ORANGE-FLESHED SWEET POTATO

SITUATION ANALYSIS AND NEEDS ASSESSMENT

TANZANIA REPORT
DECEMBER 2012

Orange-Fleshed Sweet Potato Situation Analysis and Needs Assessment Tanzania Report

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LIST OF KEY ABBREVIATIONS

ASDP	Agriculture Sector Development Program
BOT	Bank of Tanzania
CIDA	Canadian International Development Agency
CSO	Civil Society Organization
DFID	Department for International Development
DPG	Development Partners Groups
EAC	East African Community
FAO	Food and Agriculture Organization
FBO	Faith Based Organization
FSSR	Food Self Sufficiency Ration
GDP	Gross Domestic Product
GHI	Global Hunger Index
GoT	Government of Tanzania
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Deficiency Syndrome
HKI	Helen Keller International
ICT	Information and Communication Technology
IDD	Iodine Deficiency Disorder
JAST	Joint Assistance Strategy for Tanzania
LGA	Local Government Authority
LZARD I	Lake Zone Agriculture Research Development Institute
MAFC	Ministry Of Agriculture, Food Security, and Cooperatives
MDA	Ministry Department and Agency
MKUKUTA	Mkakati wa Kukuuza Uchumi na Kuondoa Umaskini Tanzania
NBS	National Bureau of Statistics
NGO	Non Governmental Organization
NNS	National Nutrition Strategy
NPERCHI	National Package of Essential Reproductive and Child Health Interventions
NSGRP	National Strategy for Growth and Reduction of Poverty
OFSP	Orange Fleshed Sweet Potatoes
PEM	Protein Energy Deficiency/Malnutrition
PHDR	Poverty Human Development Report
PMO-RALG	Prime Minister's Office Regional Administration
RAC	Reaching Agents of Change
SACCOS	Saving and Credit Cooperative Societies
SPVD	Sweet Potatoes Vector Deceases
SUA	Sokoine University of Agriculture
TAFSIP	Tanzania Food Security Investment Plan
TAHA	Tanzania Horticulture Association
TCRA	Tanzania Communication Regulatory Authority
TDHS	Tanzania Demographic Health Survey
TFNC	Tanzania Food and Nutrition Centre
TOSCA	Tanzania Official Seed Certified Agency
TOT	Trainer of trainers
UNICEF	United Nation Children Education Fund
URT	United Republic of Tanzania
VAD	Vitamin A Deficiency
WHO	World Health Organization

ACKNOWLEDGEMENT

The development of this Situation Analysis Report would not have been possible without the financial and technical support of several individuals, organizations, groups, associations, institutions and development partners. Moreover, the participatory process utilized resulted in the inclusion of the extensive contributions from the agriculture, health and nutrition, and community development stakeholders. Helen Keller International (HKI) would like to express gratitude for all the assistance provided towards completion of this important document.

HKI would wish to make a special mention of Bill and Melinda Gates Foundation for their financial support for the project and of the International Potato Centre for the technical assistance. Thanks also goes to distinguished agriculture sector lead ministries including the Ministry of Agriculture, Food Security, and Cooperatives; the Ministry of Livestock and Fishery Development; the Ministry of Water and Irrigation; the Ministry of Industry and Trade; and the Prime Minister's Office Regional Administration and Local Government. Others who should be recognized under this acknowledgement are: the Tanzania Food and Nutrition Centre, the Ministry of Health and Social Welfare, the Ministry of Education and Vocational Training, the Ministry of Community Development, Gender and Children, Sokoine University of Agriculture, representatives from the Local Government (District Agricultural and Livestock Officers –(DALDOs) from District Councils) in both Lake and Eastern zones; and the Lake Zone Agricultural Research Development Institute. Helen Keller International also wishes to appreciate the following private sector agencies: Tanzania Horticultural Association; Rulenge Diocese Development Office; the following Media Houses: Star TV, Tanzania Standard (Newspapers) Limited, IPP Media Limited and Uhuru Radio Limited; the Tanzania Chamber of Commerce Industry and Agriculture; the Agricultural Council of Tanzania; and the Tanzania Agriculture Productivity Program under the USAID funded Feed the Future program.

This acknowledgement also is extended to the Ukerewe District Council, the Sengerema District Council, the Geita District Council, the Missungwi District Council, the Mwanza City Council, the Gairo District Council, the Kilosa District Council, the Kilombero District Council, the Morogoro Municipal Council, the Ulanga District Council and the Dodoma Municipal Council. HKI is indebted to the Tanzania Home Economics Association, the Mwanza Rural Housing Programme (MRHP), the Economic and Social Research Foundation, the University of Dar Es Salaam, the Kilimo Trust, and the Reaching Agents of Change teams from both International Potato Centre and HKI for their continued assistance and support.

Last but not least, we express our gratitude to all the individuals who, in one way or another, participated in the process. It is HKI's strong belief and conviction that the findings of this situation analysis report will effectively provide the information needed to mobilize resources in an effort to fight vitamin A deficiency with orange-fleshed sweet potatoes in Tanzania.

EXECUTIVE SUMMARY

Malnutrition is one of the most serious health problems affecting infants, children, and women of reproductive age in Tanzania. Despite progress made, millions of children and women in Tanzania continue to suffer from one or more forms of under-nutrition, including low birth weight, stunting, being underweight, wasting, vitamin A deficiency (VAD), iodine deficiency disorders, and anemia. Addressing malnutrition problems results in significant economic and social benefits as it reduces morbidity and mortality leading to resource savings in healthcare, improved education outcomes, enhanced productivity and increased incomes. Improved nutrition will contribute to the achievement of six Millennium Development Goals (MDGs) including the reduction of poverty.

In Tanzania, the key ministries implementing the Food and Nutritional Policy and the Nutritional Strategy are the Ministry of Health and Social Welfare (MoHSW) and the Ministry of Agriculture, Food Security and Cooperatives (MAFC). The MoHSW has the role of assessing the health outcome/benefits (including Vitamin A status) and promoting the consumption of orange-fleshed sweet potatoes (OFSP) through the existing health education programmes in health facilities and communities. The MAFC can advocate and promote the adoption of OFSP crop through the Agricultural Sector Development Program (ASDP). The two key ministries have developed an advocacy and communication strategy that encourages several stakeholders to invest in promotion of production and utilization of OFSP. The stakeholders include the Prime Minister's Office Regional Administration and Local Government (PMO-RALG), the Ministry of Community Development, Gender and Children (MCDGC), and the Ministry of Education and Vocational Training (MoEVT). Others include the private sector, development partners, and civil society organizations (CSO).

Promoting the consumption of micronutrient rich food can contribute to the reduction of micronutrient deficiencies with minimal resource investments. OFSP are high in vitamin A content and are known to be acceptable in the communities making it easy to advocate for their uptake. However, there has been little investment in raising the awareness of the benefits of OFSP, thus the numerous nutritional benefits are generally unknown by potential consumers. A situation analysis was conducted to identify the weaknesses and challenges as well as the opportunities to promote OFSP in communities in Tanzania. This situation analysis report (SAR) is prepared as part of the Reaching Agents of Change (RAC) project implementation plan. The RAC project is a 3-year regional initiative aimed at increasing investments and commitments to the dissemination and use of orange-fleshed sweet potatoes (OFSP) as a cost effective means to combat vitamin A deficiency (VAD) and food insecurity in Africa. Helen Keller International (HKI) and the International Potato Centre (CIP) implement RAC in Tanzania with support from the Bill and Melinda Gates Foundation.

The situation analysis involved a review of the various policies, strategies and program documents of the Government of Tanzania (GoT) that could be used to advocate for and promote the investment and consumption of OFSP concomitantly. Some of the policies reviewed include the Agriculture Sector Development Strategy (ASDS), the National Strategy for Growth and Reduction of Poverty (NSGRP) I and II (better known by its Swahili acronym MKUKUTA), the Tanzania Agriculture and Food Security Investment Plan (TAFSIP), and the National Nutritional Strategy (NNS). The resources needed to invest in the promotion of OFSP were also explored. These included the quality and quantity of land, human resources, government and development partners' commitment, involvement of private sector through public private partnership, the growing Gross Domestic Product (GDP), and favourable agro-climatic zones.

The situation analysis concludes that there remains a great opportunity for production, demand and adoption of OFSP. There is already some production of OFSP in the Lake Zone, and coastal, central, and southern parts of Tanzania. The policy environment presents opportunities not only in the policies mentioned above but also in the Local Government Act and in the Food and Nutritional policy. The stable and/or increasing GDP implies purchasing power in the communities is improving and hence increasing the demand for food commodities like OFSP. In addition the GoT and implementing partners are committed to supporting agricultural initiatives

to improve food and nutritional security. The recent promotion of public private partnerships further supports government commitments in this area. Only 10% of Tanzania's arable land is used for food crop production implying that there is significant opportunity for investment. The country is endowed with climatic variations and agro ecological zones which favour production of various crops. The deficiency of vitamin A in a number of complementary foods for infants and young children who are highly affected by VAD should increase the demand of OFSP, with appropriate education to caretakers. The above factors increase the potential of OFSP adoption in Tanzania.

