



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



Zero Draft Report

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EXECUTIVE SUMMARY

This situation analysis is a prepared as part of the RAC project that aim to make an intervention for food security and VAD in Tanzania through the Orange Fleshed Sweet Potatoes (OFSP). As a cost effective way of combating vitamin A deficiency (VAD) and food security, The International Centre for Sweet Potato (CIS) and Helen Keller International (HKI) has designed a Reaching Agent of Change RAC project. The RAC project is a 3-year regional initiative aimed at increasing investments and commitment to the dissemination and use of Orange-Fleshed Sweet-potato (OFSP) as a cost effective means to combat Vitamin A Deficiency (VAD) and food insecurity in Africa.

The situation analysis study has established that 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, underweight, wasting, vitamin A deficiency, iodine deficiency disorders and anaemia. While recognizing for the existence of the over nutrition problem as well, the official data on the magnitude of the problem is yet to be well documented.

Addressing malnutrition problems will be accompanied by significant economic and social benefits as it reduces morbidity and mortality, leading to resource savings in health, improves education outcomes, enhances productivity and increases incomes and poverty reduction while an improved nutrition will contribute to achievement of six of the Millennium Development Goals (MDGs).

The two sector that are key for implementing the health and Nutritional policy and the nutritional strategy has a great opportunity to take the lead in addressing the identified nutritional disorders. While the ministry of health among will have the role of educating the people on role OFSP it can play to reduce VAD in the country; the Ministry of agriculture among others can provide the necessary support by giving its instruction to its departments to recognise the role OFSP in addressing nutritional challenges and hence include OFSP in the priority crops. The other key Ministries for the project will include PMO-RALG, Gender and Community Development, Ministry of education as most schools children are vulnerable group for VAD and therefore earmarked as key change agents for the OFSP promotion. As we recognise the cross cutting nature of the nutritional issue; the other ministries, Private sector, Development partners, CSO will be involved in the OFSP promotion as will be stated in the OFSP Promotional Strategy.

Through the situation analysis a greater opportunity for production, adoption and more demand creation for Orange fleshed sweet potato adoption by many Tanzanian has been noted; as already the country has a comparative advantage in the production of sweet potatoes in the World and in the EAC region. Moreover, Orange flesh sweet potatoes are already in higher production in lake zone, coastal, central and southern part of Tanzania, hence a higher probability for OFSP adoption. However the situation has established a number of challenges that need to be worked as they may constrain the adoption process, these may include the cultural belief that sweet potatoes is for women and children only and men are not involved in production. As men control most resources including land required for production, there is a need to sensitize them and bring them onboard through the advocacy strategy. Moreover, most people still prefer the traditional white sweet potatoes to Orange flesh sweet potatoes that have more vitamin A, hence more promotional measure is needed for behaviour and attitude change. Other challenges that will need urgent efforts include the presence of virus attacking Sweet potatoes and shortages of vines that is required for the production of Orange fleshed sweet potatoes. The Advocacy strategy will provide road map on how these challenges will be addressed during the implementation process.

1.0 BACKGROUND INFORMATION FOR THE RAC PROJECT

Helen Keller International (HKI) is a non profit making international NGO whose mission is to save the sight and lives of the most vulnerable and disadvantaged groups. The organization combats the causes and consequences of blindness and malnutrition by establishing programs based on evidence and research in vision, health and nutrition. HKI's work in Tanzania is focused in the areas of nutrition and in eye care. HKI works to strengthen micronutrient programs including the national vitamin A supplementation program, promotes the consumption of orange-fleshed sweet potatoes and alleviates the burden of neglected tropical diseases such as trachoma and cataract.

As an intervention for combating vitamin A deficiency (VAD) and food security, HKI has designed a Reaching Agent of Change RAC project. The RAC project is a 3-year regional initiative aimed at increasing investments and commitment to the dissemination and use of Orange-Fleshed Sweet-potato (OFSP) as a means to combat Vitamin A Deficiency (VAD) and food insecurity in Africa. The project, which is coordinated from Nairobi, Kenya, is funded by Bill and Melinda Gates Foundation, and implemented by the International Potato Center (CIP) and Helen Keller International (HKI). The project targets the following countries: Mozambique, Nigeria, Tanzania, Ghana and Burkina Faso.

The main objectives of RAC project are as follows:

- To Generate new investments by governments, donors, and NGOs to scale up the adoption of OFSP in five target countries; and
- To build the capacity of national implementing agencies to design and implement technically strong and cost-effective training interventions that drive the uptake of OFSP.

Through the RAC project a situation analysis will be prepared so that the major issues related to the project are brought up, challenges and opportunities are well discussed by the stakeholders. A situation analysis will also provide a status of sweet potatoes in terms of its demand and supply factors, production, consumption, value chain, marketing issues, opportunities and challenges for SP production in the country. The situation analysis will be shared to the stakeholders during the workshop and finally come up with the advocacy strategy for promoting the OFSP as studies have indicated that this is a cost effective means to combat vitamin A deficiency (VAD) especially for children, Hence this situation analysis is conducted with the objectives stated above and it will cover the overview of the economy and the agriculture sector, foods security issues as they affect nutrition through foods taken, and finally the OFSP issue are covered.

1.1 Objectives of the situation analysis Study

As indicated above the major objective of the RAC project is to promote the use of Orange Fresh Sweet potatoes consumption as a cost effective way to combat Vitamin A deficiency (VAD) and nutrition in Tanzania. Hence this study aims to provide the situation analysis for

nutrition, VAD and Sweet potatoes production in the country and consequently develop an Advocacy Strategy for the RAC Project in Tanzania.

1.2 The specific objectives

In line with the above main objectives, this assignment also aim to review a Situation Analysis and Needs Assessment for all the aspects of the project and make a SWOT analysis on policy change and investment in OFSP for addressing Vitamin A deficiency for presentation to advocacy analysis workshop based on the situation analysis report and their expert opinions

1.3 Scope of the assignment

The assignment will cover preparation of the situation analysis and need assessment, developing an Advocacy Strategy as outlined in the above objectives. While maintaining independence/neutrality, the exercise shall adopt a participatory approach and consultations of the professionals in the areas of nutrition, health and agriculture.

1.4 Methodology

Based on the above objectives and the scope of the assignment, the proposed methodology will entail desk review of various documents (online and hard copies) to collect data and information relating to the subject matter, consultations and focus group discussions with key stakeholders, read through the project document to understand its compass of mission and vision, in addition to carry out desk review and propose potential areas for project implementation areas in both lake and eastern zones. Furthermore, the Advocacy Strategy shall be structured in respect of project purpose, relevance, efficiency, effectiveness, impact and sustainability against original project objectives, taking into account of the realities on the ground; and the extent to which the project entail to address the needs of its stakeholders.

2.0 OVERVIEW OF THE TANZANIAN ECONOMY

Tanzania is one of the East African countries. It borders the Indian Ocean on the east, Uganda and Kenya on the north, Burundi, Rwanda, and Congo on the west, and Mozambique, Zambia, and Malawi on the south. Its total land area is 945,087 sq km. The Agricultural land (% of land area) in Tanzania is about 40.08 percent (URT, 2008). Agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures. Arable land includes land defined as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow (FAO, 2010).



Presently, there are 30 Regions in Tanzania, A region is headed politically by a Regional Commissioner (RC) while the districts by the District Commissioners. The head of the Civil Service at that the regional level is the Regional Administrative Secretary (RAS) while for the districts the District Administrative Secretary (DAS). In terms of functioning, the regional administration has a vision of strengthened capability to offer a multi-skilled technical resource for supporting local development initiatives to exploit locally identified opportunities and linking Central Government Ministries, Departments and

Agencies (MDAs) as well as Development Partners to the Local Government Authorities (LGAs). The Tanzania population is estimated at 43 million with an annual growth rate of 2.8%. Its population density is therefore estimated at 44.3 persons per sq. The urban population is estimated at 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 graduate from schools and migrate in towns to seek jobs and finally join the informal economy as the formal economy is unable to accommodate the growth in the labour force.

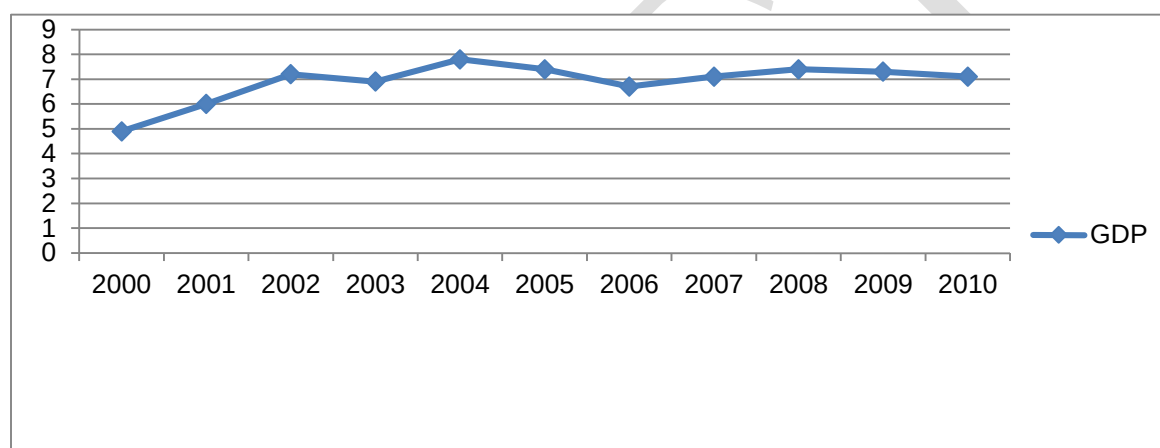
Agriculture is the major economic activity in Tanzanian and regarded as the back bone of the economy, the sector is dominated by small scale subsistence farmers whose farming activities are rain fed and very little irrigating farming. Technically the sector has had limited backward and forward linkages to all sectors of the economy such as; industries, manufacturing, water, transport, energy, land, environment, natural resources; and it contributes to around 24 percent of the country's GDP and 26 percent of the total annual export earnings. The sector also is important to the Government's resolute efforts to reduce widespread poverty partly because over

70 percent of the population depend on the agricultural sector for their jobs, food and income. The other key sectors of the economy include: Mining, tourism, trade, transport and communication, finance, and construction

2.1 Gross Domestic Product (GDP): Growth and Structure

The GDP growth trend since the 1990s has generally been rising, except during the shocks coming from draught that cause food and power crisis and the recent the global economic and financial crisis. Since 2005, Tanzania's GDP annual growth rate averaged 7 percent, which is in line with MKUKUTA target of 6 – 8 percent per annum. In 2009 however, GDP growth was 6.0 percent, lower than 7.4 percent recorded in 2008, the decline being partly due to the global financial crisis that reduced the demand for our local exports products(URT,2011).

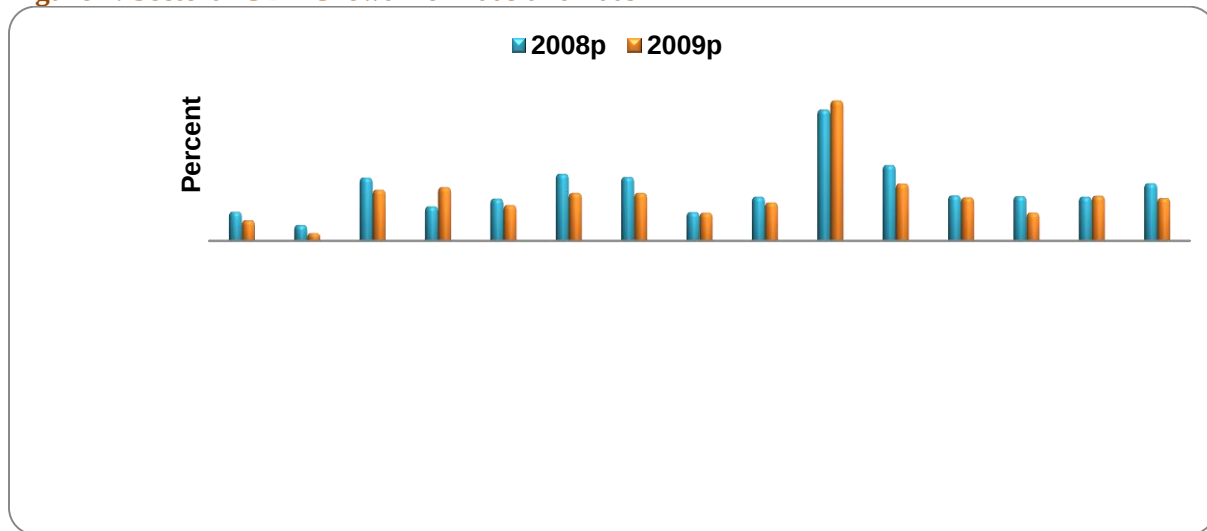
Figure 1: Real GDP growth 2000 – 2010 (at 2001 constant prices)



Source: BOT,2010

The sectoral analysis indicates that in 2010 the highest growth was recorded in communication sub-activity, which grew by 21.9 percent, followed by financial intermediation (9.0 percent) and electricity and gas that grew by 8.4 percent (BOT, 2000). The good performance in communication is in line with the increase in mobile phone usage which is believed to grow by more than 30 percent annually (TCRA, 2009).

Figure 2: Sectoral GDP Growth for 2008 and 2009



Source: BoT (2010)

2.2 The National Strategy for Growth and Reduction of Poverty (NSGRP)

The NSGRP and the Second Five Year National Strategic Plan sets a blue print for promoting economic growth and poverty reduction across all sectors of the economy, including the agricultural sector. The NSGRP-II provides a framework for focusing policy direction and thrust on economic growth and poverty reduction in various sectors of the economy by setting specific goals and operational targets within three main clusters: i) Growth and Reduction of Income Poverty, ii) Social Services and Wellbeing and iii) Good Governance. The agriculture sector issues are covered under the first Cluster on Growth and Reduction of Income Poverty (URT,2010).

2.3 Constraints to Agricultural Growth and Rural Development:

One of the major constraints to rural development and agricultural growth is low productivity of land and labour. Key constraints affecting agricultural productivity include: (i) low public expenditure on agricultural Research and Development (R&D), (ii) inadequate agricultural financing, (iii) poor production techniques(e.g use of hand hoes); (iv) Under-developed markets and market infrastructure and low farm-level value addition; and (vi) poor rural infrastructure such as, rural road networks, telecommunications and electricity etc

2.4 Role of Agricultural sector in Promoting Economic Growth, Nutrition and Poverty Reduction

Tanzania has great potential of accelerating growth of output in the agricultural sector, considering its diverse climatic zones with potential for many crops, livestock and forestry products. It also has sufficient water for both irrigation and livestock and vast opportunities in terms of rivers, lakes and sea water resources for fishing. Since agriculture employs a large proportion of the poor people and the country is endowed with all these resources, it has a big potential of lifting many of them out of poverty if proper strategies exist and implemented.

