

Linking Agriculture, Food and Nutrition Security in Zimbabwe: 2015-2018

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Executive Summary

This paper aims to demonstrate the association between agriculture and nutrition as well as describe the food and nutrition security situation in Zimbabwe. Literature has shown that agriculture plays an important role in Zimbabwe as many people depend on this sector for their livelihoods. Consultations with the Food and Nutrition Council of Zimbabwe, Department of Nutrition of the Ministry of Health and Child Care and the Department of Research and Specialist Services of the Ministry of Agriculture, Mechanization, Irrigation and Development concurred that there is a strong link between agriculture and nutrition. However, agricultural output has declined in the last 10 years because of factors such as climate change, lack of domestic and foreign investments into agriculture and the country's depressed economic performance. This decline in agricultural outputs and other economic activities has contributed to high unemployment and worsening poverty in rural and urban areas, thereby increasing the number of people who are food and nutrition insecure. The percentage of people who are food insecure has increased from 18% in 2009 to 25% in 2014, and this has caused unacceptable levels of malnutrition among different population groups especially children and pregnant women. In a bid to improve nutrition and agriculture synergy, the government of Zimbabwe formulated policies such as the Food and Nutrition Security Policy, Draft Agricultural Policy Framework and ZIMASSET among others. The government has also put in place food and nutrition management committees which start from ward to cabinet level. The committees are multisectorial showing the nexus between agriculture and nutrition. In this paper, we have developed the conceptual framework for linking agriculture, nutrition and food security, and identified policies that could lead to improved nutrition outcomes. Some of the policies or strategies include breeding for high yield and micronutrient-dense staple foods, and the promotion of consumption of traditional fruits and vegetables. The review revealed that

Zimbabwe is partially food secure and has potential to improve its food and nutrition security status.

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Acronyms

AIDS	Acquired Immunodeficiency Disease Syndrome
AIM	Agriculture, Irrigation and Mechanisation
CAADP	Comprehensive African Agricultural Development Programme
CTA	Technical Centre for Agricultural and Rural Cooperation
DFID	Department for International Development
EU	European Union
FAO	Food and Agriculture Organization
FNC	Food and Nutrition Council of Zimbabwe
GDP	Gross Domestic Product
GMB	Grain Marketing Board
GMO	Genetically Modified Organisms
HIV	Human Immunodeficiency Virus
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
MDGs	Millenium Development Goals
MHCC	Ministry of Health and Child Care
NGO	Non-Governmental Organization
UNICEF	United Nations Children’s Fund
SADC	Southern African Development Community
SDGs	Sustainable Development Goals
SUN	Scaling Up Nutrition
USAID	United States Agency for International Development
UN	United Nations
WB	World Bank
WHO	World Health Organization
ZIMASSET	Zimbabwe Agenda for Sustainable Socio-Economic Transformation

ZIMSTAT

Zimbabwe Statistics

ZVNR

Zimbabwe Voluntary National Review

ZimVac

Zimbabwe Vulnerability Assessment Committee

1.0 Introduction

Of the world's 1.1 billion extremely poor people, about 74% live in marginal areas and rely on small scale agriculture (Giovannucci *et al*, 2012). Globally, stunting, severe wasting and intra-uterine growth retardation are the major contributors to child mortality, accounting for about 3.1 million deaths of under-fives annually (Black *et al.*, 2013). Agriculture is the backbone of the economies of most sub-Saharan African countries. In 1994, 69 percent of the economically active population in sub-Saharan Africa was engaged in agriculture, as compared with 84 percent in 1961 (FAO, 1995). Despite the fact that many people are engaged in agriculture, the global food base is narrowing as only maize, wheat and rice supply the bulk of energy and protein needs (Milton, 1993).

Zimbabwe has achieved great strides in improving the health of both children and adults. Stunting levels have decreased from 31.9% in 2011 to 27.6% in 2014. Evidence from 2011 showed disparities between rural and urban populations with 33% of children living in rural areas being stunted, compared to 28% for their urban counterparts (Government of Zimbabwe, 2014). This illustrates the presence of malnutrition in the country despite efforts to increase food crops and livestock production. Food production and knowledge is not translating to consumption as a large population does not meet minimum acceptable dietary levels (ZIMVAC, 2016).

Food and nutrition security is influenced by a wide range of factors that may lead to inadequate or excessive nutrient intakes or may impair nutrient utilization. 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 (Pinstrup-Andersen, 2009). There are four pillars of food and nutrition security namely, availability,

accessibility, utilization and stability of supply of food (Republic of South Africa, 2013). This can be illustrated by use of the conceptual framework (WHO/ Basics/ UNICEF, 1999) which reinforces the multiple causes of food and nutrition insecurity and the interconnectedness of different sectors including health, agriculture, education and socioeconomic status among others (Food and Nutrition Council of Zimbabwe, 2012). Food insecurity is not just about insufficient food production, availability, and intake; it is also about the poor quality or nutritional value of the food (Sasson, 2012). The Food and Nutrition Security Policy which was launched by His Excellency, President R.G. Mugabe on the 16 May 2013 has 8 commitments. Commitment II states that poverty may be reduced if economic growth is increased through having a broad-based agricultural development sector. Commitment V states that adequate national food availability is necessary, but it is not sufficient on its own to ensure food and nutrition security in the country (Food and Nutrition Council of Zimbabwe, 2012). Food self-sufficiency which has been described by advocates in the 1970s and supported by many countries was replaced in the 1990s by the concept of food security, the objective of which is to make available all foodstuffs in sufficient quantities and with the adequate nutritional qualities, whatever their origin, be they produced locally, imported, or donated as food aid (Sasson, 2012).

The United Nations Global Nutrition Community proposed a transition from Millennium Development Goals (MDGs) to Sustainable Development Goals (SDGs). The primary objective of the 17 SDGs is to improve the food and nutrition security of communities in the global world. Sustainable Development Goal 2 emphasizes eradication of hunger, achievement of food security, improvement of nutrition and promotion of sustainable agriculture (UNGNA.10, 2015). Other SDGs like Goal 1, 3, 12 and 15 are indirectly linked to food and nutrition security and the Zimbabwe Government is a signatory to SDGs.

In the early 1980s the Zimbabwean agricultural sector was very vibrant to the point of being labelled “the bread basket of Africa”. Zimbabwe’s economy is agricultural based and the sector accounts for 15-18% of Gross Domestic Product (GDP) (Government of Zimbabwe, 2012). The prevailing agro-climatic conditions then, enabled the country to grow many diverse crops and rear different breeds of livestock and fisheries. The scenario has changed since the early 2000 with agricultural production on the decline making the population insecure in terms of food and nutrition. The Food and Nutrition Council has noted that the agricultural sector has been underperforming leading to food and nutrition insecurity among communities in Zimbabwe. According to the Draft Agricultural Policy Framework, land is available but production has continued to decline (Government of Zimbabwe, 2012). The absence of an Agricultural policy and also the uncoordinated agricultural, food and nutrition activities in the country have compromised the country’s food and nutrition security.