However, this review has established a number of challenges that need to be addressed. One such challenge is the notion that sweet potatoes are to be consumed only by women and children. Although women and young children are the most nutritionally vulnerable, increased demand among men could ensure benefits among the wider population and reduce and negative associations of this important crop. In addition, most people identify with and prefer the traditional white-fleshed varieties of sweet potato. Other challenges that need urgent attention include the proliferation of viruses that attack sweet potatoes and the shortages of vines for the crop's production. The main resource needed to produce OFSP is land; men own the majority of which. As men are targeted less in most non-commercial agricultural initiatives, there is a need to sensitize them and bring them on board as one of the key agents of change required to enhance investment in and utilization of OFSP. The formulation of an advocacy and communication strategy to encourage and further OFSP adoption in Tanzania is crucial.

1.0 INTRODUCTION TO THE SITUATION ANALYSIS REPORT

Reaching Agents of Change (RAC) is a three-year project funded by the Bill and Melinda Gates Foundation, which aims to increase investment in and utilization of orange-fleshed sweet potatoes (OFSP) to combat vitamin A deficiency (VAD) and food insecurity in Africa. The project is currently being piloted in five countries namely Mozambique, Nigeria, Ghana, Burkina Faso and Tanzania. In Tanzania, Helen Keller International (HKI) and the International Potato Centre (CIP) are implementing RAC in partnership with the Government of Tanzania (GoT), development partners and the private sector. The project aims at achieving the following objectives;

- To generate new investments by governments, donors, and NGOs to scale up the adoption of OFSP in selected countries.
- To build the capacity of implementation agencies to design and implement technically strong and cost-effective interventions that drive the uptake of OFSP.

In Tanzania, both objectives are implemented by HKI and CIP in collaboration. Both organizations seek to engage change agents to achieve these targets. The agents of change include organizations and individuals advocating at national level and local government level, to donors and their own agencies, to promote investment in and utilization of OFSP. They also include development partners and civil society organizations implementing OFSP programs.

1.1 Objectives of the Situation Analysis Report

The main purpose this situation analysis was conducted was to systematically and thoroughly review the current status of affairs affecting OFSP in Tanzania to inform the RAC project. Subsequently, this report summarizes findings and identifies challenges, threats and opportunities to increasing OFSP production, demand and consumption. These findings will be used to inform the development of an advocacy and communication strategy for the promotion of production and consumption of OFSP in Tanzania. Furthermore, this report maps out stakeholders that can support these efforts in Tanzania.

1.2 Methodology

To achieve the stated objectives and the scope of the assignment, an intensive literature review was undertaken and field visits/stakeholder interviews were conducted. The literature review was mainly a desk review of various reports and documents (both electronic and hard copies) to understand the current context and therefore suitability of OFSP adoption in Tanzania. Field visits were conducted in the Lake and Eastern zones and involved primary data collection using focused group discussions and interviews with key stakeholders in the health and agriculture sectors.

The situation analysis report first outlines the background information for the RAC project followed by the objectives of conducting situation analysis including the overview of health, nutrition, food security and policy environment in Tanzania. A summary section is given on the Tanzanian economy, key issues related to national nutritional challenges, current interventions, gaps and the proposed food approach to curb vitamin A deficiency through consumption of OFSP. It also provides a snapshot on RAC project plan to spearhead OFSP initiatives in particular entailing advocacy for investment, awareness creation and policy influence. Finally the report highlights parties for engagement as strategic stakeholders in the initiative.

2.0 BACKGROUND

The Tanzanian population is estimated at 43 million in 2012 (based on projections from the 2002 census) with an annual growth rate of 2.8%. The population density is therefore estimated at 44.3 persons per square kilometre. The urban population is estimated to be 26% while the rural population is 74%. The rate of urbanization is estimated at 4.7% per annum. However, this estimated rate may be lower than the real situation as the observed current trend for rural-urban migration is very high especially for young people who migrate in towns to seek jobs.

Agriculture is the major economic activity in Tanzania and is regarded as the backbone of the economy. The sector is dominated by small-scale subsistence farmers whose farming activities are mostly rain fed and with very few irrigation farming activities. Technically the sector has had limited backward and forward linkages to other sectors of the economy such as industries, manufacturing, water, transport, energy, land, environment, natural resources. It contributes to around 24% of the country's GDP and 26% of the total annual export earnings. The sector also is important to the government's efforts to reduce widespread poverty partly because over 70% of the population depends on the agricultural sector for jobs, food and income. The other key sectors of the economy include mining, tourism, trade, transport and communication, finance, and construction (URT, 2011a).

2.1 Constraints to Agricultural Growth and Rural Development

One of the major constraints to agricultural growth and rural development is the low productivity of land and labour. The key constraints affecting agricultural productivity include: low public investment in agricultural research and development; inadequate agricultural financing; poor production techniques (e.g use of hand hoes); under-developed markets and market infrastructure; low farm-level value addition; and poor rural infrastructure such as, rural road networks, telecommunications and electricity.

2.2 The Role of the Agricultural Sector in Promoting Economic Growth, Nutrition and Poverty Reduction

Tanzania is endowed with a wide diversity of climatic zones that can contribute to improved productivity. It has sufficient water for irrigation (though technological improvements are needed to route water appropriately). With a large segment of the poorest relying on agriculture for income, growth in this sector holds the potential to lift many out of poverty and under-nutrition.

Yet performance of the agricultural sector has had only a modest contribution to economic growth and poverty reduction. The agriculture sector has seen only a 4% growth rate over the last 10 years, where other sectors (industry and service) have grown by more than 6%. Yet, studies show that a one percent growth in the agricultural sector has a higher positive multiplier effect than the same growth in any other sector (URT, 2011a).

2.3 Status of Sweet Potato Crop Production in Tanzania

Major staple foods in Tanzania include maize, paddy rice and cassava while sorghum, wheat, millet and sweet potatoes are categorized as other staples. Tanzania is the second largest producer of sweet potato (Ipomoea batatas Lam.) in East Africa (after Uganda) with an annual production of just under one million tons (URT, 2011a). Sweet potato currently ranks as the worlds' seventh most important food crop and the fifth most important food crop on fresh weight basis in developing countries, after rice, wheat, maize and sorghum (FAO, 2004). In Tanzania, sweet potato is the third most important root and tuber crop after cassava and Irish potato. The crop is grown almost in all agro-ecological zones (Lake Zone, Western Zone, Southern Highlands Zone, Eastern Zone and Northern Zone) because of its hardy nature and broad adaptability, hence providing a sustainable food supply when other crops fail (Jana, 1982; Kapinga et al., 1995; Ndunguru and Rajabu, 2000). In terms of volume produced, sweet potato is the most important in the Lake Zone (330,600 tons/year), Southern Highlands Zone (271,000 tons/year), Eastern Zone (107,400 tons/year) and Southern Zone (37,400 tons/year) as outlined in Table 1 (URT, 2011b).

Table 1: Food crops production in Tanzania in 2005/06 – 2009/10 (000'metric tons)

Crop/Year	2005/06	2006/07	2007/08	2008/09	2009/10
Maize	3219	3423	3302	3556	3425
Rice/paddy	1168	1239	1342	1346	2952
Wheat	102	110	83	92	97
Sorghum/millet	935	940	1165	1064	899
Cassava	5539	6158	5199	5392	3568
Pulses	886	1050	1156	1126	1085
Banana	2972	3507	3083	2947	1929
Sweet Potatoes	2793	4189	3965	4138	3729

Source: URT, 2011b

2.4 Extension services

Agricultural extension services in Tanzania are mainly provided through the local government and facilitated by the Ministry of Agriculture, Food Security and Cooperatives (MAFC). For many years, the MAFC used its staff from the national level down to implement extension programs but with the recent decentralization process, the provision of these services has been transferred to the local government authorities. The MAFC has reduced the number of staff providing extension services and has moved some to local government authorities after introduction of decentralization. This transfer reduced the level of involvement of MAFC staff in the field activities and focused activities of the MAFC on agricultural policy formulation and monitoring, and providing technical backstopping. Based on 2010 records, at the national level, Tanzania public extension services comprised of 1,061 staff members (Table 2). Of these a total of 57 had PhDs in 2010, 379 had a Master's degree, 216 of them held a Bachelor's degree and the rest of the team had completed a diploma in agriculture (MAFC, 2011a).

Table 2: Total Number of Professional Public Agriculture Extension Agents

	MALE				FEMALE				TOTAL
	PhD	MSc/ MA	BSc/BA	Diploma	PhD	MSc/ MA	BSc/BA	Diploma	
2000	57	203	133	238	11	197	163	169	1,171
2001	62	221	123	219	12	130	109	103	979
2002	66	235	115	205	14	130	102	95	962
2003	55	196	138	246	15	130	124	122	1,026
2004	57	203	133	238	17	143	130	129	1,050
2005	54	192	141	251	17	143	136	137	1,071
2006	56	199	136	242	18	176	154	159	1,140
2007	49	175	155	277	18	196	184	195	1,249
2008	47	167	162	288	18	196	189	201	1,268
2009	50	178	152	271	21	145	148	152	1,117
2010	43	203	152	271	14	176	64	138	1,061

Source: MAFC, 2011a

2.4.1 Institutions Providing Extension/Advisory Services

2.4.1.1 Public Sector

There are several public institutions providing agriculture training and extension services as well as conducting agriculture research in Tanzania. Some of the key institutions are listed below.