Despite this potential, performance of the agricultural sector has had only modest contribution to economic growth and poverty reduction (PHDR, 2010). The growth rate of agricultural productivity has been relatively low compared to other sectors such as services and industry. Over the past 10 years, the agricultural sector has been growing at the average rate of about 4 percent leading to among others problems foods insecurity in the country, while services and industry have been growing by more than 6 percent. However, studies have confirmed that a one percent growth of the agricultural sector has a higher positive multiplier effect than the same growth in any other sector(URT,2010). This means that the sector is potential for growth of the economy, key for foods security and nutrition and more importantly it can easily take more people out of poverty.

3.0 FOOD SECURITY, HEALTH AND NUTRITION IN TANZANIA

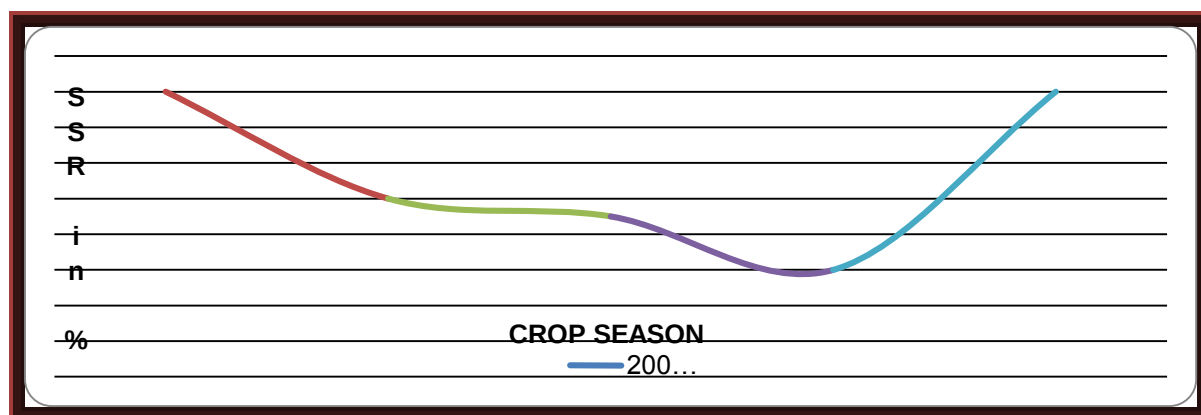
According to FAO *“Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life,”* (FAO World Food Summit, 1996, Rome). **Food Insecurity** exists when people lack access to sufficient amounts of safe and nutritious food, and therefore are not consuming enough for an active and healthy life due to the unavailability of food, inadequate purchasing power, or inappropriate utilization at household level (FAO, 2008).

Hence food security has four pillars, these are. First; **food Availability**- where sufficient quantities or appropriate food, i.e. from own or domestic production, markets, or imports including food aid. secondly **Food Accessibility**- means that sufficient resources are obtained to acquire appropriate food for a nutritious diet. The household's access to food depends on consumer prices, incomes, purchasing power, or consumption patterns that are often influenced by policy and decision makers. Third, **Utilization**; this deal with diversified diets and a healthy physical environment for a nutritional well being and for meeting individual physiological needs. Fourthly; **Food Stability**- handles the temporal dimension of food security; it is crucial to understand the concept of **vulnerability** (chronic, seasonal and transitory food insecurity) at local/community levels(FAO,2008).

In Tanzania maize is regarded as major staple foods whose supply shortage means that the country is foods insecure. Other staple foods include cereals such as beans, rice, wheat, millet and sorghum. Hence maize is major strategic food item and is highly regulated and protected by the government. However there are other foods such as banana, sweet potatoes, Irish potatoes and cassava. According to the statistics of the Ministry of Agriculture Foods Security and Cooperatives since 2006 the country is foods secure as its food self sufficiency (SSR) ration is

above 100 percent (see figure below). However, as stated above food security is defined only in terms of the presence of enough stock of maize and not other food items.

Figure 3: Food Self Sufficiency Ratio (SSR) in Tanzania: 2006/07 – 2010/11



Source: URT, 2010

Despite the country's food self sufficiency rate (SSR) being above 100% as shown in the figure above, some regions and districts have chronic food deficit. However, food security in Tanzania is also caused by low purchasing power leading to inability to buy food existing in the local markets. According to the global hunger index produced by FAO in 2011, all EAC countries including Tanzania are food insecure, the index ranges from alarming to most serious (see table below)

Table 1: EAC Global Hunger Index (GHI) 1990 - 2011

Country	1990	1996	2001	2011	Average GHI 1990 - 2011	Situation
Tanzania	26.6	22.2	23.6	20.1	23.1	Alarming
Rwanda	28.5	32.7	25.2	21.0	26.9	Alarming
Burundi	31.4	36.3	38.5	37.5	35.9	Extremely alarming
Kenya	20.6	20.3	19.9	18.2	19.8	serious
Uganda	19.0	20.4	17.7	16.7	18.5	serious

Source: IFPRI, 2011 and author calculations

Apart from low productivity problem, the other major constraint leading to food insecurity and nutrition challenges is income poverty that denied poor families to access food sold in the local market. This problem leads to the nutritional challenges especially for women and children below the age of 6 years. The following is a nutritional definition as provided by FAO:

Nutrition is the provision of adequate energy and nutrients to the cells for them to perform their physiological function of growth, reproduction, defence and repair (FAO, 2001).

Malnutrition, hunger and poverty affect nearly 1 billion people around the world and more than half of the children Population. Two billion people in the developing world are malnourished. Malnutrition continues to be the world's most serious health problem and the single biggest contributor to child mortality. As far as public health is concerned the following nutritional disorders are common in most developing countries such as Tanzania:

- **Malnutrition;** this may results from imbalance between the body's needs and the intake of nutrients, which occurs when a person's body is not getting enough nutrients (under nutrition) or getting excess nutrients (over nutrition).
- **Under nutrition:** This disorder may arise from an inadequate or unbalanced diet, increased losses, demand, or a condition or disease that decreases the body's ability to digest and absorb nutrients from foods taken in the body.
- **Over nutrition:** This also may be a result of overeating, insufficient exercise, excess intake of vitamins and minerals, it also includes over prescription of therapeutic diets, including parental nutrition.

3.1 Magnitude of the Malnutrition Problem in Tanzania

Like any other developing countries such as Tanzania, the main health and nutrition challenges are related to undernourishment rather than over- nutrition as protein-energy-deficiency (PED), iron deficiency anaemia (IDA), iodine deficiency disorders (IDD) and vitamin A deficiency (VAD). These conditions are mainly affecting under fives and pregnant women(TDHS,2010).

3.2 Causes for Malnutrition in Tanzania

Studies have indicated that malnutrition results directly from inadequate dietary intake and infectious diseases caused by food insecurity at household, village, community and national level. In Tanzania food insecurity is mainly caused by problem related to food production, harvesting, preservation, processing, distribution, preparation and use. Other factor may include; inadequate maternal and child care, poor access to health services, and an unhealthy environment. It is evident that all these factors may directly or indirectly contribute to malnutrition. However lack of knowledge and Poverty is the backbone of all of these problems due to its direct impact on the capacity of individuals, households, communities and nations to meet their needs and obligations for a healthy and nutrition and prolonged life of the people in the country (URT 1992).

Apart from these deficiency disorders, there are two nutrient excess disorders represented by fluorosis in the northern and north-western and central parts of mainland; and the problem of overweight, obesity and diet-related non-communicable diseases which seem to be increasing especially in the urban elite and business sections of the community emulating unhealthy food habits and lifestyles(FNC,2011). According to the 1999 Tanzania Reproductive and Child Health Survey (TRCHS), 5% of the children below five years were wasted, 44% stunted and 29% underweight. Furthermore, the national survey on Vitamin A conducted in 1997 showed that 24.2% of the children under -five years of age had VAD(URT,NNS,2011).

However, nutrition indicators for under-fives have shown some signs for improvements in the recent years but under nutritional disorders are still rampant in the country. Stunting, underweight status and wasting among children aged 0-59 months have reduced from 44%, 29.5% and 5.3% in 1999 to 38%, 21% and 3.7%, 42%, 16% and 3.8 in 2005 and 2010 respectively. Anaemia is also highly prevalent among under-fives with 72% of all 6-59 months children being anaemic. The main causes of anaemia are nutritional deficiency, intestinal worms and malaria (THDS, 2010).

Table 2: Indicators of child Malnutrition, 1999, 2005 and 2010

Year	Stunting (height for age below 2SD)	Underweight for age below 2SD	Weight -wasting for height below-2SD
1999	44%	29.5%	5.3%
2005	38%	21.9%	3.7%
2010	42%	16%	3.8%

Sources: MKUKUTA Implementation Report, 2010

The TDHS 2010 also indicated that adolescent girls and women nutritional status is still alarming (URT, 2011). Around one third of the women aged 15 -49 years are iron, Vitamin A and Iodine deficient, two thirds of women are anaemic and one ten are still undernourished while the data for over nutrition is not available.

Table 3 : Health 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	Anaemia	40
Iron Deficiency ²	35	Iron deficiency	30
Vitamin A Deficiency ²	33	Vitamin A deficiency	37

Source: TDHS 2010, TDHS Micronutrients 2010. ¹Children 0- 59 months. ² Children 6-59 months

As seen in the two tables above, the data are so awful; and hence some of the consequences of these malnutrition disorders for adolescent girls and women may include giving low birth weight for infants, production of anaemia babies and transfer of malnutrition disorders from generation to another. Due to this intergenerational transfer of malnutrition by girls and women, we argue that this among a very serious problem the government of Tanzania and other stakeholders have to take immediate actions if the country is to attain its National Vision 2025 of attaining the middle income level by 2025 that also requires health and very productive citizens.

3.3 Maternal Health

Tanzania is making great strides in reducing maternal and child mortality, but has demonstrated slower progress in reducing neonatal deaths each year, 51,000 newborns die in Tanzania, which places it among the top five countries with the most newborn deaths in sub-Saharan Africa. Tanzania's newborn deaths represent 29 percent of all child deaths in Tanzania.

Maternal health in Tanzania is one of the key components of the National Package of Essential Reproductive and Child Health Interventions (NPERCHI) focusing on improving the quality of

life for women and children (URT, 2008). In spite of the good coverage of health facilities, not all components of the services are provided to scale; hence, maternal, newborn and child mortalities remains a major public health challenge in Tanzania (TDHS, 2010).

In addition to the immense burden of neonatal death, between 8,000 and 13,000 (or on average 24 women die every day) Tanzanian women die due to pregnancy-related causes each year. Due to the use of different methodologies, it is difficult to accurately determine trends in maternal mortality. However, Tanzania clearly remains among the ten countries with the highest number of maternal deaths in Africa (ibid).

Only 47% of all births in Tanzania occur at health facilities and 46% of all births are assisted by a skilled health worker. Out of the 53% of births which take place at home, 31% are assisted by relatives, 19% by traditional birth attendants (TBAs) and 3% are conducted without assistance. As expected, births to women in the highest wealth quintile are more likely to be assisted by a skilled birth attendant (87%) than women in the lowest quintile (31%) (TDHS, 2004/05).

Maternal nutrition during the pre- and postnatal periods is extremely important for the outcome of pregnancy as well as infant feeding. A good and adequate balanced diet, as well as vitamin and mineral supplementation, improves birth outcome and maternal well-being. (TDHS 2004/05): However, maternal under nutrition is very common in the country leading Anaemia, VAD, and other nutritional disorders such as underweight status that contributes to poor maternal health and birth outcomes. Overall, 10% of Tanzanian women of reproductive age (15–49 years) are considered to be undernourished, having a Body Mass Index (BMI) of less than 18.5. Studies have indicated that Women living in rural areas are more affected compared to those living in urban areas (TDHS 2004/05)

Maternal under-nutrition is often reflected in the proportion of children born with low birth weight (below 2.5 kg). Representative data on the prevalence of low birth weight babies is not readily available but estimates from UNICEF suggest that 10% of Tanzanian newborns are low birth weight. Pregnant women are particularly vulnerable to anaemia due to increased requirements for iron and folic acid. According to TDHS (2004/05), 48% of women aged 15-49 years were found to be anaemic, whereas 58% of pregnant women and 48% of breast-feeding mothers were anaemic. Ten percent of pregnant women took iron tablets for at least 90 days, while about half (52%) took iron tablets for less than 60 days, and 38% did not take iron tablets at all. Haemorrhage is the most frequent cause of maternal deaths, and pregnant women who are anaemic are more vulnerable to postpartum haemorrhage (TDHS, 2010).

In terms of Maternal Health interventions, the *National Road Map Strategic Plan to Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania (2008-2015)* has been a guiding tool for achieving the goals. In one of its documents WHO stipulated the importance of the road map as “an opportunity for all partners and programmes to focus on two major levels of care where the health sector can make a difference, namely: the health service delivery and community levels. The recognition of the inseparable dyad of the mother and newborn allows all partners to focus special attention on the availability of emergency obstetric and neonatal care, skilled attendance during pregnancy and childbirth, and the essential equipment and supplies that will save the lives of women and newborns at all levels.” Tanzania’s Road Map has

exceeded this vision by adding child health to the plan, which guides all stakeholders in the areas of maternal, newborn and child health (MNCH) etc. The Road Map is in line with the National Health Policy and existing MNCH guidelines, standards and protocols (URT, NNS, 2011).

The Road Map or the Plan outlines clear strategic plans to address MNCH challenges in the following areas of child care. It also encompasses the following key components: Advocacy and resource mobilization, Health system strengthening and capacity building, Community mobilization and participation, fostering partnership and accountability in health and nutritional issues, behaviour change and Promotion of healthy behaviours (URT, 1992).

3.4 Nutrition Challenges facing primary school children in Tanzania

Over the years Tanzania has been facing chronic health and nutritional challenges for many primary schools children. This is a concern as studies have indicated that there is a close relationship between nutritional status and academic performance of school children. Evidences in Tanzania have shown that high absenteeism, lack of concentration in class and early dropouts are a result of short-term hunger (URT, 2008). It has been estimated that about 70 % of pupils attending classes without getting even a single meal.

Studies has shown that the long run effects of the nutritional deficiency and hunger at early or school age period are nutritional problems such as, stunting, low body weight and micronutrients malnutrition including deficiencies of Iron, Iodine and Vitamin A (THDS, 2005). Children who consume inadequate amount of food necessary to meet the body's energy and nutrients requirement have been proved to face diminished cognitive abilities, reduced school performance, growth retardation, reduced physical abilities, impaired resistance to infections and increased morbidity and mortality rate and hence at adult stage these deficiencies adverse effects on them in terms of productivity, incomes and general contribution to national development.