The draft policy framework listed various food and cash crops that are grown in Zimbabwe. However, the draft policy framework does not mention or promote the indigenous food crops which may boost the food and nutrition security of the population as these can be found all year round in different parts of the country. This shows a gap in the synergy of agriculture and food and nutrition security. In Zimbabwe, small scale farmers put in place coping strategies such as growing indigenous food crops and collecting fruits and vegetable during times of food insufficiency. The population also copes by reducing food quantities and skipping some meals and this compromises its health and nutrition status (ZimVac, 2015). The knowledge possessed by the indigenous people if fully explored may help counter food and nutrition insecurity that is currently being experienced in the country. However, discussions with the Department of Nutrition revealed that most members of the communities lack knowledge of nutrients present in

foods they grow and that there is severe lack of diversity in foods consumed. The suggestion was that farming communities be provided with basic nutrition training to make their food production programmes effective.

The agricultural sector faces challenges which include access to agricultural resources for production, labour which is heavily impacted by HIV and AIDS scourge, and environmental management. The Ministry of Agriculture, Mechanization, Irrigation and Development recognizes that nutrition starts from crop and animal farming to the table. In the present context of climate change, ongoing loss of species and genetic diversity, soil degradation, social conflict and extreme poverty, there is an urgent need for collective action to address food and nutrition security at global level (Vinceti *et al*, 2013). The Agricultural sector needs to explore the use of irrigation in order to widen production of food crops. The provision of social services such as clinics and farm schools is currently inadequate. These services compliment and have multiplier effects on agricultural production and productivity. Programs that promote provision of these social amenities are essential for agricultural development and bring about a holistic approach to agriculture and food and nutrition security (Government of Zimbabwe, 2012). Consultation with the Food and Nutrition Council indicated that food insecurity leads to poor nutrition, education and employment prospects for the upcoming generations in Zimbabwe. Therefore, agricultural production and health services such as appropriate nutrition, provision of clean water supply as well as sanitation must be addressed.

Promoting optimum nutrition and agricultural practices cuts across different sectors which include the Ministry of Health and Child Care (Nutrition Department), Ministry of Primary and Secondary Education, Ministry of Agriculture, Mechanization, Irrigation and Development, Ministry of Women Affairs, Gender and Community Development, The Food and Nutrition

Council, United Nations Agencies, Development Funding Partners, Non-Governmental Organisations and Communities (Government of Zimbabwe, 2014). A multi-sectoral approach will assist in strengthening the link of agriculture to food and nutrition security in the country. Despite policies being in place, at implementation stage there are no linkages. Policies in agriculture and nutrition are compartmentalized and therefore lack synergy. Policies should have a bottom to top approach and vice versa to ensure sustainability and ownership of nutrition and agriculture programmes, thereby bringing about food and nutrition security. Therefore, this paper aims to build evidence of the existence or not of an agriculture-nutrition nexus in Zimbabwe. The paper will also recommend the strengthening of the link between agriculture and nutrition in the country.

2.0 Situational analysis

2.1 Macro-economic situation and trends

Real GDP growth in Zimbabwe has decelerated drastically from 10.6% in 2012 to 3.3% in 2013 and continues to decelerate (IMF, 2014). Zimbabwe has become a net importer of food as a result of erratic rainfall, seasonal floods and other economic challenges facing the agricultural sector and the country at large (Brown, 2008). This decline in agricultural outputs and other economic activities is contributing to high unemployment and worsening poverty especially in the rural areas. When combined, under employment and unemployment is currently estimated at 95 percent (Government of Zimbabwe and FAO, 2012).

Manjengwa *et al.* (2012) reported that poverty is very high in Zimbabwe as 80% of the population is below the total poverty datum line, which is currently pegged at \$494.16 for 5 persons in a household (ZIMSTAT, 2015). About 31% of the poor are living in rural areas while

10% are in urban areas. Poverty has increased the number of people who are food and nutrition insecure. As a result, Zimbabwe has not achieved MDG 1 which was meant to halve hunger and extreme poverty by the year 2015 (Government of Zimbabwe and FAO, 2012).

2.2 Food and Nutrition Security situation

Zimbabwe has a strong environmental policy for achieving food security and improved nutrition and has prioritised ending hunger within its overall development agenda. This is demonstrated by the fact that the first cluster under the ZIMASSET focusses on Food Security and Nutrition while Sustainable Development Goal 2 is among the 10 priority Goals of the country (ZVNR, 2017). SDG 2 places emphasis on ending hunger, achievement of food security, improvement of nutrition and promotion of sustainable agriculture. Inline with the SDG 2, Zimbabwe became part of the *Zero Hunger Challenge* which is a national multilevel and multi-sector response to the global call to action made by the UN Secretary-General in 2012 towards a vision of a world that is free of hunger. The Zero Hunger Challenge is based on four pillars namely: (1) zero stunted children under two years; (2) 100 per cent, all-year round access to adequate food; (3) sustainable food systems; (4) increased smallholder productivity and incomes; and, (5) zero waste or food loss (ZVNR, 2017). SDG2 illustrates a link between agriculture and nutrition in the formulation of development policies in Zimbabwe.

The primary role of the Food and Nutrition Cluster as spelt out in ZIMASSET is to create a self sufficient and food surplus economy leading to the restoration of Zimbabwe as the “Bread Basket of Southern Africa.” (Government of Zimbabwe, 2013). The programme is designed to build a prosperous, diverse and competitive food and nutrition secure sector that promotes national development through provision of a sound environment for sustainable economic

empowerment and social transformation. The cluster programmes are linked to and informed by the Comprehensive African Agricultural Development Programme (CAADP), Draft Comprehensive Agriculture Policy Frame Work (2012-2032), the Food and Nutrition Security Policy, the Zimbabwe Agricultural Investment Plan (2013-2017), SADC and COMESA Food and Nutrition Frame Works. The critical roles of the Food and Nutrition Cluster include boosting of agricultural production, improvement of nutritional status of communities and provision of food and nutrition data. The link between agriculture and nutrition in Zimbabwe is partly highlighted in the ZIMASSET with the aim of improving the nutritional status of Zimbabwe's population.

Comprehensive Africa Agriculture Development Programme (CAADP) provides a frame work for synthesis of key data and information required to improve nutrition and scale up nutrition in agricultural strategies and programmes (CAADP Zimbabwe, 2013). In Zimbabwe, there is a comprehensive food and nutrition system established within various sectors of Agriculture, health and social services. The system is set to generate information on a routine basis. In an effort to reduce micro-nutrient deficiencies, the agricultural sector is set to implement biofortification in the national fortification agenda (CAADP Zimbabwe, 2013). The documented link between agriculture and nutrition is highlighted in CAADP and emphasizes the importance of agriculture in improving nutrition.