- Ministry of Agriculture, Food Security, and Cooperatives (MAFC)
- Kilimanjaro Agricultural Training Centre (KATC)
- Temeke Municipal Council for county level operations
- Ministry of Livestock Development and Fisheries (MLDF)
- Department of Research, Training, and Extension (DRTE)
- Ministry of Industry, Trade and Marketing (MITM)
- Ministry of Water and Irrigation (MoWI)
- Ministry of Livestock Development and Fisheries (MLDF);
- Department of Research Training, and Extension (DRTE);
- Prime Minister's Office – Regional Administration and Local Government
- (PMO-RALG);
- Sokoine University of Agriculture;
- Moshi University College of Co-operative & Business Studies MUCOBS; and
- Public Research and Education Institutions

Under the MAFC there are seven agriculture research zonal centres that employ Zonal Research Extension Officers (ZREO) in addition to the Department of Research and Development. These are:

- Central Zone: Livestock Research and Production Institute (LRPI) - Mpwapwa;
- Eastern Zone: Agricultural Research Institute (ARI) – Ilonga;
- Lake Zone: Agricultural Research Institute (ARI) – Ukiriguru;
- Northern Zone: Agricultural Research Institute (ARI) – Selian;
- Southern Highlands: Agricultural Research Institute (ARI) – Uyole;
- Southern Zone: Agricultural Research Institute (ARI) – Naliendele;
- Western Zone: Agricultural Research Institute (ARI) – Tumbi;

2.4.1.2 Non-Governmental Organizations

There are more than 200 NGOs involved in various types of agricultural extension programs, either as a major activity or as part of an integrated rural development program (Mattee and Rutatora, 2000).

2.4.1.3 Private Sector

Farmer-based (community-based) organizations and cooperatives have been established to increase access and to provide an entry point to improved technical information. The groups include:

- Rural supply cooperatives;
- Land improvement cooperatives;
- Consumer cooperatives;
- Fishery cooperatives;
- Service cooperatives; and
- SACCOS groups

There are different private firms that supply farm inputs like tractors and pesticides, for example Balton, and Private Agriculture Sector Support (PASS).

2.5 Food Security, health and nutritional situation

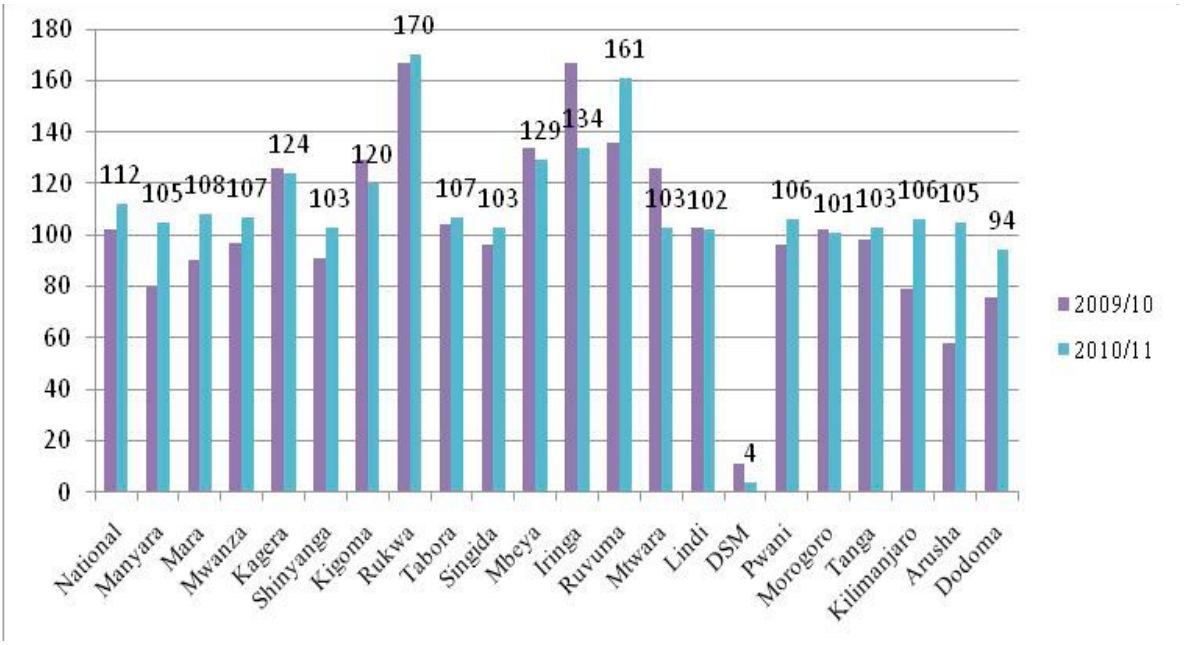
Food and nutrition security continue to be one of the most fundamental challenges for human welfare and economic growth in Tanzania. The following summarizes the current situation to contextualize the potential role of OFSP in the country.

2.5.1 Food Security Situation

2.5.1.1 Food self-sufficiency ratio

The Food self-sufficiency ratio (FSSR) is computed as the ratio of the gross domestic product over the gross domestic food requirement of twelve crops. These crops are maize, sorghum, millets (finger and bulrush), rice, wheat, pulses (beans and other pulses), bananas, cassava, and potatoes (sweet potatoes and Irish potatoes). Since the 1999/2000 season, the FSSR has fluctuated between 88% (2003/04) and 111% (2010/11) (MAFC, 2011b). However, according to the statistics of the MAFC, since 2006 the country has been food secure as the FSSR has been above 100%. Despite this national FSSR, there are significant variations in food security between different regions and districts. For example, the FSSR for the national level was 102% in 2009/10 yet a food surplus (FSSR>120) was seen in the regions of Iringa, Kagera, Kigoma, Mbeya, Mtwara, Rukwa and Ruvuma and a food deficit (FSSR<100) in the regions of Arusha, Coastal region, Dar es Salaam, Dodoma, Kilimanjaro, Manyara, Mara, Mwanza, Shinyanga, Singida and Tanga (figure 1) (MAFC, 2010).

Figure 1: Food Self Sufficiency Ratio in 2009/10- 2010/2011



Source: MAFC, 2010.

2.5.1.2 Global Hunger Index

Perhaps a better measure for health is the Global Health Index (GHI), developed by International Food Policy Research Institute (IFPRI). The GHI is calculated from a combination of equally weighted indicators:

- the proportion of the undernourished as a percentage of the population;
- the prevalence of underweight children under the age of five; and
- the mortality rate of children under the age of five (IFPRI, 2012).

The GHI indicates that all East African Community (EAC) countries are experiencing 'serious' to 'extremely alarming' hunger problems. (see Table 3).

Table 3: EAC Global Hunger Index 1990 - 2012

Country	1990	1996	2001	2011	2012	Situation
Tanzania	23.1	27.4	26.0	20.5	19.3	Serious
Rwanda	28.5	32.7	25.2	21.0	19.7	Serious
Burundi	31.4	36.3	38.5	37.5	37.1	Extremely alarming
Kenya	20.6	20.3	19.9	18.2	19.3	Serious
Uganda	19.0	20.4	17.7	16.7	16.1	Serious

Source: IFPRI, 2012

Thus, despite the Tanzania's FSSR being above 100%, food insecurity is still high and some regions and districts have a chronic food deficit. Food insecurity in Tanzania is caused by low food production and complicated by low purchasing power leading to the inability of many to buy food existing in the local markets and poor distribution.

2.5.2 Nutritional Status

Nutrition refers to the intake of an adequate amount of energy and nutrients in relation to the body's needs for normal growth, development, active and a healthy life (WHO, 2002). Like many other developing countries, Tanzania's main health and nutrition challenges are related to under-nutrition rather than over-nutrition. Conditions such as chronic malnutrition, iron deficiency anemia (IDA), iodine deficiency disorders (IDD) and vitamin A deficiency (VAD) are common among children under five years of age and pregnant women (TDHS, 2010).

2.5.2.1 Extent of Malnutrition in Tanzania

According to the Tanzania Demographic and Health Survey (TDHS) of 2010, 5% of the children below five years of age were wasted, 42% stunted and 16% underweight (NBS, 2010). The high rates of stunting in the country are indicative of chronic and intergenerational malnutrition in the country. The 2010 findings indicate only mild improvements in the nutritional situation since 1999 .

Iron deficiency and anemia remain unacceptably high in Tanzania. Anemia is highly prevalent among under-fives with 72% of all children between 6-59 months being anemic (NBS, 2010). Anemia can be caused by micronutrient deficiencies in iron, folate, vitamin B12 or vitamin A, and/or infections like malaria and hookworm infestation. Iron deficiency, some of which causes anemia, is seen in 35% of children under 5 and a third of all women (this rate is higher among pregnant women).

The TDHS (2010) also reported extremely poor nutritional status for adolescent girls and women of reproductive age (Table 4). Approximately one third of the women aged 15-49 are anemic, vitamin A and iodine deficient. One in ten of women of reproductive age have a low body mass index (NBS, 2010).

The high levels of deficiencies in women and adolescent girls contribute to low birth weight for infants, often resulting in infants with anemia and the cycling of malnutrition from generation to generation.

TDHS 2009/10 anthropometric data are based on the new WHO Growth Standards and are therefore not directly comparable with the TDHS 1999/2000 and 2004/05 findings which were based on the NCHS/ CDC/WHO standards. However, when comparing for trends using earlier standards, stunting decreased from 44% to 38% to 35%, underweight decreased from 29% to 22% to 21% and wasting increased from 5% to 3% to 4%, in 1999/2000, 2004/05 and 2009/10 respectively.

Table 4: Nutrition Challenges for Children and Women in Tanzania

Children age less than 5 years	%	Women	%
Stunting[1]	42	Low body mass index	11
Underweight[1]	16	Iodine deficiency	36
Anemia[2]	69	Anemia	40
Iron deficiency[2]	35	Iron deficiency	30
Vitamin A deficiency[2]	33	Vitamin A deficiency	37

Source: NBS, 2010.

