

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**

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Executive summary

Introduction

This desk-based review forms part of the external impact evaluation of m-Nutrition in Tanzania. 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). M-Nutrition is a global initiative supported by DFID, organised by GSMA, and implemented by in-country mobile network operators (MNOs) to use mobile technology to improve the nutritional status of children and their mothers. In Tanzania m-Nutrition is added to the existing m-Health platform 'Healthy Pregnancy, Healthy Baby' (HPHB), an SMS programme run by Wazazi Nipendeni, with the aim of improving women's dietary intake, infant and young child feeding (IYCF) and child anthropometry.

Objectives of the desk review

In line with the primary objectives of the impact evaluation (i.e. to assess the impact of m-nutrition on child under nutrition, IYCF and female dietary diversity), the review sets out to identify, review and summarise existing literature on:

- a) Determinants of undernutrition in Tanzania (with a specific focus on determinants of women's dietary diversity and IYCF); and
- b) The use of mobile phone technology for health in Tanzania (with a specific focus on experiences, lessons learnt and impact of existing m-Health and m-Nutrition interventions).

Findings

Determinants of undernutrition in Tanzania

Despite good progress in health, undernutrition remains a public health challenge in Tanzania. Childhood stunting levels are high and so are micronutrient deficiencies, especially of Vitamin A, iron and iodine. Thinness affects 5.5 per cent of all women aged between 15 and 49 years in Tanzania and about one-third are deficient in iron, Vitamin A and/or iodine. Overweight is also an increasing health concern, with more than 20 per cent of women in rural areas being classified as overweight.

Guided by the UNICEF framework for malnutrition evidence on immediate, underlying and basic causes of undernutrition was reviewed:

On the *immediate level*, dietary intake of children below the age of five years is inadequate, with sub-optimal breastfeeding practices (especially with regards to exclusive breastfeeding for the recommended first six months of life and early initiation of breastfeeding within one hour of birth) and poor complementary feeding (especially in terms of dietary diversity and meal frequency). IYCF is particularly challenging for HIV-positive mothers, who often face multiple economic, social and individual pressures. Dietary intake of women of reproductive age is equally insufficient, with low dietary diversity and a lack of animal sourced foods. Food insecurity, poverty and lack of education are the main reasons for poor diets.

Malaria and HIV/AIDS present major causes for morbidity and mortality for adults and children in Tanzania. Diarrhoeal diseases and respiratory infections are also common among children below five years especially in rural settings.

With regards to the *underlying level*, health service coverage has increased significantly since 2008. Nevertheless, health service utilisation remains low due to (direct and indirect) costs for health care, severe understaffing and lack of trust in services.

Household food insecurity is a major concern for rural households in Tanzania, in particular because a large proportion of the population depends on rain-fed agriculture. Escalation of world food prices has aggravated food insecurity further.

Access to safe drinking water and sanitation and good hygiene practices remain a significant challenge in Tanzania and have been linked to the high prevalence of diarrhoea, worm infestations (and enteropathic disease) among children and women. All three have been linked to undernutrition.

On the *basic level*, nutrition has become a priority of the Tanzanian Government in recent years. Tanzania joined the Scaling Up Nutrition (SUN) Movement in 2015 and has launched several nation-wide strategies, committees and programmes to address undernutrition more effectively.

Mobile phones for health in Tanzania

Mobile phone penetration in Tanzania is extensive with 43 per cent of the population having access to a mobile phone (although the recent ban on counterfeit phones has reduced access slightly as approximately 3 per cent of phones have been disconnected by the government).

Barriers to mobile phone use include lack of money to purchase a phone/pay for connection costs, lack of electricity and limited network coverage. All of these barriers are being addressed by MNOs and local entrepreneurs (e.g. rural mobile kiosks that provide electricity to charge mobile phones).

Mobile phones are valued as a delivery channel for information by rural communities, which rely on exogenous information. However, language barriers and fear of change and using new technologies were common barriers to the up-take of mobile phone-based knowledge.

M-health services are popular in Tanzania, with 3.4 million current users and 31 active m-Health services. Most m-Health services are donor-funded. Wazazi Nipendeni and here the HPHB SMS programme is currently the largest m-Health programme that promotes maternal and child health. No impact evaluation of existing m-Health services for mothers and children in Tanzania could be retrieved.

Conclusion

Based on the findings of this desk review insufficient IYCF feeding practices and poor dietary diversity are important challenges and contributors to undernutrition in Tanzania. The m-Nutrition intervention as part of Wazazi Nipendeni could help to address these challenges by promoting behaviour change for better IYCF feeding and dietary diversity. However, the review also highlighted context-specific barriers to IYCF feeding and dietary diversity that need to be considered, as well as other underlying and basic contributors to undernutrition.

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Abbreviations

ARV	Antiretroviral
ANC	Antenatal care
BMI	Body Mass Index
CDC	Centre for Disease Control and Prevention
EGPAF	Elizabeth Glaser Pediatric Aids Foundation
FANC	Focused Antenatal Care
FAO	Food and Agriculture Organisation
GAIN	Global Alliance for Improved Nutrition
GDP	Gross Domestic Product
GNR	Global Nutrition Report
GSMA	Groupe Spéciale Mobile Association
HDI	Human Development Index
HLSCN	High Level Steering Committee on Nutrition
HPHB	Healthy Pregnancy Healthy Baby
IYCF	Infant and Young Child Feeding
MDD	Minimum Dietary Diversity
MMF	Minimum Meal Frequency
MoHSW	Ministry of Health and Social Welfare
MNO	Mobile Network Operator
NBS	National Bureau of Statistics
SMS	Short Message Service
SUN	Scaling Up Nutrition
TNNS	Tanzania National Nutrition Survey
TDHS	Tanzania Demographic and Health Survey
TFNC	Tanzania Food and Nutrition Centre
THMIS	Tanzania HIV/AIDS and Malaria Indicator Survey

USAID US Agency for International Development

WHO World Health Organization

1 Introduction

This desk-based review forms part of the external impact evaluation of m-Nutrition in Tanzania. M-Nutrition is a global initiative supported by DFID, organised by GSMA, and implemented by in-country mobile network operators (MNOs) to use mobile technology to improve the health and nutritional status of children and their mothers in the developing world. M-Nutrition is currently being implemented in eight countries in sub-Saharan Africa. In most countries m-Nutrition is added to existing mobile phone-based platforms. A consortium of researchers from Gamos, the Institute of Development Studies (IDS) and the International Food Policy Research Institute (IFPRI) is currently conducting a rigorous mixed-methods evaluation to estimate the impact of m-Nutrition on children and mothers and to understand how the context and the components of the m-Nutrition intervention shape its impact.

The focus of the m-Nutrition impact evaluation in Tanzania is the m-Health platform 'Healthy Pregnancy, Healthy Baby', an SMS programme run by Wazazi Nipendeni.¹ The m-Nutrition component was added on top of the existing m-Health platform with the specific aim of improving women's dietary intake, infant and young child feeding (IYCF) and child anthropometry.²

The objective of this desk review is to inform the baseline data collection of the impact evaluation of m-Nutrition in Tanzania. The review sets out to identify, review and summarise existing literature on:

- a) determinants of undernutrition in Tanzania (with a specific focus on determinants of women's dietary diversity and IYCF); and
- b) the use of mobile phone technology for health in Tanzania (with a specific focus on experiences, lessons learnt and impact of existing m-Health and m-Nutrition interventions).

1.1 Methods

This review was informed by targeted searches of electronic databases (Medline, Google Scholar and Google search engine). A search was also conducted for reports from government bodies of the Republic of Tanzania, as well as Tanzania-specific reports by the World Bank, UNICEF, Food and Agriculture Organization (FAO), World Health Organization (WHO) and other relevant governmental and non-governmental organisations (NGOs) and international bodies. The focus was on evidence created between 2010 and 2016.

¹ Wazazi Nipendeni ('Parents Love Me') is a national safe motherhood multi-media campaign in Tanzania. The campaign was created to harness mobile phone technology, especially text messaging, to reduce maternal and infant mortality. The campaign is led by the government of Tanzania and key partners including the US CDC, CDC Foundation, USAID, Johns Hopkins School of Public Health, and the Joining Hands Initiative.

² Assessing the impact of m-Nutrition on women's dietary diversity, IYCF and child anthropometry are also the primary objectives of the quantitative impact evaluation.