Scaling Up Nutrition (SUN) employs nutrition sensitive approaches to reduce stunting, micronutrient deficiencies, wasting as well as risks of overweight and obesity (Unicef, 2015). Specific nutrition sensitive approaches include agriculture, early childhood development, education and WASH (Ruel, 2013). As a country with an agro-based economy, Zimbabwe has a

potential of increasing agricultural output and that will help to reduce nutritional inadequacy. As more food is made available through improved agricultural yields, the country will be in a position to scale up nutrition. With high rainfall experienced during the 2016-2017 agricultural season and input assistance provided by the Government through Command Farming, higher crop yields were expected at the end of the season. The high crop yields are expected to improve food and nutrition security of local communities.

Factors such as the poor performance of the economy, a hyperinflationary environment which existed during 2007 to 2009 and droughts (Brown, 2008) have negatively affected agriculture and subsequently the food and nutrition security situation in the country. As shown in Fig. 1, the percentage of people who are food insecure has increased from 18% in 2009 to 25% in 2014.

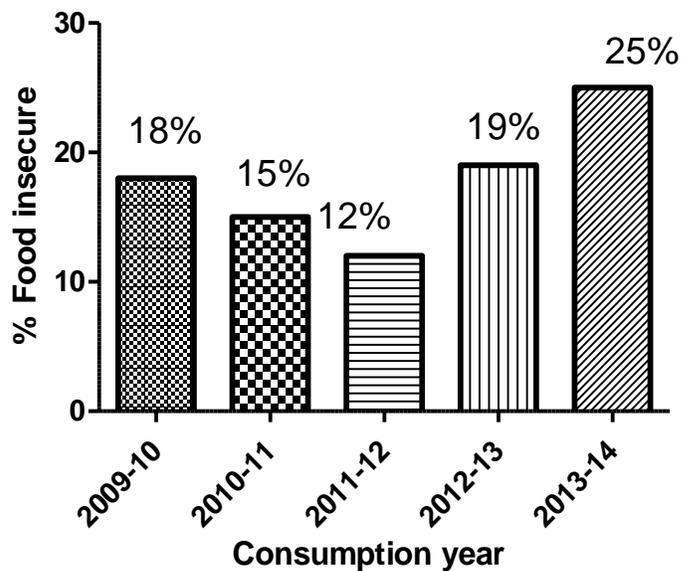


Figure 1: Rural food insecurity trends (from ZimVac, 2009-2014)

In the past 15 years, Zimbabwe has failed to produce enough food for her population and as a result the country is relying on maize imports from Zambia, South Africa and parts of South America.

For example, in the 2014/2015 agricultural season, Zimbabwe produced 742 226 tonnes of maize against an annual requirement of about 1 800 000 tonnes (FAO, 2015). This maize output is approximately one-third lower than the five-year average. Sorghum and millet production also decreased significantly when compared to the output in the 2013/2014 season due to low market prices and processing of the grains which is labour intensive. This poor performance of the 2014/2015 cereal crops resulted in the deterioration in food security conditions as 16% (1.49 million people) of the rural population were food insecure (ZimVac, 2015).

Food insecurity in Zimbabwe has largely resulted from loss of production, mainly due to prolonged dry weather for over 60 days in different parts of the country. The rainfall pattern resulting from such weather led to decrease in crop yields during 2014/2015 and 2015/2016 agricultural seasons (UN in Zimbabwe, 2015). The decline in agricultural production also led to loss of household income derived from decreased sales of produce and employment opportunities in the agricultural industry. Most households found it difficult to meet their food needs during the 2015/2016 season due to suppressed crop yields (UN in Zimbabwe, 2015). Variation in the levels of food insecurity with time in the most affected areas in Zimbabwe is presented in table 1. There was a remarkable increase in the level of food insecurity from 2015 to 2016 season. The prevailing food insecurity is likely to adversely influence the nutritional status of consumers.

Table 1: Food insecurity levels of the most affected districts in Zimbabwe in 2015 to 2016 seasons (UN in Zimbabwe, 2015).

District	January –March 2015	January –March 2016
Zvishavane	11.7	42.2
Buhera	10.0	37.8
Mbire	5.6	41.7
Mwenezi	3.9	31.1
Umzingwane	17.2	40.0
Umguza	9.4	41.7
Lupane	8.3	33.1
Binga	8.9	32.8
Tsholotsho	13.9	31.7
Hwange	7.2	28.9

For the past years, food and nutrition insecurity caused by low agricultural outputs, high levels of poverty and poor food utilization due to lack of knowledge on how to use locally available food has compromised the household food consumption (Brown, 2008). In addition, HIV/AIDS has adversely affected agricultural production by reducing labour availability and increasing expenditure on health services, thereby reducing income to purchase goods, services and food at the household level (Brown, 2008). Consequently, there is an increase in the prevalence of

chronic malnutrition (stunting) among young children and women of child bearing age (15-49 years).

According to ZimVac (2013), about 42% of the children aged between 6 and 59 months consumed less than three meals per day and as a result the children were unlikely to be consuming adequate nutrients necessary for their optimum growth and development. Even though stunting levels have decreased from 32% in the 2010-11 period to 26% in 2018 (Food and Nutrition Council of Zimbabwe, 2018) (Figure 2), the levels are still unacceptable according to global thresholds (Ministry of Health and Child Care, 2015).

The nutritional status of children improved with time as shown by a decrease in levels of wasting, underweight and overweight between 2005 and 2018 (Figure 2). The improvement may be a result of awareness of importance of nutrition to mothers and other caregivers.

According to the Government of Zimbabwe (2014 estimates), 33% of children living in rural areas are stunted compared to 28% of their urban counterparts. Other malnutrition indicators that include stunting, wasting, underweight, vitamin A deficiency, iron deficiency and anaemia showed that more people in rural areas are malnourished compared to their urban counterparts (Table 2). However, more people are overweight in urban areas compared to people living in rural areas.

In the rural areas, 60% of the households do not consume protein rich foods because most of them are poor and cannot afford meat and meat products (ZIMSTAT, 2013). These poor households use 56% of their incomes on food items compared to the share of nonfood items at 44% (ZimVac, 2013).

In order to address food and nutrition insecurity problems, the government of Zimbabwe launched the National Food and Nutrition Security Policy in August 2012. This policy promotes a multisectoral approach to address food and nutrition insecurity, the right to food, the SDGs, mitigation of the effects of shocks to food and nutrition security, especially for the most vulnerable, and establishment and strengthening of national structures responsible for food and nutrition security.