Interventions such as the School feeding programme, involvement of extension workers to promote production and consumption of vitamin foods, promotion for fortified basic foods, empowerment for communities through nutritional education (NFC, 2011). Currently, the school feeding program and is among the major interventions that can address nutrition and health problems of school age children. It can alleviate short-term hunger among children during school hours. In this programme children get at least one balanced meal per day. Examples of food crops that are currently used to prepare meals at school and households environment in Tanzania are; maize, maize flower used to prepare ugali or porridge (uji), beans, rice, wheat, sweet potatoes, cassava, yams, and banana etc.

3.5 Life Expectancy

One aspect that is linked to food security and nutrition issues is the Life expectancy at birth, it sometimes used to assess or measures the welfare status of the nation. The welfare of the nation is measured by the life expectancy or longevity and also reported in the Human Development Report. In the 2002 census, Tanzania's life expectancy at birth was estimated to be 51 years; while in 1998 census life expectancy was 49 years (NBS, 2006). This slight improvement, in

spite of falling under-five mortality, is attributed largely to the impact of adult mortality from HIV/AIDS. However, no significant difference in life expectancy was found between men and women. According to official projections by the National Bureau of Statistics, life expectancy was expected to reach 53 years for men and 56 years for women by 2008. The UNDP Human Development Report for Tanzania indicated that life expectancy at birth has risen to 58 years in year 2010 (UNDP, 2011).

3.6 Infant and under five mortality rates

Under-five mortality rate has declined by 41% from 137 per 1000 live births in 1996 to 81 per 1000 live births in 2010 (PHDR, 2010). Over the same period infant mortality have decline by 42% from 88 per 1000 live births to 51 per 1000 live births. Despite the decline in both under-five and infant mortality rates; these rates are still unacceptably high requiring modern strategies investments to deal with these challenges.

3.7 Rural and Urban Infant and under five mortality rates

While the early childhood mortality rates are higher in rural areas than in the urban areas in other parts of the Africa; the situation is different in Tanzania. The current data in the 2010 TDHS indicate that Infant mortality rates are lower in rural - 60/1000 live births, than in the urban 63/1000 live births. The same report also show that lower under-five mortality rates in the rural 92/1000 live births as compared to 94/1000 live births in urban setting. Childhood mortality indicates the usual pattern of higher mortality rates for male children. All rates portray similar pattern except for postnatal mortality, where as the mortality rate for female children is slightly higher than that for male children, although the difference is not significant. Mortality for births to mothers under the age of 20 and mothers aged 35 years and older is higher than for women age of 20-39. The same pattern is observed in previous surveys. First births and 7 and higher order births have a higher risk of dying before age 5 than births of order 2-6.

3.8 Infant and child mortality by zones and social economic differentials

Basing on 2010 TDHS report, the lake zone indicates the highest under 5 mortality rate of 109 deaths per 1000 live births followed by southern highlands having 102 deaths per 1000 live births. Both under five and infant mortality are lowest in Northern zone whether the figures stands at 58 and 40 deaths per thousand live births respectively.

The 2010 TDHS estimate of the infant mortality rate for the five years preceding the survey is 51 deaths per 1,000 live births. The overall under-5 mortality rate for the period is 81 per 1,000. The 2010 TDHS data indicate a continuing rapid decline in childhood mortality. Infant mortality has been cut almost in half, dropping from 96 deaths per 1,000 births in the 1996-2000 periods to 51 deaths per 1000 births in 2010. At this pace, in 2015, Tanzania will reach the goal set for the infant mortality rate of 38 deaths per 1,000 live births.

3.9 Breast-feeding rates and use of breast milk substitutes (rural & urban)

Most of complementary foods are mainly comprised of cereal- based porridges with little or no vegetables and often lacking animal proteins. The promotion of exclusive breastfeeding during the 6 months and appropriate feeding practices has been the integral parts of the intervention processes taking place in Tanzania. Food safety education is a critical prerequisite in the child health programs and is a cost effective intervention with long term positive impacts. Children die because their diets are lacking in basic nutrients needed to build strong immune systems and to stay healthy. When malnourished children fall sick with diarrhoea, malaria or pneumonia they are more likely to die. Had these children been adequately nourished, their deaths could have been prevented (Shirima, et al, 2001)

3.10 Vitamin A Deficiency (VAD) Prevalence for U-5 Children

Vitamin A deficiency (VAD) is one of chronic public-health challenges in Tanzania affecting mainly children, girls and women of child-bearing age. VAD is a much more widespread problem in Tanzania mainland and Zanzibar, contributing to an increased risk of morbidity and mortality for women and girls. Women of childbearing age are also at risk because of their increased need for the vitamin A, both during pregnancy and more importantly during lactation. Vitamin A deficiency results from two primary factors: inadequate intake of vitamin A rich foods and vitamin A precursors (e. g carotenoids) (TFNC, 2011).

Vitamin A is essential for immune system functions and the survival, growth and development of children. VA deficiency is a serious health challenge for many developing countries including Tanzania. It is responsible for over 600000 deaths per year, mostly in young children or pregnant women (WHO, 2009). The provision of high-dose supplements every four to six months has a dramatic impact on the health of children aged 6–59 months, reducing the risk of mortality by up to 23 per cent. In Tanzania Vitamin A deficiency increases morbidity and mortality among children and pregnant women, and is the leading cause of preventable blindness (TDHS, 2010).

According to the TDHS 2010 data, prevalence of VAD among children aged 6 -59 months is 33%. The prevalence does not vary much with child's age, however more boys are affected (35.3%) than girls (30.95). Further, it reveals that 33% of children aged 6- 59 months and 37% of women aged 15-19 years have low serum retinol binding protein level ($<0.825 \mu\text{mol/L}$ in children and $<1.24 \mu\text{mol/L}$ in women), an indicative of vitamin A deficiency. Also prevalence is 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%

3.11 Breastfeeding status

Studies indicate that Infant feeding behaviour affects both the mother and the child. While feeding practices affect the child's nutritional status, which in turn determines the magnitude of the risk of death to the child. The duration and intensity of breastfeeding affect the mother's

period of postpartum infertility as well and hence the length of the birth interval, fertility levels, and iron status (TDHS, 2010).

Surveys conducted in Tanzania indicate that majority of Tanzanian babies are breastfed, for a average duration of 22 months while fifty-four percent (54%) are breastfed up to two years. However, initiation of breastfeeding within one hour of birth is only 59% and the exclusive breastfeeding rate (0-5 months of age) is estimated to be 41%. Although the data show an encouraging trend in babies breast feeding as it is a health and nutritious way of feeding babies at young age, the recent breast feeding behaviours show a changing trend to shorter period for most mothers due to various reasons economic factors that demand women working more hours is among them.

3.12 Use of breast milk substitutes (%) (Disaggregate rural / urban)

The early complementary feeding is common in Tanzania with 39% of infants below 3 months, already introduced to complementary foods. About 12% of infants are not complemented at the age of 6-7 months. Exclusive breastfeeding is usually recommended for children from birth to 6 months but half of the children under 3 years of age are exclusively breastfed for not more than 2.4 months (TDHS, 2010).

The experience from Tanzania is that complementary feeding starts early. Fourteen percent of children aged 2- 3 months receive liquids other than breast milk, and one-third receive complementary foods during the same period of age. Half of children less than 6 months are exclusively breastfed (TDHS, 2010). This is an increase from 32 percent in the 1999 TRCHS and from 41 percent in the 2004/05 TDHS. More than 9 in 10 children aged 6 - 9 months are fed complementary diet foods mainly made from grains.

Moreover, the feeding frequency during complementation is said to be too low (about 2-3 feeds in a day), nutrient density is low and the preparation and feeding practices sometimes not safe. Children 2 – 5 years old are fed family foods; however, feeding frequency and nutrient density are also inadequate. Coverage of health workers trained on infant and young child feeding is low (TFNC, 2008). Training on Essential Nutrition issues (Vitamin A supplementation, exclusive breastfeeding, complementary feeding, and iodine and general nutrition) is in the early stages of implementation in the country.

Infant and young child feeding practices are important determinants of the health and nutrition status of children below the age of five years. Tanzania was one of the countries that had adopted the Global Strategy on Infant and Young Child Feeding. As a result an assessment of the status of infant and young child feeding practices was undertaken as part of the process towards the development of a National Strategy on Infant and Young Child Nutrition for Tanzania and a Plan of Action for the National Infant and Young Child Nutrition Programme (ibid).

When compared to other countries, Tanzania is doing well on three of the five WHO/Linkages rated indicators on infant and young child feeding. These are; percentage of babies breastfed within one hour of birth, median duration of breastfeeding for children below 36 months of age and percentage of breastfed babies 7-<10 months who received complementary foods in the last

24 hours. Tanzania did not score well on the other two rated indicators i.e. percentage of babies 0-<6 months exclusively breastfed in the last 24 hours and percentage of babies 0-<12 months of age who received any food or drink from bottles in the last 24 hours which were both rated as “fair”. The good performance on three out of five rated indicators could be attributed to implementation of national guidelines aimed at promoting optimal infant and young child feeding practices. While the majority of women in Tanzania breastfed their babies, a very slow increase in the proportion of infants not breastfed has been observed over time (TDHS, 2010).

As the noted above, the changes over time are insignificantly small, this is an alarming situation that need to be addressed urgently through increasing awareness to health workers, women, family members and community members on the dangers of bottle feeding(substitutes) as well as stricter enforcement of the Tanzanian Code of Marketing of Breast Milk Substitutes. The practice of discarding colostrums which is a rich source of various nutrients and immunological substances for the newborn infant was found to be common in some parts of the country (7, 10-11).

Another noted undesirable infant feeding practice in Tanzania is that of giving pre-lacteal feeds. Studies have shown that this practice ranges from 17% to 25% in different parts of the country (8, 9, and 11). The practice of giving pre-lacteal feeds has also been established as being more prevalent in Pakistan (94%), Bangladesh (77%) and India (77%) compared to 22-24% in Tanzania. Studies have established that women in urban areas are more likely to initiate breastfeeding earlier, to exclusive breastfeed longer and to discard colostrums less compared to those in rural areas. A likely explanation is that women in urban areas are more educated and more informed on good infant feeding practices. Rural residence, illiteracy and low socioeconomic status have also been found to be associated with shorter duration of breastfeeding in Pakistan (23). Although the rating on the duration of exclusively breastfeeding was “fair”, exclusive breastfeeding for the first 6 months of life is not a common practice in Tanzania with some infants being introduced to foods and drinks other than breast milk as early as day one (7, 11-12). As most of the studies have been done in rural areas, the duration of exclusive breastfeeding in urban areas is largely un-documented. Working mothers in Tanzania are entitled to twelve weeks of fully paid maternity leave eligible after three years from the last birth and to have paid one hour or two half hour breaks to go and breastfeed their infants.

According to a recent unpublished report on babies feeding practices, majority of working mothers are unaware of their entitlement to the one hour or two half hour paid breastfeeding breaks. The duration of paid maternity leave, limited awareness to entitled breastfeeding breaks during working days and lack of baby crèches at work places makes it very difficult for working mothers to exclusively breastfeed their infants for the first six months of life.

The timing of the introduction of other foods and drinks apart from breast milk to infants is very important. The term “weanlings’ dilemma” was used to express the predicaments facing young infants associated with the problem of “too early” and “too late introduction of complementary foods. There are many evidences to associate occurrence of diarrhoeal diseases, upper and lower respiratory tract infections with introduction of complementary foods below the age of six months. The reviewed publications on infant and young child feeding in Tanzania indicate that very few documents addressed the issues of educating the people on safety aspects of the

complementary foods given to babies especially by family helpers (Popularly known as House Girls in Tanzania). Research conducted in other parts of the world has established that when prepared under unhygienic conditions, complementary foods may be contaminated with various pathogens and this causes diarrhoea diseases and consequently malnutrition and sometimes even leads to child death (TDHS, 2010).

3.12 Nutritional Interventions in the Country

There are many interventions to deal with the above mentioned health challenges. The government of Tanzania takes the lead in these interventions with the other stakeholders play supportive role. These stakeholders include the development partners working the health, agriculture, and other ministries as the nutrition cuts across many sectors such as water, education, communication etc. The other stakeholders also include the private sector, CSO, NGOs, Faith Based organizations (FBO) etc. Many of these nutritional interventions are integrated into the country health, agriculture, education etc. for instance for educating mother on health diet, promoting exclusive breast feeding and complimentary feeding during all contacts with mothers and children during the first two years of child's life. However, priorities need to be given on the preventive measures such as sensitization on living health and insisting on balanced diets and use of exercises for country measures for over nutrition- this because overweight related health problems are increasing rapidly in Tanzania. The following essential nutritional interventions are provided by through various programs in the Ministry of health(URT,NNS,2011).

- Provision for Vitamin A supplement for Children aged 6 -59 months
- Iron-folate Supplementation of pregnant and breast feeding women
- De-worming of children aged 6-59 months and pregnant women form the second trimester of pregnancy
- Promotion, protection and support of good infant and young child feeding practices
- Promotion of fortified foods including iodated salts, consumption for balanced diet and dietary diversification in families
- Growth monitoring and promotion and nutritional assessments at all level especially for women and children
- Special treatments for nutritional disorders when discovered such as acute malnutrition, anaemia, VAD and other micronutrient deficiencies
- Nutritional care and support for children and pregnant women
- Provision for education and counselling for women and family care givers, breast feeding for special groups such as child, elderly, own health and the living health with HIV/AIDS and
- Recruitment for full time nutritional officers at district level
- Formation of nutritional committees in each region and districts

These are only few interventions documented. However, there are many other provided with them Ministry health and other Ministers not mention while others are provided by local and international CSO such as TFNC, UNICEF, WHO, HKI, etc; private sector FBO and others

4.0 AGRICULTURE

Tanzania has more than 44 million hectares of arable land, and a wide variety of ecological zones, climates and water resources. Agriculture is the foundation of the Tanzanian economy. It accounts for about 24.1 percent of the national income (URT, 2011), three quarters of merchandise exports and is source of food and provides employment opportunities to about 80 percent of Tanzanians. It has close linkages with the other sector through forward and backward linkages to agro-processing, consumption and export; provides raw materials to industries and a market for manufactured goods. The agricultural sector is vital to Tanzania's economy and therefore more important for the reduction and eradication of poverty.