2 Country profile of Tanzania

2.1 Overview

The East African country of the United Republic of Tanzania has a population of 53.4 million (2015), with 68 per cent of the population living in rural areas and 32 per cent in urban centres and towns (UNdata, 2015). Tanzania was formed in 1964 shortly after independence from the UK. It consists of Tanganyika (the mainland) and Zanzibar (an archipelago). The Tanzanian mainland is divided into 25 administrative regions, 113 districts and 133 councils (The United Republic of Tanzania 2013). Tanzania is a democratic republic and the constitution guarantees political pluralism. Tanzania is politically stable and in October 2015 held its fifth general election since it transitioned to a multiparty democracy in 1992 (CIA 2014). Tanzania is an ethnically diverse country with more than 120 languages; the national language is Swahili and the official language English. The Sukuma are the largest ethnic group representing an estimated 16 per cent of the population. Approximately 35 per cent of the population are Muslim, 30 per cent Christian and the remainder belong to other religious groups.

Tanzania has borders with Kenya and Uganda to the north; Rwanda, Burundi and the Democratic Republic of the Congo to the west; and Zambia, Malawi and Mozambique to the south. To the east is the Indian Ocean and the country's coastline extends 1,424 km. Tanzania's climate varies, with a tropical climate on the coast, semi-arid climate in the central plateau, which is prone to flooding and droughts, and temperate climate in the highlands in the north and south (CIA 2014).

Tanzania's Human Development Index (HDI)³ value in 2014 was 0.521, which means that the country is in a low human development category and ranks 151st out of 188 countries (UNDP 2014). Between 1985 and 2014, Tanzania's HDI value improved from 0.371 to 0.521, an increase of 40.5 percent. Other key indicators are presented in Table 2.1.1.

Table 2.1.1: Key indicators

Indicators	
Population (million)	53.4
Life Expectancy at birth (male/female, years)	60/64
Adult Literacy rate (%)	67.8
Primary school net enrolment ratio (%)	98.5
Infant mortality rate (under 1)	38
Under-5 mortality rate (U5MR)	54
Economy	
Population living below the national poverty line (%)	28.5
GDP (US\$, billion)	48.1
GDP growth rate (%)	7.0
GNI per capita of (US\$)	1.045

Sources: (CIA, 2014; UNdata, 2015; UNDP, 2014; WHO, 2015)

³ The Human Development Index is a composite statistic of life expectancy, education, and income per capita indicators, which are used to rank countries into four tiers of human development.

2.2 Economy

Tanzania is one of the fastest-growing economies in East Africa, mainly due to its natural resources and tourism. It has a stable economic growth with an average annual GDP growth rate of 7 per cent in 2015 and low inflation rate of 5.6 per cent in the same year (World Bank 2015).

The Tanzanian economy depends heavily on agriculture, which accounts for more than one-quarter of GDP, provides 85 per cent of exports, and employs about 80 per cent of the female labour force and 72.7 per cent of the male labour force, based on data from 2005–12 (CIA 2014, FAOSTAT 2014). The main agricultural export commodities include coffee, tobacco, tea, cotton and sisal (FAOSTAT 2014).

The country exports mineral resources including gold and oil and most likely helium in the near future, as the largest global helium gas field was discovered in Tanzania in early 2016. Others sectors that drive growth in the Tanzanian economy are construction, communications, and the financial sector (World Bank 2016b).

2.3 Development priorities

Despite promising economic growth and the vision of the government of Tanzania's becoming a middle-income country by 2025, poverty levels remain unacceptably high (UNDP 2014). The Household Budget Survey 2012 estimated that 28.2 per cent of the population of Tanzania were poor and 9.7 per cent extremely poor (UNDP 2014). Poverty is estimated to be more prevalent in rural areas (30 per cent of all households) than in urban areas (22 per cent) (NBS 2013).

Tanzania's main development priorities (according to the Tanzania Development Vision 2025) include increased agricultural productivity, good governance and political stability; investment in a good health systems; raising education quality; increased access to water and improved availability of electricity (CIA 2014).

3 Determinants of Undernutrition in Tanzania

3.1 Nutritional status of children and women in Tanzania

Tanzania has made good progress in many health indicators over the past decade (e.g. infant mortality rate), but progress has not been as good with regards to the elimination of undernutrition in children and women of reproductive age.

3.1.1 Children

Almost 35 per cent of children below the age of five years are too short for their age (stunted), which classifies Tanzania as a country with high stunting prevalence based on the WHO classification for assessing severity of malnutrition by prevalence ranges (TFNC 2014a); see also Table 3.1.1.

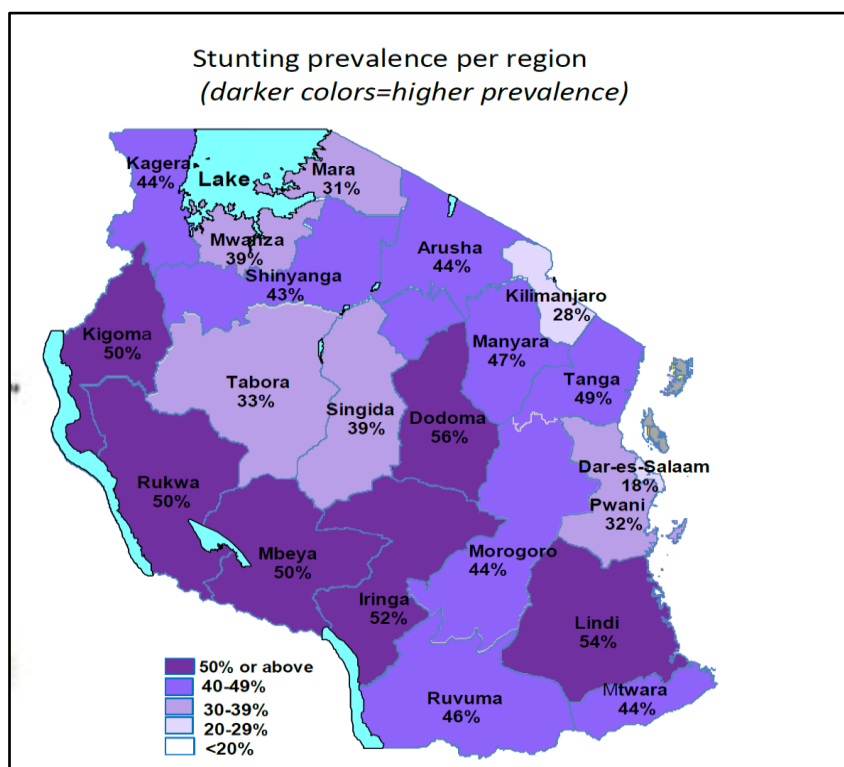
Table 3.1.1 Anthropometry measures

Child anthropometry	%
Low Height-for-age (stunting)	35
Low weight-for-age (wasting)	4
Overweight	5

Source: *Global Nutrition Report (GNR 2015)*

Childhood stunting is more prevalent in rural areas than in urban areas and there are also some regional differences (see Figure 3.1.1) with very high stunting prevalence⁴ in nine regions (Iringa, Njombe, Kagera, Dodoma, Ruvuma, Rukwa, Kigoma, Katavi and Geita).

⁴ According to WHO a prevalence of more than 40 % in stunting is defined as very high.

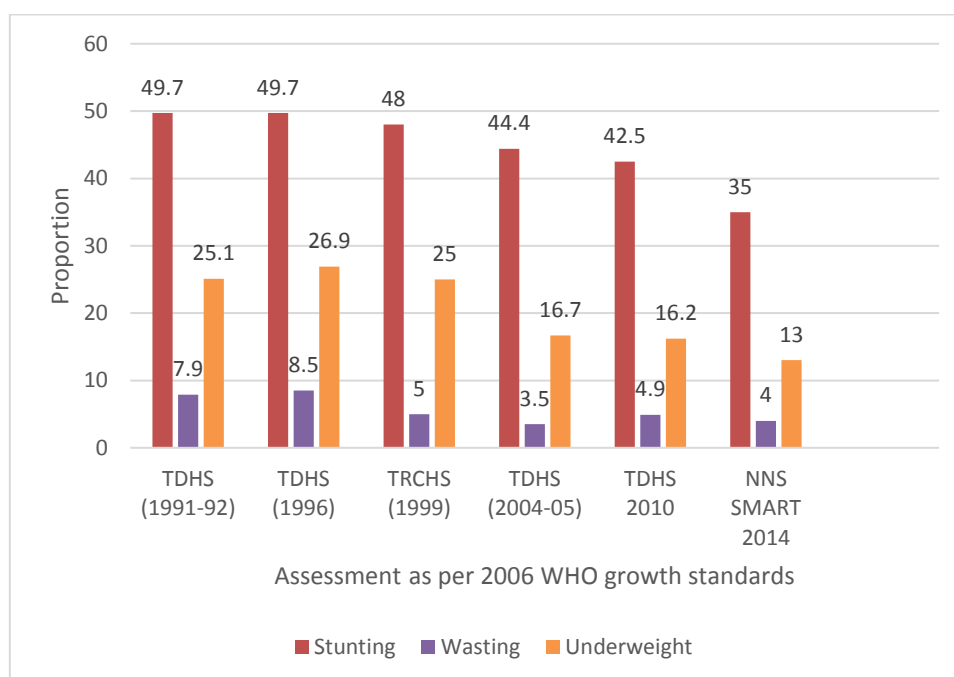
Figure 3.1.1 Regional distribution of the prevalence of stunting in Tanzania

Source: Tanzania Food and Nutrition Centre (2012)

The Tanzania Food and Nutrition Centre (TFNC) found that relatively few infants are stunting in the first month of life (16 per cent of infants aged 0–5 months old), but stunting prevalence then rapidly increases, with 39 per cent of children aged between 36 and 47 months being stunted (TFNC 2014a).

