 and will run till end of December 2019 subject to satisfactory performance as determined through DFID's Annual Review process. Progression is subject to the outcome of this review, strong performance and agreement to any revised work plans or budgets (if revisions are deemed appropriate).

A formal break clause in the contract is included at the end of the inception period. Progression to the implementation phase will be dependent on strong performance by the Evaluator during the inception period and delivery of all inception outputs, including a revised proposal for implementation period. Costs for implementation are expected to remain in line with what has been agreed upon for this contract, with costs such as fee rates fixed for contract duration. DFID reserves the right to terminate the contract after the inception phase if it cannot reach agreement on the activities, staffing, budget and timelines for the implementation phase.

DFID reserves the right to scale back or discontinue this assignment at any point (in line with our Terms and Conditions) if it is not achieving the results anticipated. The Evaluator will be remunerated on a milestone payment basis. DFID has agreed an output based payment plan for this contract, where payment will be explicitly linked to the Evaluator's performance and effective delivery of

programme outputs as set out in the ToR and approved workplan. The payment plan for the implementation phase will be finalised during the inception period.

Open Access

The Evaluator will comply with DFID's Enhanced and [Open Access Policy](#). Where appropriate the costs of complying with our open access policy should be clearly identified within your commercial proposal.

Branding

The public has an expectation and right to know what is funded with public money. It is expected that all research outputs will acknowledge DFID support in a way that is clear, explicit and which fully complies with DFID Branding Guidance. This will include ensuring that all publications acknowledge DFID's support. If press releases on work which arises wholly or mainly from the project are planned this should be in collaboration with DFID's Communications Department.

Duty of Care

The Evaluator is responsible for the safety and well-being of their Personnel (as defined in Section 2 of the Contract) and Third Parties affected by their activities under this contract, including appropriate security arrangements. The Evaluator is responsible for the provision of suitable security arrangements for their domestic and business property. DFID will share available information with the Evaluator on security status and developments in-country where appropriate.

The Evaluator is responsible for ensuring appropriate safety and security briefings for all of their Personnel working under this contract and ensuring that their Personnel register and receive briefing as outlined above. Travel advice is also available on the FCO website and the Evaluator must ensure they (and their Personnel) are up to date with the latest position.

The Evaluator has confirmed that:

- The Evaluator fully accepts responsibility for Security and Duty of Care.
- The Evaluator understands the potential risks and have the knowledge and experience to develop an effective risk plan.
- The Evaluator has the capability to manage their Duty of Care responsibilities throughout the life of the contract.

Annex C Timeline for the mNutrition impact evaluation

ACTIVITY	2016					2017					2018					2019												
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
QUANTITATIVE COMPONENT																												
Baseline survey																												
Endline survey																												
QUALITATIVE COMPONENT																												
Baseline data collection																												
Midline data collection																												
Endline data collection																												
BUSINESS MODEL & COST EFFECTIVENESS COMPONENT																												
Phase 1 stakeholder interviews & data collection																												
Phase 2 stakeholder interviews & data collection																												
MIXED METHODS																												
Mixed methods report																												
Mixed methods final report																												

Annex D Detailed description of the entire qualitative sample for the midline

Status of mother/ age of child	Husband & wife get messages	WN plus mNutrition sent to mother's phone	Age of focus woman	No. of children at baseline	Marital status	Notes after contacting treatment household	Type of interview conducted
Ugawachanya (typical site)							
Pregnant	No	yes	23	3	married	Mother receives messages	IDI mother
Pregnant	No	yes	29	3	married (polygamous)	Household not traceable as moved away	No interview
Pregnant	No	yes	38	1	married	The phone number was wrongly recorded at sign up so never received messages.	No interview
Pregnant	No	yes	28	0	unmarried	Mother receives messages	IDI mother; IDI father whose partner receives sms
Pregnant	No	yes	20	0	married	She never received messages (and child died at birth)	No interview
Pregnant	No	yes	26	5	married	Mother receives messages	IDI mother
1 month old	No	yes	37	6	married	Mother received messages around three times at the start in January and then they stopped, however she is still using same phone number	IDI mother
6 month old	No	No	22	1	married (polygamous)	Father receives message on behalf of wife	IDI father; IDI mother
1 month old	No	Yes	19	1	married	Mother still receives message but as she gave her phone to her mother she rarely sees message	IDI mother

6 month old	No	No	34	4	married	Father has never received a message	No interview
11 month old	No	yes	23	1	married	Mother still receive messages	IDI mother
10 month old	No	no	22	1	married	Father never received a message	No interview
2 month old	No	yes	23	2	married	Mother never received a message	No interview
4 month old	No	yes	20	1	married	Mother received messages until July (and then lost phone)	IDI mother
5 month old	No	yes	29	2	married (polygamous)	Mother received messages for a short time only	IDI mother, IDI father whose partners get sms
12 month old	No	yes	25	3	married	Mother receives messages	IDI mother, IDI father whose partners get sms
2 month old	No	yes	27	2	married	Mother received three messages only	IDI mother
5 month old	No	Yes				Mother receives messages	IDI mother

Bolira (typical site)							
Pregnant	No	yes	19	0	married (poly)	Father has never received a message	No interview
Pregnant	No	no	26	0	married	Mother has never received a message	No interview
Pregnant	Yes	yes	42	3	married	She received messages until last September. Father is not sure whether he receives messages or not because he never reads any messages coming from a number starting with '15...'	FGD mother
Pregnant	Yes	yes	23	0	married	Mother receives messages. Father has never received a message	FGD mother, IDI father
3 month old	No	yes	26	1	married	Mother received messages until September but she no longer receives them as she has changed her number.	FGD mother, IDI father
3 month old	No	yes	22	2	unmarried	Mother has never received a message	No interview
4 month old	Yes	yes	25	4	married	Mother provided father's telephone number only. Father receives messages	IDI father; IDI mother
3 month old	No	no	21	1	unmarried	Father has only received one message and then lost phone.	No interview
2 month old	No	yes	24	2	married	Father has never received a message	No interview
2 month old	No	no	24	2	married	Father receives messages, mother absent	IDI father

4 month old	Yes	yes	32	3	married	Father received last message in September, mother is travelling	IDI father
11 month old	No	no	24	2	married (poly)	HH moved to another district, this number is not available	No interview
4 month old	No	yes	26	1	married	Mother receives messages	FGD mother; IDI father whose partner receives message
11 month old	No	yes	20	1	unmarried	Mother received messages until last August and then changed number	FGD mother
7 month old	No	no	20	1	unmarried	Father has never received a message	No interview
Pregnant	No	yes	24	0	married	Father receives messages on behalf of wife. Last message received last year May	IDI father; IDI mother
2 month old	No	yes	24	1	married	HH moved to another district, this number is not available	No interview

Lomola (typical site)							
Pregnant	No	yes	27	1	married (poly)	Mother has never received messages	No interview
Pregnant	No	yes	21	0	unmarried	Mother received messages, but they stopped 4 months ago	IDI mother
Pregnant	No	yes	18	0	unmarried	Mother has never received messages	No interview
Pregnant	No	yes	29	0	unmarried	Mother receives messages	IDI mother
Pregnant	Yes	yes	18	1	unmarried	Mother and grandfather were receiving messages but now only grandfather receives messages, grandfather does not want to be interviewed as he does not engage with messages	FGD mother
10 month old	No	yes	28	4	separated	Father has never received a message	No interview
5 month old	No	no	35	5	married	Refused to be interviewed as busy with work	No interview
5 month old	No	yes	23	1	married	HH moved to another district	No interview
5 month old	No	yes	25	1	unmarried	Mother receives messages	FGD mother
9 month old	No	yes	26	2	married	Mother receives messages	FGD mother; FGD father whose partner receives messages
1 month old	No	yes	23	1	married	Mother receives messages	FGD mother, FGD father whose partner receives messages
12 month old	No	yes	23	1	married	Father receives messages and shares with his wife.	FGD father; IDI mother
2 month old	No	no	36	3	married	Father receives messages on behalf of wife	FGD mother, FGD father

7 month old	No	yes	25	2	unmarried	Mother has never received messages	No interview
2 month old	Yes	yes	33	3	married	Mother and father receive messages. Father severely ill and can't be interviewed	IDI mother
Pregnant	No	no	25	0	married	Father received messages until his wife delivered the baby then messages stopped	IDI father; IDI mother
1 month old	Yes	yes	22	1	married	Father received messages until September last year. Wife not available for interview	IDI father
8 month old	No	yes	29	3	married	Father receives messages on behalf of wife. Father is currently travelling and not available for interview F	FGD mother

Erula (Extreme Site)							
Pregnant	No	Yes	31	4	married	She still uses the same number but has never received a WN sms	No interview
Pregnant	No	No	29	0	married	Father receives messages on behalf of wife, but messages stopped after birth. Father absent and not available for interview	IDI mother
Pregnant	No	No	38	0	married	Father receives messages. Mother left community to care for her sick father	IDI father
Pregnant	Yes	Yes	25	0	married	Both father and mother received message but they have stopped.	IDI father; IDI mother
1 month old	No	Yes	19	2	married	Both father and mother receive messages	IDI father; IDI mother
2 month old	No	Yes	23	4	married	Never received messages	No interview
9 month old	No	No	33	3	married	Father receive messages on behalf of his wife but messages have stopped; he also divorced wife and married new wife	IDI father
11 month old	No	yes	37	0	married	Mothers receives messages	IDI mother
1 month old	No	yes	21	2	married	Father never received a message	No interview
4 month old	No	No	34	3	married	Never received a message	No interview
5 month old	No	yes	30	0	married	Mother received messages but they have stopped as she lost phone	IDI mother
2 month old	No	No	16	0	unmarried	Never received messages	No interview

10 month old	No	yes	21	0	unmarried	Never received any messages	No interview
6 month old	No	No	19	1	married	They still use the same number but have never received messages	No interview
11 month old	No	No	28	0	unmarried	Father receives messages on behalf of mother	IDI father; IDI mother
Pregnant	Yes	yes	30	4	married	Both father and mother receive messages	IDI father; IDI mother
2 month old	No	No	42	2	married	Father never received message	No interview

Annex E Midline topic guides

E.1 Topic guide for in-depth interview with mothers who have received mNutrition messages (directly or via sharing)

Purpose:

- Likes/dislikes about the mNutrition messages
- Factors which make it easier/harder for messages to be taken up (e.g. technical, individual, household-level perspective).
- Barriers to/facilitators of the translation of the mNutrition messages into practice (e.g. intra-, interpersonal, community factors)

Sample: All mothers who were registered for mNutrition during baseline and who Deo confirmed have received at least one mNutrition text message (not including welcome) either on their own phone or on their husband's phone. Deo will give you the names, but please confirm whether women have received at least one message before starting the interview.

Location: Household or other convenient place

Time for the interview: Approximately 60-75 minutes

Instructions:

Thank the female respondent for taking part in the study and explain that you are part of a research team.

Explain that she/her household has been receiving free text messages that contain health and nutrition information for several months now. This service is called mNutrition provided by Wazazi Nipendeni. Please ask the mother to confirm this. If she has the phone with her, check that we are talking about the right messages by checking on their phone and looking for 15001 messages. Use this to verify we are talking about the right messages.

Say that the aim of the interview is to find out what she thinks about the health and nutrition Wazazi text messages (e.g. what she likes/dislikes about the messages; what other family members/friends think about the messages; whether she changed any of her behaviours because of the messages; how the messages could be made more useful). Say that you are particularly interested in what she thinks about the nutrition messages.

Explain that everything she says will be treated as confidential, will not be shared with other people in their village or household and that you will not use her real name. Explain to her that her participation is voluntary, and she can stop anytime and withdraw her data at any time.

Tell her the discussion will take around 60-75 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with her. Ask whether she has any questions.

Be aware that the question about child feeding might be sensitive and women might easily feel judged as 'not being a good mother' when they don't follow certain infant and young child feeding recommendations (e.g. breastfeeding practices) or do not have the correct knowledge. Be neutral and do not judge. There are many reasons why mothers might not be able to follow the recommendations.

Registry:

Please complete the registry provided on a separate sheet that should look like the one below. Ask participants to sign to confirm their consent.