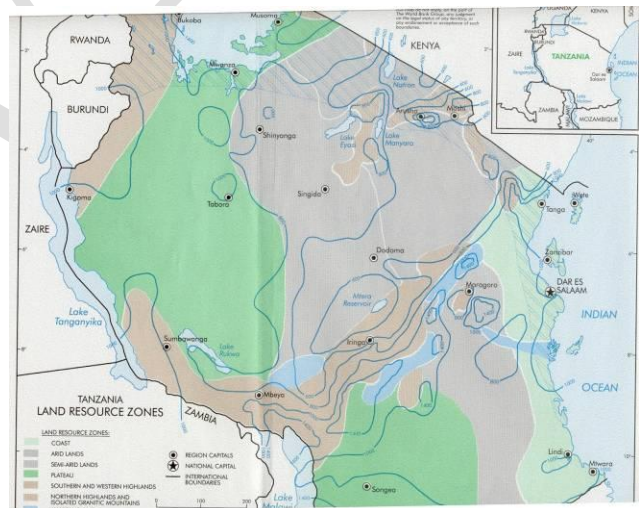


Agriculture in Tanzania is dominated by smallholder farmers (peasants) cultivating an average farm sizes of between 0.9 hectares and 3.0 hectares each. About 70 percent of Tanzania's crop area is cultivated by hand hoe, 20 percent by ox plough and 10 percent by tractor. It is rain fed agriculture. Food crop production dominates the agriculture economy 5.1 million ha. are cultivated annually, of which 85 percent is under food crops. Women constitute the main part of agricultural labour force. The major constraint facing the agriculture sector is falling labour and land productivity due to application of poor technology, dependence on unreliable and irregular weather conditions. Both crops and livestock are adversely affected by periodical droughts and the production is categorised in agro-ecological zones.

4.1 Agro-ecological zones:

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

- Coastal plains
- Eastern plateaus and mountain blocks
- Southern Highlands
- Northern rift zone and volcanic highlands
- Central plateau
- Rukwa – Ruaha rift valley
- Inland Sedimentary
- Ufipa and Western highlands



Crops grown, area, intercrops

The major staples include; maize, sorghum, millet, rice, wheat, pulses (mainly beans), cassava, potatoes, bananas and plantains. The export crops include; coffee, cotton, cashew nut, tobacco, sisal, pyrethrum, tea, cloves, Horticultural crops, Oil seeds, Spices and flowers.

4.2 Farming Systems

Tanzania has approximately ten (10) farming systems as shown in the table below :

Table 4: Farming Systems in regions or geographic areas

SN	Farming System	Regions/Geographical areas
1	Banana/Coffee/Horticulture system	Found in Kagera, Kilimanjaro, Arusha, Kigoma and Mbeya regions. It is characterized by tree crop planting, high intensive land use, and volcanic soils with high fertility, land scarce
2	Maize/Legume system:	Found in Rukwa, Ruvuma, Arusha, Kagera, Shinyanga, Iringa, Mbeya, Kigoma, Tabora, Tanga, Morogoro, Kahama, and Biharamulo characterized by plenty of land resources (not scarce), shifting cultivation, maize & legumes, beans and groundnuts intercropped, Arabic coffee are grown in large quantities.
3	Cashew/Coconut/Cassava System	Found in coast regions; eastern Lindi and Mtwara characterized by low rainfall, low soil fertility, suitable for cassava, coconut and cashew, land is not scarce, and there is a shifting cultivation
4	Rice/sugar cane system	Found in alluvial river valleys suitable for rice and sugarcane.
5	Sorghum/Bulrush millet/Livestock system	Found in Sukumaland; Shinyanga and rural Mwanza suitable for Sorghum, millet, maize and cotton, oilseeds and rice. There is intense population pressure with declining soil fertility
6	Tea/Maize/Pyrethrum system:	Found in Njombe and Mufindi districts in Iringa region. Suitable crops are; tea, maize, Irish potatoes, beans, wheat, pyrethrum, wattle trees and sunflower.
7	Cotton/Maize system	Found in Mwanza, Shinyanga Kagera, Mara, Singida, Tabora and Kigoma, Morogoro, Coast, Mbeya, Tanga, Kilimanjaro and Arusha. The areas are suitable for cotton, sweet potatoes, maize, sorghum and groundnuts. There is intensive cultivation and livestock keeping as well.
8	Horticulture based system	Found in Lushoto district; Tanga region, Morogoro rural; Morogoro region and Iringa rural in Iringa region. Crops grown are vegetables, (cabbages, tomatoes, sweet pepper, cauliflower lettuce and indigenous vegetables) and fruits, (pears, apples, plums, passion fruits and avocado). Other crops are maize, coffee, Irish potatoes, tea and beans.
9	Wet – rice and irrigated	Occupies river valleys and alluvial plains, Kilombero, Wami Valleys, Kilosa, Lower Kilimanjaro, Ulanga, Kyela, Usangu and Rufiji.
10	Pastoralists and Agro pastoralist System	Found in semi-arid areas i.e. Dodoma, Singida, parts of Mara and Arusha; Chunya districts, Mbeya and Igunga district in Tabora. There is deep attachment to livestock and simple cropping system. There is shifting cultivation of sorghum millet, moderate population density of 30 per sq. km, limited resource base and poor and variable rainfall.

4.3 Extension Services system

Agricultural extension services in Tanzania still remains entirely financed by the public sector represented by the government through the Ministry of Agriculture Food Security and

Cooperatives (MAFC) and financed through the government budget. Prior to decentralization, MAFC had the mandate to provide extension services to the whole country. The excessive government dominance in the management of the sector did not provide room for coordination with other actors already supplementing extension delivery of the public system in the field. These other actors operate as private for-profit firms or private not for profit organizations. The latter may be further classified into member-based organizations, such as producer and community organizations, and nongovernmental organizations (NGOs) that are not member-based. In most cases, these private agencies do not specialize in providing advisory services but combine advisory services with other services. There is a need to create a more efficient and manageable organization guided by the MAFC.

Major reforms undertaken by the government intended to limit its role to the core functions of governance, rationalize the roles and functions of Ministries, downsize the civil service, and pass on commercial activities to the private sector. The basis of these reforms is provided by the Agricultural Sector Development Strategy (ASDS) which was formulated in 2000 and 2001. With the decentralization of extension services following the Local Government act No. 6 of 1999, the overall function of MAFC as far as extension services are concerned was reduced to providing technical support to the local authorities and an enabling environment for extension services to function at the farm level (Rutatora & Mattee, 2001). The public sector withdrawal from direct production and provision of goods and services as well as reliance on centralized control and state ownership of the major means of production is reflected in the increased private sector and NGO participation in the production, processing and marketing of agricultural inputs and produce.

4.4 Human resources

The Ministry of Agriculture food security and cooperatives has for many years used its staff from the national level down to the field level to implement extension programs. Within the recent decentralization process, the services have been transferred to the Local Government Authorities, and the Ministry delegated its entire field staff to local government authorities in line with the district focus policy. This transfer reduced the level of involvement of the ministries and the number of technical staff for coordination activities. At the national level, Tanzania public extension comprises 1,061 staff members. Only four staff members have a Master of Science degree, ten of them hold a bachelor degree and the rest of the team completed a 2-3 year agriculture diploma. Women account for 69% of senior management staff. There are 9 subject matter specialists, none of them has a graduate degree and 55% of which are female. Field level extension workers constitute the bulk of staff (70%); all of them holding a 2 to 3 year agricultural diploma, and 86% are female. There are two other groups of workers: Information, Communication & Technology (ICT) Support Staff and In-Service Training Staff. The MEAS report (2010) indicates that the public sector does not employ in-service training staff, and ICT support services personnel (Table below). The data is somehow encouraging as the Ministry had 43 PhDs by 2010. These are important professionals in the areas of research and generation of new knowledge

Table 5 : 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: URT, 2011

4.5 Institutions Providing Extension/Advisory Services

4.5.1 Public Sector:

The public sector is represented by the Ministry of Agriculture, Food Security, and Cooperatives (MAFC), the Ministry of Livestock Development and Fisheries (MLDF), Sokoine University of Agriculture, other Education and Research institutions around the country. These institutions provide extension services through various departments and institutes some of which are listed below:

- **Public Extension Institutions**

- Ministry of Agriculture, Food Security, and Cooperatives (MAFC)
 - www.kilimo.go.tz
 - 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)
- Prime Minister's Office – Regional Administration and Local Government (PMO-RALG)

- **Public Research and Education Institutions**

Under the Ministry of Agriculture, Food Security and Cooperatives there are seven agricultural research zonal centers that employ Zonal Research Extension Officers (ZRELO) in addition to the Department of Research and Development.

- Ministry of Agriculture, Food Security, and Cooperatives (MAFC)
 - Department of Research and Development
 - 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
- Ministry of Livestock Development and Fisheries (MLDF)
 - Department of Research Training, and Extension (DRTE)
- Sasakawa Africa Fund for Extension (SAFE)
 - Sokoine University of Agriculture

4.5.2 Private Sector Firms

The Government of Tanzania is utilizing the current economic reform platform to make it more attractive for the private sector to participate in the agricultural sector as inputs suppliers, service providers and producers. The private sector involved in agricultural development include private agribusiness firms which distribute and market agricultural inputs such as seeds, agrochemicals, and equipment; those which deal with processing; and those which procure agricultural products, especially cotton, coffee, tobacco, cashew nut and other cash crops. These private firms are profit making institutions which will be found in areas with high demand for their products. It is obvious that private agribusiness firms will not be located in rural areas, rather, they are mostly found in urban centres. Most of these firms do not have their own extension services. They dependent on government extension staff whom they pay and provide training on specific technical or business message to take to their clients. Locally based agribusiness firms are small in terms of capital and lack competent and qualified staff to provide services that fall in the domain of public goods. In the other hand, the big multinational firms including tobacco and tea making companies with large capital are not interested in directly financing extension services. Almost all private agribusiness firms are more concerned with making profit rather than empowering farmers and their communities. Two of the private firms are:

- Mogabiri Farmer Extension Center (MFEC)
- Katani, LTD, www.katanitz.com

4.5.3 Non-Governmental Organizations and other Donors

Although traditionally extension services in Tanzania have generally been provided by the government with minimal involvement of the private sector, recently, several NGO and farmer-

led initiatives have started to assist public extension in its work with the population. Currently, more than 200 NGOs are involved in various types of agricultural extension programs, either as a major activity itself or as part of an integrated rural development program. In addition to NGOs, big donors like Sasakawa Global 2000 and the Rural Integrated Project Support (RIPs) have joined hands to help take the burden away from the public sector by cutting down on expenses and improving management and staff professionalism through training (Rutatora & Mattee, 2001). It is observed that a good number of these NGOs and donors use participatory approaches to extension or a combination of some elements of the Training & Visit (T&V) system with participatory methods. Some of the NGOs and projects which are seen to be doing an effective job include:

- Rural Integrated Project Support (RIPs)
- INADES-Formation
- Uluguru Mountain Agricultural Development Project (UMADEP) a Sokoine University of Agriculture-based project
- Special Program on Food Security (SPFS) Hifadhi Mazingira Project (HIMA)
- Southern Highlands Dairy Development Project (SHDDP)
- Soil Erosion Control and Agroforestry Project (SECAP)
- Soil Conservation and Agroforestry Project (SCAPA)
- Total land care
- Pelum Tanzania
- RUCODIA, Ruvuma Commercialization and Diversification of Agriculture

4.5.3 Farmer-Based (Community-Based) Organizations and Cooperatives

It is well known that farmers have the tradition of organizing themselves at local level into membership-based entities such as associations and cooperatives. In Tanzania, farmers are organized into groups, associations, SACCOS, and networks and they are linked to the *Mtandao wa Vikundi vya Wakulima Tanzania* (MVIWATA). One of the goal of these organizations is to promote saving and gain access to credits. Farmer groups and/or associations can provide a better atmosphere in which new or improved technical information can be introduced and evaluated; have a multiplier effect in cases where farmer motivators or extensions are used; share of information and experiences, and with group support, help members to make better and more informed decisions. The following are examples of cooperatives and associations:

- Rural supply cooperatives,
- Land improvement cooperatives
- Consumer cooperatives
- Fishery cooperatives
- Service cooperatives
- Savings and credit Cooperatives Societies (SACCOS)
- Tanzania Horticultural Association (TAHA)

4.5.4 Gender division of labour for main crops production

Traditional men were more involved in cash crops while women dominated the food crops. But with the agriculture sector liberalization both crops have gained market value hence men and women participate in the production of both crops but on average men still dominance in all crops.

Overall the statistics in Tanzania show that there are 11,541,750 women (compared to 9,443,250 males), among the usually active population. Agriculture is the mainstay for 84% of females as well as 74% of the males in the above categories. Nevertheless, traditional agriculture employs more than 13,694,935 inhabitants. Domestic help cleaner work, farm hands and labourers are the other occupations for most women (4.7%), and men (7.5%). Personal service work is the third main occupation for women, and poultry farming for men. Looking at the active employed population, it is evident that 88% of the women and 83% of the men are engaged in agriculture, followed by industry, trade and personal service. Women dominate in housework related duties (66.5% of its workforce), and private traditional agriculture (52.3%). Men on the other hand dominated almost entirely in parastatal organisations (81.4%), NGO/party or religious organisations (76%), central and local government work (67%), and the private informal sector (59.3%).

4.5.5 Gender roles in agricultural decision making and control of income.

It is obvious that women in Africa are the backbone of agricultural production and account for 70% of the labour, 60% of the production, and 80% of food crop produced. However, their long term benefits from the sector remain vague. The role of women in agricultural production is largely misrepresented due to myths and sheer neglect to accounting for the value of women's contribution. Women remain invisible to the eyes of most male practitioners, due to cultural and social constraints. Current gender blindness excludes women. Tanzania's Agriculture Policy acknowledges the fact that women perform most of the tasks in crop farming. The policy reads; *"It is estimated that the ratio of males to females in the agricultural sector is 1:1.5. Women in Tanzania produce about 70% of the food crops and also bear substantial responsibilities for many aspects of export crops and livestock production. However, their access to productive resources (land, water, etc.) supportive services (marketing services, credit and labour saving facilities, etc.) and income arising from agricultural production is severely limited by social and traditional factors."*

4.5.6 Gender differences in access and Ownership of production resources

General gender difference exists in terms access and ownership of land resources, use of inputs for production, labour, technology and access to credit facilities where women in most cases are disadvantaged due to traditional and cultural factors.

As shown above, a clear division of labour exists in Tanzania with regard to farming activities performed by men, women and children. Men are actively involved in land clearing, land preparation and planting cash crops, whereas women are more involved in activities such as planting food crops, watering the crops, storage and food processing. Children are responsible

for chasing away birds and rodents, whereas all parties are engaged in activities such as weeding and harvesting.

Men generally allocates more hours to farming activities than women does. Women, however, are responsible for a larger number of reproductive activities performed in and around the house, in addition to their productive and community management activities. As a result, women performed more tasks, had greater responsibilities and worked longer hours than men.

The intercropping of cash and food crops by women on their husbands' farm plot(s) are a common practice in Tanzania. Women generally control the incomes derived from this activity. In addition, they often assist their husbands in farming activities on his farm plot(s). This obligation had shifted from being a legal obligation (i.e. according to traditional law) to more of a moral or economic obligation. A small number of men and women work as farm labourers on the fields of others. Although male and female farm labourers receive equal pay for a day's work, male labourers receives higher daily wages as compared to female labourers. The difference is usually due to the tougher tasks performed by men and their longer working hours.