[1] Children 0-59 months
[2] Children 6-59 months.

2.5.2.2 Impact of Vitamin A Deficiency

Vitamin A Deficiency (VAD) is a chronic and widespread public health problem affecting mainly children, adolescent girls and women of reproductive age in Tanzania. Vitamin A is essential for immune system functions and the survival, growth and development of children. It is a serious health challenge for many developing countries including Tanzania. It is responsible for over 600,000 deaths per year globally, mostly in young children and pregnant women (WHO, 2009). VAD results from two primary factors: inadequate intake of foods rich in vitamin A/vitamin A precursors (e.g. carotenoids) and recurring infections increasing vitamin A requirements (MoHSW, 2010).

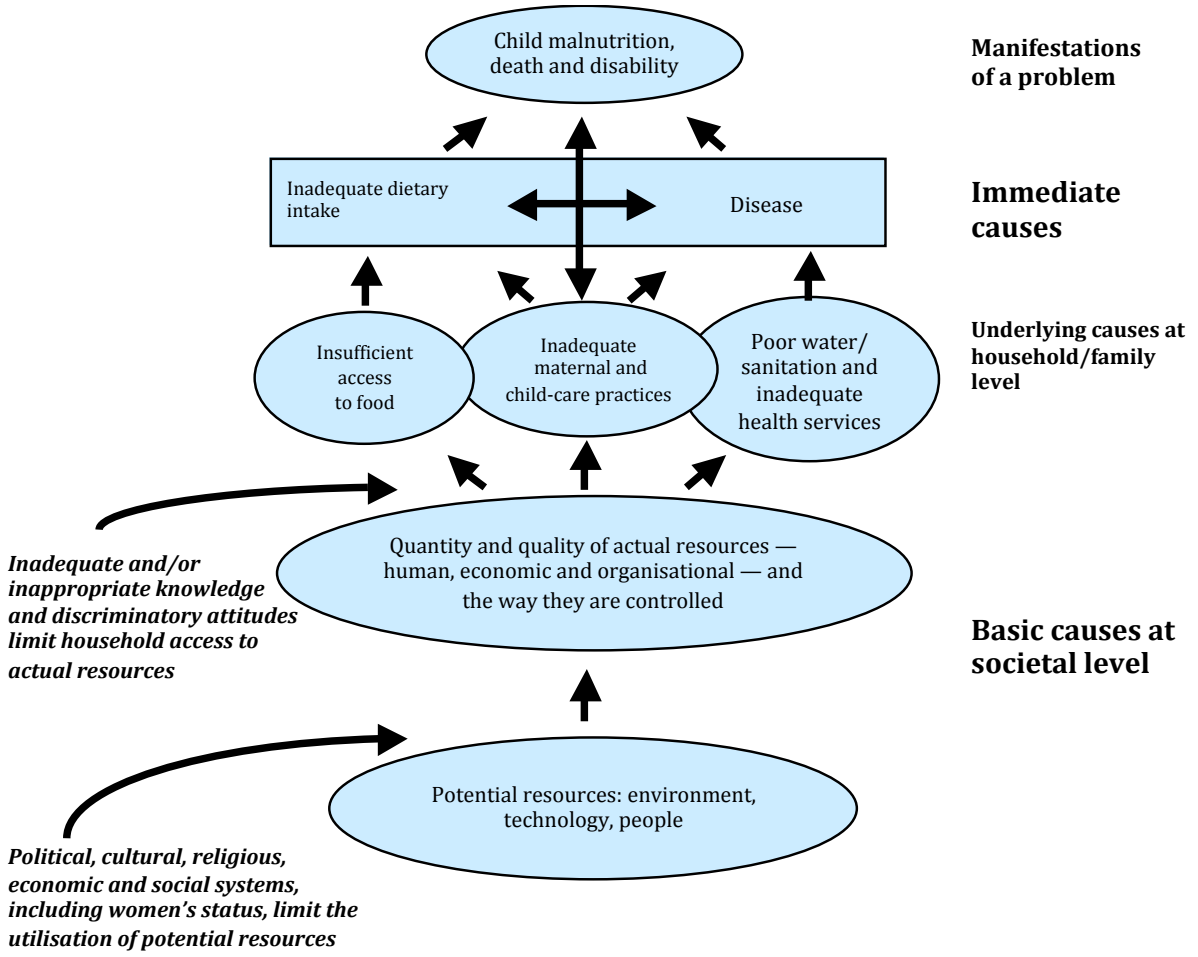
According to the TDHS (2010) data, the prevalence of VAD (as defined by serum retinol < 0.70 l µmol/L) among children in Tanzania aged 6-59 months is 33%. The prevalence does not vary significantly with the child's age, however more boys are affected (35.3%) than girls (30.95%). Prevalence of VAD is only slightly higher among children residing in the rural areas (33.3%) than those in the urban setting (31.9%). VAD prevalence is highest in North Pemba (51%) followed by Kagera (46.7%). Furthermore, the data reveal that VAD prevalence is 37% in adolescent girls aged 15-19.

Vitamin A deficiency impairs immunity and can lead to increased morbidities, blindness and in serious cases death. Vitamin A supplements delivered twice a year to children under 5 have been shown to reduce child mortality by 24% (Imdad et al., 2010).

2.5.3 Causes of malnutrition in Tanzania

It is well understood that malnutrition results from inadequate dietary intake coupled with recurring infectious diseases. Diets with limited diversity stem from food insecurity at household, village, community and national level which is in turn caused by inadequate food production, harvesting, preservation, processing, distribution, preparation and use. Other factors associated with malnutrition include inadequate maternal and child care, poor access to health services, and unhealthy environments (figure 2). It is evident that all these factors may directly or indirectly contribute to malnutrition. However, the Tanzanian government identifies the lack of knowledge and poverty is the backbone of all of these problems due to their direct impact on the capacity of individuals, households, communities and nations to meet their needs and obligations for health and nutrition (Black and Sazawal, 2001).

Figure 2: Conceptual framework for causes of malnutrition



Source: UNICEF, 1997.

2.6 Current Interventions to combat VAD and the Role of OFSP

VAD is considered to be a serious public health problem when the prevalence of the blood indicator, serum retinol, is below 0.70 umol/l. Africa and South East Asia, where over 40% of pre-school aged children are at risk, have the highest burden of this form of micronutrient malnutrition.

VAD and under-nutrition generally limit the intellectual potential of individuals affected and therefore undermines economic and social development. The cognitive and physical damage caused by chronic under-nutrition, particularly in the 1000 days between pregnancy and age two, is largely irreversible. Populations that are under-nourished have lower individual productivity, reduced physical capacity, higher health care costs and lower economic output, thereby impacting negatively on a country's economic growth. Under-nourished children are less likely to grow into healthy adults who can give their own children a good start in life.

Under-nutrition not only impairs development of individuals but it also hinders development of nations. The World Bank estimates that under-nutrition significantly impacts lifetime earning potential and reduces gross domestic product by up to 3% (Worldbank, 2007).

Treating VAD has been established as one of the most effective ways to increase child survival. In settings where VAD is prevalent, improving the vitamin A status of children age 6-59 months reduces their risk of dying from measles by an average of 50%, from diarrhea by an average of 40%, and from all-cause mortality by an average of 23% (Imdad et al., 2010). This translates into saving 645,000 lives per year in Sub-Saharan Africa alone.

The three most common strategies for addressing VAD are large scale vitamin A supplementation programs, food fortification with vitamin A, and food based approaches that encourage diet diversification and promote vitamin A rich foods including bio-fortified foods (staple crops bred to make them richer in micronutrients). Using OFSP to address VAD is a food-based intervention. Other complementary interventions include promotion of exclusive breastfeeding, home fortification with multi-micronutrient powders or lipid-based nutrient supplements, and dietary diversification with vitamin A rich foods.

2.6.1 Supplementation

In areas where VAD is a public health problem, children under-five are at an increased risk of illness and death as they tend to be born with low vitamin A stores. These children are subsequently exposed to frequent infections and are unlikely to receive sufficient vitamin A from breast milk due to inadequate breastfeeding. As they grow up, young children are unable to eat enough to get their daily requirement of vitamin A. Distributing vitamin A capsules twice a year is a cost-effective strategy to immediately improve the vitamin A status in children. However, the impact of supplementation on vitamin A levels is temporary (lasts for 2-3 months) and does not address VAD over the long term. In addition, in many African countries the challenges of providing supplementation to the "hard-to-reach", the poorest households living in marginal conditions, result in high (over 70%), but not complete, coverage of under-fives with two doses per year. The long-term financial sustainability of a large scale vitamin A supplementation program requires governments to cover the high cost of national campaigns; in most countries these are presently supported by external organizations.

2.6.2 Fortification

In this approach, vitamin A is added to products that are widely consumed such as milk, sugar, vegetable oil, and flour. Fortification programs, though cost effective, can take many years to initiate as they require policy change and significant investment by the private sector. This approach can take even longer to reach target populations especially the rural populations in hard to reach areas. In Tanzania, access to fortified foods may be limited by the availability of and access to fortified industrial foods (e.g. agro-processed foods) and purchasing power. In addition, even when fortified foods are available, children 6-59 months of age may not consume enough to reach their daily vitamin A requirements.