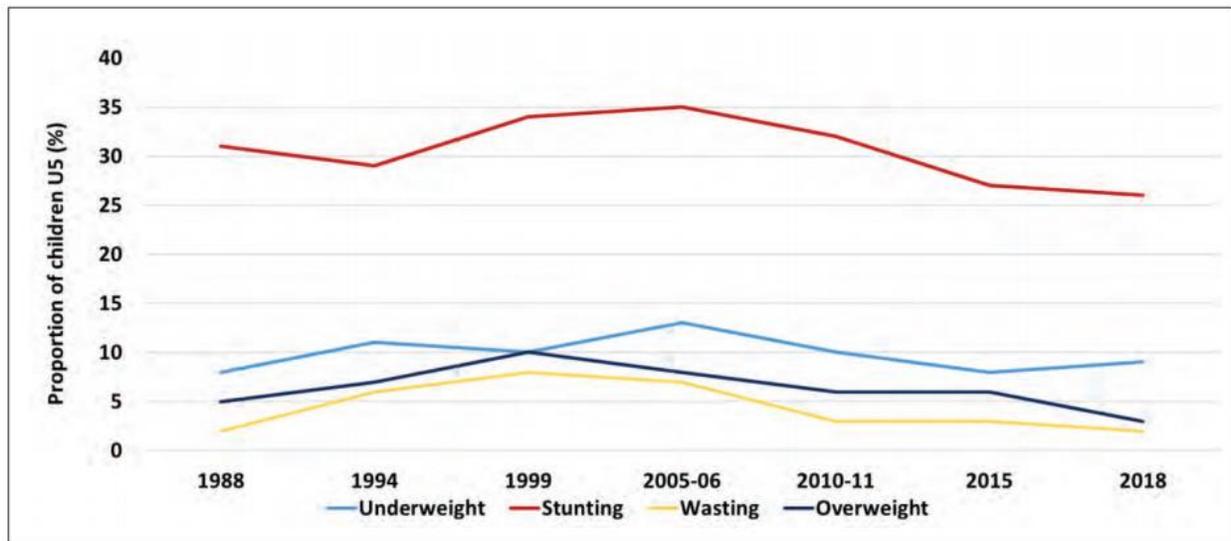


Figure 2: Trends in nutrition status of children aged 0-59 months (Food and Nutrition Council of Zimbabwe, 2018)

Table 2: Nutritional Status of children under 5 years in Zimbabwe in 2015

Indicator	urban	Rural	Total
Stunting	20.9	28.1	25.9
Wasting	2.2	3.6	3.2
Underweight	7.0	10.9	9.7
Overweight	5.8	3.0	3.9
Vitamin A deficiency	10.9	25.3	21.2
Iron	71.9	72.2	72.2
Anaemia	28.7	32.7	31.5

Source: Ministry of Health and Child Care, (2015)

Figure 3 outlines food consumption scores obtained in the National Nutrition Survey conducted by the Food and Nutrition Council of Zimbabwe in 2018 in collaboration with Government Departments, UN Agencies and NGOs.

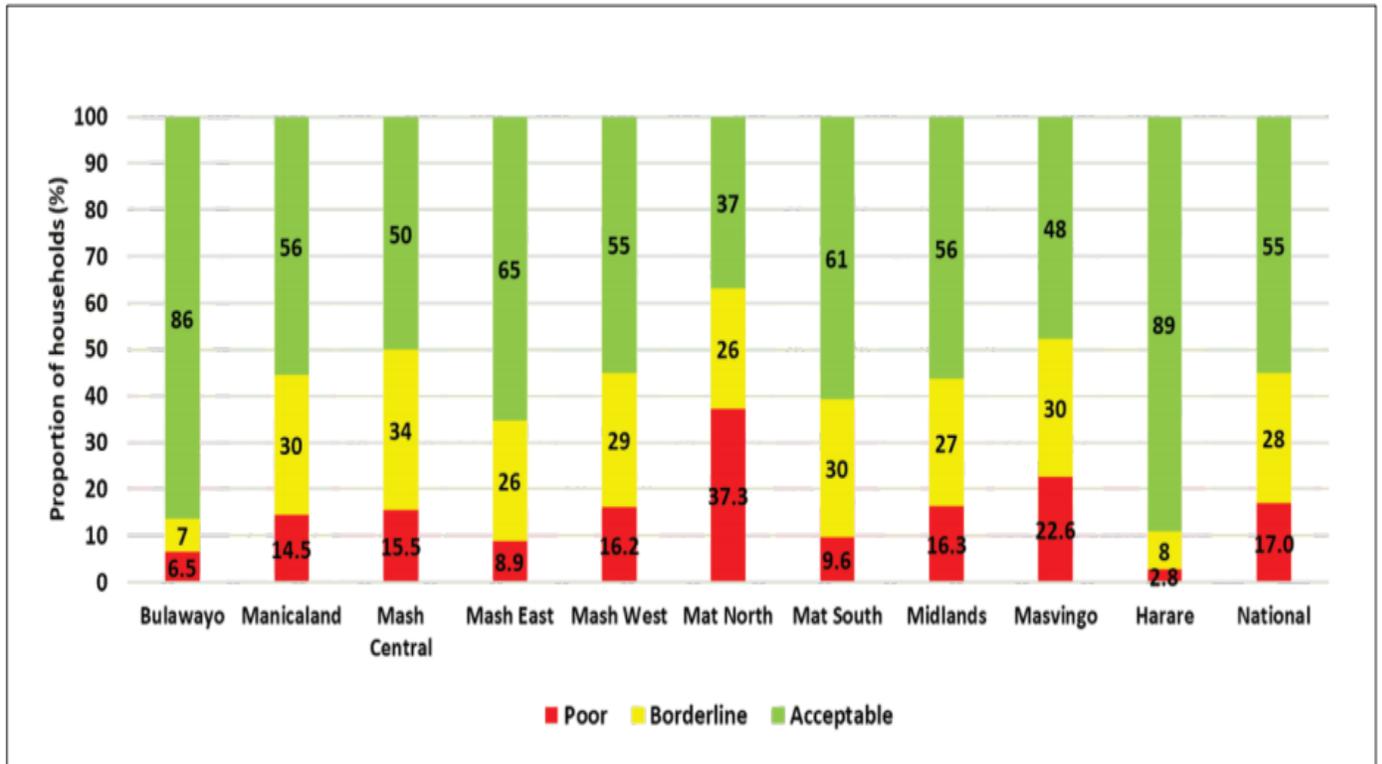


Figure 3. Household food consumption scores for Zimbabwe ((Food and Nutrition Council of Zimbabwe, 2018)

Nationally, 17% of households had poor diets while slightly above half of the households had acceptable food consumption scores. The province with the highest proportion of poor food consumption scores was Matabeleland North (37%) followed by Masvingo (22.6%). Poor food consumption scores in Matabeleland North and Masvingo may be attributed to low rainfall which generally makes the land less arable. The food consumption patterns point to varying levels of food and nutrition security in different parts of the country. Consumption trends of different food groups by households in the country is presented in figure 4.