Access to credit facilities by most women especially in rural areas is limited because of lack of ownership of collaterals normally needed to guarantee loans in most financial institutions such as banks and microfinance institutions.

4.5.7 Changing roles and responsibilities of women in the agrarian sector

Women's roles and responsibilities had increased in the agrarian sector since independence. This is due to changes in the gender division of labour, an increased involvement of male household members in non-farm activities, increased financial and nutritional needs of the household, and the desire of women to become economically independent. Women had become increasingly involved in both cash and food crop production, and farm related trading activities. Their greater involvement in cash crop production was remarkable because this activity was traditionally only open to men as it could increase one's ownership rights to the land resources. From traditional point of view it was feared that if women were to obtain such rights, land could be lost to another clan or lineage in case of marriage, this because traditionally in most tribes in Tanzania (especially matrilineal societies) when a women is married, she practical belongs to the husband's and not her father's clan.

Historically the increased need for agricultural labour paved the way for an increased involvement of women in not only food crops but also in cash crop farming, thus making their involvement socially acceptable.

4.5.7 Access rights of different categories of women to land resources

Differences in access rights to land are observed, not only between women and men, but also between different types of women status (single or daughter, married, divorce, widows, disable women, etc). The access rights of widows with children and biological daughters are slightly more secure than those of step or adopted daughters, widows without children, women with physical disabilities and women involved in a consensual relationship. Access rights of all

categories, however, strongly depend on the presence of a father or husband and/or their relationships with his relatives.

4.6 Major food crops in Tanzania.

Major staple food include; maize, paddy rice and cassava. Other staples are sorghum, wheat, millet and potatoes. Tanzania is the second largest producer of sweet potato (*Ipomoea batatas* Lam.) in East Africa after Uganda with annual production of 0.97 m tons (URT, 2011). Sweet potato currently ranks as the world seventh most important food crop and 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, Eastern Zone and Northern Zone) because of its hardy nature and broad adaptability, hence providing sustainable food supply when other crops fail (Jana, 1982, Kapinga *et al.*, 1995; Ndunguru *et al.*, 1998). In terms of volume produced, sweet potato is most important in the Lake Victoria region (330,600 tons), Southern highlands (271,000), Eastern zone (107,400 tons) and Southern zone (37,400 tons) (URT, 2008).

Table 6: Food crops production in Tanzania in 2005/06 – 2009/10 (000'MT)

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: UTR, 2010

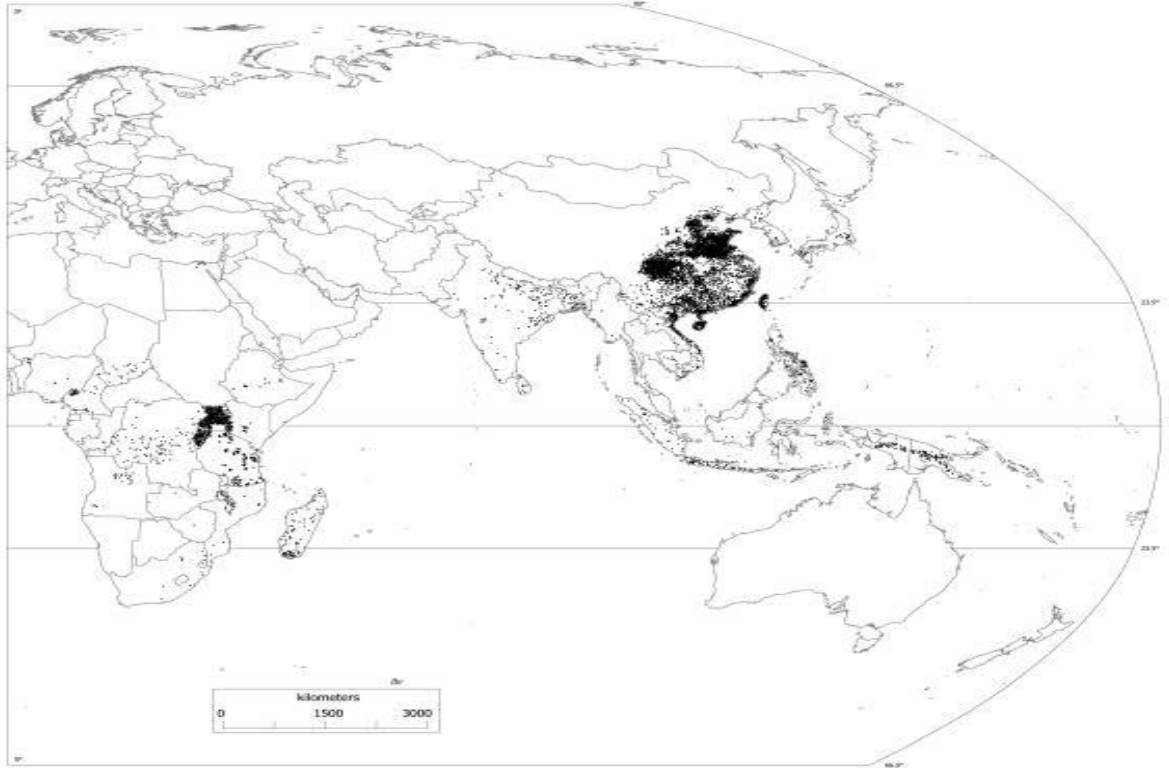
5.0 PROMOTING OFSP FOR COMBATING VITAMIN A DIFICIENCY

5.1 Historical perspective of Sweet potatoes

Sweet potatoes 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 (www.wikipedia.org). Christopher Columbus brought sweet potatoes to Europe after his first voyage to the New World in 1492. By the 16th century, they were brought to the Philippines by Spanish explorers and to Africa, India, Indonesia and southern Asia by the Portuguese. Around this same time, sweet potatoes began to be cultivated in the southern United States, where they still remain a staple food in the traditional cuisine. In the mid-20th century, the orange-fleshed sweet potato was introduced to the United States and given the name "yam" to distinguish it from other sweet potatoes. Sweet potatoes are a featured food in many Asian and Latin American cultures. Today,

the main commercial producers of sweet potatoes include China, Indonesia, Vietnam, Japan, India and Uganda. The figure below show the global sweet potatoes production distribution (www.wikipedia.org)

Figure 6 : Global sweet potato production distribution.



Source: www.wikipedia.org

5.2 Sweet potato production in Tanzania

Sweet potato is grown by smallholders, especially youth and women and occupies approximately 14 percent of total arable land of the farms surveyed (Kapinga *et al.*, 1995). Sweet potato production is mainly for home consumption including boiling, roasting and deep-frying of the roots, and the leaves are used as vegetable and are marketed. In the named zones, sweet potato has gained importance due to its adaptability to marginal conditions such as drought, low soil fertility, and is ranked highly as food security crop when local staple crops like maize and rice are scarce or fail. The problems of cassava mosaic and brown streak, and banana bacterial wilt, sigatoka, nematodes and weevils on these 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 tons per hectare compared to potential yields of 20-40 t/ha (Ewell and Mutuura, 1991). Such 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 the most devastating disease affecting sweet potato production in Tanzania. The disease can lead to yield losses of up to 50 percent of total production. Sweet potato weevils (*Cylas spp* and *Blocyrus spp.*) 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).

Table 7: Sweet potato Production in Tanzania

Year	Area harvested (ha)	Total Production (MT)	Yields (Production per hectare (MT/ha))
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

According to the McKnight Foundation report (2005) the major limiting factor to increased sweet potato production is 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 large numbers of landraces where farmers have to source planting material from neighbouring farms. This problem is compounded by the fact that local farmer varieties are low yielding, narrowly adapted, and susceptible to diseases and insect pests.

Other problems include low content of a precursor of Vitamin A, beta-carotene; low protein content; low dry matter (less than 30%) which is the main factor of variety selection in all areas of Tanzania and limited range of processed products. Drought and low soil fertility in many parts of the country are also reported as yield limiting factors of the crop (Kapinga *et al.*, 1995; Bashaasha *et al.*, 1995). This situation has to be reversed if Tanzania is to attain self-sufficiency in sweet potato production. Therefore we propose a rapid breeding and release of new varieties that are superior varieties with important attributes, including high yield, resistance to diseases, insect pests and drought tolerance, high dry matter content, good texture and high beta-carotene, the available varieties should be improved to meet farmer, consumer and market needs.

Table 8: Existing projects for sweet potatoes Farming agriculture

Name of project	Focus	Location	Time frame	Implementing institution	Donor
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SASHA	Marando bora,	Lake zone	2009-2014?	CIP	BMGF
S/potato Improvement	Breeding	Lake zone	2009-2012	NARS-Tanzania, Ukiriguru	AGRA
Promotion of OFSP	S/P value chain	Eastern and Central zone	2012-2014	NARS-Tanzania, Kibaha	URT-COSTECH

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 offseason crop is grown in the lowlands after harvesting in the uplands. 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 9: Sweet potato cropping calendar (Lake and Eastern zones)

Zone	Region	District	Planting	Harvesting
Lake	Mwanza	Ukerewe	October-March June-September	February-June October-January
		Sengerema	September-October July-September	January-March December-January
Eastern	Dra-es-salaam	Temeke	March-May	July-September
		Kilosa	March-May	June -August

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 Eastern zone only 30% practice the system of intercropping.

5.3 Benefits Sweet potatoes (SP) consumption

SP are believed to be one of the most nutritious foods in the world especially as a source for Vitamin A found Orange -Fleshed Sweet potatoes. However, there are two types of vitamin A available in foods: preformed retinol (vitamin A itself) typically found in animal foods such as eggs, liver, and milk; and pro-vitamin A carotenoids found in plant foods such as dark green leafy vegetables, yellow and orange vegetables and fruits, and OFSP (McLaren and Frigg 2001). Beta-carotene is the major pro-vitamin A carotenoid and the dominant carotenoid in OFSP. Most families in Tanzania may not afford to consume the highly bioavailable animal foods on a regular basis. As OFSP is an extremely rich source of bio-available, pro-vitamin A that is largely retained when boiled, steamed, or roasted is highly encouraged for consumption as an alternative source of Vitamin A (Low *et al.* 2007, van Jaarsveld, 2006).

It is believed that the intensity of the orange flesh colour is an indication of the rich amount of beta-carotene (the precursor of vitamin A) in a particular variety, but on average of 100–125 g (the size of a small sweet potato) contains the recommended daily need for vitamin A for children below five years. OFSP uptake in normal Tanzanian family will make a difference as the is one of the main a staple food that also has a high concentration of a major micronutrient including vitamin A to make a difference to human health. Because OFSP is such a rich source of vitamin A, very little land may be needed to produce enough vitamin A to meet the daily needs of Vitamin A in normal family of six in Tanzania that also have a lactating mother and a child under the age of 2 years. The table also below provide other health benefits attached to sweet potatoes consumption (Low *et al*, 2007).

Table 10: Health Benefits of Sweet potatoes Consumption

Sn	Nutrition Benefit	Description
1	Antioxidants	SP many contain both vitamin A and vitamin C, these are invaluable for the prevention of many different types of cancer. Research has shown that the antioxidant pigment is abundant in the anthocyanin starch of the sweet potato, which may decrease the dangers presented by heavy metals and oxygen radicals. Further antioxidant properties are produced by storage enzymes found in SP. When damaged, the potato releases sporamins to help heal itself
2	Anti-Inflammatory	Sweet potatoes especially OFSP have anti-inflammatory properties due to the vitamin C, vitamin B6, beta-carotene, and manganese it contains. These are very effective in curing both internal and external inflammations. Lowered inflammation has been shown in brain tissue and nerve tissue throughout the body following the consumption of sweet potato.
3	Reduce the risk of Arthritis	SP are rich in beta-cryptoxanthin, which has been found to help in the prevention of chronic inflammatory diseases such as rheumatoid arthritis. Studies have found that those who ate foods rich in beta-cryptoxanthin were 50% less likely to develop inflammatory arthritis than those who ate very of those foods. Just one serving per day of foods containing beta-cryptoxanthin, such as sweet potatoes, provided significant benefit. In addition, the vitamin C in sweet potatoes helps maintain collagen and reduces the risk of developing certain forms of arthritis
4	Stabilizes blood Sugar	The carotenoids found in sweet potato can help your body respond to insulin and stabilize your blood sugar. Sweet potatoes also have a significant amount of Vitamin B6, helping resistance to diabetic

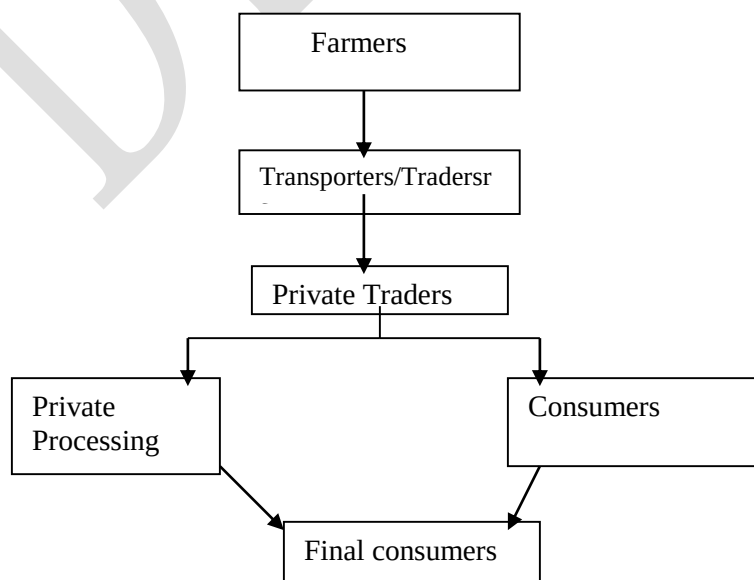
		heart disease. The high content of soluble fiber aids in lowering both blood sugar and cholesterol, and their abundance of chlorogenic acid may help decrease insulin resistance.
5	Reduced Stomach Ulcers	Sweet potatoes can play a role of soothing the stomach. The B vitamins, vitamin C, potassium, beta-carotene, and calcium they contain can assist in the healing of stomach ulcers. The fiber in sweet potatoes helps prevent constipation and acidity, consequently reducing the possibility of ulcers. The anti-inflammatory properties of sweet potatoes also soothe the pain and inflammation of ulcers.
6	Cure for Emphysema	SP can provide over 90% of the body's vitamin A requirements. Researchers have found that smokers should eat foods high in vitamin A, as emphysema and many other lung diseases may be brought on by a deficiency of vitamin A associated with smoking.
7	Digestive Tract	Sweet potatoes are a good source of dietary fiber that can help to promote a healthy digestive system in the body. Several researches have found that they may also help to cleanse heavy metals such as arsenic and mercury from the digestive tract.

Source: Low *et al*, 2007

5.4 Sweet potato Marketing and value chain

Sweet potato marketing is characterised by a few 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 consumers.