2.6.3 Dietary Diversification

Improving the diet is the third approach to reducing VAD in a population and is more sustainable in the long-term. A diverse diet, including fruits and vegetables, is most likely to provide for the wide array of nutrients and micronutrients needed for the health of individuals. A diet diverse in foods relies heavily on a diversity of agricultural production, either locally or through imported foods. Imported products tend to be more expensive and often unaffordable for rural poor consumers, therefore there is a heavier reliance on locally produced food. Within this approach, orange-fleshed sweet potatoes provide a locally-available, vitamin-A rich food which can assist in combating VAD amongst children and women in Tanzania. Just one small root (100-125 grams) of most OFSP varieties supplies the recommended daily allowance of vitamin A for children under-five years of age (Low et al., 2007). Even at low yields (6 tons/ha), just 500 square meters can generate an adequate annual supply of vitamin A for a family of five.

If implemented along with other interventions, it is estimated that regular consumption of OFSP by young children can contribute to reducing VAD in children under-five in Tanzania. The above facts suggest that a combination of several interventions is the most effective way to reach populations most at risk of VAD. This requires effective coordination between agencies involved in health, nutrition, agriculture, and community development and households and to ensure a sustainable outcome.

2.6.4 Orange-fleshed Sweet Potatoes - a food based approach

Promoting OFSP is an effective approach for reducing VAD in African countries including Tanzania for several reasons. Sweet potato is already widely grown in Tanzania. Many OFSP varieties have extremely high levels of bio-available beta-carotene. The crop tends to be grown by women who also bear the responsibility for child feeding and children like the taste and its agronomic characteristics. Market value makes it an attractive crop for all types of households, including the poor, who may be hard to reach by other interventions. The success of a nutrition-focused OFSP program depends on the timely availability of quality vines and effective demand creation through nutritional and extension messaging.

3.0 Orange-fleshed Sweet Potatoes For Livelihoods and Food Security

3.1 Historical Perspective of Sweet Potatoes

Sweet potatoes are said to be a native to Central America and are one of the oldest vegetables known to man. They have been consumed since prehistoric times as evidenced by sweet potato relics dating back 10,000 years that have been discovered in Peruvian caves (WHFoods, 2012). Christopher Columbus brought sweet potatoes to Europe after his first voyage to the New World in 1492. By the 16th century, the Spanish brought them to the Philippines and Portuguese brought them to Africa, India, Indonesia and southern Asia (WHFoods, 2012).

OFSP was introduced in the United States as "yams" to distinguish it from other varieties of sweet potatoes. Many Asian and Latin American cultures also use sweet potatoes prominently with China, Indonesia, Vietnam, Japan, India and Uganda as key producers and exporters of OFSP (WHFoods, 2012).

3.2 Sweet Potato Production and Consumption in Tanzania

Sweet potato is a food and nutrition security crop, grown in almost all agro-ecological zones of Tanzania. Sweet potato is grown by smallholders, especially youth and women, and occupies approximately 14% of total arable land of the farms surveyed (Kapinga et al., 1995). Sweet potato production is mainly for home consumption. The preparation for consumption in most families in Tanzania involves boiling, roasting and deep-frying of the roots and the leaves are eaten as a green vegetable with ugali, rice or other food items. The vegetables are sometimes dried and packed for consumption during the dry season. In most parts of Tanzania sweet potato has gained importance due to its adaptability to marginal conditions such as drought, wet conditions, low soil fertility, and is ranked high as food security crop when local staple crops like maize and rice are scarce or fail. The problems of cassava mosaic, brown streak, banana bacterial wilt, sigatoka, nematodes and weevils on staple crops aggravate food security, and thus increase the importance of sweet potato in the country.

The national fresh root yield at farm level in Tanzania is only 5.6 metric tons (MT) per hectare compared to potential yields of 20-40 t/ha (Ewell and Mutuura, 1991). The table below indicates sweet potatoes production area, total production and yield per hectare.

Table 5: Sweet potato Production in Tanzania

Year	Area harvested (hectares)	Total Production (metric Tons)	Yields (Metric Tons Produced per hectare)
2003	135,470	207,830	1.5
2004	517,530	1,501,620	2.9
2005	469,110	1,414,820	3.0
2006	480,000	1,396,400	2.9
2007	450,000	1,322,000	2.9
2008	460,000	1,379,000	2.9
2009	465,000	1,381,120	2.9
2010	480,000	1,392,000	2.9

Source: FAOSTAT, 2010.

3.3 Major Sweet Potatoes Production Constraints

As indicated above sweet potato productivity in Tanzania is very low compared to international standards despite its potential. Low yields are due to the fact that farmers use local landraces that are low yielding and susceptible to disease and insect pests. Unavailability of high quality planting material of improved varieties, especially during critical periods of planting sweet potato has contributed to these problems (Kapinga et al., 1995 and Mukasa et al., 2003). Sweet potato virus disease (SPVD) is another problem, which is arguably the most devastating disease affecting sweet potato production in Tanzania. The disease can yield losses of up to 50% of the total production. Sweet potato weevils (Cylas spp and Blocyrus spp.) are the most important insect pests of sweet potato, affect the crop by tunnelling in the root flesh rendering the roots inedible (Kapinga et al., 1995).

According to Ndunguru et al. (2009) sweet potato production is constrained by "the lack of clean planting materials, lack of high-yielding cultivars, low soil fertility, lack of resistant cultivars and weevils". However, although plants may recover from some combination of these factors Ndunguru et al. (2009) found that co-infection of sweet potato feathery mottle virus (SPFMV) and sweet potato chlorotic stunt virus (SPCSV), were the most detrimental to yields.

A study was conducted in Tanzania and Uganda to determine the status of sweet potato virus disease (SPVD) incidence and its vectors indicated that SPVD incidence was high (66% - 100%) in Tanzania but low (10% - 40%) in Uganda (Ndunguru et al., 2009). In Tanzania, SPCSV was detected in 50% of the plants examined and these were usually co-infected with SPFMV which was seen in 45% of the plants examined. SPMMV, sweet potato mild speckling virus (SPMSV), SPCFV, and sweet potato virus G (SPVG) occurred in low frequency (Ndunguru et al., 2009).

SPVD is among the major challenges for growing sweet potato and OSFP in Tanzania and the EAC. If OSFP is to be promoted, strategies need to address to this problem.

Most of the sweet potato cultivars are landraces that are white, cream, or purple fleshed with low beta-carotene content. It has been established that there are relatively few OFSP local cultivars that have high levels of beta-carotene - the precursor to vitamin A. Only two improved OFSP varieties, which have high beta-carotene content, have been officially released in Tanzania, as of 2012. Many factors, including inadequate resources to support the National Sweet Potato Improvement Programme, have contributed to this problem. Similarly, the unavailability of high quality planting material of improved varieties is another major limitation in increasing OFSP production. The situation has been aggravated by the lack of an organized seed system of clonally propagated crops in the seed sector in Tanzania. The need for fast tracking the evaluation of advanced breeding lines through participatory variety selection and the release of superior clones, with high beta-carotene content cannot be overemphasized. Varieties that are released need to be multiplied in collaboration with key institutions and partners for change to meet farmer demands using the Community Seed Production Model.

Other major factors limiting sweet potato production and productivity include the continued use of landraces that have low yield potential and are susceptible to disease and pests (especially weevils), and the shortage of clean and healthy planting material of improved varieties. SPVD is the most devastating disease affecting sweet potato production in Tanzania. In addition, varieties with low dry matter content (less than 30%) are not preferred by consumers in the country. Drought and low soil fertility in many parts of the country affect crop productivity. Genetic erosion accelerated by the climate change has been another major problem in the country limiting the genetic diversity for sweet potato improvement.

According to a McKnight Foundation report (2005), the major limiting factor for increased sweet potato production is the shortage of clean planting materials of superior varieties. Carey et al. (1998) reported that throughout the Sub-Saharan region production of the sweet potato crop is mainly based on the large numbers of landraces where farmers have to source planting material from neighbouring farms. This is supported by anecdotal evidence in Tanzania where most sweet potato farmers interviewed reported receiving vines through other farmers.

Drought and low soil fertility in many parts of the country are also reported as a yield-limiting factor of the crop (Kapinga et al., 1995; and Bashaasha et al., 1995). This situation has to be reversed if Tanzania is to attain self-sufficiency in sweet potato production. Therefore, the rapid breeding of new varieties that are high yield, resistant to diseases, insects and pests, drought tolerant, have high dry matter content, good texture and high beta-carotene is proposed.

Table 6: Some of the Recent or Existing Sweet Potato and OFSP Projects in Tanzania

Name of project	Focus	Location	Time frame	Implementing institution	Donor
Marando Bora	Scaling up OFSP demand creation	Lake zone	2009-2014	International Potato Centre (CIP) Catholic Relief Service (CRS), Helen Keller International (HKI) and local IPs	Bill & Melinda Gates Foundation (BMGF)
Sweet Potatoes Improvement	Breeding	Lake zone	2009-2012	National Agriculture Research System (NARS)- Ukiriguru	Alliance for a Green Revolution in Africa (AGRA)
Promotion of OFSP	Sweet potatoes value chain	Eastern and Central zone	2012-2014	National Agriculture Research System (NARS)- Kibaha	Commission of Science and Technology in Tanzania (COSTECH)
Maximizing Incomes from Sweet Potato Production	Increase incomes of poor farmers, improved storage or handling	Lake zone Kagera region	2010-2013	Natural Resources Institute (NRI), Tanzania Food and Nutrition Centre (TFNC), the Lake Zone Agricultural Research And Development Institution (LZARDI)	DFID
Eat Orange! Tanzania	Raise awareness on VAD and nutrition education increase demand for the OFSP, marketing and planting materials	Lake zone	2011- 2013	Helen Keller International (HKI), Tanzania Home Economics Association (TAHEA)	Monsanto Foundation

Source: Dr. Kido – NARS Breeder, personal communication, 15 June 2012.