Name (check that this is the same name provided to you by Deo)	When (approx.) did she/her household receive the first health and nutrition message (month/year)	Does she get the messages on her own phone or someone else's phone (specify)
Age of her youngest child (in months)	Date of the interview and start time	Village name
Whether this is her first child (yes/no)	Specify whether she has a mobile phone or phone with internet access/WhatsApp	How often on average (per week) does she receive the mNutrition messages

Interviewer should ask all the questions in bold. If the interviewee doesn't say anything in response to the she has given a full answer to the question above, this isn't necessary

Warm-up

Small talk – build a rapport (e.g. about village, her children). Find out whether she is married/living with partner.

1. Perceived value of the mNutrition messages

1. Why did you/your household agree to sign up for the mNutrition text messages on health and nutrition last year? (The answers might be very short here – that's fine.)

- What did you expect from the messages?
- Who made the decision to sign up? (Mother, father, together?)
- Were you influenced by a relative or neighbour to sign up for the messages?

Kwanini wewe/kaya yako mliamua kujiunga na huduma ya kupokea meseji za lishe mwaka jana?

- Ulitarajia nini kutoka kwenye jumbe hizo
- Ni nani alifanya maamuzi ya kujiunga na jumbe hizo (Mama, baba, wote kwa pamoja?)
- Je, ulipata ushawishi kutoka kwa ndugu au jirani kuhusu kujiunga na meseji hizi?

2. Can you describe the way you access these messages on the phone

- SIM card swap, reception
- If the husband gets the messages, does he always share them?
- Do you have to ask for them?

-
- Is there a time delay between your husband getting them and him sharing the messages (e.g. if he is at work during the week)?

Je, unaweza kuelezea namna unavyopata meseji hizi kupitia simu ya mkononi?

- Kubadili line za simu, upatikanaji wa mtandao
- Kama mume wako ndiye hupokea meseji hizi, je huwa anakuonyesha mara kwa mara.
- Je, huwa unaomba kuona meseji hizo?
- Je, kuna uchelewaji wa meseji hizi kutoka kwa mumeo mpaka kukufikia wewe (mf. Mume akiwa kazini juma zima)

3. How often do you/your household have problems with your phone which might prevent you getting messages and what kind of connectivity problems do you experience?

- No electricity to charge phone
- No battery/charge
- Use of different SIM cards and therefore miss messages
- Network coverage is poor
- Phone is broken/stolen/lost

Je, ni mara ngapi wewe au kaya yako inapata matatizo ya simu yanayoweza kuzuia upokeaji wa meseji, je ni matatizo gani mnayokumbana nayo?

- Hakuna umeme wa kuchaji simu
- Matatizo ya batri
- Kuwa na line zaidi ya moja-uwezekano wa kukosa jumbe
- Mtandao mbovu
- Simu kuaribika/kuibiwa/kupotea

4. If you stopped receiving messages at some point, why do you think this happened?

Explore perception around needing airtime to get the messages, and of impact of gaps in service on perception of reliability

- I unsubscribed

Kama uliacha kupokea meseji hizo wakati flani, unadhani ni kwanini hii ilitokea?

- Nilijitoa kwenye huduma

5. Do you normally read these messages in full or do you just read part of them? If not, why? Do you think about these messages later or just quickly read and forget about them?

Explore level of engagement with content

Je, huwa unasoma meseji hizi hadi mwisho au huwa unaishia katikati? Kama ni Hapana, kwanini?. Je, huwa unazitafakari meseji hizi baada ya kuzisoma au huwa unasoma na kuachana nazo.

6. What do you do with the mNutrition text messages on health and nutrition after you read them?

- Delete. Why? Is it because you ran out of space on your phone?

- Keep them/some of them. Why? (e.g. to re-read them)
- Share the messages with others. Who? Why? (e.g. showing/forwarding the message to others)
- Tell others about the information in the messages. Who? Why?
- Do you seek more information from a community health worker?

Je, huwa unazifanyia nini meseji hizo za afya na lishe baada ya kuzisoma?

- Huwa nazifuta, kwanini? Ni kwasababu simu yangu ina nafasi ndogo ya kuifadhi meseji?
- Nazihifadhi/baadhi ya meseji. Kwanini (mf. Ili kurudia kuzisoma)
- Kushirikisha wengine. Akina nani? Kwanini? (Mf; kuwaonesha/kuwatumia meseji hizi wengine)
- Kuwaambia wengine kuhusiana na taarifa zilizopo kwenye meseji hizo. Akina nani? Kwanini?
- Je, huwa unatafta taarifa za ziada kutoka kwa muhudumu wa afya wa jamii?

7. In your opinion, how useful and relevant is the nutrition information in the mNutrition text messages for you?

You do not need to ask about all categories of messages in detail. Encourage the mother to identify the category/ies she found most useful (or not useful) and then enquire why.

- Messages were overall useful/not useful at all: ask why?
- What messages did you find particularly useful (e.g. messages about nutrition during pregnancy, breastfeeding, young child feeding, general health and nutrition advice, family planning) Why?
- Can you give me an example of how you used this information?

Kwa maoni yako, ni kwa kiasi gani taarifa za lishe unazozipata kupitia meseji zina umuhimu kwako?

- Kwa ujumla meseji zilikuwa na umuhimu/hazikuwa na umuhimu kabisa; Uliza kwanini?
- Ni aina gani za meseji uliona zina umuhimu? (Mf. Meseji kuhusu lishe wakati wa ujauzito, unyonyeshaji, ulishaji wa mtoto mdogo, afya kwa ujumla na ushauri wa lishe) Kwanini?
- Je, unaweza kutoa mfano kwa jinsi ulivyokuwa unazitumia taarifa hizo?

8. Why did you like or dislike the messages?

- Novelty: You learn something new/you knew most of the information already. Ask for examples.
- If she knew most of the information ask from where and whether she still found the messages useful? Why (e.g. reminder)?
- Relevant to personal situation: Information was relevant to your personal situation/was not relevant.
- Realistic: What problems did you encounter when you tried to follow the advice (e.g. time, effort, working mums)

Ni kwanini ulipenda au hukupenda meseji hizo?

- Upya: Kujifunza kitu kipya/tayari ulijua taarifa nyingi. Ulizia mifano.
- Kama alikuwa anajua taarifa nyingi, muulize alizijulia wapi, na kama bado anaona umuhimu wa meseji hizo? Kwanini (mf. Kukumbushwa)?

- **Kwendana na hali binafsi:** Taarifa hizi zilikuwa zinaendana na hali yako binafsi au haziendani. Kwanini? Kwanini hapana?
- **Uhalisisa:** Ni changamoto gani ulizokutana nazo ulipojaribu kufuatilia ushauri (mf. Muda, jitihada, akina mama wanaofanya kazi) kwanini hapana?

9. **In general, how well do you think the messages address your specific and changing needs related to nutrition and child care?**

Do you receive messages with information that is relevant to you as regards your child's stage of growth/pregnancy.

- Ask for examples where the messages were well adapted to the mothers needs and where they were not.
- Ask respondent to explain why, in their view, the messages were or were not well adapted (e.g. not at right stage of pregnancy).

Kwa ujumla, unafikiri meseji hizi zinaelezea matakwa/mahitaji yako yanayohusiana na lishe na utunzaji wa mtoto. Je unapokea meseji zenye taarifa zinaendana na hatua ya ukuaji wa mtoto/ujauzito.

- Hapa omba mifano ya meseji ambazo zilizokuwa zinaendana au haziendani na hali yake. Na aeleze kwanini zilikuwa zinaendana au haziendani.

10. **Do you trust the information in the messages? Why/why not?**

Potential mistrust of mobile phone companies came up in baseline so this might be influential.

- **Perceptions about the author/sender:** Who do they think is sending the messages (MNO, government)? Does this influence whether they believe them or not?
- **Perceptions about text messages as delivery channel:** Would you trust a different delivery channel more? (e.g. radio, health worker) Why?

Je, unaamini taarifa zinazotoka kwenye meseji hizo? Kwanini/ Kanini hapana?

- **Mitazamo kuhusu muandishi/mtumaji:** Je, Unafikiri ni nani anatuma hizo meseji (makampuni ya simu, serikali), Je chanzo/vyanzo hivi vina ushawishi namna unavyoziamini au kutoziamini meseji hizi.
- **Mitazamo kuhusu njia za upokeaji jumbe hizi:** Je, utaamini njia tofauti ya kupokea meseji? (Mf. Radio, muhudumu wa afya) Kwanini?

2. Barriers to/enablers of uptake of mNutrition messages

11. **How does your partner/husband and other family members/friends/work colleagues feel about the text messages?**

Make sure you are distinguishing between responses from different people in the person's life – friends, husband, etc

- What was the reaction of the various people in your life to you receiving these messages? How does their response influence you ? (e.g. trust more/less)
- Do you discuss the content of the messages with them? Why?
- Do you keep the messages and share message with them/show messages to them? Why?
- Have you ever quarrelled about the messages with them? Why?

Je, mwenza wako na wanafamilia wengine/marafiki/wafanyakazi wenzako wanajisikiaje kuhusu meseji hizo?

- Je watu waliokuzunguka walichukuliaje wewe kupokea meseji hizo? Je, mtazamo wao ulikushawishi vipi? (Mf: Kuamini Zaidi au kiasi)
- Je, huwa unajadili maudhui ya meseji hizi na watu hao? Kwanini
- Je, huwa unatunza meseji na kuwashirikisha/kuwaonesha meseji hizo? Kwanini?
- Je umewahi kutofautiana nao kuhusiana na meseji hizo? Kwanini?

12. Have you ever discussed the information in the mNutrition text messages with a community health worker or health facility worker? Why?

- What did they say? Do they agree, reinforce or contradict the messages? (Check if the two health workers contradict one another).
- How does their response to the mNutrition messages influence you? (e.g. trust more/less)

Je, umewahi kujadili taarifa zinazohusiana na meseji za lishe na muhudumu wa afya ya jamii au muhudumu wa kituo cha afya? Kwanini?

- Walisemaje? Je walikubali, walitilia mkazo au kukuchanganya kuhusu meseji hizi (angalia kama wahudumu wa afya walitoa taarifa zinazotofautiana)
- Ni kwa namna gani mwikio wao ulikushawishi kuhusu zile meseji (mf. Kuamini Zaidi au kidogo)?

3. Experience with/influence on behaviour change

INTRODUCTION: I would now like to ask whether you have tried anything/have done anything differently because of the information in the mNutrition text messages.

You do not need to ask about all categories of messages in detail. Encourage the participant to tell you about what she tried to do differently and then ask detailed questions depending on the category of messages she chose.

13. Have you followed any of the advice that you got in the text messages and changed your behaviour?

Refer to earlier answers to make sure you are probing the right topics related to age of child; e.g. nutrition during pregnancy, breastfeeding, young child feeding, information on other child health and nutrition topics, family planning

- Why did you decide to try the advice given in the text message? What motivated you? Was there anything that prompted you to change? (e.g. heard the information from different sources, you/your child did not feel well)?
- What, if any, problems have you encountered when trying to do something differently?
 - Belief in own abilities: How confident were you about it? How easy or difficult did you find it?
 - Knowledge: Did you feel the message provided enough information about the issue? Why not? What did you do? (e.g. ask others, access other information sources)
 - Social influences: How did views/opinions/expectations of your husband/family/friends influence you? To what extent?

-
- Access to resources: In what way did your personal circumstances influence you (e.g. access to food or services, demands on your time, pressures of working life, poverty)

Je, umewahi kufuata ushauri wowote ule ulioupata kutoka kwenye mesiji hizo na kubadili mwenendo wa tabia?

- Kwanini ulijaribu kufuata ushauri uliopokea kutoka kwenye meseji hizo? Kipi kilikuhamasisha? Kuna chochote kilichokufanya ukabadalika? (Mf. Kusikia taarifa kutoka vyanzo vingine, wewe au mwanao alikuwa hajisikii vizuri)?
- Je, kuna tatizo lolote ulilowahi kukutana nalo wakati unajaribu kufuata ushauri wa zile meseji)
 - Imani katika uwezo wako: Je ni kwa kiasi gani ulikuwa unajiamini? Ulipata wepesi au ugumu kiasi gani?
 - Uelewa: Je, ulihisi meseji ilikuwa na taarifa ya kutosha kuhusu swala hilo? Kwanini? Kwanini hapana? Ulifanya nini (Mf. Kuuliza wengine, kupata taarifa kutoka vyanzo vingine)?
 - Ushawishi wa kijamii: Je ni kwa namna gani maoni/mtazamo/matarajio ya mwenza wako/familia/marafiki yalikushawishi? Ni kwa kiasi gani?
 - Upatikanaji wa rasilimali: Ni kwa namna gani hali yako binafsi ilikushawishi? (Mf. Upatikanaji wa chakula au huduma, upatikanaji wa muda, msukumo wa mazingira ya kazi, umasikini)

14. Did you receive any support in trying to follow the advice in the messages? What/who helped you to try something different and how long did you try it for?