Figure 7: Sweet Potatoes Marketing Chain



Generally farmers consume most part of the sweet potato produced at household level and the little surplus production is sold to traders from villages or towns, who eventually sell to consumers in villages, towns or cities. Most sweet potato are grown in lake zone, coast areas, Tabora, Southern Part of Tanzania like Ruvuma region, Morogoro, and Some parts of Dodoma. From farmers' sweet potato are sold to middle men who transport using hired trucks or boats for the case of Ukerewe and Sengerema. Selling in big markets such as Dar-es-Salaam, Mwanza, etc, is normally through commission agents (known as madalali). Gairo in eastern zone is the main sweet potato growing area located in morogoro region. Sweet potatoes from Gairo are transported in Lorries and trucks to Morogoro, Dodoma, Pwani, and Dar-es-salaam markets. About 70% of the sweetpotatoes from Gairo are sold in these markets, while Sweet potatoes from villages surrounding Dar es Salaam region such as Mwasonga, Gezaulole, Kimbiji in Temeke districts are sold in various markets in Dar-es-salam city; Trucks normally cross ferry to the city downtown markets such as Tandale, Mwananyamala, Buguruni and Kariakoo.

5.5 Sweet Potato agronomy and breeding

Due to the differences in agro-ecologies, breeding of sweet potato has been decentralized in major zones. Research on sweet potato in Tanzania has been supported by different institutions, particularly the International Potato Centre (CIP) and Natural Resource Institute (NRI). This has led to 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, Eastern 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. The varieties are high yielding with high dry matter but with low beta-carotene and low resistance to insect pests and diseases. In response to low beta-carotene some varieties namely, Zapallo, Japon Tres, Carrot Dar, Resisto, SPK004 (Kakamega), Tainung 65 and Jewel were introduced by CIP in late 1990 and early 2000. The table below indicate the Orange Fleshed Sweet potatoes varieties found in Tanzania and other EAC countries.

Table 11 : Orange Fleshed Sweet Potatoes (OFSP) varieties

Variety	Status (released/in pipeline) (indicate date of release)	Yield in t/ha	Maturity period	Dry matter content	B-carotene content
Mataya	Released 2010	13.0	3-4 months	26-28%	
Kiegea	Released 2010	12.0	3-4 months	26-28%	
SPKBH 03/03	In pipeline for the release	10.0	4 months		
SPKBH 03/676	In pipeline for release	14.0	4 months		
Jewel	In pipeline for release				

Kabode	In pipeline for release				
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Source: ARI Kibaha, 2011

Sweet potato breeding is mainly done by NARS especially the research institutes under the Directorate of Research and development (DRD). These institutes are located in different zones and the important zones for sweet potato production including the Lake zone regions (i.e Mwanza, Shinyanga, Mara, Kagera), Eastern regions (Morogoro, Dar-es-salaam, Coast and Tanga) , Western zone (Tabora and Kigoma) and Southern zones (Mbeya, Ruvuma, Rukwa, Iringa).

As for many countries in Africa including Tanzania, there is no well-developed sweet potato seed system. Multiplication of sweet potato planting materials is done by researchers and partners. Multiplication scheme is divided into primary, secondary and tertiary. Primary sites are found and managed by researchers who multiply breeder seeds. Secondary and tertiary sites are found closer to the community. Experience in Tanzania and the EAC region is that the Private sector is not interested (not involved) in seed multiplication of sweet potatoes. At secondary sites management is done by CBOs or NGOs in collaboration with farmers. While the tertiary sites are community based sites managed by farmers. Seed distribution is done mostly informally with very little quality assurance at secondary and tertiary sites. This situation means that if HKI and other stakeholders want to promote OFSP production and consumption for combating VAD Concerted efforts are required to develop seed systems of vegetative propagated crops in Tanzania which should be accompanied with quality aspects.

5.6 The potential for adoption for Orange Fleshed Sweet Potato (OFSP)

For the combating VAD, sustained adoption is required for orange fleshed sweet potato varieties that fit to the agro-ecological conditions of the country and which meet local preferences of farmers and consumers. Development of these materials through breeding, multiplication and dissemination is central to achieving the potential goal of food and nutrition security in Tanzania. According to FAO statistics, Tanzania has 76 percent of its land suitable for Sweet Potatoes production. Out of the 940,565 Sq km of land in Tanzania, 199,942 is moderately suitable, 264,595 sq km is suitable, while 246,265sqkm is highly suitable. The data also indicates that Only 8% of the land is not suitable for Sweet potatoes production in the country; this means that a large part of the land resources in Tanzania is suitable for production for all types of Sweet potatoes including the OFSP(see table below)

Table 12: Suitability of land for OFSP Production under Low input and rain fed conditions in Tanzania

	Areas in Square Kilometres (1Sq km = 100 ha)					% Area of Moderate to highly Suitable	% Area Marginally suitable
Not suitable	Marginally suitable	Moderately suitable	Suitable	Highly Suitable	Total		

77,131	152,728	199,942	264,590	246,265	940,565	76%	16%
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Source: FAO website (www.fao.org)

The Sweet Potatoes opportunities for production in Tanzania and the EAC region is seen when the ranks for major agricultural crops for foods commodities is prepared from the FAO data. As seen in the table below Tanzania's rank for sweet potatoes production is the second (2nd) in the EAC region and ranks 7th in the world. At the same time Uganda is the second in the world rank and the first in the region. Other countries' ranks include; Rwanda (9th), Burundi (10th) and Kenya 13th in the world ranks.

Table 13: Worldwide Ranks of Major agriculture food commodities produced in EAC states (2007)

Product	Tanzania	Kenya	Uganda	Burundi	Rwanda
Maize	24	29	43	91	95
Rice(paddy)	35		56	71	91
Beans	11	8	7	15	19
Cassava	8	29	12	28	9
Millet	16	28	7	44	58
Banana	40	24	20	11	
Sugarcane	43	30	43	76	82
Oil seeds	14	8	12		
Sorghum	13		19	42	26
Sweet potatoes	7	13	2	10	9
Potatoes			58	111	36
wheat			97		90

Source: FAO website (www.fao.org)

These data indicates that the country and EAC region in general has a comparative advantage for sweet potatoes production. Despite the comparative advantages in production shown in the table below, still many challenges remain reading to low production and consumption for Sweet potatoes such challenges fall in varies categories such as infrastructural and behaviour and attitude factors such as perception that sweet potatoes is a female crops hence men are not much involved in production and consumption..

5.7 Sweet potatoes Virus Disease (SPVD) incidence and its vectors

Sweet potato production is constrained by relatively few abiotic and biotic factors including lack of clean *planting materials*, *lack of high-yielding cultivars*, *low soil fertility*, *lack of resistant cultivars and weevils*. However, the main constraint to sweet potatoes production in the Victoria basin is *virus diseases* (SPVD) caused by combination of *feathery mottle virus* (SPFMV) and *sweet potatoes chlorotic stunt virus* (SPCSV), which are transmitted by 2 vectors namely aphids and whitefly, respectively (Joseph *et al*, 2009).

A study conducted in sweet potato farmers' fields in Tanzania and Uganda to determine the status of sweet potatoes virus disease (SPVD) incidence and its vectors in 2009 indicated that

SPVD incidence was high (66 to 100%) in Tanzania but low (10 - 40%) in Uganda. SPVD symptom expression and severity were highly variable both within and between countries. Whitefly (*Bemisia tabaci*) but no aphids were observed in all the fields and their abundance varied remarkably between locations. In Tanzania, sweet potatoes chlorotic stunt virus (SPCSV) was serologically detected in 50 percent of the samples and sweet potatoes feathery mottle (SPFMV) in 45 percent in dual infection. Sweet potatoes mild mottle virus (SPMMV), sweet potato mild speckling virus (SPMSV), sweet potato chlorotic fleck virus (SPCFV) and sweet potato virus G (SPVG) occurred in low frequency (Joseph *et al*, 2009) .

SPCSV was detected in (100%) of the samples collected from Uganda followed by SPFMV (67%). The nature of SPVD incidence, symptom severity, whitefly, and aphid abundance observed in this study suggested a complex nature of SPVD in East Africa (Joseph *et al*, 2009), hence SPVD is among the major challenges for growing SP and OSFP in Tanzania and EAC, if the OSFP is to be promoted strategies need to pay attention to this problem as well.

6.0 POLICY ENVIRONMENT

The Government of Tanzania, development partners and other stakeholders has put in place many interventions being supported by many national policy and program aiming to address the chronic problem of malnutrition directly or indirectly: as seen above the levels of malnutrition and other nutritional disorders is still very high. Moreover, this malnutrition problem has not attracted sufficient political attention and has not featured high on the development agenda of Tanzania including the Tanzania Development Vision 2025 and the recently formulated Five Year Development Plan 2012 - 2017. There are inadequate institutional arrangements in place at national and local authority (local governments) level for nutrition. Although health matters are cross-cutting, the key sectors for this challenge include health and agriculture who are yet to fully acknowledge their responsibilities in both preventing and addressing malnutrition in the country. The low prioritization of nutrition is evident by the lack of district and regional coordinators for nutrition in many areas, the poor coverage of many key nutrition services and the slow progress in crucial areas that could reduce malnutrition, such as promotion of good infant and young child feeding practices, maternal and nutrition education in all level of education. Within the agriculture sector, the Agriculture Sector Development Strategy (ASDS) of 2001, operationalized through the Agriculture Sector Development Programme (ASDP) in 2003 have largely omitted the nutrition concerns as if agriculture is not directly linked to nutrition.

However, there have been some recent encouraging developments. In the recent high level national meeting held on 12th June 2011 between the Prime Minister for Tanzania, US Foreign Secretary and the Deputy Prime Minister for Ireland, the government of Tanzania committed to address food security and nutritional issues, recently the government done several efforts as shown in the following initiatives:

- Finalization of the implementation plan for the National Nutrition Strategy (NNS), which will include clear responsibilities for the ministries, Development Partners (DPs), the private sector and civil society.
- Establishment of a new High Level National Nutrition Steering Committee, led by Government with participation from selected DPs and CSOs. Effective in FY 2012/13, establishment of a designated line in the national budget for nutrition. Stronger integration of nutrition into agriculture activities as outlined in the Tanzania Agriculture and Food Security Investment Plan (TAFSIP).
- Rapid establishment of Nutrition Focal Points at the district level and local governments.
- Gazetting, finalization and enforcement of the national standards for oil, wheat and maize flour that were set in 2010 so that millers will begin fortification of these food products.
- Working with various stakeholders in food fortifications

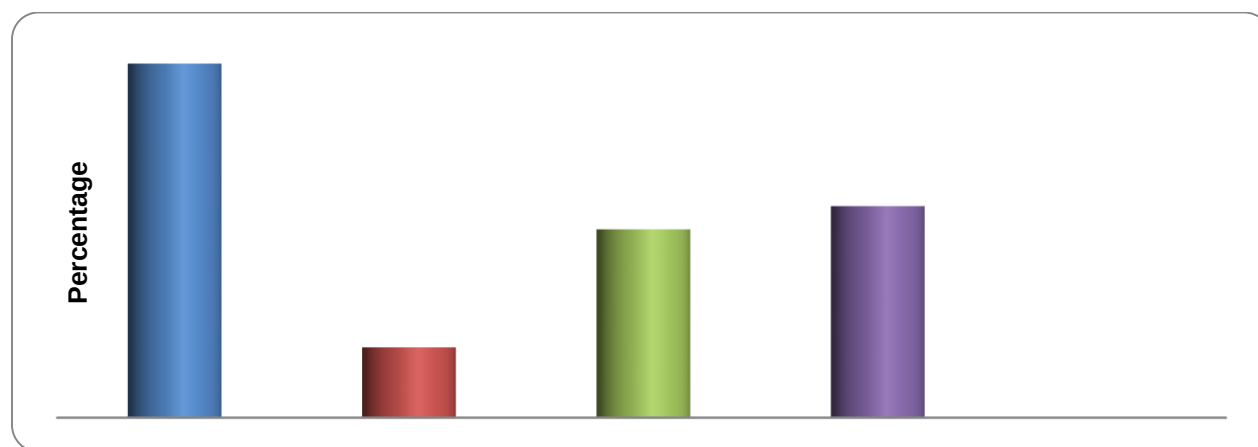
All this will require close engagement by nutrition stakeholders, who have previously been sidelined from discussions that if well-structured could impact to improving the nutrition situation. However, these commitments are now key focus areas for the newly established High Level National Nutrition Steering Committee.

6.1 Nutrition content of the policy

The extent to which nutrition related issues have been stipulated in the policy document. Aspects related to malnutrition, i.e. manifestations (stunting, Anemia, micronutrient deficiencies, etc) and causes (immediate, underlying, and basic) were examined in the policy documents. The degree to which these aspects were stipulated was expressed in terms of frequency of being mentioned. Close to 43% of the policy documents did not include any nutrition issues. Five policies and 4 strategies/programmes (25.7%) covered nutrition issues more frequently (>4 times) than others (Fig. 3). The figure below indicates the level of policy on nutrition. These policies cover areas related to health, food and nutrition, agriculture, child and community development sectors.

Other policies that addressed nutrition issues to a fairly good extent were those related to sectors such as water, irrigation, livestock, fisheries, and gender and youth development sectors.

Figure 8: Level of Policy Coverage on Nutritional Aspects



Source: Authors analysis

The survey policies indicate that Sectors related to HIV/AIDS, transport, agricultural marketing, environment, land, industry and enterprise development did not mention any of the key aspects related to nutrition. Extend of coverage for each policy on nutritional issues is presented in table 14 below.

Table 14: Extend of Coverage of Nutritional issues in Policy documents

Extent	Policy
Quite good (More than 4 times)	National Health Policy 1990
	Food and Nutrition Policy for Tanzania 1992
	National Agricultural Policy 1997 and the review draft
	Child Development Policy 1996
	Community Development Policy 1996
	MKUKUTA II (2010-2015)
	MKUZA II
	CAADP POST COMPACT ROAD MAP
	TAFSIP
Fairly good (Three to four times)	National Water Policy
	The National Irrigation Policy
	National Science and Technology Policy for Tanzania
	National Population Policy
	National Livestock Policy
	National Fisheries Sector Policy and Strategy Statement

	Women and Gender Development Policy
	National Youth Development Policy
Hardly (Once or twice)	The Energy Policy of Tanzania
	National Trade Policy
	Sera ya Elimu na Mafunzo (rasimu 2) (Education and Training Policy – review draft 2)
	The Mineral Policy of Tanzania 1997
	National Research And Development Policy 2010
	National Policy for the Elderly People
None at all	National Policy on HIV/AIDS
	National Transport Policy 2003
	Cultural Policy (policy statements)
	Agricultural Marketing Policy
	National Environmental Policy
	National Higher Education Policy
	Sera ya Habari na Utangazaji (Information and Broadcasting Policy)
	Small and Medium Enterprise Development Policy
	Sustainable Industries Development Policy SIDP
	National Land policy

Source: BACAS, 2012

6.2 Nutrition aspects covered in the policy documents

Aspects related to nutrition that have been stated or addressed in the policy documents. The more detailed content of policies and their focus on nutrition-related aspects were further obtained from the documents. Topics most commonly addressed in the policies were those related to food insecurity and diseases as they apply to wider population. Policies related to health, food and nutrition, agriculture, child and community development sectors addressed a wide range of nutrition issues. Under-nutrition was usually more frequently addressed in policies than over-nutrition and emerging diet-related chronic diseases. The table below presents detailed description of nutrition-related issues covered in each policy document.