Approximately 4 per cent of children below the age of 5 years are too thin for their height (wasted), indicating a low wasting prevalence, although there are some pockets of high levels of acute malnutrition, particularly in Zanzibar. The highest rates of global acute malnutrition were found in Tanga, Mara and Singida regions, with Dodoma recording even higher levels of 6 per cent (TFNC 2014a).

Despite what are still unacceptably high levels of child undernutrition, it should be noted that Tanzania has made progress in addressing stunting, wasting and underweight in children; see Figure 3.1.2 (Global Nutrition Report 2015; TFNC 2014a).

Figure 3.1.2 Trends in nutritional status of children, 0–59 months (1991–2014)

Source: adapted from National Nutrition Survey 2014 (TFNC 2014a)

Micronutrient deficiencies remain a challenge, with approximately 43 per cent of children aged between 6 and 59 months deficient in Vitamin A and one-third deficient in iron. Iodised salt is used by only about 62 per cent of all households in Tanzania (UNICEF 2012).

3.1.2 Women of reproductive age

At national level, 5.5 per cent of women aged 15-49 years were considered being thin (body mass index (BMI) below 16) (TNS 2014). A high prevalence of thinness was found in Pemba North (11 per cent), Town West (10 per cent), Pemba South (10 per cent) and Manyara (9 per cent). Prevalence of thinness was higher in age groups aged 15-19 years and 45-49 years at 10 per cent and 7 per cent respectively. About one-third of women aged 15-49 years were deficient in iron, vitamin A and iodine; and two-fifths of women were anaemic.

Overweight and obesity among women is an increasing challenge, with 20 per cent of women being classified as overweight (BMI>25) or obese (BMI>30). Prevalence of overweight and obesity were higher in age groups aged 35–39 years and 45-49 years.

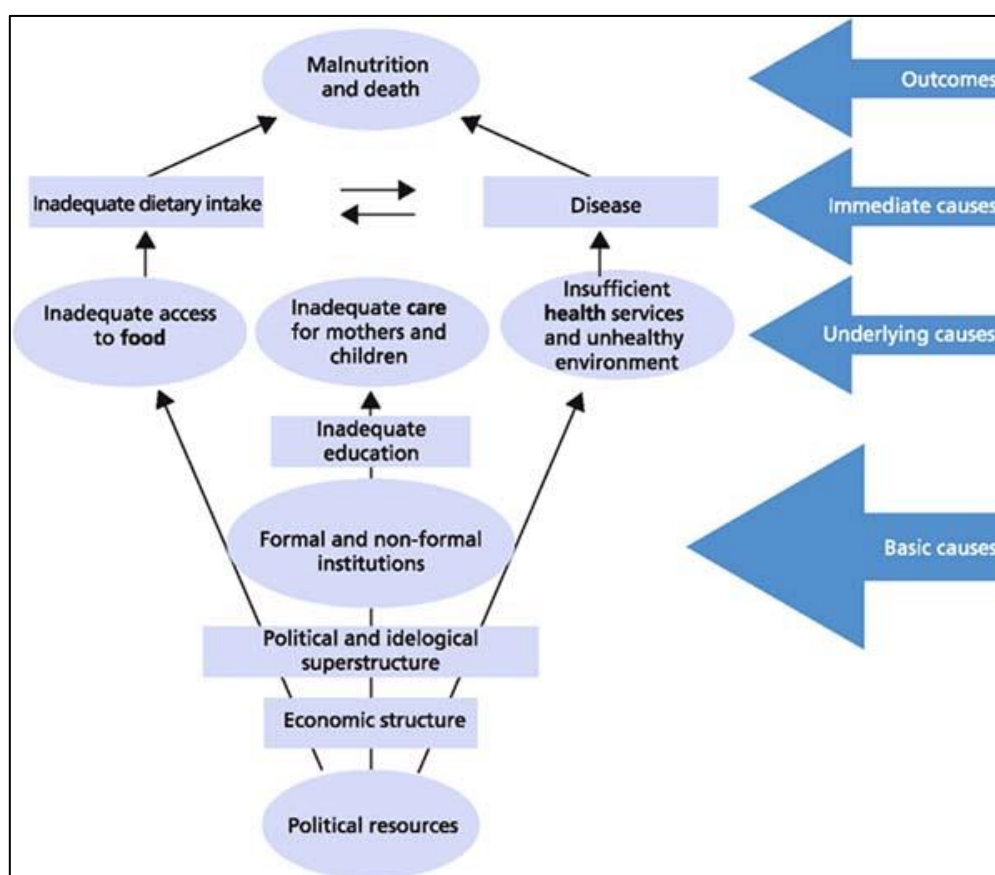
At the national level, 31 per cent of women aged 15-49 years with children under five years of age had not taken an iron-folic acid supplement during pregnancy (41 per cent according to the Tanzanian Demographic and Health Survey (TDHS 2010)).

3.2 Determinants of undernutrition in Tanzania

The review of determinants of undernutrition in Tanzania is guided by the UNICEF Conceptual Framework (1990), illustrated in Figure 3.2.1 (UNICEF, 1990). The framework identifies three interlinked levels of causes of undernutrition: *intermediate causes* that operate at the individual level (e.g. dietary intake and ill health); *underlying causes* that influence household and communities (e.g. food security, care and living environment); and

basic causes that form the structure of communities and society (e.g. political system, governance, income).

Figure 3.2.1 UNICEF framework on undernutrition



Source: adapted from UNICEF (1990)

3.2.1 Immediate causes

3.2.1.1 Inadequate dietary intake

Adequate dietary intake in terms of nutrients and energy is important to promote healthy growth and development in children. In women, an adequate diet is important to support a healthy pregnancy, prevent anaemia, promote foetal growth, and ensure that babies are born at a healthy birth weight.

Breastfeeding

For infants, breastfeeding provides optimal nutrition and also protection against infections (Victoria *et al.* 2016). According to WHO and UNICEF, optimal breastfeeding practices include early initiation within one hour of birth, exclusive breastfeeding for up to six months and continued breastfeeding additional to complementary feeding for 24 months and beyond.

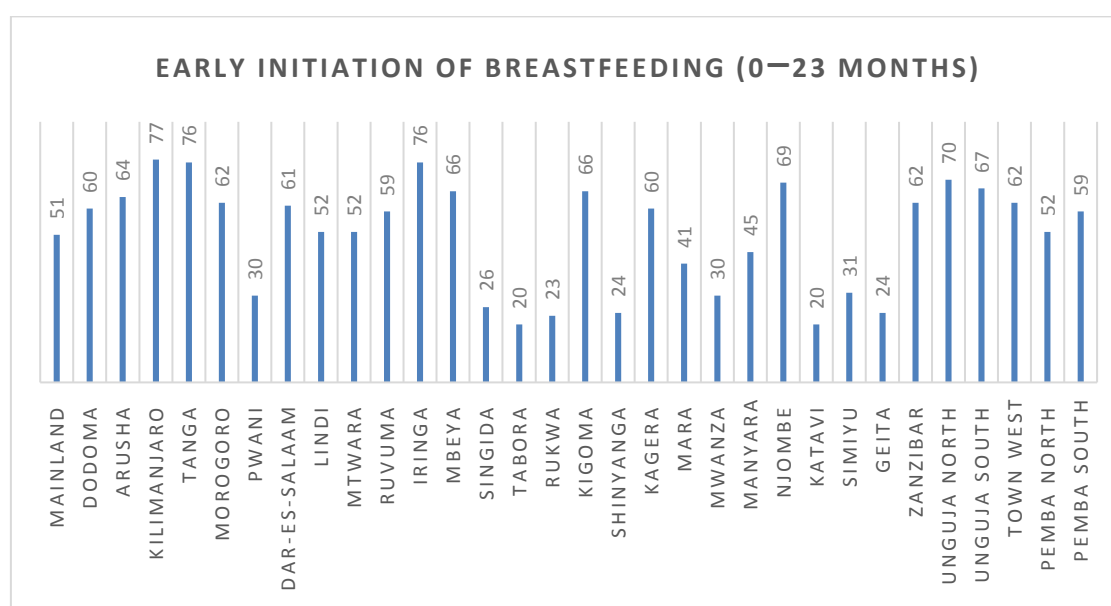
As can be seen in Table 3.2.1, breastfeeding practices in Tanzania are suboptimal. While almost all children were breastfed at one point in 2014, only 41 per cent were exclusively breastfed for the first five months of life. Early initiation of breastfeeding, which is important to establish good milk supply, also happened for only half of all children in Tanzania.