- What consequences of applying these changes have you experienced? Ask about positive and negative, short- and long-term consequences
- How long did you do things differently for? Why did you carry on or stop? (maintenance of change). Use example of dad who changed what he was feeding his baby

Je, ulipata msaada wowote ulipokuwa unajaribu kufuatilia ushauri wa hizo meseji. Nini/Nani alikusaidia wakati unajaribu kufuata maudhui ya zile meseji, na kwa muda gani ulijaribu kufanya hivyo?

- Je, ni matokeo gani ya kutumia mabadiliko haya uliyoyaona? Uliza kuhusu matokeo hasi na chanya, ya muda mfupi na ya muda mrefu.
- Ni kwa muda gani ulifanya vitu tofauti? Kwanini uliendelea/uliacha? (kuendelea na mabadiliko). Tumia mfano wa baba aliye badilisha uji wa lishe.

5. Exploration of specific theories related to influence of the mobile phone on behaviour change

THESE ARE INTENDED TO BE LEADING QUESTIONS AND MUST BE COVERED.

15. Do you think the fact that the nutrition information is sent via your/your husband's mobile phone has an impact on the likelihood of you changing your behaviour compared to information you get from other sources such as radio, health worker? Why or why not?

If they have already talked about the information channel you can scrap this.

- Does it influence your health behaviour and practices in response to the information? (e.g. are you more likely to change your behaviour based on information you get via the mobile phone than via radio? Via health worker? Why/why not?)

Je, taarifa za lishe zinazotumwa kupitia simu ina mchango wowote katika uwezekano wa kubadili tabia yako ukilinganisha na taarifa unazozipata kutoka kwenye vyanzo vingine? (mf: redio, muhudumu wa afya) Kwanini au kwanini hapana.

- Je hii inashawishi tabia na mienendo yako ya kiafya kuzingatia taarifa hizi? (Mf. Uko tayari kubadilika kulingana na taarifa unazozipokea kupitia kwenye simu kuliko kupitia redio? Kupitia muhudumu wa afya? Kwanini/kwanini hapana?)

16. Do you feel that the fact that you can read the messages in private on your mobile phone and that they are tailored has an impact on what you do with the information? Why or why not?

Here we are keen to find out whether private, personalised messages have more of an impact than public messages such as radio shows.

- Does it influence how you behave in response to the information? (e.g. are you more likely to change your behaviour based on information you get via the mobile phone than via radio, health worker, family or friends? Why/why not?)

Je, unadhani ukiweza kusoma meseji zinazokulenga wewe kupitia simu yako binafsi, itachangia kwa kile unachokifanya kutokana na taarifa ile? Kwanini au kwanini hapana?

- Je, taarifa hizi zinachangia namna unavyo ishi (mf. Kuna uwezekano wa wewe kubadili tabia kutokana na taarifa unazozipata kupitia simu ya mkononi kuliko redio, muhudumu wa afya, mwanafamilia and marafiki? Kwanini/kwanini hapana?)

17. Do you think that the fact that you cannot respond to the mNutrition text messages or ask follow-up questions has an impact on what you do with the information?

- Does it influence how you behave in response to the information? How?
- Would you prefer to be able to respond and ask for clarification or more information? Why or why not?

Je, unadhani wewe kutoweza kujibu meseji hizi za lishe au kuuliza maswali ina athari juu ya namna unavyotumia taarifa hizi?

- Je, kutoweza kujibu kunachangia jinsi unavyotumia taarifa hizi? Kivipi?
- Je, ungependa kuwe na uwezekano wa kujibu, kuuliza na kupata taarifa zaidi? Kwanini/kwanini hapana?

6. Ideas for improvement of mNutrition

18. How could mNutrition text messages be improved?

Ask about the content of the information and the delivery via text messages

- Would you prefer a different format? Why? Which ones? (e.g. WhatsApp, in person)
- A free hotline for additional advice?
- Would you like to be able to respond to the messages or discuss their content with a health worker?

Je, ni kwa namna gani meseji hizi za lishe zinaweza kuboreshwa? (Uliza kuhusu maudhui ya meseji hizi na namna zinavyofika kupitia meseji mf. Muda wa kupokea, urefu wa sms, namba inayotuma n.k)

- Je, wangependelea kuzipokea kwa njia nyingine? Kwanini, njia zipi? (Mf;whatsapp, kuambiwa na mtu binafsi)
- Simu ya bure kwa ushauri Zaidi.
- Je, ungependa kuwa na uwezo wa kujibu meseji au kujadili maudhui (ujumbe) na muhudumu wa afya.

19. Suppose the current mNutrition SMS service was available in future for a small fee – would you pay for it? If so, how much would you be willing to pay per month for this service? Would you be willing to pay for voice-based messages?

- Explore perceptions on whether there are costs involved in receiving the current messages

Kwa mfano huduma ya meseji hizi za lishe zikipatikana baadae kwa gharama ndogo, Je utaweza kulipia? Kama ndivyo, uko tayari kulipia kiasi gani kwa mwezi? Je utakuwa tayari kulipia meseji za ujumbe wa sauti?

- Dadisi kuhusu mitazamo kama kungekuwa na gharama zilizohusika katika kupokea meseji hizi.

7. Final checklist before closing interview

Instructions for interviewers: Please use the below list as a checklist to ensure that no important questions were missed. Don't skip any questions in this section if they haven't already been covered previously in the interview. These questions aim to explore the context, mechanism and outcome of the messages. If these themes have already come up, they can be skipped.

20. Factors that affect usefulness of messages

- Access to health workers
- Feelings about the advice you get from your health worker
- Feelings about the advice you get from your family/friends
- Whether you get enough information about maternal and child nutrition.
- The information in the messages repeats something you have heard before
- The time you have to look for information on child nutrition

Sababu zinazo athiri matumizi ya jumbe za lishe

- Upatikanaji wa wahudumu wa afya.
- Hisia juu ya ushauri wanaoupata kutoka kwa muhudumu wa afya.
- Hisia juu ya ushauri wanaoupata kutoka kwa familia au marafiki.
- Kama unapata taarifa za kutosha kuhusu lishe ya mjamzito, mama anaye nyonyesha na mtoto mdogo
- Taarifa za kwenye meseji zinarudia kitu ambacho niliwahi kusikia kabla.
- Muda ulionao kutafuta taarifa za lishe ya mtoto.

Thank you. Do you have any questions or suggestions?

E.2 Topic guide for in-depth interview with fathers for households where both men and women own phones and both receive mNutrition messages

Purpose:

- Assess spousal interactions about the messages
- Assess father's beliefs/perceptions about the messages
- Assess father's role in potential changes in behaviour

Sample: All fathers in the treatment group who receive the messages in parallel to their wives (i.e. both receive the messages on their personal mobile phone). Determine whether father received the messages. If not, please call Deo and ask him to replace the household with the next household on the list.

Location: Household or other convenient location

Time for the interview: Approximately 45-60 minutes

Instructions:

Thank the father for taking part in the study and explain that you are part of a research team.

Explain that he and his wife have been receiving free text messages that contain health and nutrition information for several months now. This service is called mNutrition provided by Wazazi Nipendeni. Please ask him to confirm this. If he has the phone on him, please check that we are talking about the right messages by checking his phone and looking for 15001 messages. Use this to verify we are talking about the right messages.

Say that the aim of the interview is to find out what he thinks about the health and nutrition Wazazi text messages (e.g. what he likes/dislikes about the messages; whether he talks with his wife about the messages; whether he and his wife have changed anything in response to the messages).

Explain that everything he says will be treated as confidential, will not be shared with other people in their village or household and that you will not use his real name. Explain to him that his participation is voluntary, and that he can stop at any time and withdraw his data at any time.

Tell him the discussion will take around 45-60 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with him. Ask whether he has any further questions.

Registry:

Please complete the registry provided on a separate sheet that should look like the one below. Ask participants to sign to confirm their consent.

Name (check that this is the same name provided to you by Deo)	When (approx.) did he receive the first health and nutrition message (month/year)	Age of his youngest child (with the wife who receives the messages)
Date of the interview and start time	Village name	Total number of children (include all children with this wife or other wives/women)
Specify whether he has a mobile phone or phone with internet access/WhatsApp	How often on average (per week) does he receive the mNutrition messages	

Warm-up

Small talk – build a rapport (e.g. about village)

1. Likes and dislikes about the mNutrition messages

1. **Why did you/your household agree to sign up for the mNutrition text messages on health and nutrition last year?** (*The answers might be very short here – that's fine.*)

- What did you expect from the messages?
- Who made the decision to sign up? (you, mother, together?)
- Were you influenced by a relative or neighbour to sign up for the messages?

Kwanini wewe/kaya yako mliamua kujiunga na huduma ya kupokea meseji za lishe mwaka jana?

- Ulitarajia nini kutoka kwenye jumbe hizo
- Ni nani alifanya maamuzi ya kujiunga na jumbe hizo (Mama, baba, wote kwa pamoja?)
- Je, ulipata ushawishi kutoka kwa ndugu au jirani kuhusu kujiunga na meseji hizi?

2. **Can you describe the way you access these messages on the phone**

- SIM card swap, reception.

Je, unaweza kuelezea namna unavyopata meseji hizi kupitia simu ya mkononi?

- Kubadili line za simu, upatikanaji wa mtandao

3. How often do you/your household have problems with your phone which might prevent you getting messages and what kind of connectivity problems do you experience?

- No electricity to charge phone
- No battery/charge
- Use of different SIM cards and therefore miss messages
- Network coverage is poor
- Phone is broken/stolen/lost

Je, ni mara ngapi wewe au kaya yako inapata matatizo ya simu yanayoweza kuzuia upokeaji wa meseji, je ni matatizo gani mnayokumbana nayo?

- Hakuna umeme wa kuchaji simu
- Matatizo ya batri
- Kuwa na line zaidi ya moja-uwezekano wa kukosa jumbe
- Mtandao mbovu
- Simu kuaribika/kuibiwa/kupotea

4. If you stopped receiving messages at some point, why do you think this happened?

Explore perception around needing airtime to get the messages, and of impact of gaps in service on perception of reliability

- I unsubscribed

Kama uliacha kupokea meseji hizo wakati flani, unadhani ni kwanini hii ilitokea?

- Nilijitoa kwenye huduma

5. Do you normally read these messages in full or do you just read part of them? If not, why? Do you think about these messages later or just quickly read and forget about them?

Explore level of engagement with content over time.

Je, huwa unasoma meseji hizi hadi mwisho au huwa unaishia katikati? Kama ni Hapana, kwanini?. Je, huwa unazitafakari meseji hizi baada ya kuzisoma au huwa unasoma na kuachana nazo.

6. What do you do with the mNutrition text messages on health and nutrition after you read them?

- Delete. Why? Is it because you ran out of space on your phone?
- Keep them/some of them. Why? (e.g. to re-read them)
- Share the messages with others. Who? Why? (e.g. showing/forwarding the message to others)
- Tell others about the information in the messages. Who? Why?
- Do you seek more information from a community health worker?
- Discuss them with your wife?
- Change in likelihood of reading them over time?

Je, huwa unazifanyia nini meseji hizo za afya na lishe baada ya kuzisoma?

- Huwa nazifuta, kwanini? Ni kwasababu simu yangu ina nafasi ndogo ya kuifadhi meseji?
- Nazihifadhi/baadhi ya meseji. Kwanini (mf. Ili kurudia kuzisoma)
- Kushirikisha wengine. Akina nani? Kwanini? (Mf; kuwaonesha/kuwatumia meseji hizi wengine)
- Kuwaambia wengine kuhusiana na taarifa zilizopo kwenye meseji hizo. Akina nani? Kwanini?
- Je, huwa unatafta taarifa za ziada kutoka kwa muhudumu wa afya wa jamii?
- Huwa najadili meseji hizi na mke wangu
- Uwezekano wa kubadilika katika kusoma meseji hizi.