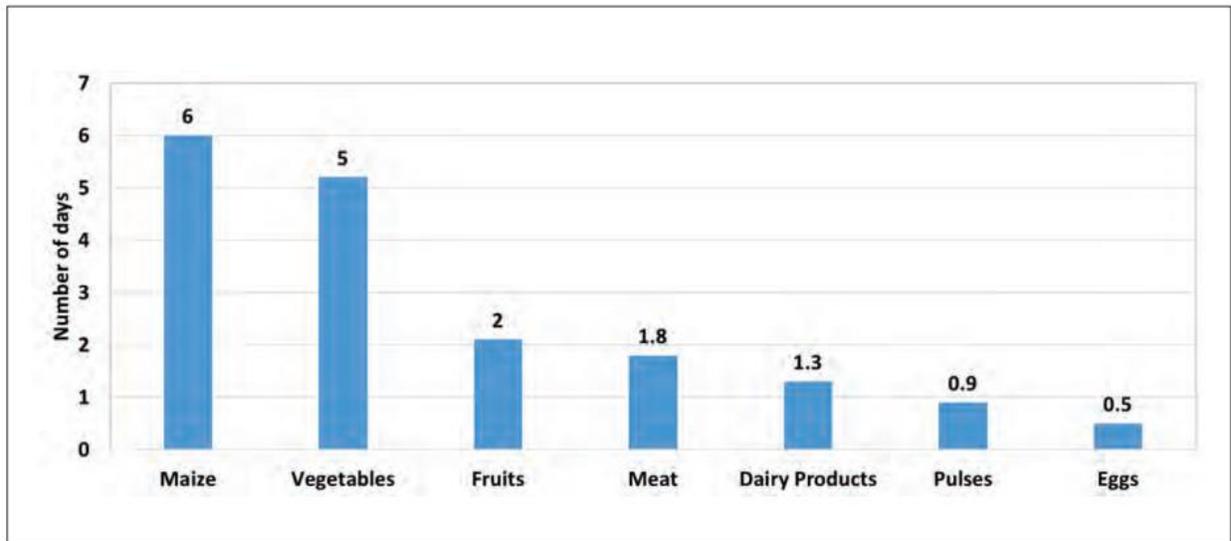


Figure 4. Food groups consumption trends from 2018 National Nutrition Survey (Food and Nutrition Council of Zimbabwe, 2018)

The majority of households consumed mostly cereals while meat, dairy products, pulses and eggs were the least consumed. The low consumption of food groups that are sources of protein and micronutrients contribute to wasting and micronutrient deficiencies which may contribute to stunting among children under the age of 5 years. The low consumption of meat and dairy products may be attributed to poor husbandry farming, communities having few functional dip tanks and agricultural extension workers.

2.3 The agricultural situation

Agriculture plays an important role in Zimbabwe as over 70% of the population depends on this sector directly and indirectly (Government of Zimbabwe and FAO, 2012). In addition, agricultural activities in Zimbabwe support 33% of the labour force. Agriculture was reported to

contribute about 12.38% of the GDP in 2013 and the sector also contributes over 40% of national export earnings and 60% of raw materials to agro-industries (Government of Zimbabwe and FAO, 2012).

A variety of food and cash crops are grown in Zimbabwe. According to the ministry of AIM, the top 6 food crops grown in the country include maize, sorghum, pearl millet, finger millet, ground nuts and wheat. The main cash crops are tobacco, cotton, coffee, soya bean, and horticultural products. The livestock that include cattle (for beef and milk), pigs, goats, poultry and sheep are reared for both domestic and export markets (Government of Zimbabwe, 2012).

2.3.1 International and local stakeholders' role in nutrition and agriculture

The European Union (EU), Food and Agriculture Organization of the United Nations (FAO), the Technical Centre for Agricultural Cooperation (CTA) and the World Bank Group are major participants in agriculture at both policy and programme levels and work together to strengthen the link between agriculture and nutrition for the benefit of the poor and most vulnerable communities (Rudischhauser *et al*, 2015). The US Agency for International Development (USAID) policy paper on nutrition highlighted that multisectorial approaches employing gender-sensitive agricultural strategies to solve nutrition problems were required (IFPRI, 2003). The World Bank explored the nutritional consequences of agricultural projects. The International Food Policy Research Institute funded an international conference on agricultural research and human nutrition which focused on the role of agricultural research, food production and farm incomes on improvement of nutritional status of communities (IFPRI, 2003). The international organizations work in collaboration with the government to implement appropriate agricultural, food and nutrition policies set to promote the health of communities. Programmes administered

by the Ministries of Agriculture and Health and Child Care are aimed at improving the food and nutrition security of communities. Non-Governmental Organizations work in collaboration with government institutions to boost agricultural production which improves availability of food for the less privileged members of the community. For example, ICRISAT and the Agricultural Research and Extension Department of the Ministry of Agriculture worked on a DFID funded project aimed to implement conservation farming and micro-dosing in dry areas of Zimbabwe in order to increase crop yields (Hove, 2006). The improved agricultural yields in the low rainfall areas are expected to make food available and enhance food and nutrition security of the community members. Programmes offered in agriculture at universities and colleges train graduates who implement livestock and crop production projects which produce food that act as sources of nutrients for consumers.

2.3.2 Absence of a policy on agriculture and its effects

The primary objective of a policy on agriculture is to ensure national and household food security. A policy enables government and stakeholders to focus on achieving the objective through commitment of resources to set agricultural projects. Absence of the policy results in uncoordinated activities which result in low agricultural production which does not make adequate food supplies available to guarantee food and nutrition security for communities.

2.3.3 Link between Food and Nutrition Security Policy and Agriculture Sector Programmes

The Food and Nutrition Security Policy is impacted by provision of agricultural inputs to under privileged farming communities. Facilities provided under the scheme include farming tools and

implements, seeds, agrochemicals and animals (Food and Nutrition Council of Zimbabwe, 2012). The intervention packages are designed to promote long term food security by stimulating local market production and procurement of inputs, strengthening community based cooperatives, increasing technical service support, facilitating information on price markets and crop production forecasts (Food and Nutrition Council of Zimbabwe, 2012). Household or community gardens where fruits and vegetables are grown have been found to contribute to the communities' food and nutritional needs in the short to medium term. Results of micronutrient survey revealed that 58% of national households owned vegetable gardens and a higher proportion of these were rural households (63%) compared with 51% of urban households (MHCC, 2015). Fruit trees were grown by 79% of the households and there was no significant difference between levels of growing of the trees by rural and urban residence. The extent of growing of fruits and vegetables by families point to some level of awareness of the nutritional importance of fruits and vegetables. Hence, the successful implementation of a Food and Nutrition Security Policy is dependent on the existence of sound agricultural programmes.