Table 3.2.1 Breastfeeding practices in Tanzania in 2014

Breastfeeding practice	%
Ever breastfed	98
Initiation of breastfeeding within one hour of birth	51
Exclusive breastfeeding of 0–5 month olds	41
Continuation of breastfeeding at one year	90

Source: TFNC (2014a)

Figure 3.2.2 highlights regional disparities in breastfeeding practices in Tanzania. The figure specifically shows figures for early initiation, but similar patterns can be observed in other breastfeeding practices too.

Figure 3.2.2 Regional differences in early initiation of breastfeeding in Tanzania

Source: adapted from TFNC (2014a)

Barriers to the initiation of breastfeeding within one hour of birth include: caesarean delivery; child birth at home with a traditional birth attendant or relatives; rural residence; discarding colostrum because it is perceived as unclean; being unmarried; lack of decision-making power (e.g. in the presence of the mother-in-law); being a young mother aged under 24 years; low education level; and being in employment (Esteves *et al.* 2014; Exavery *et al.* 2015; Victor *et al.* 2013). Mothers in urban areas are more likely to initiate breastfeeding early, which could be due to stronger support and promotion of breastfeeding by health care workers and more breastfeeding campaigns (Mgongo *et al.* 2013).

Exclusive breastfeeding is more likely to be practised if mothers received breastfeeding counselling at point of delivery, are married, do not consume alcohol and are older (Mgongo *et al.*, 2013). Regular antenatal visits have been shown to support healthier pregnancies and better breastfeeding practices in Tanzania (Mgongo *et al.* 2013; Saka, 2012). Given that grandmothers, husbands and traditional birth attendants influence breastfeeding practices, inclusion of these groups in breastfeeding promotion has been suggested as an effective strategy (e.g. via radio) (Shirima *et al.* 2000).

Factors that negatively affected exclusive breastfeeding included: traditions regarding prelacteal feeding (e.g. giving water as a sign of welcome to the newborn); beliefs that the

breastmilk was inadequate in nutrients or could cause illness ('bad milk'); pressure to provide additional food or drink to infants (e.g. by the mother-in-law); child care by grandparents; and issues with breast health (Agnarsson *et al.* 2001; Exavery *et al.* 2015; Mgongo *et al.* 2013; Nyaruhucha *et al.* 2006; Penfold *et al.* 2010; Saka 2012). Infants often received water, porridge or mashed banana to complement breastmilk early on.

Several studies found that knowledge on optimal breastfeeding practices was often relatively good thanks to, for example: a combination of policies supporting breastfeeding; the Baby Friendly Hospital Initiative; community education on breastfeeding to women in general; and increased support for breastfeeding, especially since 2004 when the Prevention of Mother-to-Child Transmission of HIV programme was introduced and scaled up in the country. However, this knowledge was frequently not translated into practice (Nkala and Msuya 2011).

Mothers who were HIV positive were even more likely to provide other foods and drinks to infants before six months of age (Exavery *et al.* 2015; Mgongo *et al.* 2013; Nyaruhucha *et al.* 2006; Saka 2012). Reasons for early cessation of breastfeeding among HIV positive women included fear of transferring the infection to the infants, breast problems, and social and family pressures to terminate breastfeeding (Saka 2012). On the one hand, they feared communicating their HIV status to husbands and family because of social stigma and concerns of being abandoned; on the other hand, they wanted to protect their newborn from the HIV virus (Falnes *et al.* 2011). The Tanzanian policy on infant feeding in the context of HIV mandates that all women who attend antenatal care (ANC) should be provided with free HIV counselling and testing, and that free provision of antiretroviral (ARV) therapy should be made if they test positive (Government of Tanzania 2009; Saka 2012).

Complementary feeding

Adequate complementary feeding practices are described as the timely introduction of nutritious, age-appropriate and safe foods for children from six months onwards in addition to breastfeeding (WHO and UNICEF 2003). Inadequate complementary feeding has been associated with poor nutritional and development outcomes (Arimond and Ruel, 2004; Menon *et al.* 2015) and development delays, due to the lack of stimulation during responsive feeding (Elder *et al.* 2014). The TDHS found an increase in stunting in children aged 7–22 months (even with optimal breastfeeding practices) that could have been due to poor complementary feeding (NBS 2011).

The Tanzania National Nutrition Survey (TNNS) showed that 90 per cent of children aged 6–8 months had a timely introduction of complementary food (TFNC 2014a). However, meal frequency⁵ and dietary diversity⁶ of complementary feeding were less positive. Only 66 per cent of children met the minimum meal frequency (MMF) and only 25 per cent met the minimum dietary diversity (MDD) target, although there were some regional differences, with a higher proportion of dietary diversity in Kilimanjaro and Tanga at 66 per cent and 80 per cent, respectively, and the lowest in Iringa, Mbeya, Singida, Tabora, Manyara and Katavi with less than 10 per cent.

Traditional complementary foods are low in energy and nutrients in Tanzania (Dawkins *et al.* 2015). Foods commonly provided include a thin filtered porridge from refined maize flour as

⁵ MMF helps assess adequate energy intake from non-breast milk sources. For breastfed children the recommendations are two meals at 6-8 months per day and three thereafter. For non-breastfed children, the minimum meal frequency is four.

⁶ MDD is a proxy to assess adequate micronutrient density of foods and liquids other than breast milk. Minimum dietary diversity is defined as the proportion of children aged 6–23 months who receive foods from four or more of the recommended food groups.

the first complementary food and *ugali*, or a similar starch-based staple, with vegetables or legumes, seldom combined with meat and/or fruits (Dawkins *et al.* 2015; Kulwa *et al.* 2015; Masetta, Kogi-Makau, and Omwega, 2009; Victor *et al.*, 2014). A lack of animal-source foods was observed in several studies and surveys and has been associated with iron deficiency among children in Tanzania (Dawkins *et al.* 2015; Kulwa *et al.* 2015). Meal sizes are often inadequate to meet children's energy requirements (Kulwa *et al.* 2015).

Food insecurity and limited or no access to nutritious food (e.g. due to poor economic status) were common reasons for poor complementary feeding (Dawkins *et al.* 2015). Other reasons included low paternal or maternal education; limited access to mass media and thus campaigns that promote good IYCF practices; and lack of post-natal check-ups (Victor *et al.* 2014).

Dietary intake of women

Dietary diversity among rural women in central and north-eastern Tanzania is 'alarmingly low' (Keding *et al.* 2012). Diets usually consist of only two food groups per day, mainly cereals and vegetables (Keding *et al.*, 2012). Animal-sourced food is seldom consumed and pregnancy-related food taboos restrict the consumption of fish and meat in some areas (Marchant *et al.* 2013). As a consequence, the prevalence of iron-deficiency anaemia is high. Anaemia during pregnancy can have negative effects for the offspring and also increases the risk for maternal mortality and morbidity. The TNNS found that 31 per cent of women in Tanzania did not take iron supplements during pregnancy (TFNC, 2014b).

In many rural areas food insecurity security and food consumption patterns vary between the rainy and the harvest seasons, with both being worst during the rainy season (Ntwenya *et al.* 2015). Dietary diversity was usually lower among women who lived in food-insecure households, with food-insecure women less likely to consume animal-source foods and fruits (Leyna *et al.* 2010; Ntwenya *et al.* 2015)

Keding *et al.* found initial signs of the nutrition transition among women in rural Tanzania (Keding *et al.* 2011, 2012, 2013). In a series of studies, Keding found that three times as many women were overweight or obese than were undernourished in some rural areas. Overweight women mainly followed a diet characterised by high consumption of bread and cakes (usually fried or baked in oil), sugar and black tea.

3.2.1.2 Diseases

Infections increase the body's requirements for nutrients, reducing appetite and the absorption of nutrients from the intestine, all of which increase the risk of undernutrition. Undernutrition can increase the risk of infection, while infection can cause undernutrition, leading to a vicious cycle of undernutrition and infection.