7. In your opinion, how useful and relevant is the nutrition information in the mNutrition text messages for you and your household?

You *do not need to ask about all categories of messages in detail. Encourage the father to identify the category/ies he found most useful (or not useful) and then enquire why.*

- Messages were overall useful/not useful at all: ask why?
- What messages did you find particularly useful (e.g. messages about nutrition during pregnancy, breastfeeding, young child feeding, general health and nutrition advice, family planning) Why?
- Can you give me an example of how you/your household used this information?

Kwa maoni yako, ni kwa kiasi gani taarifa za lishe unazozipata kupitia meseji zina umuhimu kwako wewe na kaya yako?

- Kwa ujumla meseji zilikuwa na umuhimu/hazikuwa na umuhimu kabisa; Uliza kwanini?
- Ni aina gani za meseji uliona zina umuhimu? (Mf. Meseji kuhusu lishe wakati wa ujauzito, unyonyeshaji, ulishaji wa mtoto mdogo, afya kwa ujumla na ushauri wa lishe) Kwanini?
- Je, unaweza kutoa mfano kwa jinsi wewe/kaya yenu mlivyokuwa manazitumia taarifa hizo?

8. Why did you like or dislike the messages?

- Novelty: You learn something new/you knew most of the information already. Ask for examples
- If he knew most of the information ask from where and whether he still found the messages useful? Why (e.g. reminder)?
- Relevant to personal situation: Information was relevant to your personal situation/was not relevant
- Realistic: What problems did you encounter when you tried to follow the advice (e.g. time, effort)
- Regularity with which messages arrive
- Free of charge
- Fact that messages arrive on your mobile phone
- Some other reason?

Ni kwanini ulipenda au hukupenda meseji hizo?

- Upya: Kujifunza kitu kipya/tayari ulijua taarifa nyingi. Ulizia mifano.
- Kama alikuwa anajua taarifa nyingi, muulize alizijulia wapi, na kama bado anaona umuhimu wa meseji hizo? Kwanini (mf. Kukumbushwa)?
- Kwendana na hali binafsi: Taarifa hizi zilikuwa zinaendana na hali yako binafsi au haziendani. Kwanini? Kwanini hapana?
- Uhalisisa: Ni changamoto gani ulizokutana nazo ulipojaribu kufuatilia ushauri (mf. Muda, jitihada) kwanini hapana?
- Utaratibu ambao meseji hizi zinakuja
- Ni za bure, hakuna kulipia.
- Ukweli kwamba meseji hizi zinaingia kwenye simu binafsi.
- Sababu nyingine

9. Do you trust the information in the messages? Why/why not?

Potential mistrust of mobile phone companies came up in baseline so this might be influential.

- Perceptions about the author/sender: Who does he think is sending the messages (MNO, government)? Does this influence whether he believes them or not?
- Perceptions about text messages as delivery channel: Would you trust a different delivery channel more? (e.g. radio, health worker) Why?

Je, unaamini taarifa zinazotoka kwenye meseji hizo? Kwanini/ Kanini hapana?

- Mitazamo kuhusu muandishi/mtumaji: Je, Unafikiri ni nani anatuma hizo meseji (makampuni ya simu, serikali), Je chanzo/vyanzo hivi vina ushawishi namna unavyoziamini au kutoziamini meseji hizi.

2. Interaction with wife about messages

10. Do you and your wife talk about the mNutrition text messages that you both receive? Who usually starts the conversation about the messages? What do you talk about? Why do you/don't you talk about the messages?

- Probe for examples of specific messages and ask why they talked about these messages?
- Have you and your wife ever disagreed over the messages? Why?

Je wewe na mwenzako huwa mnajadili meseji za lisho mnazozipokea? Ni nani huwa anaanzisha majadiliano ya meseji hizo? Huwa mnaongelea nini? Kwanini mnaongelea /hamuongelei kuhusu meseji hizo?

- Dadisi kwa mifano meseji husika na uliza kwanini huwa wanazungumzia meseji hizo?
- Je wewe na mwenzako mmewahi kutokubaliana/kutofautiana juu ya meseji hizi?kwanini?

11. Do you find it useful that you get the same messages as your wife? Why?

- We both learn about child nutrition and health
- You know what messages your wife receives
- You can discuss messages with your wife
- You can support your wife better
- Others?

Je unaona umuhimu wowote katika meseji unazozipokea sawa na mwenza wako?

- Wote tunajifunza kuhusu lishe na afya kwa mtoto.
- Unaweza kujua meseji gani anazipokea mwenza wako.
- Unaweza kujadili meseji hizi na mwenza wako.
- Unaweza ukampa msaada Zaidi mwenza wako.
- Nyingine?

INTRODUCTION: I would now like to ask whether you have tried anything/have done anything differently because of the information in the mNutrition text messages.

You do not need to ask about all categories of messages in detail. Encourage the participant to tell you about what he tried to do differently and then ask detailed questions depending on the category of messages he chose.

12. Have you followed any of the advice that you got in the text messages and changed your behaviour?

Refer to earlier answers to make sure you are probing the right topics related to age of child; e.g. nutrition during pregnancy, breastfeeding, young child feeding, information on other child health and nutrition topics, family planning

- Why did you decide to try the advice given in the text message? What motivated you? Was there anything that prompted you to change? (e.g. heard the information from different sources, you/your child did not feel well)?
- What, if any, problems have you encountered when trying to do something differently?
 - Belief in own abilities: How confident were you about it? How easy or difficult did you find it?
 - Knowledge: Did you feel the message provided enough information about the issue? Why not? What did you do? (e.g. ask others, access other information sources)
 - Social influences: How did views/opinions/expectations of your wife/family/friends influence you? To what extent?
 - Access to resources: In what way did your personal circumstances influence you (e.g. access to food or services, demands on your time, pressures from working life, poverty)

Je, umewahi kufuata ushauri wowote ule ulioupata kutoka kwenye mesiji hizo na kubadili mwenendo wa tabia?

- **Kwanini** ulijaribu kufuata ushauri uliopokea kutoka kwenye meseji hizo? Kipi kilikuhamasisha? Kuna chochote kilichokufanya ukabadalika? (Mf. Kusikia taarifa kutoka vyanzo vingine, wewe au mwanao alikuwa hajisikii vizuri)?
- **Je, kuna tatizo lolote** ulilowahi kukutana nalo wakati unajaribu kufuata ushauri wa zile meseji)
 - Imani katika uwezo wako: Je ni kwa kiasi gani ulikuwa unajiamini? Ulipata wepesi au ugumu kiasi gani?
 - Uelewa: Je, ulihisi meseji ilikuwa na taarifa ya kutosha kuhusu swala hilo? Kwanini? Kwanini hapana? Ulifanya nini (Mf. Kuuliza wengine, kupata taarifa kutoka vyanzo vingine)?
 - **Ushawishi wa kijamii**: Je ni kwa namna gani maoni/mtazamo/matarajio ya mwenzu wako/familia/marafiki yalikushawishi? Ni kwa kiasi gani?
 - Upatikanaji wa rasilimali: Ni kwa namna gani hali yako binafsi ilikushawishi? (Mf. Upatikanaji wa chakula au huduma, upatikanaji wa muda, msukumo wa mazingira ya kazi, umasikini)

3. Ideas for improvements of mNutrition text messages

13. How could mNutrition text messages be improved?

Ask about the content of the information and the delivery via text messages

- Would you prefer a different format? Why? Which ones? (e.g. WhatsApp, in- person)
- A free hotline for additional advice?
- Would you like to be able to respond to the messages or discuss their contents with a health worker?

Je, ni kwa namna gani meseji hizi za lishe zinaweza kuboreshwa? (Uliza kuhusu maudhui ya meseji hizi na namna zinavyofika kupitia meseji mf. Muda wa kupokea, urefu wa sms, namba inayotuma n.k)

- Je, wangependelea kuzipokea kwa njia nyingine? Kwanini, njia zipi? (Mf;whatsapp, kuambiwa na mtu binafsi)
- Simu ya bure kwa ushauri Zaidi.
- Je, ungependa kuwa na uwezo wa kujibu meseji au kujadili maudhui (ujumbe) na muhudumu wa afya.

14. Suppose the current mNutrition SMS service was available in future for a small fee –would you pay for this? If so, how much would you be willing to pay per month for this service? Would you be willing to pay for voice-based messages?

- Explore perceptions on whether there are costs involved in receiving the current messages

Kwa mfano huduma ya meseji hizi za lishe zikipatikana baadae kwa gharama ndogo, Je utaweza kulipia? Kama ndivyo, uko tayari kulipia kiasi gani kwa mwezi? Je utakuwa tayari kulipia meseji za ujumbe wa sauti?

-
- Dadisi kuhusu mitazamo kama kungekuwa na gharama zilizohusika katika kupokea meseji hizi.

Thank you. Do you have any questions or suggestions?

E.3 Topic guide for in-depth interview with fathers who were not sharing messages with their wives or were deleting messages

Purpose:

- Understand why fathers were not sharing messages
- Assess spousal interactions about the messages
- Assess father's beliefs/perceptions about the messages
- Assess father's role in potential changes in behaviour

Sample: All fathers in the treatment group who receive the messages on behalf of their wife (because they share the phone) but who do not pass them on to their wives for some reason. Deo will identify them during mobilisation

Location: Household or other convenient place

Time for the interview: Approximately 25-30 minutes

Instructions:

Thank the father for taking part in the study and explain that you are part of a research team.

Explain that he has been receiving free text messages containing health and nutrition information for several months now which seek to improve the health and food consumption of mothers and children. This service is called mNutrition and is provided by Wazazi Nipendeni. Please ask him to confirm, if possible by asking to see or for him to show you his phone and look for 15001 messages. Use this to verify we are talking about the right messages.

Say that the aim of the interview is to find out what he thinks about the health and nutrition Wazazi text messages (e.g. what he likes/dislikes about the messages; whether he talks with his wife about the messages; whether he and his wife have changed anything in response to the messages). Please confirm that he has not shared the messages with his wife.

Explain that everything he says will be treated as confidential, will not be shared with other people in his village or household and that you will not use his real name. Explain to him that his participation is voluntary, and that he can stop any time and withdraw his data at any time.

Tell him that the discussion will take around 25-30 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with him. Ask whether he has any questions.

Registry:

Please complete the registry provided on a separate sheet that should look like the one below. Ask participants to sign to confirm their consent.

Name (check that this is the same name provided to you by Deo)	When (approx.) did he receive the first health and nutrition message (month/year)	Age of his youngest child (with the wife who receives the messages)
Date of the interview and start time	Village name	Number of children in total (include all children with this wife or other wives/women)?
Specify whether he has a mobile phone or phone with internet access/WhatsApp	Who does he share his phone with?	Name of spouse

Warm-up

Small talk – build a rapport (e.g. about village, children). Make sure the father knows you will not be judging him for not sharing or for deleting the messages.

1. Understanding process of not sharing

1. What happens when the messages arrive on your phone?

- Delete them straight away?
- Keep the messages but never share them?
- Do you tell your wife you have received the messages?
- Share some of the messages with your wife?
- Stop sharing for some reason?
- Explore reason for his actions without guiding him – leave it very open (content aimed at women not men, women’s work not men’s work, tone of messages ‘dear mama’, spam, not enough space on phone, offended at content of family planning messages?)

Huwa unafanya nini unapokea meseji za lishe na afya?

- Je, huwa unazifuta hapo hapo?
- Je, huwa unaziifadhi lakini haumshirikishi mwenza wako?

- Je, huwa unamwambia mwenza wako kwamba huwa unapokea meseji hizo?
- Je, huwa unamshirikisha mwenza wako kwa baadhi ya meseji?
- Je, uliacha kumshirikisha kwasababu fulani?
- Dadisi sababu za maamuzi hayo bila kuwaongoza. Acha mjadala uwe wazi (maudhui yanamlenga mwanamke na sio mwanaume, kazi za mwanamke na sio mwanaume, namna zinavyosomeka kwa mfano 'mpendwa mama', spam, hakuna nafasi ya kutosha kwenye simu, kukerwa na meseji za uzazi wa mpango)

2. Why did you like or dislike the messages?

- Novelty: You learn something new/you knew most of the information already. Ask for examples.
- If he knew most of the information ask from where and whether he still found the messages useful? Why (e.g. reminder)?
- Relevant to personal situation: Information was relevant to your personal situation/was not relevant.
- Realistic: What problems did you encounter when you tried to follow the advice (e.g. time, effort, working mums)

Ni kwanini ulipenda au hukupenda meseji hizo?