The seasons for planting and harvesting sweet potatoes differ according to the agro-ecological zone. There are two planting and harvesting seasons (main season and off-season). Farmers in the Lake Zone have the opportunity of planting and harvesting their crop twice a year. The off-season crop is grown in the lowlands after harvesting in the highlands. In the Eastern Zone there is only one planting and harvesting season for the crop. However, where marketing is important, staggered planting is practiced. A few farmers grow the crop in valleys as a means of maintaining planting materials.

Table 7: Sweet Potato Cropping Calendar (Lake and Eastern Zones)

Zone	Region	District	Planting	Harvesting
Lake	Mwanza	Ukerewe	October-March	February-June
			June-September	October-January
		Sengerema	September-October	January-March
			July-September	December-January
Eastern	Dar-es-salaam	Temeke	March-May	July-September
	Morogoro	Kilosa	March-May	June –August
Southern	Ruvuma	Songea	December-January	April- June

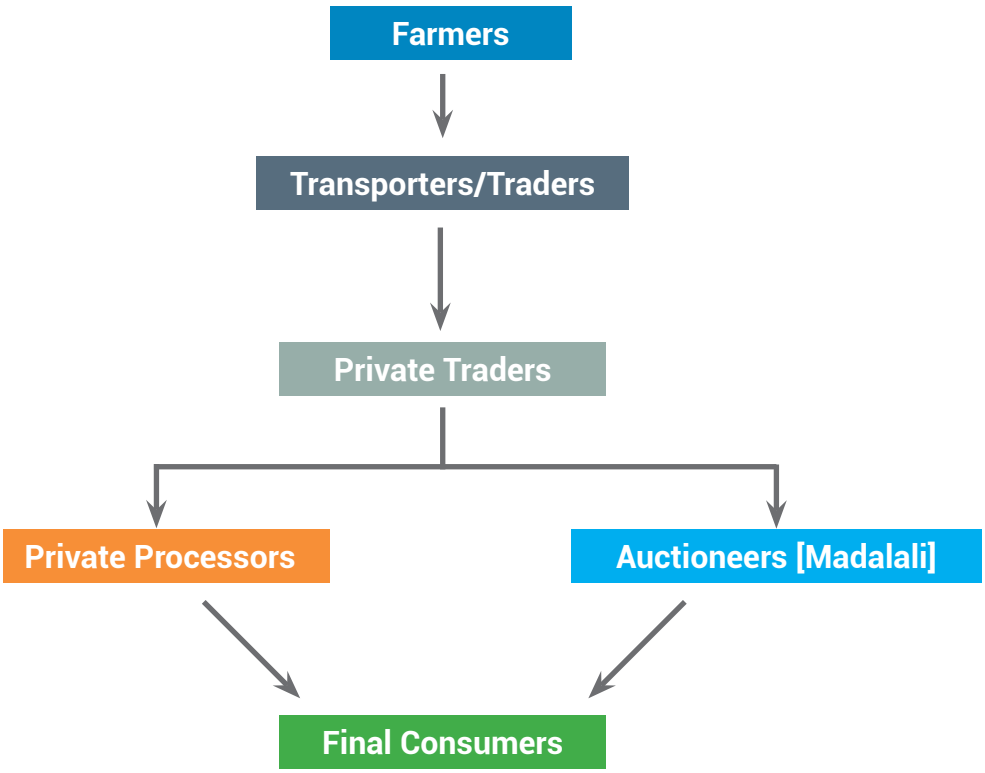
Source: Dr. Kido – NARS Breeder, personal communication, 15 June 2012.

Two major cropping systems have been identified in the sweet potato growing areas. These are mono-cropping and intercropping with other crops such as cassava, cowpeas, maize, beans, bananas, and fruit trees. Intercropping is the predominant practice (90%) in the Lake Zone compared to other areas. In the Eastern Zone only 30% practice the system of intercropping.

3.4 Sweet Potato Marketing and Value Chain

Sweet potato marketing is practiced by a small number of small-scale traders, operating privately on individual basis. Usually farmers sell sweet potatoes directly to consumers within the villages whenever there is a need. The marketing chain of sweet potato involves farmers, traders, transporters, commission agents, and final consumers.

Figure 3: Sweet Potato Marketing Chain



Farmers and their families generally consume most of the sweet potatoes produced at household level. The surplus produced is sold to middlemen who transport them using hired trucks (or boats), to neighbouring village or town markets. In the big cities, selling in the main markets is

normally done through commission agents (known as madalali) hence middlemen will usually sell to commission agents before the sweet potato can reach the final consumer.

3.5 Sweet Potato Agronomy and Breeding

Due to the differences in agro-ecologies breeding of sweet potato has been decentralized in major zones. Different institutions, particularly the International Potato Centre (CIP) in collaboration with the National Agricultural Research System have supported research on sweet potatoes in Tanzania. This has resulted in the development of genotypes, which are currently at clonal, preliminary and advanced breeding stages and some released. The sweet potato trials are limited to few agro-ecologies in the country such as Lake Zone, Eastern Zone and Zanzibar. However, eight sweet potato varieties (Simama, Juhudi, Sinia, Mavuno, Vumilia, Ukerewe and Kiegea and Mataya), have been released through participatory variety selection between 2002 and 2010 (Dr. Kido – NARS Breeder, personal communication, 15 June 2012.).

Figure 4: Sample of Varieties of OFSP grown in Tanzania

Mataya

Kiegea

Many varieties are high yielding with high dry matter but have low beta-carotene levels and have low resistance to insects, pests, and diseases In response to low beta-carotene some varieties namely, Zapallo, Japon Tres, Carrot Dar, Resisto, SPK004 (Kakamega), Tainung 65 and Jewel1 were introduced by CIP in late 1990 and early 2000 (Dr. Kido – NARS Breeder, personal communication, 15 June 2012.). In addition, from 2000 the National Programme embarked on breeding and selection for OFSP, which resulted in the release of Mataya and Kiegea varieties in 2010 (MAFC, 2010).

Table 8: Some of the Sweet Potatoes Varieties Released in Tanzania

Variety	Major Characteristics	Status
Simama	High yielding (20t/ha), tolerant to SPVD, high dry matter content, most popular, consumer accepted, highly marketable, cream flesh.	Released 2000
Ukerewe	High yield (15-20t/ha), high dry matter, sweet, tolerant to SPVD, marketable, cream with orange pigments in the background.	Released 2003
Kiegea	OFSP, moderate yield (12-15t/ha), tolerant to SPVD, moderate dry matter content, accepted by farmers.	Released 2010
Mataya	OFSP, moderate yield (12-15t/ha), tolerant to SPVD, moderate dry matter content, accepted by farmers.	Released 2010

Source: MAFC, 2010.

The table above indicates the sweet potato varieties released in Tanzania. The table below documents some of the varieties being tested in Tanzania.

Table 9: Sweet Potatoes Varieties in National Performance Trial (NPT) in the Lake Zone

Variety	Major Characteristics	Status
Kakamega	High yielding (16.5t/ha), OFSP, tolerance to SPVD, high dry matter content (32%), maturity 4 months.	NPT
Ejumula	Moderate yield (15t/ha), high dry matter content (33%), OFSP, sweet, mild tolerance to SPVD, maturity 4 months.	NPT
Naspoti	OFSP, moderate yield (16t/ha), tolerant to SPVD, moderate dry matter content, accepted by farmers.	NPT
Polista	High yield (12-15 t/ha), tolerant to SPVD, white flesh, moderate dry matter content, accepted by farmers.	NPT

Source: MAFC, 2011a

Table 10: OFSP Landraces

Variety	Major Characteristics	Status
Carot-C	Moderate yield (15t/ha), susceptible to SPVD, high dry matter content (33%), deep orange, consumer accepted.	Used as parent to improve beta-carotene and dry matter content.
Mayai	Low yield (10t/ha), high dry matter (32.5%), susceptible to SPVD, deep orange.	Used as parent to improve beta-carotene and dry matter content.

Source: CIP Variety Catalogue, 2010.

In the Eastern Zone there are OFSP clones in advanced stages of evaluation. The materials are evaluated on-farm for the farmers to test and provide feedback to researchers. The breeding lines SPKBH 03/069, SPKBH 03/03, SPKBH 06/676 will be evaluated under the National Performance Trial (NPT) probably from 2012/13 (Dr. Kido – NARS Breeder, personal communication, 15 June 2012.). Sweet potato breeding is mainly done by NARS in particular by the research institutes under the Department of Research and Development (DRD) of the MAFC. These institutes are located in different zones including the important zones for sweet potato production: the Lake Zone regions i.e Mwanza, Shinyanga, Mara, Kagera; Eastern regions i.e. Morogoro, Dar es Salaam, Pwani and Tanga; Western zone i.e. Tabora and Kigoma; and Southern zones i.e. Mbeya, Ruvuma, Rukwa, and Iringa.