Tanzania has made considerable progress in the reduction of child mortality since the 1990s thanks to the government's commitment to increase key health interventions, such as sustained high coverage of routine immunisation for children aged under five years, Vitamin A supplements, the use of insecticide-treated bed nets, and better drugs to treat malaria (UNICEF 2012). Nevertheless, malaria, fever, acute respiratory infection and diarrhoeal disease remain common among children, especially in rural areas (UNICEF, 2012).

Malaria

Malaria is the leading cause of morbidity among children below five years of age (National Bureau of Statistics 2013). The Tanzania HIV/AIDS and Malaria Indicator Survey (THMIS) found that 9 per cent of children aged 6–59 months were infected with malaria and that the prevalence increased gradually with age (Tanzania National Bureau of Statistics 2013). Children who lived in rural areas were five times more likely to be infected with malaria than

children who lived in urban areas. Malaria is most prevalent in Lake and Western regions. Malaria decreases with the mother's education level and with increasing levels of household wealth (Tanzania National Bureau of Statistics 2013).

Malaria is also widespread among adults, with an estimated 10 million malaria cases in 2010. Malaria in pregnancy poses a major mortality risk for mothers and children, especially if placental parasitaemia develops (Ndeserua *et al.* 2015).

Knowledge of the signs of malaria (e.g. fever, convulsions) and approaches to prevent malaria (e.g. sleeping under insecticide-treated bed nets) is very high throughout Tanzania thanks to widespread public health campaigns (Tanzania National Bureau of Statistics 2013). Ownership of bed nets is high (95 per cent of all households) and approximately three-quarters of the population regularly slept under bed nets, especially during the rainy season (Tanzania National Bureau of Statistics, 2013).

A key aspect of malaria control is the effective diagnosis and treatment of malaria, especially in the children. Without timely treatment children can die quickly. In 2013, 77 per cent of children with fever received health care and 32 per cent received anti-malaria drugs (Tanzania National Bureau of Statistics 2013). Self-medication or consultants of traditional healers to treat fever was still practised in some areas (Dillip *et al.* 2009; Mayombana 2004).

HIV

In 2-15, it was estimated that 4.7 per cent of adults aged 15–49 years are HIV positive and 91,000 children aged 0–14 years are living with HIV in Tanzania (UNAIDS 2015).

Undernutrition has been associated with HIV/AIDS in different ways in the context of Tanzania. HIV-infected children and adults have higher nutrient requirements than non-infected individuals, HIV-affected households are more prone to food insecurity and poverty and as a consequence, IYCF practices are often poor in terms of frequency, quality and quantity (Sunguya *et al.* 2014). HIV can be transmitted during breastfeeding. To prevent mother-to-child transmission of HIV, the Ministry of Health recommends exclusive breastfeeding for the first six months combined with preventive breastfeeding measures (e.g. intake of ARV medication) and strongly discouraged mixed feeding (MoHSW 2013). However, as discussed above, social pressures, intra-household decision-making processes and maternal concerns often pose multiple barriers for HIV-infected mothers and health workers when attempting to put these recommendations into practice (Sunguya *et al.* 2014). Gaps in the knowledge of health workers with regards to breastfeeding and HIV have been identified as another barrier in translation of information (TFNC 2012).

Other diseases and infections

Diarrhoeal diseases are common among children aged below five years, with 15 per cent reported to have diarrhoea in the past two weeks in 2011 (NBS 2011). There were large regional differences in the prevalence of diarrhoea and also in its treatment (e.g. use of oral rehydration salts), with urban areas being slightly better off than rural areas (NBS 2011).

3.2.2 Underlying determinants

3.2.2.1 Access to health services

Tanzania has one of the highest densities of primary health care facilities in Africa due to the government's systematic efforts to strengthen the health system (MoHSW 2008). Despite good coverage, health care utilisation remains low (Semali 2010; Shayo *et al.* 2016).

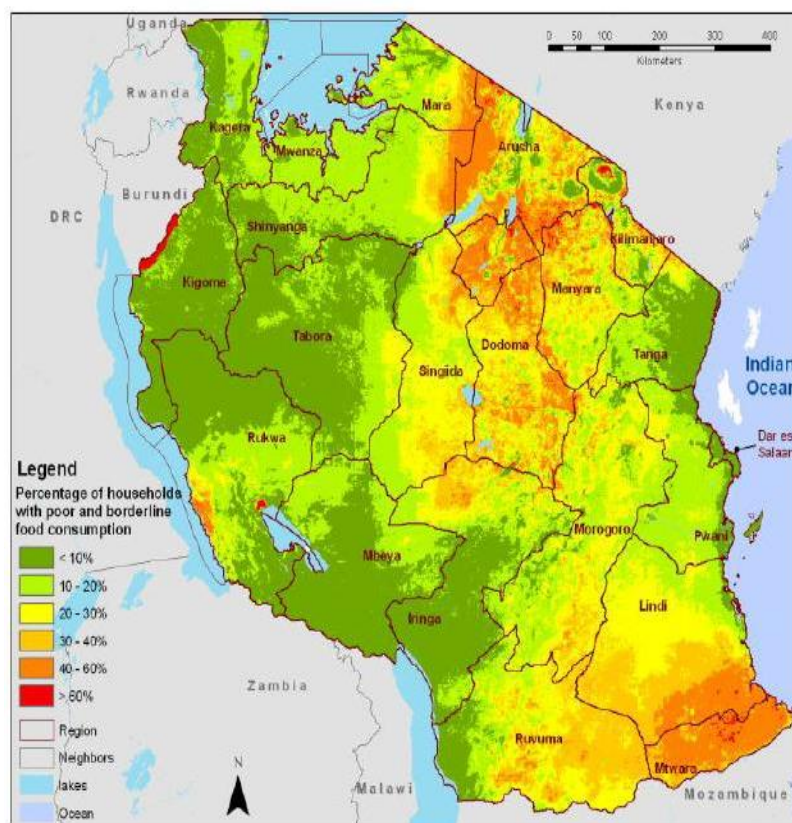
Districts are semi-autonomous in health planning and implementation and health services are carried out by the local governments via the Ministry of Health and Social Welfare

(MoHSW), which coordinates between the Prime Minister's Office, local governments and other actors. Reasons for poor health care utilisation include: direct and indirect costs of health care; lack of trust, especially in public health care facilities; shortages of medications; and understaffed facilities, with only 35 per cent of the positions filled by qualified health workers (Semali 2010; Shayo *et al.* 2016; The United Republic of Tanzania, 2013). Accessibility of health care facilities was also a challenge, including fear of encountering wild animals on the way (Mrisho *et al.* 2009)

Maternal mortality due to obstetric complications around the time of childbirth remains an issue in Tanzania, despite the Focused Antenatal Care (FANC) programme, which the government launched in 2002. Gaps in ANC include: poor training among health workers, absenteeism, lack of resources, limited adherence to FANC guidelines; and critical gaps in examination and drug administration (Gross *et al.* 2011; Sarker *et al.* 2010). Another study on ANC and postnatal care in rural Tanzania found that women were generally unwilling to go to health centres due to lack of money. Similarly, high priority was not given to mothers for postnatal care due to limited resources and lack of health workers. Access-related factors and availability and affordability of services were also identified as barriers that led people to choose traditional practices over formal health systems (Dillip *et al.*, 2009). Although ANC has had a high coverage in Tanzania since the sector was opened to private health care in 1990, the majority of rural areas are still served by government services, which suffer from supply-side problems of access, understaffing and poor diagnosis.

3.2.2.2 Household food security

Food security underpins households' ability to ensure adequate dietary intake. Close to 40 per cent of the population live in areas described as 'chronic food deficit regions'; see Figure 3.2.3 (TFNC 2012). Food insecurity is widespread with 41 per cent of households reporting having only two meals per day (NBS 2011). The vast majority of Tanzanians rely on rain-fed agriculture, which makes them vulnerable to climatic, economic and seasonal shocks, all of which are linked to food insecurity (Galiè, Kantor and Njuki 2014). Escalating food prices around the world further have increased the risk of food insecurity among poor households in Tanzania (FAO 2011).

Figure 3.2.3 Households with poor food consumption (as per region)

Source: TFNC (2012)

3.2.2.3 Water, Sanitation and Hygiene

Access to safe drinking water, improved sanitation and hygiene (WASH) are essential to reduce the risk of poor health due to diarrhoea, parasitic and worm infections, and enteropathic disease, all of which are linked to child undernutrition (Dangour *et al.* 2013).

In 2014, it was estimated that 46 per cent of Tanzanians did not have access to safe drinking water; 87 per cent had no access to improved sanitation; 16 per cent defecated openly; and only 12 per cent of the households reported using soap for handwashing (TFNC 2014a). The government launched a large WASH programme 2011–15 with support from UN-Habitat, UNICEF and WHO to address these shortcomings.