- Upya: Kujifunza kitu kipya/tayari ulijua taarifa nyingi. Ulizia mifano.
- Kama alikuwa anajua taarifa nyingi, muulize alizijulia wapi, na kama bado anaona umuhimu wa meseji hizo? Kwanini (mf. Kukumbushwa)?
- Kwendana na hali binafsi: Taarifa hizi zilikuwa zinaendana na hali yako binafsi au haziendani. Kwanini? Kwanini hapana?
- Uhalisia: Ni changamoto gani ulizokutana nazo ulipojaribu kufuata ushauri (mf. Muda, jitihada, akina mama wanaofanya kazi) kwanini hapana?

3. Would you like your wife to receive these messages instead of you?

- Find out if he likes the messages but feel it is not right that they go to the husband

Je, ungependa mwenza wako apokee meseji hizi badala yako?

- Dadisi ili kujua kama wanapenda meseji hizo lakini wanaona sio sawa kutumwa kwao.

4. How could mNutrition text messages be improved? (ask about the content of the information and the delivery via text messages)

- Would they prefer a different format? Why? Which ones? (e.g. WhatsApp, in person)
- A free hotline for additional advice?
- Would you like to be able to respond to the messages or discuss their contents with a health worker?

Je, ni kwa namna gani meseji hizi za lishe zinaweza kuboreshwa? (Uliza kuhusu maudhui ya meseji hizi na namna zinavyofika kupitia meseji)

- Je, wangependelea kuzipokea kwa njia nyingine tofauti? Kwanini, njia zipi? (Mf; whatsapp, kuambiwa na mtu binafsi)
- Simu ya bure kwa ushauri zaidi.
- Je, ungependa kuwa na uwezo wa kujibu meseji au kujadili maudhui (ujumbe) na mhudumu wa afya.

5. **Do you have any other questions or points you would like to raise?**

Je, una swali lolote lile ambalo ungependa kujadili na sisi?

Thank you for your time

Tunashukuru kwa muda wako.

E.4 Topic guide for in-depth interview with local health expert (e.g. midwife, community health worker)

Purpose:

- Explore whether they have heard about the mNutrition text messages on health and nutrition for mothers and their opinion about the messages
- Explore whether there have been any conflicts as a result of the messages
- Understand the context of health and nutrition in the village

Sample: One health worker per village. Health worker should be based in the village, or be responsible for health in the village, and NOT based in the health facility.

Location: Household of health worker, somewhere in the community

Time for the interview: Approximately 30-45 minutes

Instructions:

Thank the health worker for taking part in the study and explain that you are part of a research team.

Say that the aim of the interview is to find out more about the health and nutrition situation in this village and whether they have heard about the Wazazi text messages on child nutrition and health that some households in this village have received in the past few months.

Explain that everything they say will be treated as confidential, will not be shared with other people in their village or household and that you will not use their real names. Explain to them that their participation is voluntary, and they can stop any time and withdraw their data at any time.

Tell them that the discussion will take around 30-45 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with them. Ask whether they have any questions.

Registry:

Please complete the registry provided on a separate sheet that should look like the one below. Ask participants to sign to confirm their consent.

Name (just first name, so you can use their name during the interview)	Since when have they been a health worker in this village	Date of the interview and start time
Village name	Level of education and professional training	Age
Number of children	Receive mNutrition messages?	

Warm-up questions

How long have you been a health worker? How long have you been living in this community? Have you always worked in this area? If not, where did you work before?

1. Information about health and nutrition

IMPORTANT INSTRUCTIONS FOR INTERVIEWER: The examples provided are all based on the mNutrition text messages. Therefore, try to specifically cover all the points below.

1. What are the most common health problems for people in this village?

- What are the most common health problems for young children? (ask about worms, diarrhoea)
- What are the most common health problems for women? (ask about iron deficiencies (low blood), underweight – please distinguish between whether they are present in the village and whether they are common)
- Is malnutrition among children a problem in this village? What ages are affected? Are girls and boys affected equally? What types of malnutrition are most common? Are there any groups in the village for whom malnutrition is particularly common?

Kwa kawaida ni matatizo gani ya kiafya yanayowapata watu wa kijiji hiki?

- Ni matatizo gani ya ki afya yanayowakumba watoto wadogo (uuliza kuhusu minyoo na kuharisha)
- Ni matatizo gani ya ki afya yanayowakumba wanawake (upungufu wa madini chuma, upungufu wa damu, kupungua uzito. Tofautisha kama magonjwa haya yapo na ni yakawaida kijijini?)
- Je utapiamlo kwa watoto ni tatizo katika kijiji hiki? Ni umri gani huathrika zaidi? Je wavulana na wasichana wanaathirika kwa kiwango kile kile. Ni aina gani ya utapiamlo hutokea saana? Je, kuna makundi yoyote hapa kijijini ambayo kupata utapiamlo ni kawaida? Aina gani ya utapiamlo ni tatizo zaidi? (mwembamba zaidi, mfupi zaidi, ukosefu wa vitamin, kwashakoo, marasmus)

2. What are the most important causes of ill health in children in this village?

- Is access to safe water and sanitation a problem? Can you explain more
- Is access to varied or sufficient food a problem? Why? (e.g. availability, money to purchase)

- Is poor hygiene a problem? (e.g. area where children play is dirty; utensils children eat with are dirty; handwashing before eating and meal preparation is a problem)
- Is alcoholism a problem? Explain
- Is mothers' absence from home for work a problem? (e.g. infant cannot be breastfed)
- Child work? Long distances travelled to collect water/firewood, graze cattle, attend school? Eye problems from cooking stoves?

Ni sababu zipi kuu zinazosababisha magonjwa kwa watoto katika kijiji hiki?

- Je, upatikanaji wa maji safi na salama ni tatizo? Unaweza kuelezea Zaidi?
- Upatikanaji wa vyakula mbalimbali na vya kutosha ni tatizo? Kwanini? Mf; uwepo wa vya vyakula, pesa kununulia chakula)
- Je hali ya usafi ni tatizo? (Mf; maeneno ya watoto kuchezea ni machafu, vyombo ambavyo watoto wanatumia kula ni vichafu, kunawa mikono kabla ya kula na kuandaa chakula ni tatizo?)
- Je, ulevi ni tatizo? Elezea.
- Je, kutokuwepo kwa mama nyumbani kwa ajili ya kufanya kazi ni tatizo? Mf; mtoto mdogo hawezi kunyonyeshwa.
- Kazi za watoto mf; kutembea umbali mrefu kuchota maji/kuni, kuchunga, kuudhuria shule? Matatizo ya macho yanayotokana na kupikia majiko yenye moshi.

3. Where do people usually go when they have a health problem?

- Ask about traditional healer, pharmacy, government health facility, health workers not attached to a facility, 'medicine shops', self-care
- What barriers to accessing health care do people face? (e.g. time, money, trust)
- Do mothers take their children to the monthly health clinic to check their growth? Why not?

Kwa kawaida watu huenda wapi wanapokua na matatizo ya kiafya?

- Uulizia kuhusu mganga wa kinenyeji, duka la madawa, kituo cha afya cha serikali, wahudumu wa afya ambao hawajaajiriwa kwenye kituo cha afya, maduka ya kawaida yanayouza dawa, kujihudumiwa wenyewe.
- Je, watu hukutana na vikwazo gani katika kutafuta huduma ya afya? Muda, fedha, uaminifu kwa wahudumu)
- Je, akina mama huwapeleka watoto wao clinic kila mwezi kuangalia maendeleo ya ukuaji wao? Kwanini hapana?

4. Where do pregnant women and young mothers get information about child feeding?

- Who provides advice?
- What advice is provided?
- Do women follow the advice you give? Why not?

Je, wajawazito na akina mama wengine huwa wanaenda wapi kupata taarifa kuhusu ulishaji wa watoto?

- Ni nani hutoa ushauri?
- Ushauri gani hutolewa?
- Je, wanawake hufuata ushauri unaowapa? Kwanini hapana?

5. Where do young mothers usually go when they have a problem with breastfeeding? What support and advice do they get?

Je, kwa kawaida akina uenda wapi wanapokuwa na matatizo ya unyonyeshaji? Je ni msaada na ushauri gani hupata?

6. How easy is it for women in this area to access information about nutrition? What do you think are possible barriers to access? (lack of interest, literacy, health facilities are far away, availability of alternative sources, etc)

Kuna uwepesi gani kwa wanawake katika eneo hili kupata taarifa kuhusu masuala ya lishe? Je unafikiri kuna vikwazo gani katika kupata taarifa hizi? (ukosefu wa nia, uelewa, vituo vya huduma za afya viko mbali, upatikanaji wa vyanzo mbadala n.k)

7. Have you observed any changes in health and nutrition behaviour since the beginning of the year? If so, why?

Je, umeshuhudia mabadiliko yoyote katika masuala ya lishe na afya mwanzoni mwaka? Kama ndiyo, kwanini?

2. Awareness and opinion of mNutrition messages

8. Have you heard that some women and men in this community have been getting text messages about health and nutrition on their mobile phones since the beginning of the year?

Je,umesikia kwamba baadhi ya wanawake na wanaume katika jamii hii wamekuwa wakipokea meseji kuhusu afya na lishe kupitia simu zao tangia mwanzoni mwa mwaka huu?

9. Have you ever seen these messages? If so, what are they about?

Umewahi kuona meseji hizi? Kama ndiyo, zinahusiana na nini?

10. What do you think about these messages?

- Useful/not useful. Why?
- Are there problems to do with the technology as a means of delivering the message or are they to do with the messages themselves?
- What do you think about the quality of the messages? (e.g. too short, confusing, not enough detail, just right) Explain.
- Does it support or hinder what you do?
- Do the messages ever lead to conflict (e.g. with health workers, within community, within household).

Je, una mtazamo gani juu ya meseji hizi?

- Ni muhimu/sio muhimu. Kwanini?
- Je kuna matatizo ya kiteknologia kama njia ya kuwasilisha meseji au zinatokana na meseji zenyewe?
- Je, una mtazamo gani juu ya ubora wa meseji hizi(mf. Ni fupi sana, zinachanganya, hazina maelezo ya kutosha, ziko sawa tu) Elezea
- Je, zina saidia au kukwamisha unachofanya?

-
- Je, zimewahi kuleta mgogoro? (mf. Na wahudumu wa afya, ndani ya jamii, ndani ya kaya)

11. Do women come and show you/discuss the messages with you? If they did, what was the message about and why did they show it to you?

- What are the most common things that the women either like or dislike about the messages?

Je wanawake huwa wanakuonesha au kujadili na wewe meseji hizi? Kama walifanya, meseji zilihusu nini na kwanini walikuonesha?

- Je, ni vitu gani ambavyo wanawake huwa wanapenda au kutopenda kuhusu meseji hizi?

12. Do you think that receiving text messages is a useful way of changing the behaviour of pregnant women, mothers of young children? Why/why not?

- Also discuss in relation to fathers/other caregivers

Je, unafikiri kupokea meseji ni njia muhimu katika kubadili tabia za wajawazito na akina mama wenye watoto wadogo? Kwanini/kwanini hapana?

- Pia jadili kwa kuzingatia uhusiano wa baba/walezi wengine

13. Can you think of any way in which the messages could be made more useful?

- Additional content, ask what specifically
- Combined with other information/channels for information (e.g. opportunities for discussion)
- Increase in frequency of messages (or send reminders)

Je, unaweza kufikiria njia nyingine yoyote ambayo inaweza kufanya meseji hizi kuwa za muhimu Zaidi?

- Kuongezewa maudhui ya ziada, muulize mfano
- Kuunganishwa na taarifa nyingine/vyanzo vingine vya taarifa (mf. Kutoa fursa ya kujadili)
- Kuongezeka wingi wa utumaji wa meseji hizo (kutuma meseji za kukumbusha)

Thank you. Do you have any questions?