As for many countries in Africa including Tanzania, there is no well-developed sweet potato seed system. Researchers and partners do the multiplication of sweet potato planting materials. The multiplication scheme is divided into primary, secondary and tertiary sites. Primary sites are founded and managed by researchers who multiply breeder seeds. Secondary and tertiary sites are found closer to the community (Dr. Kido – NARS Breeder, personal communication, 15 June 2012). Experience in Eastern and Central Africa shows that 70-90% of seeds used in a given cropping season are seeds saved from the previous crops (ASARECA, no date). Organized seed production is not widely used and therefore the role of private sector in seed industry and seed policy needs to be adequately addressed to realize significant levels of adoption. This situation means that if OFSP production and consumption for combating VAD is to be promoted, concerted efforts are required to develop seed systems (including quality management) of vegetative propagated crops in Tanzania.

4.0 Policy Environment

The Scaling Up Nutrition (SUN) movement has taken hold in Tanzania, with President Kikwete making early commitments to combat malnutrition. Similarly, in 2011 the Prime Minister of Tanzania committed the GoT to addressing food security and nutritional issues, specifically identifying:

- the finalization of the implementation plan for the National Nutrition Strategy (NNS), which will include clear responsibilities for the ministries, development partners, the private sector and civil society; and
- the integration of the nutrition issues into the Tanzania Agriculture and Food Security Investment Plan (TAFSIP);

promising future improvements in the reflection of nutrition in major policies revisions to come.

There currently exist a number of government policies that promote the nutrition agenda in Tanzania. However, there is still much to be done to ensure policies adequately cover nutrition needs. The finalized National Nutrition Strategy (2009-2014) specifically addresses this in Strategy 4 which is to "mainstream nutrition in national and sectoral policies and plans." This section reviews briefly the policy environment, which may hinder or help the promotion of OFSP in Tanzania.

In 2011, the Sokoine University of Agriculture (SUA) was commissioned by the Partnership for Nutrition in Tanzania, managed by Save the Children Tanzania, to conduct an assessment of the coverage of nutrition in national policies. The report was helpful in uncovering the areas where nutrition is currently well reflected and can be used to further support OFSP promotion. Of the 35 policies reviewed the following 9 were found to be the most supportive of nutrition :

Table 11: Nutrition Friendly National Policies

National Health Policy
Food and Nutrition Policy for Tanzania
National Agricultural Policy (review draft)
Child Development Policy
Community Development Policy
MKUKUTA II
MKUZA II
CAADP Post-Compact Road Map
TAFSIP (Tanzania Agriculture and Food Security Investment Plan)

Source: SUA, 2011.

[4] *As reflected by the number of times nutrition was indicated in the policy (SUA, 2011)*

There are a few policies that have been developed by the Government of Tanzania to support the nutrition within the agriculture sector, specifically. These include the Agriculture and Livestock Policy (1997), and the National Health Policy 2007. The Agriculture and Livestock Policy of 1997 emphasizes the need to increase production, quality, output to make food crops available for food and nutritional security purposes. The National Health Policy (2007) mainly covers issues directly related to health and food security. It aims to promote household food security and the availability of adequate food among vulnerable groups such as children, pregnant women and breastfeeding mothers to prevent nutrition related diseases or disorders such as VAD.

The Tanzania Agriculture and Food Security Investment Plan (TAFSIP) highlights resources required to accelerate agriculture production and address nutrition issues. The plan mentions a number of key issues affecting both food security and nutrition on mainland and Zanzibar outlined below.

Table 12: Key food security and nutrition issues in Tanzania

Key issues in Food and Nutrition security	
Food security issues in Mainland	**Food security issues in Zanzibar**
Low productivity for crops, livestock and fisheries products	Low productivity for crops, livestock and fisheries products
Vagaries of weather causing instability of food supply and periodic shock	Vagaries of weather causing instability of food supply and periodic shock
High post harvest losses depleting food stock	High post harvest losses depleting food stock
Weak early warning systems	Weak early warning systems
High food inflation	High food inflation
Low capacity for current food reserve structures	
Inadequate and poor food storage at household level	
Weak and inadequate school feeding programs	
Poor and rural storage preservation facilities	
Weak system of social protection and disaster preparedness and response	
Nutritional security issues in Mainland	**Nutritional security issues in Zanzibar**
Limited awareness of the requirement for healthy diet, food hygiene, food preparation and preservation methods, use of fortified foods and the importance of the dietary diversity	Limited awareness of the requirement for healthy diet, food hygiene, food preparation and preservation methods, use of fortified foods and the importance of the dietary diversity
Low household availability of nutritious foods arising from limited diversity for agricultural systems.	Low household availability of nutritious foods arising from limited diversity for agricultural systems.
Low literacy levels among women and girls limits their access to nutrition information	Low literacy levels among women and girls limits their access to nutrition information
Vulnerability of rural communities to rural disaster and other shocks which affect their nutrition status and lack of comprehensive social protection systems	Vulnerability of rural communities to rural disaster and other shocks which affect their nutrition status and lack of comprehensive social protection systems
Inadequate capacity to conduct extension, research, and training in nutrition and food technology.	Inadequate capacity to conduct extension, research, and training in nutrition and food technology.
Inadequate institutional linkage/coordination and integration for nutrition planning, programming and implementation (agriculture, health, and social welfare education, and the TFNC)	

Source: Tanzania Agriculture and Food Security Investment Plan (TAFSIP), 2012

It should be mentioned that Tanzania has undergone decentralization in the last decade and therefore implementation of activities at the community level are prioritized by and conducted through local government authorities. The Local Government (District Authorities) Act of 1982 emphasizes the need for the districts to implement agricultural activities including extension services with technical and budgetary support from the central government and development partners. It gives power to the local authorities to plan for the allocation of resources. In addition, it allows local communities to participate in decision making processes regarding matters

affecting or relating to their livelihood and well-being at all local levels. Therefore, although national policies are important for guiding district decisions, the final authority to implement or not implement OFSP interventions is more critically in the hands of districts.

5.0 SWOT ANALYSIS

A strengths, weaknesses, opportunities and threats (SWOT) analysis was conducted to document the specific contextual issues that could affect the promotion of OFSP in Tanzania. These are outlined below.

5.1 Weaknesses and Threats

The successful expansion of OFSP in Tanzania requires a number of weaknesses and threats to be considered.

5.1.1 Low Productivity of Land

As discussed above, there are several factors constraining agricultural growth and rural development in Tanzania. Tanzania has made some progress in increasing land productivity however, the progress has been hampered by the relative under-investment in agricultural research, and the development and dissemination of new technologies. Current expenditure on agricultural research as a proportion of agricultural GDP (a measure of research intensity) is 0.3%, which is less than half the Africa region average of approximately 0.75%, and one third that of other developing countries. Furthermore, there is limited access to financing for the uptake of new technologies.

5.1.2 High Cost of Agricultural Transactions

The governments' inability to invest in rural roads and other infrastructure leads to high transaction costs for farmers. In addition, the overall policy and regulatory environment governing market transactions also contribute to high transaction costs; these include unfriendly tax regimes and licensing requirements and costs for rural farmers.

5.1.3 Limited Access to Technology

There is limited access to technology both from the demand and delivery aspects. According to the Tanzania Communication and Regulatory Authority, 60%-75% of households in Tanzania are estimated to have no contact with research and extension services. With Tanzania having over 15 million subscribers to mobile phone networks, a lot of progress has been made in mobile phone coverage, however overall access to information communication technology (ICT) services remains a challenge, and connectivity is generally limited to urban areas. As of quarter 2 of 2012, 5.6 million Tanzanians had access to the internet (IWS, 2012), which represents about one-tenth of the country and likely highly concentrated in urban areas.

5.1.4 Ecological Factors

Variability in weather patterns with periodic droughts increases the exposure to risks. The impact of these events is furthered by the dependency on rain-fed agriculture and the limited capacity to manage land and water resources.

5.1.5 Weak Co-ordination

The formulation and implementation of interventions by various actors in the sector is still inadequate. In addition, despite many initiatives, the linkages between the public and private sectors in agriculture are still weak and most government interventions are now promoting public-private partnerships.

5.2 Strength and Opportunities

Conversely, there are certain contextual factors about the current state of Tanzanian policies and programs that make the expansion and increased uptake OFSP viable in Tanzania.

5.2.1 Policy environment

As discussed above, the policy environment is very conducive to the promotion of nutrition-focused agricultural programs in the country. Most ministries are engaged in the High Level Steering Committee for Nutrition, chaired by the Permanent Secretary of the Prime Minister's Office, and are accountable to the Permanent Secretary on advances for nutrition within their sector.

5.2.2 Government Commitment

Aside from being a lead country in the Scaling Up Nutrition movement, there have been some specific commitments made regarding government spending in agriculture. The Government of Tanzania has also developed the Tanzania Agriculture Investment Plan as well as the Tanzania Agriculture and Food Security Investment Plan (TAFSIP), a ten year investment plan that maps the investments needed to achieve the Comprehensive Africa Agriculture Development Programme (CAADP), targeting 6% annual growth in the agriculture GDP through the allocation of 10% of the national budget to the agriculture sector. All these initiatives are aimed at transforming the agriculture sector into a modern, commercial and competitive sector in order to ensure food security and poverty reduction (URT, 2012). For the above initiatives to be implemented, the GoT has come up with the "Kilimo Kwanza" vision that encourages different stakeholders to participate in agricultural development.