3.2.3 Basic Determinants

3.2.3.1 Gender

In 2011, some 75 per cent of households in Tanzania were male-headed and 25 per cent were headed by females. Female-headed households were on average poorer than their male counterparts (NBS 2011). In terms of decision-making processes, 36 per cent of women made their own decisions with regards to spending the money they earned, 47 per cent made decisions jointly with their husbands, and 17 per cent relied on husbands to make decisions (NBS 2011). The Tanzania Constitution of 1977 prohibits gender-based discrimination; however, legal protection for women has remained limited, in part because Tanzania's judicial authorities take into account customary and Islamic laws (OECD 2014).

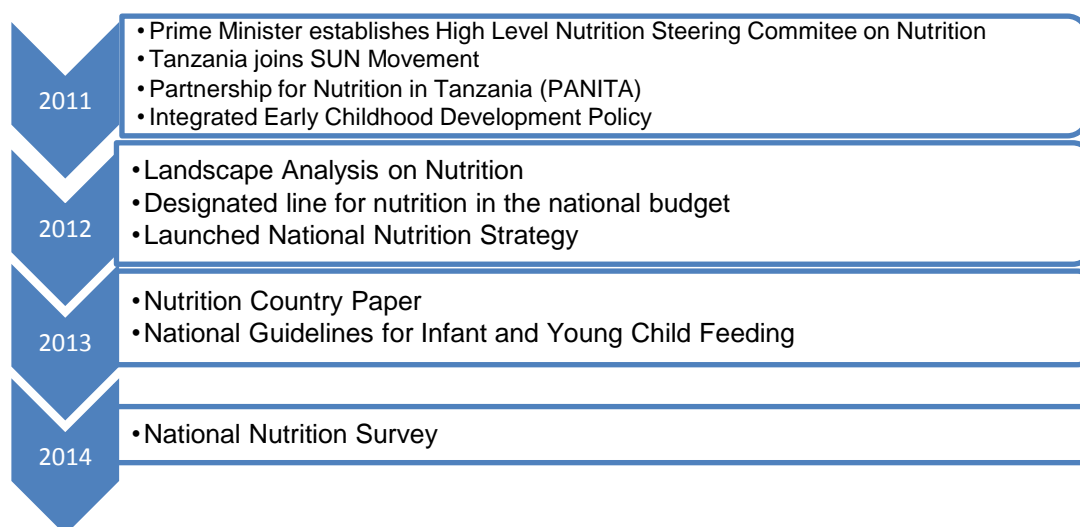
3.2.3.2 Education

Tanzania has a literacy rate of 79.0 percentage (World Bank, 2016a). Higher education among women is low with only 32 per cent female secondary education enrolment (Global Nutrition Report 2015). Educational attainment differs significantly across regions.

3.2.3.3 Policy environment for nutrition

Nutrition has become a focus of the Tanzanian policy arena in the past few years; see Figure 3.2.4 (SUN Movement 2015). The budget allocation for nutrition has increased considerably. According to the Nutrition Public Expenditure Review 2014, spending for nutrition doubled from 18bn shillings (2010/11) to 33bn shillings (2012/13). Tanzania joined the SUN Movement in 2011 (SUN Movement, 2011).⁷

Figure 3.2.4 Major national policy milestones in nutrition



Source: SUN Movement (2015)

To coordinate national efforts against undernutrition, the government set up the High Level Steering Committee on Nutrition (HLSCN), a multi-sectoral, multidisciplinary and multi-dimensional body to ensure collective efforts are made to scale up nutrition. The HLSCN is chaired by the permanent secretary of the Prime Minister's Office and the secretariat is managed by the TFNC (TFNC 2012). The same multi-stakeholder coordination structure has been established at the sub-national level as the Council Steering Committee on Nutrition, with nutrition officers appointed in each council. The National Technical Working Group in Nutrition has a multi-sectoral role and is chaired by the TFNC.

The National Nutrition Strategy was developed by the TFNC and launched in 2012. It is in the line with the 2025 Vision, and has identified a set of priority areas to improve the nutritional status of the population. The objectives are: (1) promotion of good IYCF practices; (2) prevention of vitamin and mineral deficiencies; (3) improvement of maternal nutrition; (4) prevention and control of diet related non-communicable diseases; and (5) improvement of household food security (MoHSW 2011).

The National Nutrition Social and Behaviour Change Communication Strategy (2013–2018) focuses on individual and societal behaviours, and provides guidance on the most effective

⁷ The SUN Movement was founded on the principle that all people have a right to food and good nutrition. It unites people – from governments, civil society, the UN, donors, businesses and researchers – in a collective effort to improve nutrition.

and efficient ways and means to motivate individuals to change their behaviour (SUN Movement Tanzania 2015).

3.3 Implications for M-Nutrition impact evaluation

The mNutrition intervention provides nutrition behaviour change messages with the aim of improving women's dietary intake, infant and young child feeding (IYCF) practices and child anthropometry. Dietary intake, IYCF and a child's nutritional status has been shown to be influenced (directly and indirectly) by multiple and often interlinked immediate, underlying and basic factors (as shown in Section 3). These factors may facilitate or hinder the up-take of the mNutrition intervention, may act as independent causes for undernutrition (e.g. poor WASH or health services) and may help to explain why, under what circumstances, and for whom the m-Nutrition intervention was successful. Both the qualitative and quantitative evaluation streams will collect comprehensive data on a) nutrition knowledge, beliefs and practices and their determinants; b) immediate, underlying and basic determinants of undernutrition; and c) will assess whether and how mobile-phone based messages may challenge/change existing beliefs and behaviours.

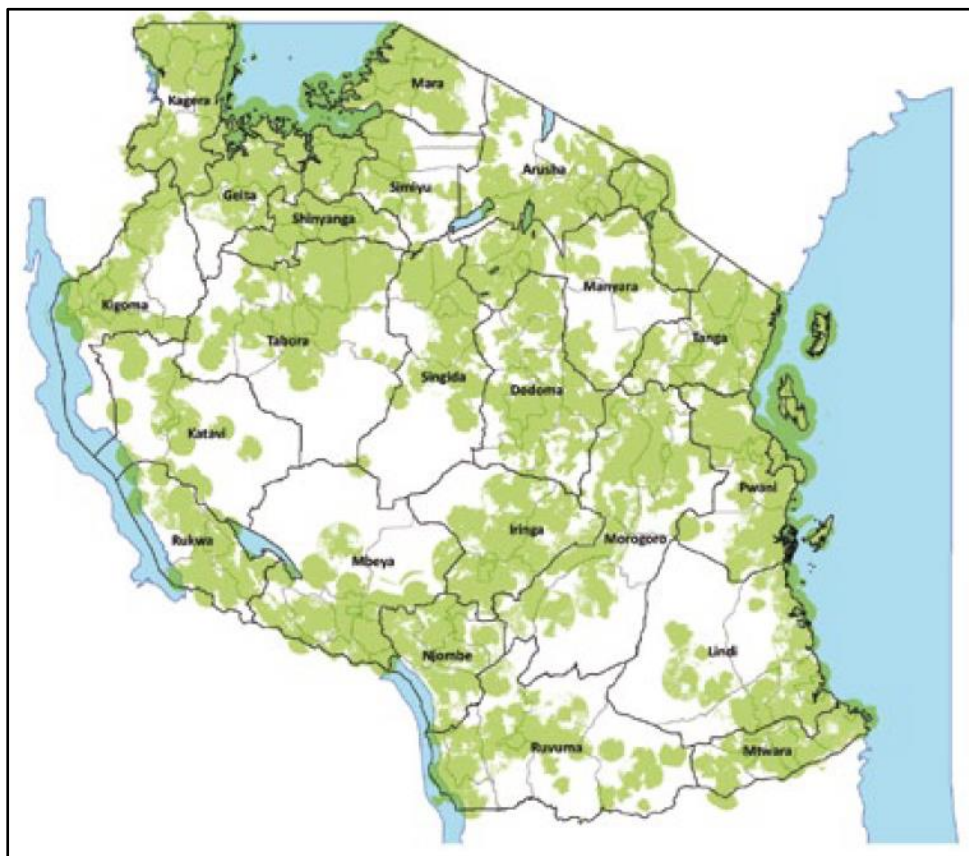
4 Mobile phones for health in Tanzania

4.1 Mobile phone technology in Tanzania

Tanzania is the second-largest mobile communications market in East Africa (Van Genuchten *et al.* 2012). Mobile phone subscriptions have grown rapidly from 21m in 2010 to 40m in 2015 with some individuals having more than one subscription (Tanzania Communications Regulatory Authority 2016).