E.5 Topic guide for in-depth interview with village chairman and local expert

Purpose

- Explore whether they have heard about the mNutrition text messages on health and nutrition for mothers and their opinion about the messages
- Understand contextual issues relating to maternal and child nutrition (e.g. WASH, maternal work commitments, alcoholism, lack of male support, food insecurity with regard to fresh foods)

Sample: One village chairman per village, and if we work in more than one village please also interview the other village chairman. Please do whatever fits best in terms of choosing who to speak to. These interviews were added to build rapport with the community and increase support and safety of team

Location: Household of chairman or somewhere in the community

Time for the interview: Approximately 30-45 minutes

Instructions:

Thank the chairman for taking part in the study and explain that you are part of a research team.

Say that the aim of the interview is to find out more about the health and nutrition situation in this village. Ask whether they have heard about the Wazazi text messages on child nutrition and health that some households in this village have been receiving for a few months.

Explain that everything they say will be treated as confidential, will not be shared with other people in their village or household and that you will not use their real names. Explain to them that their participation is voluntary, and they can stop any time and withdraw their data at any time.

Tell them the discussion will take around 30-45 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with them. Ask whether they have any questions.

Registry:

Please complete the registry provided on a separate sheet that should look like the one below. Ask participants to sign to confirm their consent.

Name (just for use in interview)	Village name	Age of his youngest child (with the wife who receives the messages)
Date of the interview and start time	Age	Total number of children (include all children with this wife or other wives/women)
Specify whether he has a mobile phone or phone with internet access/WhatsApp	Does his household receive mNutrition messages?	

Warm-up questions

How big is the village? How long have you been the chairman?

1. Health and nutrition situation in village

These questions are about contextual factors related to undernutrition

1. What are the health and nutrition conditions of people in the village?

- Common health problems. Why?
- Health problems of children (ask about worms, nutrient deficiencies, diarrhoea). Why?
- Is malnutrition a problem? Why?

Je, Afya na lishe ya watu wa kijiji hiki ikoje?

- Magonjwa ya kawaida. kwanini?
- Magonjwa ya kiafya kwa watoto (uliza kuhusu minyoo, mapungufu ya virutubisho, kuharisha)
- Je utapiamlo ni tatizo? Kwanini?

2. How do people in this village get information about health and nutrition?

- Who/what sources provide it? Radio? TV
- What information is provided?
- Do any households not have access to information? Why?
- What /whose information do they trust most?
- What information is provided on child health and nutrition?

Je watu wa kijiji hiki wanapataje taarifa kuhusu afya na lishe?

- Nani/ni vyanzo gani vinawapa taarifa?Radio?Luninga
- Aina gani ya taarifa inayotolewa?
- Je, Kuna kaya zozote ambazo hazipati taarifa hizi?Kwanini?
- Nini/ni taarifa ya nani unayoiamini sana?
- Ni aina gani ya taarifa inayotolewa juu ya afya ya mtoto na lishe?

2. Awareness and opinion of mNutrition messages

3. Have you heard that some households in this community have been getting text messages about health and nutrition on their mobile phones?

Je umeshawai sikia baadhi ya kaya katika jamii yenu wamekua wakipata meseji zinazohusu afya na lishe kupitia simu zao za mkononi?

4. What do you think about these messages?

- Useful/not useful. Why?

Je, unazichukuliaje meseji hizi?

- Zina umuhimu/ hazina umuhimu? Kwanini?

5. Do people come and show you/discuss the messages with you? In your opinion, why/why not do they want to discuss the messages with you?

- What do they like/dislike about the messages?
- How do you feel about this? (e.g. help you with your work; make your work more difficult; why?)
- What do you think about the quality of the messages? (e.g. too short, confusing, not enough detail, just right). Explain

Je, watu huwa wanakuja na kukuonesha au kujadili meseji hizi na wewe? Kwa mtazamo wako. Kwanini/kwanini hawajadiliani hizi meseji na wewe?

- Ni nini wanapenda/hawapendi kuhusiana na meseji hizi
- Je unajisikiaje kuhusu hili? (eg. Kukusaidia katika kazi zako, kufanya kazi zako kuwa ngumu Zaidi; Kwanini?)
- Unaonaje ubora wa meseji hizi?(eg: fupi sana, zinachanganya, hazina maelezo ya kutosha, ziko sawa) Elezea

6. Have you observed any changes in behaviour as a result of people receiving these messages?

- Ask about different people in the community: women/men/community health workers/teachers/kiosk owners?

Je, umeshawai kuona mabadiliko yoyote ya tabia ya watu kutokana na meseji wanazopokea?

-
- Uliza kuhusu watu tofauti katika jamii: wanawake/wanaume/wahudumu wa afya/walimu/wamiliki wa maduka madogo.

7. Do you know whether the messages have led to any discussions within the community or within households?

- Conflict? Positive and negative discussions

Je unafahamu kama meseji hizi zimeleta majadiliano yoyote kwenye kaya au jamii kwa ujumla?

- Migogoro?majadiliano mazuri na mabaya

8. Can you think of any way in which the messages could be made more useful?

- Additional content, ask what specifically
- Combined with other information/channels for information

Je unaweza kufikiria njia yoyote ambayo inaweza ikafanya meseji kuwa na umuhimu Zaidi?

- Kuongeza maudhui, uliza yapi?
- kuchanganya na taarifa nyingine/ kutumia njia zingine za taarifa

Thank you. Do you have any questions

E.6 Topic guide for in-depth interview with national-level mNutrition programme stakeholders

Purpose:

- Learn more about the Wazazi Nipendeni plus Nutrition intervention
- Learn more about the design of the programme
- Learn more about the aims of the programme
- Learn more about any issues with implementation of the programme
- The interviews mainly aim to inform the process evaluation component of the qualitative midline study

Sample description: Staff from mHealth PPP/Cardno, TFNC, Ministry of Health

Location: Offices in Dar es Salam

Time for the interview: approximately 30 minutes

Thank them for taking part in the study and explain that you are part of a research team.

Say that the aim of the interview is to find out more about the Wazazi plus mNutrition service for the impact evaluation. Explain to them that their participation is voluntary, and they can stop any time and withdraw their data at any time.

Tell them the discussion will take around 45 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with them. Ask whether they have any questions

Name	Position	Date of interview

- 1. Why do you think text messages are a good channel (vs other channels) for sending information about nutrition and health to mothers (and fathers) in Tanzania? (idea behind the programme). What other channels are available and how well do you feel they perform?**
- 2. What should mothers (and fathers) do with the information they receive in the messages? (idea behind the programme)**
 - Discuss the messages with others
 - Ask their health worker for more details
 - Messages are meant to be standalone information
- 3. Can you tell me a little more about how the decision to include mNutrition messages into the established Wazazi service was made?**
 - Who had the initial idea, how did they persuade others, how was it put into practice
 - What they like about the combination
 - What challenges they see in combining the two
 - What overlaps there are
- 4. How were the nutrition messages to be sent selected (from the long list GAIN and others had developed)?**
 - Ask about priority areas and why?
 - Ask about differences across the messages and why they were made? (e.g. tone of the message, some start with 'Dear mother' while others not)
 - Ask whether the 111 messages have been or will be extended/modified/changed at any point. When and why?
- 5. How are the mNutrition messages sent on a weekly basis selected?**
 - Based on status in pregnancy/child age?

-
6. **Some messages have very similar information (e.g. breastfeeding): Are these messages sent together or close to each other? (e.g. to remind mothers)**
 7. **How are the mNutrition messages to be sent on a weekly basis combined with the Wazazi messages that are sent in the same week?**
 - Are the selected messages based on topic area or is the combination random?
 - Are the messages sent at the same time or at different times? Why?
 8. **When during the day are Wazazi messages plus mNutrition usually sent? Why?**
 - Morning, afternoon, evening or random?
 - Difference between when Wazazi messages are sent and when MNutrition messages are sent?
 - Depends on MNO?
 9. **How many messages do mothers (and fathers) get each week?**
 - **Do mothers (and fathers) always get the same number of messages each week?** Why/why not? (e.g. national holidays)
 10. **What are the relative strengths of the SMS (WN) and voice message (HNI) services? What are the relative strengths of 'push' (WN) and 'pull' (HNI) services?**
 11. **What are the main challenges the programme has experienced in implementation?**
 - Customer sign-up/ registration and retention? How can people unsubscribe from the messages?
 - Technological/phone-related limitations?
 - Mobile platform delivery via MNOs? Others?
 12. **What are the plans for Wazazi plus mNutrition in the medium and long term?**
 - Ask for planned changes in the service
 - Ask for plans regarding the mNutrition messages

Thank you. Do you have any questions?

Ask for any documents that describe the Wazazi plus mNutrition service and that they could share (including programme and technical documents). Ask whether they can recommend anyone else we should interview and why they are recommending them.

E.7 Topic guide for focus group discussion with mothers in the treatment group who receive messages

Purpose:

- Likes/dislikes about the content and channel of the mNutrition messages

-
- Reasons for likes and dislikes
 - Suggestions for improvement

Sample description: 1-2 per village, but only if enough mothers receive text messages to carry out a sufficiently large number of in-depth interviews first. Focus group discussions can involve mothers of all stages of motherhood at baseline – i.e. pregnant and with children of varying ages, who subscribed and remain active.

Location: Central place in the community

Time for the focus group: Approximately 60-90 minutes

Instructions:

Thank the focus group participants for taking part in the study and explain that you are part of a research team.

Explain that their households have been receiving free text messages containing health and nutrition information for several months now. This service is called mNutrition and is provided by Wazazi Nipendeni. Please ask the mothers to confirm this. If they have their phones with them check that we are talking about the right messages by checking on their phones and looking for 15001 messages. Use this to verify we are talking about the right messages.

Say that the aim of the focus group discussion is to talk openly about mothers' perceptions of the text messages received on child nutrition and health and that their households have been receiving messages for the past few months. Tell them you will be including a participatory exercise as part of the discussion to help the group to discuss and rank their main likes and dislikes about the mNutrition messages.

Explain that everything they say will be treated as confidential, will not be shared with other people in their village or household (beyond the focus group participants) and that you will not use their real names. Explain to them that their participation is voluntary, and they can stop any time and withdraw their data at any time.

Tell them the discussion will take around 60-90 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with them. Ask whether they have any questions.

Registry:

Please complete the registry provided on a separate sheet that should look like the one below. Ask participants to sign to confirm their consent.

Name (check that this is the same name provided to you by Deo)	When (approx.) did their household receive the first health and nutrition message (month/year)	Do they get the messages on their own phone or someone else's phone (specify)
Age of their youngest child (in months)	Date of the interview and start time	Village name
Whether this is their first child (yes/no)	Specify whether they have a mobile phone or phone with internet access/WhatsApp	How often on average (per week) do they receive the mNutrition messages

Warm-up

Build rapport. How long have you lived in this village or similar?

Instructions and material needed for participatory matrix ranking (PMR)

Requirements:

- 1) A moderator/facilitator and a note taker
- 2) Paper cards and thick pens (so that writing/drawing is visible)
- 3) Post-it notes
- 4) Scoring objects such as matches/toothpicks

Purpose:

The ranking method will be used to determine what features of the messages mothers like or dislike, to record their relative preferences and the reasons for preferring one feature over another.

Instructions for note takers:

The note taker should record all the discussions continuously. To remember who said what, create a seating plan and name people and link this information with the registry. Please take photos/bring the scoring matrix for our analysis but please make sure the notes don't just replicate any photos you take. Notes have to record the debates and discussions, not just the ranking.

Participatory matrix ranking (PMR)

Step 1: Create a long list

- Have a discussion about what people like and dislike about the messages, answering the questions ‘**What do you like most about the text messages and why?**’ and ‘**What do you dislike most about the text messages?**’
- Write these long lists on a piece of paper or on individual post-it notes.