2.3.4 Grains

The Grain Marketing Board is responsible for maintaining a minimum floor price of white maize (main staple food crop in Zimbabwe) and all other agricultural commodities (Government of Zimbabwe, 2012). It is mandated to maintain minimum strategic reserves of 500 000 tonnes of grain crops in physical stock. However, the board is failing to maintain the strategic grain reserves as a result of low productivity due to lack of domestic and foreign investments into agriculture with the deteriorating economic conditions, recurrent droughts and over-reliance on rain-fed agriculture. Figure 5 shows that from 2009 up to 2016 the production of maize in Zimbabwe has significantly decreased. Some of the key policy drivers of production trends in the

country have been controlled prices for agricultural inputs and commodities. Controlled prices of maize and wheat led to a gradual switch by the large-scale commercial farmers to non-price-controlled crops such as tobacco and cotton (Government of Zimbabwe, 2012). The change in crop production practice by commercial farmers resulted in significant reduction in availability of cereal based foods which led to hunger and protein-energy malnutrition among consumers, especially young children.

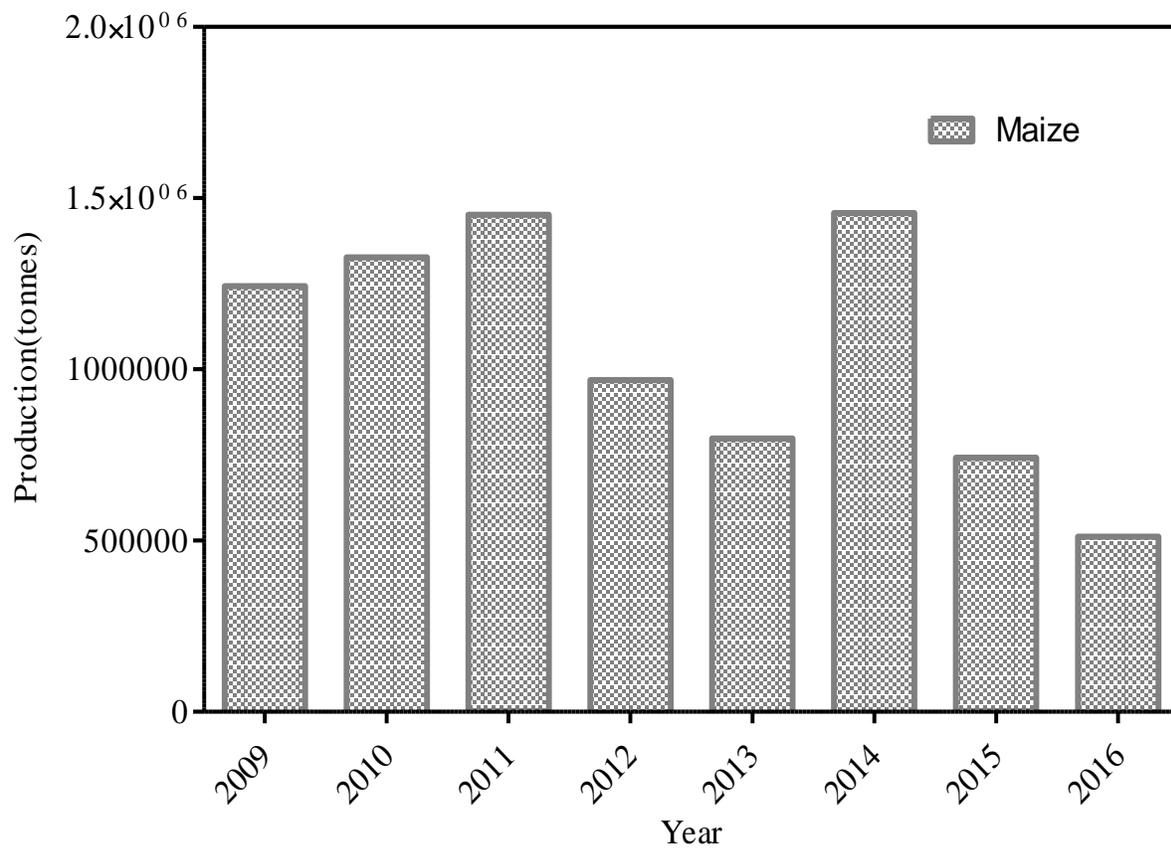


Figure 5 Zimbabwe maize production from 2009 – 2016 (Ministry of Agriculture,

Mechanisation and Irrigation Development, 2016)

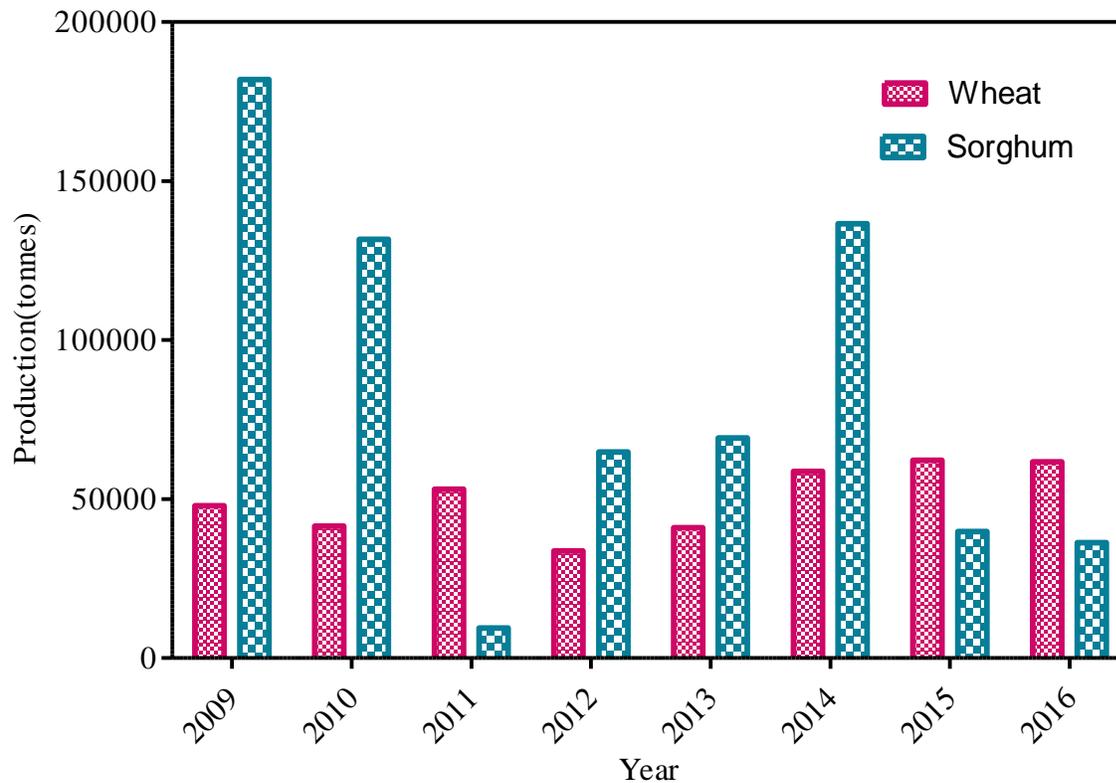


Figure 6 Zimbabwe wheat and sorghum production from 2009 – 2016 (Ministry of Agriculture, Mechanisation and Irrigation Development, 2016),

2.3.5 Edible Oilseed Crops

The edible oilseed crops have the potential to enhance food and nutrition security in drought prone areas as they do well in these areas and therefore their production should be raised. The market price of the seeds should be made attractive to make their production viable. The increase in production levels of oilseed crops will enhance the production of foods that are sources of fat, carbohydrates and protein that are important in preventing protein-energy malnutrition.