GSM (Groupe Spéciale Mobile) Association has estimate that 43 per cent of the Tanzanian population has access to a mobile phone, with rural access slightly lower at 38 per cent (GSMA 2014). The majority (98 per cent) of mobile phones are pre-paid (GSMA Intelligence 2016). Mobile network coverage in Tanzania is good with only a few areas of low coverage (Figure 4.1.1).

Figure 4.1.1 Spatial mobile network coverage in Tanzania



Source: Intelcon (2012) in Esselaar and Adam (2013)

MNOs include Vodacom, Tanzania Telecommunication Company, Tigo Tanzania, Bharti Airtel, Zantel, Sasatel, Benson Informatics and Dovetel. See Table 4.1.2 for the distribution of market shares by the different MNOs.

Table 4.1.1 Subscription market share of MNOs (March 2016)

Mobile network operators	%
Vodacom	31
Zantel	5
Airtel	27
Smart	3
Halotel	4
Tigo	29
TTCL	1

Source: Tanzania Communications Regulatory Authority (2016)

In June 2016, the government launched a nationwide ban on using counterfeit mobile phones. As a consequence, 630,000 so-called 'fake' phones were disconnected, although it was estimated that a total of 1.2m phones would

eventually be disconnected, approximately 3 per cent of mobile phones in Tanzania (BBC 2016).

4.1.1 Access to mobile phones for poor households

The main motivations for buying a mobile phone were maintaining business relations and the social prestige of owning a mobile phone (Mopogle, Usange and Tedre 2008). In rural areas, in particular, where mobile phone ownership is relatively low, phone sharing or renting is a common practice (Mtega and Ronald 2013; Siyao 2012).

To reduce mobile phone bills or save credit, the practice of beeping – calling a number and hanging up before the recipient can pick up the call – is widespread (Donner 2007; Mpogole, Usanga and Tedre 2008).

One reason for rapid mobile phone penetration in Tanzania is the vibrant second-hand market for SIM cards and mobile phones (Mtenzi, Chachage and Ngumbuke 2008). Since affordability is a significant barrier to mobile phone subscriptions and use, most mobile providers offer special discounted services and time-bound offers at cheaper rates (Mtega and Ronald 2013). The relative spend on a mobile phone in Tanzania is low, at about US\$6 per month (GSMA 2014).

4.2 Barriers to the use of mobile phones

The use of mobile phones in rural areas is constrained by: (1) poor infrastructure; (2) limited access to telecommunications networks; (3) poor electrification; and (4) high mobile tariffs. New local businesses that provide charging facilities for mobile phones (e.g. so-called mobile kiosks) have emerged in many rural communities (Siyao 2012; Mtega and Ronald 2013).

Individual use is also limited by low literacy levels (Nyamba and Mlozi 2012; Siyao 2012). In March 2012, the regulator introduced stricter registration policies, requiring customers to display a physical ID to register a phone, which may have slowed down the pace of subscriptions. This was, however, balanced by a reduction in interconnection rates and discounted offerings by MNOs, which led to an increase in total minutes of use (GSMA 2014).

4.3 Mobile phone as an information source for rural communities

Rural communities in Tanzania depend on exogenous knowledge and information (Mtega, Dulle and Ronald 2013). Mobiles phones have been identified as an important channel for the delivery of information for rural communities in Tanzania (Mtega 2012). Other frequently used channels are radio and television (Uzuegbu 2016). Decisions on sources consulted are influenced by socio-economic, demographic and geographical factors surrounding rural communities. Language barriers limit the use of mobile phones as information sources if information is provided in English only (Chilimo 2008). Another barrier to the use of mobile phone-based information is fear of change (Siyao 2012; Mtega 2012; Sife 2010; Chilimo 2008; Lwoga 2009). Mobile phones are also used to share information with others in the rural community and beyond, also there are differences between ethnic groups with regards to what information is shared and with whom (Mtega, Dulle and Ronald 2013).

4.3.1 Mobile phones for money services (m-Pesa and others)

M-money applications are very popular in Tanzania with around 35 per cent of households in Tanzania having at least one mobile money user; see Table 4.1.1 (ISTAfrica 2014). Increased market penetration of mobile phones into poor communities has brought mobile payment schemes to a population that has not been linked to formal financial channels; mobile money applications are used to pay water and utility bills, and transfer funds (Seetharam and Johnson 2013). The M-Pesa initiative, under Vodacom, has the largest customer base and dominates the market share having been the first to enter the mobile phone sector in 2008.

Table 4.1.2: Services provided by different MNOs

Operators	Services	Purpose
Vodacom Tanzania	M-Pesa	Money transfer and payments
Airtel	Airtel Money	Money transfer
	Sanlam Life and Health Insurance	
Zantel	Easy-Pesa	Money transfer and payment of fees
Tigo	Tigo Insurance	Micro-insurance offering for medical health emergencies, as part of users' monthly contractual spend
	Tigo Pesa	Money transfer and international remittances
	Tigo Kilimo	Farmers access market prices, weather forecasts and agronomy information

Sources: ISTAfrica (2014); Airtel (2016); allAfrica (2014); Businesswire (2015)

4.3.2 M-health services in Tanzania

M-health services have become increasingly popular in Tanzania and in parts aim to address shortcomings in the health care system, mainly acute staff shortages (Van Genuchten *et al.* 2012).

M-health services currently reach an estimated 3.4 million people in Tanzania, approximately 7 per cent of the population (see table 4.1.2), with the most-targeted segment being women who account for 55 per cent of m-health service users (GSMA 2014).

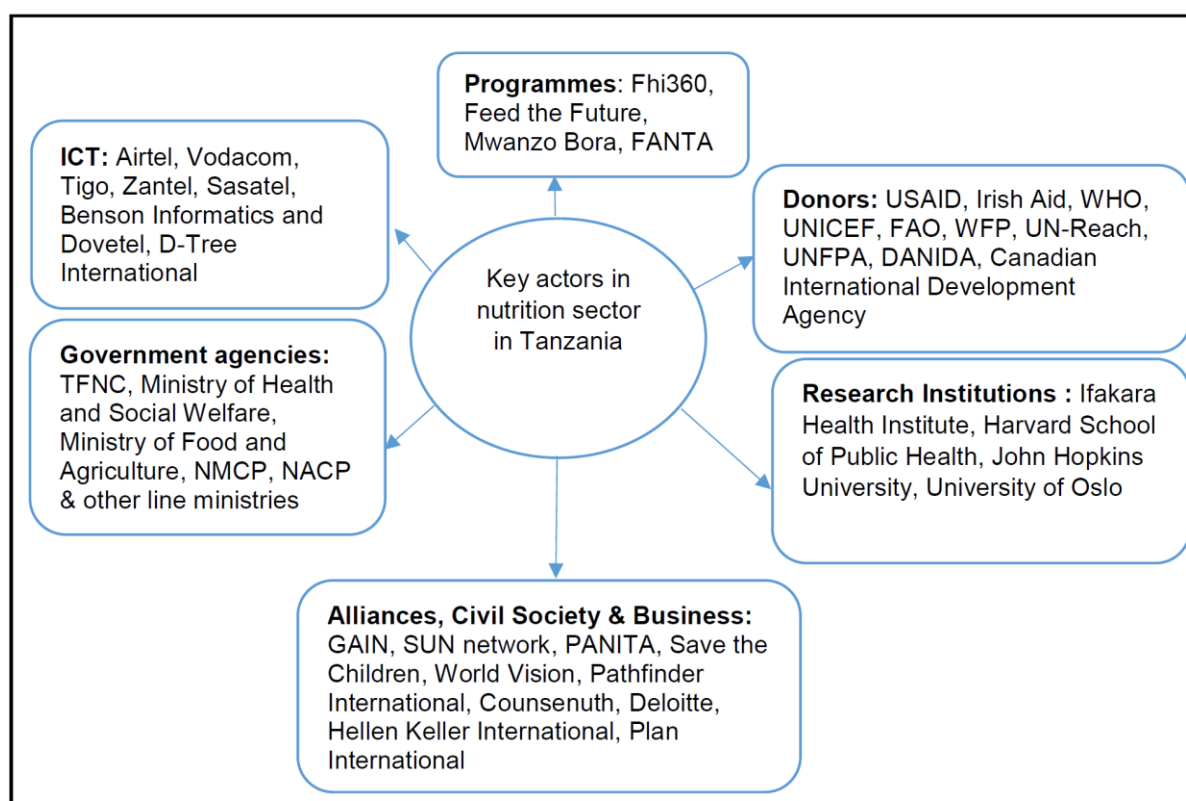
Table 4.1.3: M-health services in Tanzania

Availability	Number of live m-health services	31
	Services available nationally (%)	16
Medium	Use of SMS as an access channel (%)	52
	Use of internet as an access channel (%)	48
Users	Number of users (million)	3.4
	Number of frontline health workers reached	1,234

Source: GSMA (2014)

The mobile phone sector in Tanzania is also actively involved in the country's efforts in the SUN Movement (SUN Movement 2015). Two approaches are used: (1) the mobile phone sector's involvement through SUN and collaboration with GAIN (Global Alliance for Improved Nutrition);⁸ (2) through the involvement of the mobile phone sector in delivering m-health services. Leading MNOs in m-health in Tanzania are Vodafone, Airtel, Tigo and Zantel.