Step 2: Create shortlists of five likes and five dislikes by expanding or contracting

- If the lists are too long, make them shorter by creating connections between the things listed (group them)
- If the lists are too short, expand through discussion with the group
- When you have five likes and five dislikes, write each one on individual pieces of paper
- You can also draw, use symbols or use objects to represent the likes/dislikes

Step 3: Voting for features

(Features are the nominated things mothers like or dislike)

- Give each mother ten objects (e.g. matches) to vote for her five top features in each category of likes and dislikes
- They can give all objects to one feature, distribute across two or more, or not give any
- When everyone has voted, arrange cards with features in order of voting outcome
- Have a discussion about people’s reasons for their choice of a particular feature. Encourage group discussion

Step 4: Final discussion

- Once everyone has discussed why they voted in a particular way, encourage the group to discuss the results of the matrix. Ask if they agree or disagree with the final result and note any agreements or disagreements for these results
- Finally, ask participants to make suggestions on how to improve the mNutrition service

E.8 Topic guide for focus group discussion with fathers from households who are active users of mNutrition service

Purpose:

- Assess impact on fathers who were exposed to the messages
- Assess fathers’ beliefs/attitudes towards the messages their wives receive

-
- Assess spousal interaction about the messages
 - Assess fathers' involvement/support of behaviour change triggered by the messages

Sample: 1-2 focus group discussions per village (selected based on quantitative sample).

Include fathers who receive messages on a phone that is shared with their wife, husbands of women who signed up for the service.

(NB Exclude households where both husband and wife were signed up and men who deleted the messages.)

Location: Central place in the community

Time for the focus group: Approximately 30-40 minutes

Instructions:

Thank the focus group participants for taking part in the study and explain that you are part of a research team.

Explain that their households have been receiving free text messages containing health and nutrition information for several months now. This service is called mNutrition provided by Wazazi Nipendeni. Please ask them to confirm this. If they have their phone with them check that we are talking about the right messages by checking on their phones and looking for 15001 messages. Use this to verify we are talking about the right messages.

Say that the aim of the focus group discussion is to talk openly about fathers' perceptions of the text messages received on improving the health and eating practices of children and mothers.

Explain that everything they say will be treated as confidential, will not be shared with other people in their village or household (beyond the focus group participants) and that you will not use their real names. Explain to them that their participation is voluntary, and they can stop any time and withdraw their data at any time.

Tell them the discussion will take around 30-40 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with them. Ask whether they have any questions.

Registry:

Please complete the registry provided on a separate sheet that should look like the one below. Ask participants to sign to confirm their consent.

Name (check that this is the same name provided to you by Deo)	When (approx.) did his household receive the	Does he get the messages on his own phone or his wife's phone (specify)
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	first health and nutrition message (month/year)	
Age of his youngest child (in months)	Date of the interview and start time	Village name
Primary source of livelihood of household	Specify whether he has a mobile phone or phone with internet access/WhatsApp	How often on average (per week) does he receive the mNutrition messages
Number of children in total (with the wife who gets the messages)		

Warm-up

Build rapport. Ask about their children, etc.

1. Attitude and opinion of the messages his wife receives

INTRODUCTION: *Your household/wives have been receiving regular mNutrition text messages on nutrition and health on mobile phone for a few months.*

1. What do you think about your wives getting health and nutrition information as a text message on a mobile phone?

- Issues about mobile phone as the delivery channel
- Are messages useful and relevant to your family?

Je, mna mtazamo gani juu ya wake zenu kupokea taarifa za afya na lishe kupitia simu za mkononi?

- Maswala yanayohusu simu kama njia ya kupokelea taarifa.
- Je, meseji hizi ni za muhimu na zinaendana na matakwa ya familia?

2. How often do you/your household have problems with your phone that might prevent you getting messages, and what kind of connectivity problems do you experience?

- No electricity to charge phone
- No battery/charge
- Use of different SIM cards and therefore miss messages
- Network coverage is poor
- Phone is broken/stolen/lost

Je, ni mara ngapi wewe au kaya yako inapata matatizo ya simu yanayoweza kuzuia upokeaji wa jumbe, je ni matatizo gani mnayokumbana nayo?

- Hakuna umeme wa kuchaji simu
- Matatizo ya batri
- Kuwa na line zaidi ya moja-uwezekano wa kukosa jumbe
- Mtandao mbovu
- Simu kuaribika/kuibiwa/kupotea

3. Do you and your wives sometimes talk about the mNutrition text messages?

- How often?
- What do you talk about? (can you give an example)
- Why do you/don't you talk about the messages?
- Who usually starts the conversation about the messages?

Je, nyie na wenza wenu huwa mnaongelea meseji zinazohusiana na maswala ya lishe?

- Ni mara ngapi?
- Huwa mnajadili mambo gani (mnaweza kutoa mfano)
- Ni kwanini huwa mnaongelea/hamuongelei kuhusu meseji hizo.
- Kwa kawaida ni nani huanzisha mazungumzo haya?

4. Do you think the information in the messages is true and believable?

- Why/why not?
- Does it contradict something you believed before?
- Does the sender of the message influence whether you believe it?
- Would you trust the radio, health worker, etc more?

Je, mnadhani taarifa za kwenye meseji hizi ni za kweli na kuaminika?

- Kwanini/kwanini hapana?
- Je, taarifa hizi huwa zinachanganya na kile mlichokuwa mkiamini kabla?
- Je, mtumaji ana ushawishi wowote katika kuamini meseji hizi?
- Je, ungeweza kuamini redio, wahudumu wa afya n.k?

INSTRUCTIONS: Check with your group here to find out whether they are 'sharers' or not. Ask sharers question 5 and others question 6. Then encourage a group discussion between the two groups of fathers

If any of the fathers receive the mNutrition messages on their phone because their wives don't have a phone (sharers) ask these fathers:

5. If the mNutrition messages arrive on your mobile phone, do you always share the mNutrition messages with your wife? Why/why not?

- Do you sometimes forget to share and why?
- Does your wife remind you to share messages?
- Do you discuss the messages after you shared them? Why/why not? What sorts of things do you talk about?

Kama meseji za afya na lishe zinaingia kwenye simu zenu, Je mara nyingi huwa mnashirikishana na wenza wenu? Kwanini/ kwanini hapana?

- Je, kuna wakati mwingine huwa mnasahau kushirikishana meseji hizo? Kwanini?
- Je, wenza wenu huwa wanawakumbusha kushirikishana?
- Je, baada ya kushirikishana huwa mnajadiliana? Kwanini? Kwanini hapana. Huwa mnaongelea mambo ya aina gani kuhusu hizo meseji?

If the mNutrition messages arrive on wife's mobile phone ask the fathers:

6. Do you sometimes read them or ask her to show them to you?

- Do you discuss the messages after she shares them?
- Why/why not?
- What things do you talk about?

Je, wakati mwingine huwa mnazisoma au kuwaomba wenza wenu kuwaonyesha meseji hizo?

- Je, huwa manajadili meseji hizo baada ya kushirikishwa?
- Kwanini? Kwanini hapana?
- Ni vitu gani huwa mnaongelea?

2. Experience with/influence on behaviour change

7. Do you know whether your wives have ever tried anything/done anything differently because of the information in the text messages and how did you react?

If so, what? Ask for specifics.

- For example, feed more often, more fresh fruit and vegetables, more meat and eggs.
- What did you think about her trying something new because of the information in the message?
- Did you try to help her with the change? Why/why not? How did you help her?
- What problems/challenges did she face when trying to change?
- How did other people react?
- Why did your wife continue or stop? (maintenance of change)

Je, mnajua kama wenza wenu wamewahi kujaribu/kufanyia chochote kutokana na taarifa za meseji? Je mlichukuliaje?

Kama ndiyo, ni vitu gani walivyojaribu kufanya?

- **Kwa mfano, kulisha mara kwa mara, matunda na mboga mboga kwa wingi, nyama na mayai kwa wingi**
- **Je, ulifikiria nini kuhusu yeye kujaribu kitu kingine kipya kutoka na taarifa za kwenye meseji?**
- **Je, ulimsaidia katika kufanya mabadiliko? Kwanini/kwanini hapana? Ulimsaidiaje?**
- **Je alikutana na matatizo/changamoto gani wakati anajaribu kuafanya mabadiliko?**
- **Watu wengine walichukuliaje?**
- **Kwanini mke wako aliendelea au aliacha? (muendelezo wa mabadiliko).**

8. If she hasn't done anything differently, do you know why?

Kama hajafuatisha taarifa za meseji, unajua ni kwanini?

9. Whose responsibility is it to make sure that everyone in a family is healthy and eating well?

Je, ni jukumu la nani kuhakikisha kwamba kila mtu katika familia ana afya bora na kula vizuri?

10. Would you like your wives to receive text messages on nutrition and health in the future?

- Why/why not?
- If you like the messages, would you be willing to pay for them?
- Ask participants to make suggestions on how to improve the service.

Je, mngenda wenza wenu wapokee meseji za afya na lishe hapo baadae?

- Kwanini? Kwanini hapana?
- Kama mnapenda meseji hizo, mtakuwa tayari kulipia?
- Waombe washiriki watoe mapendekezo juu ya kuboresha huduma ya meseji.

Thank you.

E.9 Topic guide for focus group discussions with elderly women and non-treatment mothers (do not need to own a phone)

Purpose:

- Understand current information-seeking behaviours and practices related to child feeding
- Explore whether they have heard about mNutrition messages and what they think about them

Sample: 1-2 focus group discussions in extreme case village only. Snowball sampling with help of chairman. Make sure no members of treatment households are involved.

Location: Central place in the community

Time for the focus group: Approximately 60-90 minutes

Instructions:

Thank the focus group participants for taking part in the study and explain that you are part of a research team that wants to collect information about health and nutrition in this community.

Explain that some households have been receiving free text messages containing health and nutrition information for several months now. This service is called mNutrition and is provided by Wazazi Nipendeni. Please ask them to confirm this. If they have their phone with them check that we are talking about the right messages by checking on their phones and looking for 15001 messages. Use this to verify we are talking about the right messages.

Explain that everything they say will be treated as confidential, will not be shared with other people in their village or household (beyond the focus group participants) and that you will not use their real names. Explain to them that their participation is voluntary, and they can stop any time and withdraw their data at any time.

Tell them the discussion will take around 60-90 minutes and that you (and the note taker) would like to take notes and audio-record (so that you do not miss any information). Check that this is okay with them. Ask whether they have any questions.

Registry:

Please complete the registry provided on a separate sheet that should look like the one below. Ask participants to sign to confirm their consent.

Name (just so you can use it in the discussion)	Age	Number of children
Age of their youngest child (in months)	Date of the interview and start time	Village name
Specify whether they have a mobile phone or phone with internet access/WhatsApp		

1. Warm-up questions

How long have you lived in this village? With whom do you live? Are there any small children in your household? How old are they?

2. Information about nutrition

1. **What do people in this area usually eat on a typical day?**

Kwa kawaida watu wa eneo hili huwa wanakula nini?

2. **In your opinion, what makes a good diet? Why? (Knowledge, get details)**

- Prompt: What types of foods
- Number of meals a person has per day
- Differences between good diet for men/women, pregnant women and adults/children (if same food, is it cut in smaller pieces for children, or mashed, or less spicy)
- Size of portion per meal What do you value in a diet (quantity of food? Quality of food? Type of food?) Why?

Kwa mtazamo wenu, chakula bora ni kipi? Kwanini?

- Dadisi: Ni aina gani za vyakula
- Idadi ya milo kwa siku
- Kiasi cha chakula kwa kila mlo
- Utofauti wa chakula bora kati ya wanaume/wanawake, wajawazito na watu wazima/watoto (kama ni chakula kile kile , je kinakatwa vipande vidogo vidogo kwa ajili ya watoto wadogo, au kusagwa, au kupunguzwa viungo)
- Vitu gani mnathamini katika mlo (wingi wa chakula? ubora wa chakula? Aina ya chakula?) kwanini?

3. **Would you describe the diets of people in this community as a good diet? Why? Why not? (Practice)**

- Reasons for not having a good diet: Choice, barriers, preference, taste (e.g. don't have money to buy food, limited access to food, they have no influence on what type of food is purchased as someone else buys the food)?
- Think about different meals during the day

Je, mnafikiri kwamba mlo wa watu katika jamii hii ni bora? Ni kwanini? Ni kwanini sio? (Practice)

- Sababu za kutokuwa na mlo bora: Uchaguzi, vikwazo, upendeleo, Ladha, (Mfano, kutokuwa na hela ya kununua chakula, ugumu katika upatikanaji wa vyakula, kutokuwa na maamuzi juu ya ununuzi wa vyakula kwasababu mtu mwingine ananunua chakula)?
- Fikiria milo tofauti tofauti kwa siku.