Table 15: Policy content in relation to nutrition issues covered

Policy	Aspects related to nutrition
National Health Policy	Malnutrition, Diseases, Care of children and the sick, Maternal nutrition, Child growth and development, Food

	quality and safety at all stages, Environmental health and sanitation, Water quality and safety
Food and Nutrition Policy for Tanzania	Malnutrition, Food security, Diseases, Nutrition education, Care, Child nutrition, Maternal nutrition, School children nutrition
National Policy on HIV/AIDS	None
National Water Policy	Food insecurity (food production, biodiversity and water consumption), Diseases
National Land Policy	None
The Energy Policy of Tanzania	Food insecurity (crop production due to timely delivery of input using transport)
The National Irrigation Policy	Food insecurity, Diseases
National Transport Policy	None
Agricultural Marketing Policy	None
National Agricultural Policy (review draft)	Production of nutrient dense crops, Disease burden to households that hampers food and livelihood insecurity, Enhancement of food security through production of sufficient quantity and quality foods, Monitoring trends of food security
National Trade Policy	The concept of human capital as a function of production, Response to food shortage such as banning exportation of foods, Food importation in case of shortage
National Environmental Policy	None
National Science and Technology Policy for Tanzania	Achievement of food self-sufficiency, security Improvement of methods of preparing, drying, preserving and handling food to ensure nutritive values, palatability, and reduction post-harvest losses
Sera ya Elimu na Mafunzo (rasimu 2) (Education and Training Policy – review draft 2)	Education on environment and public health (diseases, malnutrition)
National Population Policy	Infant mortality as they relate to better health care, Food security, Water and sanitation, Food & nutrition education, Controlling micronutrient deficiencies, Cultural barriers related to nutrition
National Higher Education Policy	None
National Livestock Policy	Malnutrition, Food insecurity, Diseases
National Fisheries Sector Policy and Strategy	Malnutrition, Food Insecurity

Statement	
The Mineral Policy of Tanzania	Food insecurity, Diseases
Sera ya Habari na Utangazaji (Information and Broadcasting Policy)	None
Child Development Policy	Nutrition knowledge/awareness/education (recognises nutrition to be an important factor for child growth and survival)
Community Development Policy	Nutrition knowledge/awareness/education (recognises nutrition to be one of the indicators that can be used to show the levels of development and welfare in communities)
Women and Gender Development Policy	Nutrition knowledge/awareness/education (recognises good care to be necessary for nutrition well-being of women)
National Policy for the Elderly People	Diseases (recognizes that poor nutrition is among the contributing factors to sick aging individuals)
National Youth Development Policy	Nutrition knowledge/awareness/education (recognises good nutrition to be among the necessary rights for the youth)
Small and Medium Enterprise Development Policy	None
Sustainable Industries Development Policy SIDP	None
MKUKUTA II	Malnutrition, Food insecurity, Diseases, Nutrition knowledge/awareness/education, High dependency ratio, Child growth and development, Maternal nutrition
MKUZA II	Malnutrition, Food insecurity, Diseases, Nutrition knowledge/awareness/education High dependency ratio, Child growth and development, Maternal nutrition
CAADP POST COMPACT ROAD MAP	Food insecurity, Diseases, Integrating food and nutrition security in agricultural development
TAFSIP	Malnutrition, Food insecurity, Diseases, Nutrition knowledge/awareness/education, High dependency ratio, Child growth and development, Maternal nutrition

Source: BACAS, 2012

About 43% of the policy documents reviewed have stipulated nutrition within the policy's vision/mission/goals and objectives. Others (29%) have mentioned nutrition somewhere else within the document for example in the background or policy statement. About 24% of the

policies have mentioned nutrition issues within the policy measures and strategies and only one policy included nutrition within policy statements.

6.3 Policy challenges

It is noted that almost all policies lack a section on monitoring and evaluation including evaluation plan. There are neither indicators for evaluating the implementation of the policy nor the type of data to be collected, mechanisms and techniques for data collection. This could be an inherent practice probably related to the guidelines for policy formulation in government sectors in Tanzania. The analysis has revealed that there is limited inter-sectoral collaboration and participation during formulation and implementation of policies. Hence, a tendency for sector specific policies with limited inter-linkages. This implies that sectors consider aspects that have a direct bearing on the sector activities only. In this regard, the sectors may have limited contribution to the overall development of the economy and human well-being. Since there is no joint or collaborative formulation of policies, it is very difficult for one sector to know what other sectors are planning to implement, which may lead to overlap of activities and misallocation of resources.

Few policies have included nutrition issues/aspects; however, there are still significant gaps, for example, population groups that are addressed by the policy and the extent of coverage. All policies that have included nutrition issues do focus on children below five years of age and women of child bearing age forgetting the fact that nutritional issues matter to all ages. This is a gross under representation of the Tanzania population. Men and boys are not mentioned in most of the policies. It should be realized that children and women do not live in isolation; they are surrounded by other members of the household, family and community. Therefore policies should be more encompassing and include statements that apply to various groups of people in the community. A policy is a high level document and working tool with declared objectives that a government seeks to achieve and preserve in the interest of national development and peace. Because it is from the policy documents that strategies and programmes are derived, it should be as encompassing as possible. Consequently, if other groups are left out, it is very difficult to develop a programme to address their problems.

Since many policies were formulated about 20 years ago, there are gaps in relation to the current nutrition scenario. Issues related to overweight, non-communicable diseases and nutrition challenges related to climate change and HIV/AIDS need to be articulated in the policies. Hence a strong need for policy reviews.

6.4 Way forward to improve nutrition in the country: VAD

The issues that are used to address improvement of public nutrition policies in the country can be grouped in 5 categories as summarized below:

- Population and population groups
- Health, nutrition and water
- Food and environment
- Information and education (lack of education is the main cause for malnutrition in most LDC, save the children 2011)
- Energy, transport and minerals
- Cultural issues

7.0 SWEET POTATO NEEDS ASSESSMENT

Sweet potato is regarded by many farmers in Tanzania as a household food security crop that prevents transitory food shortage before the next harvest of maize or other staple food crops (Kapinga et al., 1995). Sweet potato is mainly grown by rural women near their homes to feed their families and its sale can provide women an entry to cash economy (Kapinga et al., 1995). According to Woolfe (1992), sweet potato has one of the highest rates of production per unit area per unit time, making it attractive to farmers with little land. This was recently observed in Lake Zone areas especially in Ukerewe, Missungwi, Sengerema, Geita in Mwanza region and Chato, Biharamulo and Muleba districts in Kagera regions.

Sweet potato productivity is limited by both climatic changes and biotic constraints, leading to poor yields at farm level. They include low soil fertility and draught, shortage of improved varieties, shortage of planting materials, pests and diseases particularly viruses, post-harvest problems such as storages, and market availability and demand as well as low socio status in some communities

Orange-fleshed sweet potato cultivars grown in the surveyed areas such as Lake and Eastern zones displayed Sweet Potatoes Virus Diseases (SPVD) symptoms with high incidence and severity. These results indicate that SPVD situation in Tanzania is not uniform in the major sweet potato growing areas and the significance of this virus diversity needs to be investigated.

7.1 Potential for Orange Fleshed Sweet Potato and areas of Collaboration

Overall, there is great interest of investing in OFSP for the institutions visited during needs assessment survey. The institutions among others were Sokoine University of Agriculture (SUA), SUA Graduate Entrepreneurs Cooperatives (SUGECO), Lake Zone Agricultural Research and Development Institute (LZARDI), many are interested in developing joint proposal for research and also in higher education opportunities in food science

7.2 Potential Areas of Collaboration

1. Primary production of OFSP includes access to varieties and cultivars for production and distributing to other farmers in need around the areas of operation
2. Processing interventions that includes access and identification of appropriate technologies
3. Market Interventions and other support services such as extension services
4. Need to establish public-private linkages for sustainable development of markets for farmers.
5. Provide research based information and technical expertise

6. Application for ICT for communicating with farmers, extension services, markets, new seeds, diseases, early warning systems etc
7. Promotion for production and consumption for OFSP through targeted effective medias such as, Radios, TVs, cartoons, drama, comedy etc
8. Measures to change people's mindsets on SP as some individuals regard Sp as a female crops hence no need to put more weight in production and consumption
9. Creating more demand and adoption of Orange flesh Sweet potatoes in areas where the White sweet potatoes predominate.

7.3 Training and Extension services

Following a country's historical back ground of a command economy where the public sector is driver of the economy. All capacity building and trainings were offered by the government, Agricultural training has always been provided by the government's monopoly institutions where private sector has to be encouraged to carry out specialized such trainings. To the greatest extent possible, training programs in agriculture have been and continue to be conducted in all major project areas, including impact assessment, seed multiplication, post-harvest processing and marketing, micro-enterprise and micro-credit. Priority has always been given to the concept of training of trainers. The training of experts who can move skills and expertise to rural areas and help to empower local people including extension workers, NGOs and community leaders, has been given increasingly higher priority.

Under the RAC project and other our intension is that extension services delivery will not be a monopoly of the government. Private sector participation for collaborative efforts will be promoted and where necessary private sector will be allowed to own and manage extension services for specific enterprises such as beef, dairy, poultry, small ruminants, horticulture, tobacco and other subsectors which call for special attention. In areas where private sector/NGOs or CSOs offer extension services by providing funding, planning, monitoring and evaluation, the government will be advised to continue with its key role of coordination.

7.4 Seed Systems in Tanzania

Under the current policy framework the Private sector is allowed to produce, distribute and market all types of seeds. Production of breeder seed is done at research institutes, foundation seed production on five foundation seed farms now under the Department of Research and Development, and certified production by contract growers vested in Arusha, Morogoro, Iringa regions. Tanzania Seed Company (TANSEED) is involved in both foundation seed farms and certified seed production. The Tanzania Official Seed Certification Agency (TOSCA) is responsible for quality control from the foundation seed farm stage up to the sale of certified seed to the farmers. The Main Seeds produced are hybrid and composite maize, sorghum, beans, wheat and sunflower. Private Companies involved in seed production and distribution are Cargill Hybrid Seeds, Pioneer Hybrid International and Paunar and Rotian Seeds Company. The Seed

production system in Tanzania is governed by the Seed Act No. 29 of 1973, and the Seeds (Registration of Standards) Act.

A new approach known as community based seed production has been introduced as well, whereby selected farmers, who have received specific training in Seed Multiplication, are supplied with foundation seed which they then multiply under the supervision of extension workers. TOSCA is responsible for inspecting the fields and the final product. Farmers sell the seed produced locally as “Quality Declared Seed” with simple packaging and labelling, at a reduced price(URT,2008).

7.5 Strategies for the Promotion of OFSP

Different strategies have been employed to promote the OFSP in different parts of the country. Interviews with implementing partners and extension workers identified twenty different promotion strategies. Information collected from implementing partners that have been working on OFSP, extension workers and district Agricultural Officers provided insights of prevailing situation in areas of sweet potato farming particularly in Lake and Eastern zone. One way to promote the Sp production is making seeds easily accessible, during the meeting conducted in Geita district, participants especially farmers pointed out the sources of planting materials were mainly from institutions like schools, prisons and local governments, HKI can work with these institutions to make sure seeds are readily available in each planting season.

The other mentioned sources of OFSP vines for farmers among others were through NGOs such as KIMKUMAKA, RUDDO and BRAC. Very few farmers used purchasing of vines as a source of OFSP vines mainly because vines were said to be expensive and scarce. Some farmers cited the lack of a market for OFSP as a factor that discouraged them from purchasing vines. For farmers that buy the vines, they feel that they should be able to sell the final product if the costs incurred in purchasing vines are to be recouped. With the lack of a market for OFSP the potential for development of a commercial vine sector may be limited; hence ensuring ready market for OFSp is paramount. value chain linkages is needed; farmers need to be linked to middlemen who buy and sell to agro-processors or sell to big markets in cities such as Mwanza, Dar and Mbeya, without markets farmers cannot be encouraged to increase their production.

Stakeholders visited during the needs assessment survey commented and pointed out a number of reasons as to why some previous programs were considered ineffective. There was a lack of knowledge especially on the nutritional benefits of OFSP, which was often referred to as only for children. Most of the educational efforts concerning the nutritional benefits of OFSP activities involved only women while men were left out. This would explain in part why children and women most frequently consumed OFSP. While women may indeed be responsible for food preparation decisions and participate extensively in agricultural labour, men still dominate decisions about agronomic management and crops choice including the decision on what to produce and variety of sweet-potato to plant. Hence a need of full participatory approach in promoting OFSP production by involving both gender (i.e. women and

men). Moreover, education can be provided in colleges and schools on the nutritional values of sweet potatoes and while such messages can be passed via messages in TVs and radio.

Another reason that led to ineffectiveness of extension efforts was that the community leadership was noted to be weak and could not adequately support the OFSP promotional programs. Future OFSP promotional programs may need to involve at least a wider audience of stakeholders at the community level so as to build acceptability and support. The use of politicians was among of the strategies pointed out by the stakeholders that has been noted to be effective in OFSP promotion and could help solidify community support for RAC program.

Some of the efforts at OFSP promotion deliver vines but provide no training support to farmers. Some of the “Marando bora” implementers explained their fear of vine availability and affordability to farmers after SASHA phasing out in mid-year of 2012. Even though, the assessment made noted the quantity of vines initially distributed was also limited and therefore both training and institutional mechanisms for vine multiplication need to be put in place.

Another important problem mentioned by farmers is the susceptibility of OFSP to drought, virus and diseases. Plants often wilt over the dry season leaving no vine planting material for the next cropping season. The weak linkages were reported persisting between the implementing partners, farmers and research institutions that led to poor communication on when to supply planting materials among partners. In some cases, the delivery of vines was done during the dry season when farmers lacked access to water to cultivate nurseries for vine propagation. In general, extension efforts need to ensure that there is a permanent and reliable source of vine planting material if OFSP is to spread sustainably throughout the communities where it is introduced.

7.6 Sweet Potatoes (SP) consumption in Tanzania

Sweet potato is used for human consumption, as livestock feed, and in industrial processes to make alcohol and starch. Sweet potato is high in carbohydrates. The orange-flesh varieties also provide vitamins A and C. In addition, the green leaves of the plant can be consumed by both humans and animals providing additional protein, vitamins and minerals. In Tanzania, sweet potato is grown principally for its storage roots which are generally harvested either piecemeal, or progressively, and eaten fresh, steamed or boiled and leaves are eaten as a vegetable.