M-Health services in Tanzania vary widely and include very specific, targeted services for individuals (e.g. services that promote the adherence to medication) and broader services (e.g. medical supply stock monitoring, disease surveillance). The majority of m-health services are funded by donors, especially USAID, but other actors are also involved; see Figure 4.1.3 (GSMA 2014).

Figure 4.1.3 Key actors in the nutrition sector

Sources: Adapted from Ollis (n.d.); GAIN (2012)

⁸ Other organisations involved in nutrition-based activities are: Mwanzo Bora, a five-year programme supported by USAID; Partnership for Nutrition in Tanzania advocacy efforts for reduction of malnutrition; and UNICEF.

4.3.3 M-health services to promote maternal and/or child health in Tanzania

Table 4.1.3 lists previous and existing m-health services in Tanzania that aim to improve maternal and child health. There has been no evaluation of any of the existing m-health services in Tanzania.

Table 4.1.4 M-health services that promote maternal/child health in Tanzania

Programme	Status	Donor	Operators	Purpose	Service provided	Description
Wired Mothers Initiative	Ended in 2013	DANIDA	Zantel Tanzania	Delivery of maternal health by linking pregnant mothers to health facilities using mobile phones	SMS (short message service) with health education and appointment reminders for antenatal care (ANC), mobile phone credit to call midwife	Use of ANC improved significantly, as did facility-based delivery Very small-scale project that has ceased to exist
Child Count+	Started in 2009, unclear whether it is ongoing	Sony Ericsson, Earth Institute at Columbia University, UNICEF, Zain	MTN	Developed by MVP (Millennium Villages Programme) to assist communities in improving child survival and maternal health	SMS messages to facilitate and coordinate activities of community-based child and maternal health care providers; and to register patients and their health status on a central web dashboard that provides a real-time view of the health of a community	Seems to be very small scale and only focused on one area of Tanzania
'Healthy Pregnancy, Healthy Baby' (HPHB) program run by Wazazi Nipendeni ('Parents Love Me' in Swahili)	Ongoing	CDC, CDC Foundation, USAID, Johns Hopkins Bloomberg School of Public Health Center for Communication Programs,	Vodacom, Zantel, Tigo and Airtel	Wazazi Nipendeni, a national healthy pregnancy and safe motherhood multimedia campaign, is reaching new and expectant mothers in the most remote corners of Tanzania. HPHB is an SMS-	Free text messages in Swahili to pregnant women, mothers with newborns up to 16 weeks old and their supporters; assists health professionals in the dissemination of information; typically	9% of respondents identified SMS as the medium of communication; 35% of respondents reported knowledge of Wazazi Nipendeni, with 17% reporting daily exposure. Main means of communication (in order of highest frequency): radio; brochure; poster; TV; boards and banners; SMS; tire cover; T-shirt; magazine; newspaper bag; community event;

		Elizabeth Glaser Pediatric AIDS Foundation, Joining Hands Initiative (JHI-Aga Khan Health Services), Text to Change, and others		based programme that forms part of Wazazi Nipendeni	mothers learn about the service during ANC visits	kanga (Tanzanian garment); Facebook; others and blog. Exposure to the messages resulted in higher knowledge regarding danger signs of pregnancy. The decision to give birth at a health centre was related to the education level of the pregnant mother and exposure to messages (Kaufman <i>et al.</i> 2014).
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Source: GSMA m-health tracker (GSMA 2016)

4.3.4 Further details on ‘Healthy Pregnancy, Healthy Baby’ as part of Wazazi Nipendeni

This review aims to inform the evaluation of m-Nutrition that will be added on top of the existing ‘Healthy Pregnancy, Healthy Baby’ (HPHB) SMS programme as part of Wazazi Nipendeni. The programme is run by the m-Health Tanzania public-private partnership, which was initiated in 2012 by the MoHHSW, with financial support from the US Government Centres for Disease Control and Prevention (CDC). It is run in coordination with the National Malaria Control Program, National AIDS Control Program and Health Promotion and Education Section.⁹ Under the leadership of the Ministry of Health, Community Development, Gender, the Elderly and Children, the Healthy Pregnancy, Healthy Baby 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 drive health seeking-behaviour (Open Government Partnership, n.d.).

HPHB has reached 1.2 million registered users in 2016 and has sent 74m text messages so far. However, the programme’s management, aggregator and operator messaging costs are currently paid for by CDC and sustainability is therefore unclear. The m-Health Tanzania partnership seeks to attract more corporate partners for the long-term sustainability of the service (Prweb 2016). This partnership is managed by Cardo Emerging Markets and led by the MoHHSW. Text to Change has been the lead technology partner in the partnership, and has designed and implemented the technology involved.

Anyone interested in receiving healthy pregnancy information and appointment reminders can text the word ‘MTOTO’ (child) to the short code 15001. Thereafter, registrants receive instructional messages during registration, allowing them to indicate the woman’s current week or month of pregnancy (or the age of the new-born baby) during the enrolment process. This process allows the recipients to receive specific text messages relevant to the time and stage of pregnancy. Health care partners such as EGPAF and Aga Khan Health Services’ Joining Hands Initiative play an important role by supporting the registration assistance of pregnant women at the health care facility level. Phase II of this service was launched in 2015 (Centre for Communication Programs 2015).

According to the m-Health Tanzania PPP report, on an average, there are 7,300 Airtel subscribers to Wazazi Nipendeni content monthly. Of these, 41 per cent are pregnant women, 15 per cent are mothers of new-borns and the remaining 44 per cent are supporters of women, including spouses, relatives and others who seek general information (Telecompaper 2016).

4.4 Implications for the m-Nutrition impact evaluation

Section 4 has highlighted several barriers to the access and use of mobile phones in Tanzania and also described common practices of mobile phone use (e.g. shared mobile phones, ownership of multiple sim cards). All of these factors potential may hamper the successful up-take of the m-Nutrition information and need to be carefully monitored in both the qualitative and quantitative evaluation streams. Other factors such as network accessibility, access to electricity and language barriers may reduce the up-take and will be assessed at baseline and endline. Competing m-

⁹ 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). 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.

services, and their potential effect on m-Nutrition will be captured in the business and quantitative components of the evaluation.

5 Conclusion

This desk review aims to inform the quantitative and qualitative baseline data collection of the m-Nutrition impact evaluation in Tanzania. The purpose of the review was to review the evidence on (1) determinants of undernutrition in Tanzania (with a specific focus on determinants of women's dietary diversity and IYCF); and (2) the use of mobile phone technology for m-health services in Tanzania.

1. Determinants of undernutrition

- Undernutrition remains a major health concern in Tanzania with very high levels of childhood stunting and micronutrient deficiencies in children and women. Overweight is also emerging as an important health threat for rural women in Tanzania.
- Dietary intake in children is insufficient due to sub-optimal breastfeeding practices and poor complementary feeding (in terms of dietary diversity and meal frequency).
- Infant and Young Child Feeding (IYCF) poses particular challenges for HIV-infected mothers.
- Diets of women in rural areas are characterised by low dietary diversity and lack animal-source foods.
- Malaria and HIV/AIDS are major causes for mortality and morbidity among children and women.
- Food insecurity is a concern for many rural households, especially during the rainy seasons.
- Health service utilisation remains low due to direct and indirect costs, staff shortages and lack of trust.
- Access to WASH is a huge challenge in Tanzania.
- There is a strong enabling policy environment for nutrition in Tanzania

2. M-health services in Tanzania

- Mobile phone penetration and access are good in Tanzania (43 per cent have access; 38 per cent in rural areas).
- Mobile phones are valued as delivery channel for information by rural communities, though there are often language barriers and reluctance to use new ICTs.
- M-Health services are popular, with 3.4 million users and 31 active m-health services .
- Wazazi Nipendeni is the largest multimedia campaign that uses m-health services to promote child and maternal health.
- There is a lack of evidence of the effectiveness of m-health services in Tanzania.

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