Production was expected to increase especially after good rains and a government funded production of crops in the 2016 season.

As illustrated in figure 7, the annual production of groundnut and soybean oilseeds decreased with time from 2009 to 2016. Similarly, as shown in figure 8 for groundnut and soybean, the yearly production of cotton and sunflower oilseeds decreased from 2000 to 2014. Oilseed processors in Zimbabwe are currently facing a critical shortage of raw materials due to poor yields of cotton and soya beans. Expected yields of 40 000 tonnes of soya beans and 50 000 tonnes of cotton seed fall short of the processors' requirement of 350 000 tonnes (Zimpapers Group, 2017). During the 2014-2015 season, cotton production declined to its lowest level due to reduction in inputs support to farmers and poor market for the crop. Under the environment, Zimbabwe imported soya bean from neighbouring countries to augment local production in order to meet requirements of processors. Cooking and other edible fats are being imported from South Africa. Logistics associated with importation of seed based edible fats and oils are likely to influence the nutrition of some consumers. To boost production, viable markets should be made available to producers of crops. For example, institutions like Grain Marketing Board and Cotton Company of Zimbabwe have been failing to pay producers for produce delivered to them. Measures need to be put in place to ensure such organizations play their role in complementing functions of the farming industry.

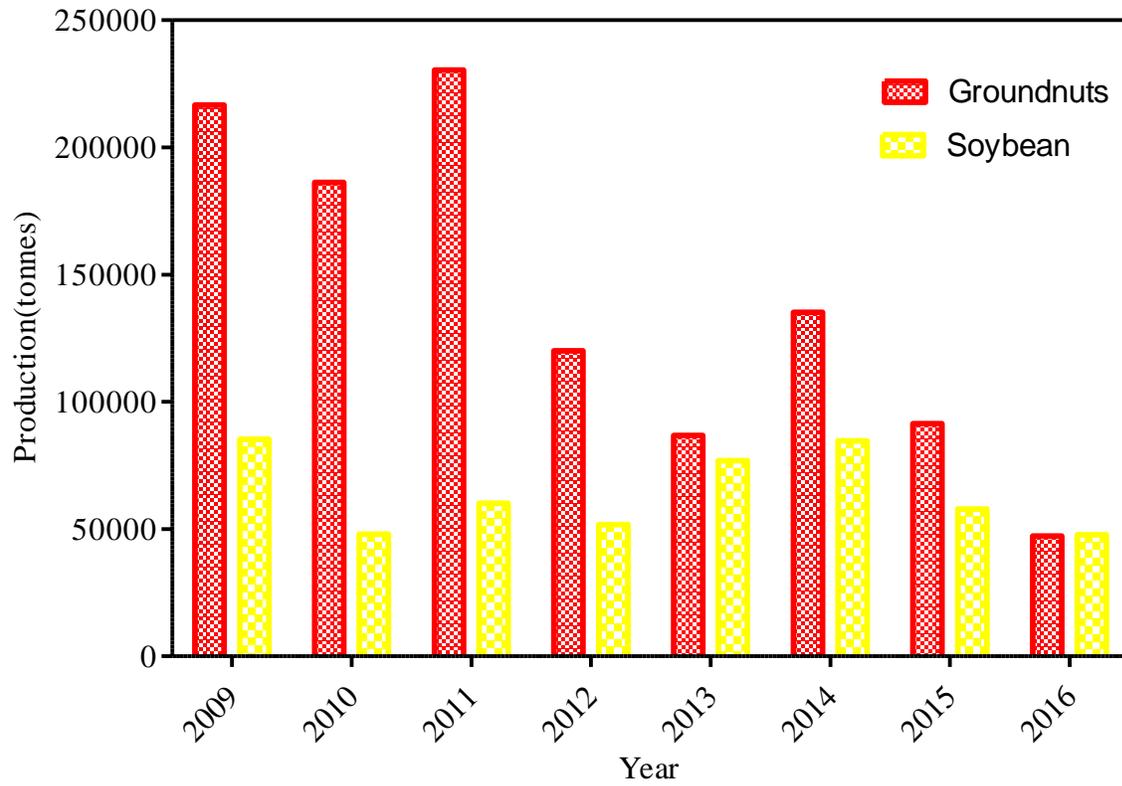


Figure 7 Zimbabwe groundnuts and soybean seed production from 2009 – 2016 (Ministry of Agriculture, Mechanisation and Irrigation Development, 2016),