4. **What do you think is important for babies to eat to stay healthy and grow well? What do you plan to do? Why? (knowledge, beliefs)**

- What is the first food a baby should get after delivery and why? And when? (breastfeeding, colostrum, other food or drinks as first food, and when and why? (e.g. due to problems breastfeeding or beliefs)
- In the first six months after birth? (breastfeeding; whether they believe a baby needs other food/drink)
- In the first year of life? (ask about the age at which the baby needs to get food and drinks other than breastmilk; type of food)
- What foods/drinks do people give to children over six months of age in this area? Why?
- Have there been any changes in the types of foods/drinks that children over six months get these days compared to when you were a young mother? Why have there been changes?

Ni kitu gani mnafikiri ni muhimu kwa watoto kula ili kuwa na afya na ukuaji mzuri? Mna mpango wa kufanya nini? Ni kwanini (uelewa, Imani)

- Ni chakula gani mtoto anatakiwa apate baada tu ya kuzaliwa na kwanini? Na muda gani (kunyonyesha, dang'a-maziwa ya mwanzo ya njano, vyakula vingine au vinywaji kama chakula cha mwanzo, wakati gani na kwanini?) (mfano kutokana na matatizo ya unyonyeshaji au imani)
- Miezi sita ya mwanzo baada ya kujifungua, (kunyonyesha; kama anaamini mtoto anahitaji vyakula/vinywaji vingine)
- Ndani ya mwaka mmoja? (uliza kuhusu umri ambao mtoto anatakiwa aanze kupata chakula na vinywaji vingine tofauti na maziwa; aina ya chakula.
- Ni aina gani ya vyakula/ vinywaji watu huwapa watoto wenye umri zaidi ya miezi sita katika eneo hili? kwanini?
- Kumekuwa na mabadiliko yoyote katika aina za vyakula au vinywaji ambavyo watoto wenye umri zaidi ya miezi sita wanapata siku hizi ukilinganisha na kipindi mlipokua akina mama? Kwanini Kumekua na mabadiliko?

5. How do you know that a child is growing well? (signs of undernutrition)

- Weight gain, height, cognitive stage of development
- Girl/boy
- What do parents in this village do when they think the child is not growing well?
- Who do they ask for help?

Je, mnajuaje kuwa ukuaji wa mtoto ni mzuri? (Dalili za utapiamlo)

- Kuongezeka uzito, urefu, uwezo wa ubongo kufanya kazi
- Msichana/Mvulana
- Je, wazazi wanafanya nini wanapogundua ukuaji wa mtoto sio mzuri?
- Ni nani mnamuomba msaada?

6. What do you recommend to a mother when her child is not growing well? What should she do?

- Whom should she ask for advice?

-
- What type of food should she feed?

Mnatoa ushauri gani kwa mama ambaye mtoto wake hakui vizuri? Afanye nini?

- Apate ushauri kwa nani?
- Aina gani ya chakula amlishe mtoto?

7. Where do people usually go when they have a health problem?

- Who do people go to? (e.g. traditional healer, pharmacy, dispensaries, knowledgeable person, hospital). Why?
- Barriers to accessing health facilities (probe for different levels from dispensaries to hospitals) (e.g. cost, distance, waiting times, staff at facilities, refusal of referral, medication available at facilities, transport, accompanying family members)

Kwa kawaida watu huenda wapi wanapokua na matatizo ya kiafya?

- Huenda kwa nani? (mfano mganga wa kienyeji, duka la madawa, zahanati, mtu mwenye uelewa/ujuzi, hospitali) Kwanini?
- Vikwazo katika kufikia vituo vya afya. (dadisi utofauti uliopo kati ya zahanati na hospitali) (mfano gharama, umbali, muda wa kusubiri, uwepo wa wahudumu, kutopewa rufaa, upatikanaji wa dawa, usafiri, kusindikizwa na wanafamilia)

8. Who in this village gives young mothers guidance on how to feed and care for baby?

- Whose advice do mothers trust?

Ni nani anayetoa ushauri kwa akina mama juu ya lishe na utunzaji wa watoto katika kijiji hiki?

- Akinamama huamini ushauri kutoka kwa nani?

9. In this area, who in the household usually determines what foods the household eats?

- Who purchases (mother, grandmother, father, grandfather, etc), Why?
- Who decides what food is bought? Why?
- Who decides what food is eaten (mother, grandmother, father, grandfather, etc), Why?
- Who decides how much food everyone gets (mother, grandmother, father, grandfather, etc). Why?
- If husbands decide, what happens if a wife wants to buy something different from what men or others in the household want them to buy?

Katika eneo hili, ni nani anayefanya maamuzi juu ya chakula gani kiliwe katika kaya?

- Nani anayenunua (bibi, mama, baba, babu, n.k) kwanini?
- Nani anayefanya maamuzi katika ununuzi wa chakula? Kwanini?
- Nani anayefanya maamuzi ya chakula gani kiliwe? (bibi, mama, baba, babu, n.k) kwanini?

- Nani anayefanya maamuzi juu ya kiasi cha chakula kila mwanakaya apate? (bibi, mama, baba, babu, n.k) kwanini?
- Kama mwanaume amefanya maamuzi, nini kitatokea endapo mwanamke au mke atafanya manunuzi tofauti na alivyo agizwa na mume au wanakaya wengine wanavyotaka?

10. Where do people in this area usually go to get information on how to eat well to stay healthy?

- Who? (e.g. health worker, family, NGOs, radio/TV)? Why?
- What type of information is available?
- Do you seek advice from different sources and compare them?

Kwa kawaida watu wa eneo hili wanapata wapi taarifa kuhusu ulaji bora ili kuwa na afya nzuri?

- Nani? (mfano: mhudumu wa afya, familia, asasi zisizo za serikali, radio na luinga) Kwanini?
Ni aina gani ya taarifa hupatikana
- Je, unatafuta ushauri kutoka vyanzo tofauti na kuweza kulinganisha?

11. How easy or how difficult is it for people in this area to access information about nutrition?

- Barriers to access
- Best way to get information (channels)
- Time of day/week they want information (e.g. Saturdays)

Je, kuna urahisi au ugumu wowote kwenye upatikanaji wa taarifa zinahusiana na lishe katika eneo hili? Kwanini?

- Ugumu wa upatikanaji
- Njia nzuri zaidi ya kupata taarifa
- Muda wa siku au wiki ambao wangependa kupata taarifa (mfano jumamosi)

12. In your opinion, is there any information on nutrition that is missing in your area? (ask for details)

- Breastfeeding
- Preparing food
- Food for different age groups? Do you know for all ages?

Kwa mtazamo wako, kuna taarifa za lishe zinazokosekana katika eneo hili? Uliza kwa taarifa zaidi.

- Unyonyeshaji
- Utayarishaji wa chakula
- Chakula kwa rika tofauti? Je , unafahamu kwa rika zote?

3. Awareness of mNutrition

Have you heard that some households in this community have been receiving text messages about health and nutrition on their mobile phones for a few months?

- If they say yes, ask what they think about the messages. Useful/not useful? Have they ever been shown a message or told about its content from another mother?
- If they say no, ask whether they would find text messages with health and nutrition information for the household useful. Why/why not?

Mmewahi kusikia kwamba baadhi ya kaya katika kijiji hiki zinapokea meseji kuhusu afya na lishe kupitia simu zao kwa miezi kadhaa?

- Kama wakikubali waulize wanamtazamo gani kuhusu meseji hizo. Ni muhimu/ sio muhimu? Je wamewahi kuoneshwa meseji au kuambiwa kuhusu madhui na akina mama wengine?
- Wakisema hapana, waulize kama watadhani kama zenye taarifa za afya na lishe ni muhimu kwa kaya. Kwanini/kwanini hapana?

Thank you. Do you have any questions?

Ahsante. Mna maswali yoyote?

Annex F Coding scheme used for the midline data analysis

Codes	Sub-codes	Description
Implementation process of WN plus mNutrition		
Registration process	Signing up Message sender number/Spam Problems with delivery or signing up	Process by which people signed up for the programme People not liking messages coming from 15001 as they think they are spam or network messages People not receiving messages
Hardware problems	Broken phone Changes in phone & sim Credit Lost phone Multiple sims Network Paying to have phone charged Solar	Phones breaking/children breaking phones Impact of people changing phones & Sim cards Buying credit People losing phones Multiple sim cards in one phone Issues with network quality Payments for phone charging at local shops People using solar panels for charging phones
Perceptions about mobile phone as delivery channel	Being able to reply to messages Delivery frequency and regularity Getting more info from CHWs Mobile channel negatives Mobile channel positives Thinking message is spam Literacy	People wanting an interactive system so they could reply to messages Frequency and regularity of message delivery Wanting to get follow up information from community health workers Overall negatives with the mobile channel Overall positives with the mobile channel Not knowing who the message is from and thinking it's spam People being able to read messages or having to have messages read to them if they could not read

<p>Reaction to WN plus mNutrition messages</p>	<p>Following message advice Keeping or deleting messages Message dislikes Message likes Not reading messages Reading in part or full Novelty Realistic Relevant to personal situation Reminder</p>	<p>Following the advice in the messages People keeping messages Overall what people disliked about the messages Overall what people liked about the messages People not reading messages Whether people read the whole message Message content was new information Message content realistic Message content relevant to personal situation Message was a reminder of knowledge they had been exposed to elsewhere</p>
<p>Messages sharing</p>	<p>Sharing Thinking about messages later</p>	<p>Sharing messages Whether people thought about messages later on</p>
<p>Perceptions of the usefulness of the messages</p>	<p>Relevant to personal situation Reminder Reasons for why not useful Useful as access to formal healthcare difficult Useful because through mobile phone Complements enhances info from health worker Messages reinforce health worker action Messages influence how they receive message from health workers Messages provide more specific information than health worker Make more useful get advice based on specific current problems Not useful as too many too remember Not useful no time to engage as occupied Useful as health service does not teach nutrition</p>	<p>Users perceptions of the usefulness on WN plus mNutrition and why.</p>
<p>Ease of comprehending messages</p>	<p>Couple discusses message Message comprehension difficult Messages easy to understand self-explanatory Misunderstanding content no way to clarify</p>	<p>Users perceptions of the ease of use of the WN plus mNutrition messages.</p>

Factors that affect the trust in the WN plus mNutrition messages	<p>Threats to trust</p> <p>Not trust because believe message comes from MNO</p> <p>Distrust as believe it is spam</p> <p>Trust because from health sector</p> <p>Trust because the heard the same from health worker</p> <p>Trust because written word</p> <p>Trust because they read text messages themselves no translation error</p> <p>Trust because timed well provide guidance</p> <p>Suspicion as knowledge of stage of pregnancy</p> <p>Danger to trust and credibility not well timed</p> <p>Trust content personal contact</p>	Factors that affect users trust in the content of the messages/
Enablers/barriers to behaviour change		
Enabler of behaviour change	<p>Behaviour change Husband support</p> <p>Change as child was often ill</p> <p>Community reaction if change</p> <p>Enabler to change positive child growth</p> <p>Other supportive health and agriculture projects from various organisations</p> <p>Couple discusses</p> <p>Enabler food is easily available and cheap</p> <p>Enabler health service improved</p> <p>Enabler messages reinforces health workers</p>	Various enablers of a change in behaviour in response to the messages.
Pathways of behaviour change	<p>Mechanism behaviour change _barrier to sharing</p> <p>Mechanisms of change share with others</p>	Detailed description of specific pathways of behaviour change.

	Pathway to change couple discusses	
Barriers to behaviour change	<p>No behaviour change but interesting</p> <p>No behaviour changes nothing new</p> <p>Barriers access to food</p> <p>Barriers to sharing messages family concern</p> <p>Barrier women don't have phone and men does not share</p> <p>Barrier time</p> <p>Barrier recommendation not context specific</p> <p>Barrier poor WASH_</p> <p>Barrier high level HIV extreme site</p> <p>Barrier customs</p> <p>Barrier child needs are different</p> <p>Barrier_alcohol_extreme side</p> <p>Barrier breastfeeding_time</p>	Various barriers to a change in behaviour in response to the messages.