5.2.3 Contribution of the Agriculture Sector to GDP

Despite its potential, the performance of the agriculture sector has had only a modest contribution to economic growth and poverty reduction. The growth rate of agricultural productivity over the past 10 years has been an average of 4% per year contributing to problems of food insecurity, while services and industry have been growing by more than 6% per year during the same time period (URT, 2011a). Studies have confirmed that a 1% growth in the agricultural sector has a higher positive multiplier effect than the same growth in any other sector (URT, 2011a). The agriculture sector employs over 60% of the population of Tanzania and is the source of most of the food in Tanzania. It accounts for about 24% of GDP and provides strong inter-sectoral linkages with non-farm sectors, both backward and forward linkages.

5.2.4 Land as a Factor of Production for OFSP

Tanzania has more than 44 million hectares of arable land with a wide variety of ecological zones, climates and water resources. Approximately 5.1 million hectares are cultivated annually, of which 85% produce food crops (Mukami, 2003). This implies that only 10% of the arable land is used for production of food crops and much more land is available for cultivation of the food crops including OFSP. OFSP can grow and thrive well on most of the arable land in Tanzania.

5.2.5 Existing Agro-ecological zones

Tanzania is well endowed with a variety of farming systems with climatic variations and agro-ecological conditions on which various crops can be grown. The Agro–Ecological Zones (AEZs) in Tanzania are divided as follows:

- Coastal Zone;
- Eastern Plateau and Mountain Blocks Zone;
- Southern Highlands Zone;
- Northern Rift Valley and Volcanic Highlands Zone;
- Central Plateau Zone;
- Rukwa–Ruaha Rift Zone;
- Inland Sedimentary Plateau Zone; and
- Ufipa Plateau and Western Highlands Zone.

5.2.6 Availability of Different Stakeholders (Actors)

All development partners supporting various sectors in Tanzania are coordinated under the Development Partners Group (DPG) and are guided by the agreed principles stated in the Joint Assistance Strategy for Tanzania (JAST) agreed between the Government of Tanzania and the donors.

The health and agriculture sector development partners and donors in Tanzania include DFID, Denmark, Germany, Ireland, Switzerland, the UK, the Netherlands, Canada, the European Union, USAID, DANIDA, CIDA, and Irish Aid, while the international multilateral organizations include: the World Bank, UNICEF, the United Nations Population Fund (UNFPA) and the World Health Organisation (WHO). Many of these are also interested in specific agriculture programs, interventions for food security and nutrition. Donors like Norway, Sweden and Finland may be willing to invest in advocacy and capacity building aspects of the project. There are also international NGOs involved in the health sector including CARE International, Catholic Relief Services (CRS), World Vision, Save the Children, and SNV that also provide extension services.

5.2.7 Low Availability of Vitamin A in Complementary Foods for Young Children

Breast milk provides enough vitamin A (over 100% of recommended daily allowance (RDA)) for children below 6 months of age. With exclusive breastfeeding, vitamin A losses from infections and other causes are reduced. After the age of 6 months, however, vitamin A needs to be obtained from the food consumed, as breast milk alone does not meet the RDA for the child. One option is to take vitamin A fortified breast milk substitutes, which are very expensive, not readily available (especially in rural areas), and have various challenges with relation to hygiene during their administration. In addition, most of the locally available complementary foods for children 6-23 months of age have inadequate or entirely lack vitamin A (porridges, white potato, bananas, groundnuts, etc). Vitamin A interventions, like supplementation and vitamin A rich foods, provide child health and survival benefits. The promotion of consumption of food items like OFSP that have a high concentration of beta-carotene can alleviate the challenges of vitamin A inadequacy in the diet, and contribute to improved health during an important period of child growth.

5.2.8 The Growing Economy

The Tanzanian economy offers tremendous opportunities for investors as it is endowed with abundant natural resources such as arable land and political stability. Other important attributes include its' excellent geographical location in the East African Region and the excellent tourist attraction sites. Mineral and industrial production have picked up since private sector was allowed (URT, 2011b) however agriculture is considered the base of the Tanzanian economy. It is the main source of food as it provides about 95% of the national food requirements and provides employment opportunities to approximately 77% of Tanzanians. It accounts for about 24.1% of the GDP and contributes about 31% of the national foreign exchange earnings. It has linkages with the non-farm sector through forward linkages to agro-processing, consumption and exports; provides raw materials to industries; and a market for manufactured goods (MAFC, 2011a). Tanzania has a large land mass, and of its' 94.5 million hectares of land, 44 million are classified as suitable for agriculture (MAFC, 2011). Tanzania is also endowed with enormous water resources constituted of rivers, lakes, and underground water sources that can be used for irrigation and other needs. In total, there are 2.3 million hectares with high development potential, 4.8 million hectares with medium potential and 22.3 million hectares with low potential where irrigation would be required (MAFC, 2010).

5.2.8.1 Established Agricultural Interventions

In a drive to achieve the Tanzania Development Vision 2025 and the Millennium Development Goals (MDGs), Tanzania has embarked on a number of initiatives that aim at improving the national agricultural growth. These include National Strategy for Economic Growth and Poverty Reduction of Tanzania in Swahili known as MKUKUTA (main land) and the Zanzibar Growth and Reduction of Poverty (ZGRP) known as MKUZA (Zanzibar); Agricultural Sector Development Strategy (ASDS) of 2001 and its implementing tool known as Agricultural Sector Development Program (ASDP) of 2006; the Decentralization Reform Program that gives the autonomy for

the regions and districts to plan their economic investments based on policies and guidelines from the central Government; and the Tanzania Agriculture and Food Security Investment Plan (TAFSIP) under the Comprehensive African Agriculture Development Plan (CAADP) which is an initiative of the New Partnership for African Development (NEPAD) to address agriculture development and growth issues. Tanzania has started implementing a five-year Agricultural Development Plan through a corridor approach like the Southern Agricultural Growth Corridor in Tanzania (SAGCOT) that encourages partnership in various aspects including agro-processing and contract farming. SAGCOT is a unique and powerful public-private partnership capable of enhancing investment and delivering sustainable agricultural growth in the southern corridor of Tanzania.

All the initiatives including those mentioned in the above are coordinated under the Agriculture Transformation Initiative (ATI), or Kilimo Kwanza in Swahili, which advocates for all sectors to engage in agriculture based on the ten pillars of the Kilimo Kwanza vision.

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Based on this Situation Analysis Report some challenges and opportunities have been identified that should to be taken on board during the implementation of Reaching Agents of Change (RAC) project. Some of the opportunities identified are: a conducive policy environment, Government commitment to nutrition, the contribution of agriculture sector to the GDP, the availability of land as a factor of production for OFSP and the existence of different agro-ecological zones. Other opportunities are the availability of various stakeholders or actors, the availability of vitamin A complementary foods for young children, established Public-Private Partnerships (PPP) and the growing Tanzanian economy. These opportunities can provide the starting point for the project and enhance its achievement.

On the other hand, challenges that might hinder the progress and performance of the project need to be noted. These include the low productivity of land, the high agricultural transaction cost, limited access to technology and information, biological factors and weak co-coordination at policy level.

This report also highlights interesting findings that stakeholders need to pay attention to and to consider during the implementation of the RAC project. These are the low awareness of the opportunity to reduce VAD by using OFSP as a nutritive crop; the low policy inclusion or coverage of nutrition issues; the shortage of vines for multiplication and distribution to the farmers as needed; and the prevailing diseases that have been affecting the development of sweet potatoes. However, the most interesting finding of this report was that OFSP are a common food in Tanzania and thus provide a great opportunity for up scaling its production and consumption. It was also noted that there are few OFSP varieties officially released by the Government. Only two varieties have been released for OFSP production in Eastern Zone and so far neither has been released in Lake Zone despite the fact that many of the OFSP activities have been taking place in this area of the country.

This situation analysis has found that the following issues require urgent attention in order for the RAC project to succeed in reducing VAD. It is evident that more resources are required for the promotion of OFSP and policy change.

1. Low awareness of most people on health and nutritional issues, especially on the magnitude of the nutritional challenges (over-nutrition and malnutrition particularly on VAD) across the country. However, the National Nutrition Strategy has recognised this challenge and calls for multi-sectoral approach to address the nutritional challenges in the country. Action on the strategy is now needed.
2. Nutrition does not feature in many relevant policies. The Government has recognised this problem and has requested all ministries to review the policies and to include the issues of nutrition. This requires urgent support to ministries to conduct technical reviews of policy documents with a nutrition lens.
3. Sweet potato is a common food in Tanzania, hence there is a great opportunity for scaling-up its production and consumption. However, there is strong preference for traditional sweet potatoes and not OFSP. The benefit of the orange-fleshed variety for health needs to be promoted heavily to entice behaviour change in consumption preferences. Evidence from on-going OFSP projects indicates that this behaviour change is likely with promotion and education.
4. As far as sweet potato consumption is concerned there is a perception by most men that sweet potato is a women's and children's food, hence it is not a priority for men who own land resources to grow. This may be a benefit, as it is self-targeted for women to consume for themselves and their children. But in terms of production, marginalized land is commonly used for OFSP production.
5. Key challenges for promotion of OFSP are related production and shortage of vines, and diseases affecting sweet potatoes.

6.2 Recommendations

In view of the conclusion of this report, the following are recommended:

1. It is important to develop an Advocacy and Communication Strategy for OFSP that can be used to advocate and promote investment in and consumption of OFSP crop as alternative means to combat vitamin A deficiency especially for the children under 5 years of age and lactating mothers;
2. Implementation and/or use of established Public-Private Partnerships should be promoted and encouraged;
3. The Government needs to fast-track the release process of other OFSP varieties to increase availability of vines; and
4. More research and development of OFSP in Tanzania needs to be encouraged to improve productivity, production and utilization.

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