In areas where availability of rain pattern is not determined, sweet potato storage roots harvested are being processed by slicing and drying them. The dried slices form part of the dietary staple mainly during seasons of low food supply (Kapinga, et al, 1995)

Tanzania is one of the world's poorest countries and undernourishment is prevalent, especially in children. The young life expectancy age of 42.3 years is mostly due to malnutrition, tropical diseases such as malaria, and very unsanitary conditions. Open sewers, uncovered garbage piles, and contaminated streams and lakes are sources of disease. Although living conditions in larger towns and cities are typically better than in rural areas, unsanitary conditions and malnourishment are widespread throughout both. Childhood deficiencies in Vitamin A (which can cause blindness) and iodine are the country's most serious malnourishments.

7.7 Sweet potatoes Preparation and consumption patterns

The preparation for SP in most parts of Tanzania is mostly by boiling; roasting and deep-frying of the roots, while the SP leaves in most parts of country such as the lake zones are used as vegetable and consumed with ugali and rice as and starch foods. Also the percentage of farmers producing sweet potato for home consumption during the breakfast, dinner or supper and some SP surplus products sold in local markets ,the SP production is higher in the Lake zone and coastal areas such as (Mwanza, Mara, Kagera and Shinyanga), the Eastern Zone i.e. Morogoro, Dar es salaam and Coast region.

7.8 The Healthiest Way of Cooking Sweet Potatoes

From a nutrition standpoint, there are a number of good options for cooking sweet potatoes. While we have our own personal recommendation (namely, Healthy Steaming) here are some additional options to consider:

Boiling: In several studies looking at the bioavailability of beta-carotene from sweet potatoes, boiling has been shown to be an effective cooking method. Consumption of boiled and mashed sweet potatoes has been shown to raise blood levels of vitamin A in children. When compared to roasting or baking, boiling has also been shown to have a more favourable impact on blood sugar regulation and to provide sweet potatoes with a lower glycemic index (GI) value. In one study, the average GI value for roasted sweet potato was 82, for baked sweet potato 94, and for boiled sweet potato 46.

Stir-Frying: Many studies have shown that better absorption of the beta-carotene from sweet potatoes when fat-containing foods are consumed together with the sweet potatoes foods. It doesn't take much fat for this better absorption to take place—only 3-5 grams.) What fat makes possible is the conversion of beta-carotene into a special form called micellar form. Micelles are specialized collections of molecules that allow fat-soluble substances (like beta-carotene) to move around comfortably in non-fat environments (like our water-based bloodstream). They can also make it easier for fat-soluble substances to get absorbed from our digestive tract.

Among several studies that have shown the benefits of a fat-containing meal for absorption of beta-carotene from foods sweet potatoes, one study has shown that stir-frying in oil is one specific cooking technique for sweet potatoes that can enhance the bioavailability of their beta-carotene. It's interesting to note that the sweet potato stir-fry in this study used a very low stir-frying temperature of 200F or 93 C) and that only 5 minutes of stir-frying were required to achieve the beta-carotene bioavailability benefits.

While recognizing that boiling and frying as the best options for preparation of sweet potatoes diets, the recommend healthy ways is steaming of sweet potatoes for maximum nutrition and flavour. The basic logic is that it is possible to add a small amount of fat (like a tablespoon of extra virgin olive oil) so that sweet potato recipe *after* the sweet potatoes have been cooked is

retained. This means that someone has to avoid any heating of vegetable oils that might damage their heat-sensitive nutrients in the Sweet potatoes. With the practice of steaming, this means that someone can avoid soaking of the sweet potato in boiling water as a means of Sp preparation. That kind of submersion could result in the getting additional water-soluble nutrients from the sweet potatoes.

8.0 SWORT ANALYSIS FOR THE RAC PROJECT IN TANZANIA

SWOT Analysis (or SLOT analysis) is a strategic planning method used to evaluate the Strengths, Weaknesses/Limitations, Opportunities, and Threats involved in a project or in a business venture. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favourable and unfavourable to achieve that objective (www.wikipedia.org). The SWOT analysis for the RAC project that aim to promote production and consumption for OFSP as means to attain food security and cost effective way of combating VAD for under 5 years and women of the reproductive age. The table below provides the draft for what is scanned the strengths, weaknesses, opportunities and threats for the project before it commences

Table 16: SWOT analysis for the RAC project for promoting OFSP in Tanzania

<u>Strengths</u> 1) HKI long term experience working in Tanzania 2) HKI's Experienced staff and many networks partners in Tanzania including the GoT,CSO,FBO and Private sector 3) Many programs on Nutritional and foods securities in the country 4) Full support by government on foods insecurity and VAD reduction	<u>Weakness</u> 1) Weak policies recognition of importance of nutrition issues in foods security 2) Few Sweet potatoes experts within the country 3) Lack of knowledge for many people on nutrition issues and benefits of OFSP consumption.
<u>Opportunities</u> 1) SP is one of the major food items in Tanzania 2) Many programs designed to promote agriculture and foods security in Tanzania(ASDP, Kilimo Kwanza DASIP,DADP, 3) Many stakeholders involved in the agriculture sector promotion 4) Easy to get political support as it will assist to combat food security and VAD 5) Presence of Nutrition strategy that show Government recognition and commitment for Nutrition as priority issue in the country	<u>Threats</u> 1) Peoples Preference for white sweet potatoes over OFSP 2) Resistance of people to switch from traditional SP to OFSP(behaviour change difficulties) 3) Difficulties of villagers to get new vines for growing OFSP 4) Competition for resources for various methods for fighting VAD 5) Lack of Sustainability of the OFSP project after 4 years of the project implementation

9.0 DONORS WORKING IN THE HEALTH AND AGRICULTURE SECTORS

All development partners (DP) supporting various sectors in Tanzania are coordinated under the Development Partners Group (DPG) and are guided by the agreed principles states in the Joint Assistance strategy of Tanzania (JAST) agreed between the Government of Tanzania and the Donors.

The Development Partners Group for the Health sector (DPG Health) is a collection of 17 bi-lateral and multi-lateral agencies supporting the health sector in Tanzania. DPG-Health was established to support the Tanzania government in improving the health and well being of all Tanzanians and to promote coordination among development partners for efficient use of development partners' resources provided. The DPG-Health supports the government of Tanzania in its efforts to achieve the health objectives stated in the Mkukuta and the Health Sector Strategic Plan (HSSP III) . They fund through a various mechanisms; through general budget support, the health basket, projects, technical assistance and through goods in kind (www.tzdpg.or.tz).

The lead donor for the health sector in Tanzania is the DFID (www.worldban.org). These development partners that have interest in the health sector and can be targeted and approached for investments OFSP for nutrition reasons are; the Denmark, Germany, Ireland, Switzerland, the UK, the Netherlands, Canada, the European Community, the US, UNICEF, the UN Population Fund (UNFPA) and the World Health Organisation (WHO). While the international multilateral organizations include: the World Bank, DANIDA, CIDA, Irish Aid, IDA, DFID. Many of these invest in specific agriculture programs/interventions for food security, nutrition etc . Other donors that may be approached and convinced to support the investments may include the Norwegian, Sweden and Finland government, who may be willing to support the capacity building aspect of the project. There are international NGOs involved in the health sector, these include CARE INTERNATIONAL, CRS, World Vision, Save the Children, SNV are among them.

The group of donors supporting the agriculture sector is known as agriculture sector working group (A-WG). They are fourteen (14) bi-lateral and mult-lateral agencies supporting the agriculture sector in Tanzania. The A-WG has been established to promote coherence and consistency in development assistance to agriculture through coordination of Development Partner's support in the sector with a view of achieving a harmonization, promoting coordinated policy dialogue and reducing transaction costs. Specifically, the A-WG supports the government of Tanzania's implementation of the Agriculture Sector Development Strategy (ASDS) achieving objectives stated in the second National Strategy for Growth and Poverty Reduction (NSGPR II).

The Development Partners (DP) group is organized around terms of references and a code of conduct agreed between government and DPs and is organized through a modified troika

chairing structure. The chair, co-chair and secretariat act as the leaders of the A-WG and may represent other donors during the discussion with the government of Tanzania. Other DPs can be either active or delegating members, in accordance with the division of labour outlined in the Joint Assistance Strategy for Tanzania (JAST). The A-WG list is shown in the table below:

Table 17: Agriculture sector working group of Development partners (DP)

Agriculture Sector Working Group (A-WG) Member	Member Status
World Bank - Active	Active
Embassy of Ireland - Active	Active
Embassy of Japan/JICA	Active
FAO	Active
USA (USAID) - Chair	Active
IFAD	Active
Switzerland	Active
WFP	Active
African Development Bank(AfDB) - Co-Chair	Active
European Commission	Active
Netherland - Delegating	Active
French Active	Active
AGRA	Active
Korea	Delegating

Source: www.tzdpg.or.tz

Currently the A-WG is chaired by the United States (USAID) and co-chaired by the African Development Bank (AfDB).

10.0 STRATEGY FOR RESOURCE MOBILIZATION

To mobilize resources for investments for the Orange Fleshed Sweet potato (OFSP), the above donors working to support the health and agriculture sector could be approached to support either the project or some activities planned in the project such as advocacy for OFSP adoption and consumption as a way of combating VAD. The Central Ministries such as the Agriculture food security and Cooperatives and the Ministry of Health and Social Welfare, and the Local Governments such as the Districts Councils can be convinced to allocate part of their annual budget for promoting OFSP for food security and nutritional reasons (Vitamin A). Other institutions can be approached to support capacity strengthening component or seed production etc. The CSO such as the SNV, Save the children, and the private sector institutions working in the sector such as the RLDC can be approached for the same purpose.

11.0 MAJOR FINDINGS

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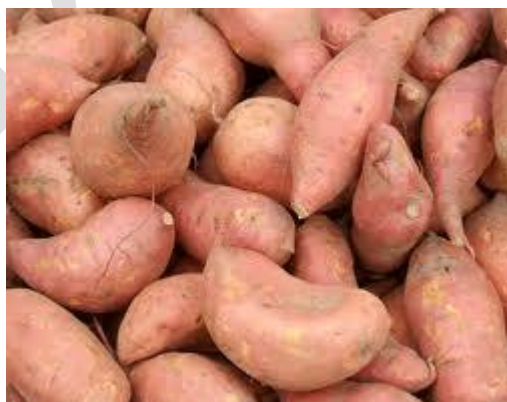
APPENDICES

Appendix 1: Production of Main Food Crops

Crop	Parameter	Years									
		2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Maize	Prodn (000'mt)	1,012.7	3,071.2	1,697.3	2,688.1	1,449.2	3,423.03	3,302.1	5,343.2	3,326.20	4,733.1
	Area (000' ha)	1,132.3	2,053.1	2,464.6	1,922.2	1,889.3	2,570.15	2,600.3	3,980.97	2,961.3	3,050.7
	Yields (tons/ha)	0.89	1.50	0.69	1.40	0.77	1.33	1.27	1.34	1.12	1.55
Paddy	Prodn (000'mt)	488.28	1,031.5	468.68	841.33	855.86	1,238.56	1,341.8	1,416.7	1,334.80	2,650.1
	Area (000' ha)	252.26	543.82	530.87	497.71	585.27	633.77	557.98	888.45	805.63	1,136.3
	Yields (tons/ha)	1.94	1.90	0.88	1.69	1.46	1.95	2.40	1.59	1.66	2.33
Cassava	Prodn (000'mt)	356.93	182.52	193.28	2,528.5	2,438.3	6,158.30	5,198.9		5,916.44	4,547.9
	Area (000' ha)	43.35	35.02	52.39	1,151.3	1,103.3	993.17	779.07		1,081.38	873.00
	Yields (tons/ha)	8.23	5.21	3.69	2.20	2.21	6.20	6.67		5.47	5.21
Banana	Prodn (000'mt)	142.90	255.34	68.4	2,080.7	1,676.0	3,507.45	3,082.6		3,006.40	3,155.7
	Area (000' ha)	21.01	36.82	7.29	276.73	268.14	499.62	404.43		507.81	417.91
	Yields (tons/ha)	6.80	6.94	9.39	7.52	6.25	7.02	7.62		5.92	7.55
Beans	Prodn (000'mt)	-	360.18	245.73	322.84	426.69	707.62	889.29	492.93	773.72	867.53
	Area (000' ha)	34.80	461.43	536.41	506.61	557.28	851.73	772.14	634.23	868.41	1,208.69
	Yields (tons/ha)		0.78	0.46	0.64	0.77	0.83	1.15	0.78	0.89	0.72
Pigeon Pea	Prodn (000'mt)	-		0.10	94.44	69.72	143.70	77.44		66.76	138.59
	Area (000' ha)	4.82		0.16	136.02	110.60	135.69	91.34		138.05	187.01
	Yields (tons/ha)			0.60	0.69	0.63	1.06	0.85		0.48	0.74
Simsim	Prodn (000'mt)			19.84	62.16	96.95	221.42	155.79	57.55	90.00	144.42
	Area (000' ha)			59.08	112.97	143.22	101.60	118.99	134.98	160.63	203.42
	Yields (tons/ha)			0.34	0.55	0.68	2.18	1.31	0.43	0.56	0.71
Sorghum	Prodn										

	(000'mt)	1,450.6	690.85	180.56	585.05	638.37	711.64	971.20	655.05	709.31	798.54
	Area (000' ha)	709.51	710.13	409.35	635.99	691.69	715.88	817.95	645.34	874.22	618.37
	Yields (tons/ha)	2.04	0.97	0.44	0.92	0.92	0.99	1.19	1.02	0.81	1.29
Sweet potatoes	Prod'n (000'mt)	689.55	667.28	207.20	1,518.6	1,475.3	2,606.04	2,466.5	444.54	1,417.39	2,424.2
	Area (000' ha)	467.66	430.63	134.39	516.05	462.33	590.47	511.02	234.87	651.94	576.22
	Yields (tons/ha)	1.47	1.55	1.54	2.94	3.19	4.41	4.83	1.89	2.17	4.21
Irish potato	Prod'n (000'mt)		25.770	95.814	59.050	366.460	1,583	1,498.3	112.483	860.985	1,472.6
	Area (000' ha)		17.011	24.692	31.553	92.730	177.242	153.394	27.782	195.694	172.966
	Yields (tons/ha)		1.51	3.88	1.87	3.95	8.93	9.77	4.05	4.40	8.51
	Area (000' ha)			26.68	19.04	24.19	53.22	75.37	77.20	149.20	54.57
	Yields (tons/ha)			0.81	0.72	2.35	2.06	1.10	0.96	0.55	1.14

Appendix: Varieties of Sweet Potatoes







Potatoes with beans mixed





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