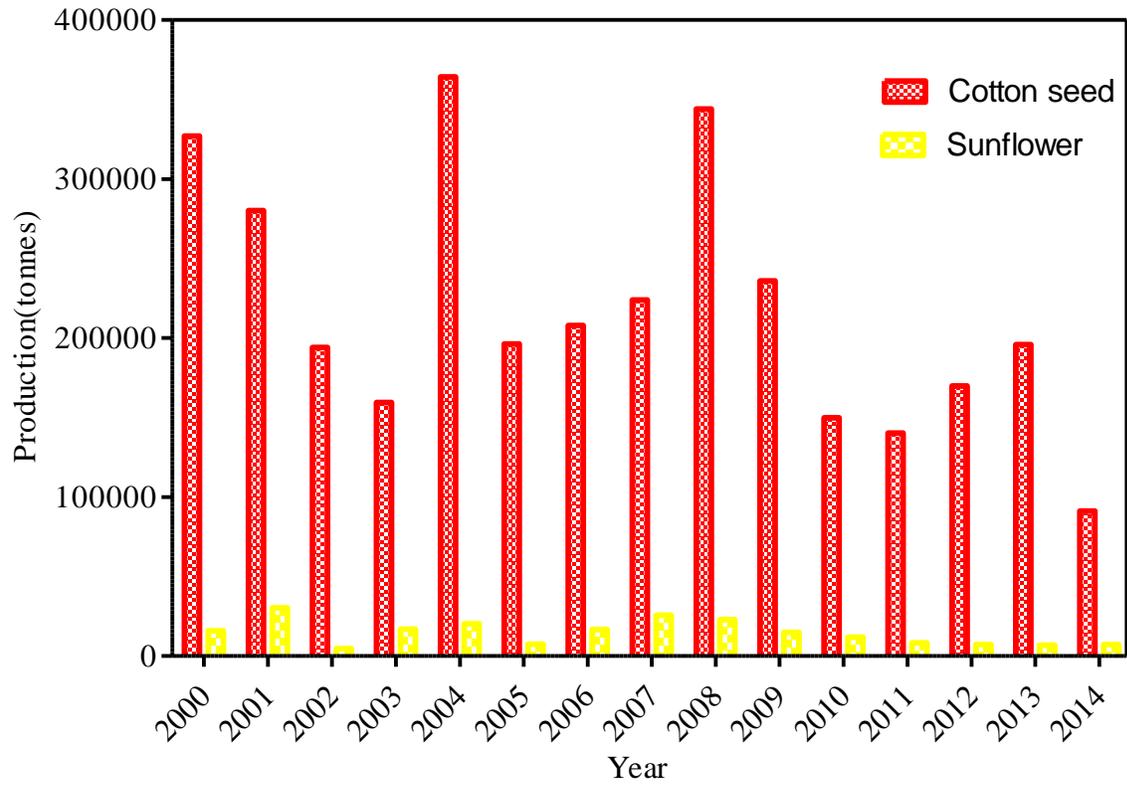


Figure 8 Zimbabwe cotton and sunflower seed production from 2000 – 2014 (FAO, 2017)

2.3.6 Livestock

Livestock and fisheries contribute about 40 percent of the agricultural GDP (Government of Zimbabwe and FAO, 2012) and play an important role in the national agricultural economy and as sources of animal protein necessary to achieve balanced diets (Delgado *et al.*, 1997). However, their contribution to national agricultural sector performance is not fully recognized compared to that of the crop sub-sector.

Livestock produced in Zimbabwe include cattle (beef and dairy), poultry, pigs, goats and sheep. More than 90% of the products from livestock are sold locally. Previously, beef exports contributed significantly to the country's GDP but due to the poor performance of the economy and outbreaks of diseases such as foot and mouth, anthrax and tick borne no exports are currently being realized. Meat and egg production trends presented in table 3 show a general increase in output with time from 1990 to 2013. Stock feeds to sustain the increase in production may be expensive as inadequate local crop output may need to be supplemented by importing produce from other countries. The average livestock and milk production has declined during the past years as a result of many factors that include inexperienced farmers, poor animal nutrition, disease outbreaks, poor management of resources, high feed prices and a decline in the number of commercial dairy farms. As a result, animal sources of protein become expensive and unaffordable to low income earners and unemployed members of the community. Under the stated conditions cases of protein-energy malnutrition increase among communities.

Table 3: Meat and egg production from 1990 to 2014 in tonnes (FAO, 2017)

Year	Eggs	Chicken	Beef	Goat	Pig	Sheep
1990	15600	16871	81740	10440	11391	580
1991	16800	17808	83840	10560	11055	547
1992	17400	17335	94086	10680	11407	539
1993	16800	17365	75443	10200	8179	479
1994	18000	17825	67412	10560	9955	493
1995	19500	18975	73169	10800	13101	486
1996	19500	20700	67440	11640	12727	497
1997	18000	21850	73605	11580	11891	442
1998	18600	23345	73720	12000	12925	490
1999	20100	23575	95380	12840	12770	616
2000	22000	25300	101250	13200	21835	672
2001	22000	37950	108000	13200	29150	588
2002	22000	35075	96750	15000	29260	630
2003	23550	40250	99450	14640	29040	546
2004	25200	46115	102375	13800	29150	518
2005	25920	51750	101700	14400	29425	504
2006	26880	53475	102375	13800	29700	488
2007	27600	56925	103500	14760	29975	464
2008	29280	60950	103950	13764	30250	459
2009	29760	61870	109000	18700	17300	392
2010	29760	62100	115634	22400	19300	358
2011	29760	63250	121300	22600	19500	355
2012	29760	63825	122000	23500	19400	375
2013	29760	63825	123000	24000	20400	378

The fisheries sub-sector is not performing optimally, regardless of the fact that Zimbabwe has many large to medium size dams. Fish farming has a potential role in the provision of protein and as a result contributes to balanced diets for both rural and urban communities. Globally, aquatic products provide approximately 3 billion people with at least 15% of their animal protein intake (Gjedrem *et al.*, 2012). Communities need to be supported in fish farming through building small and large dams and emphasize the importance of reduction of river and dam siltation. The production of fish in Zimbabwe is among the lowest in the SADC region (SADC, 2014). The low production of fish which is a source of protein may contribute to stunting which is above 30%, underweight and wasting (SADC, 2014) which are indicators of malnutrition.

2.3.7 Command agriculture as a tool for achievement of 2030 vision

The 2030 vision is set to transform Zimbabwe into a middle income economy. One of the strategies being implemented to achieve the target is command agriculture. This is a special programme on crop and animal production for import substitution aimed at ensuring that the country produces adequate grains and animal foods to feed itself by giving identified farmers inputs, irrigation and mechanized equipment (Zimbabwe Voluntary National Review Report, 2017). According to the Agriculture member of the National Food and Nutrition Security Committee, 176 farmers in districts within a radius of 100 km of Harare benefited from 489000 chickens distributed by the government under the command agriculture scheme. Under the same scheme, beef cattle have so far been distributed to 1000 farmers in Matabeleland South while 863 farmers from Matabeleland North received their allocation of the animals. It was further

reported that 400000 smallholder farmers received agricultural inputs for growing cotton. The scheme is set to improve livelihoods of households through increased income and improved availability of food. The scheme is expected to make food available for household consumption while leaving surplus for sale to the markets like the Grain Marketing Board. Produce used for home consumption will contribute to household food and nutrition security while the surplus will be sold to enhance national nutrition security. With an improvement in food and nutrition security, the country's vision of becoming a middle income economy will be partly fulfilled.

3.0 The conceptual framework

The conceptual framework for linking agriculture, nutrition and food security we propose in this paper is based on the UNICEF model of food security and also the model proposed by Bouis and Hunt (1999). Therefore, the conceptual framework emphasizes the basic inputs to better nutrition that is quality diet, energy intake, health, sanitation and child care.

In order to achieve food and nutrition security at the household or individual level, policymakers should promote micro-level policies that ensure all population groups have adequate quantities of macro- and micronutrients. We have identified 8 programmes or policies which could lead to improved nutrition outcomes as shown in Figure 9. Agricultural policies in this paper will emphasize on increasing yield and availability of macro- and micronutrients in the diet through organic farming. Sound agricultural production strategies such as conservation agriculture and agricultural research are to be enhanced. These strategies will ensure that basic inputs to better nutrition that is quality diet, energy intake, health, sanitation and child care are improved. Thus, agricultural production has a great impact on women and child nutritional status as they are the most vulnerable groups.

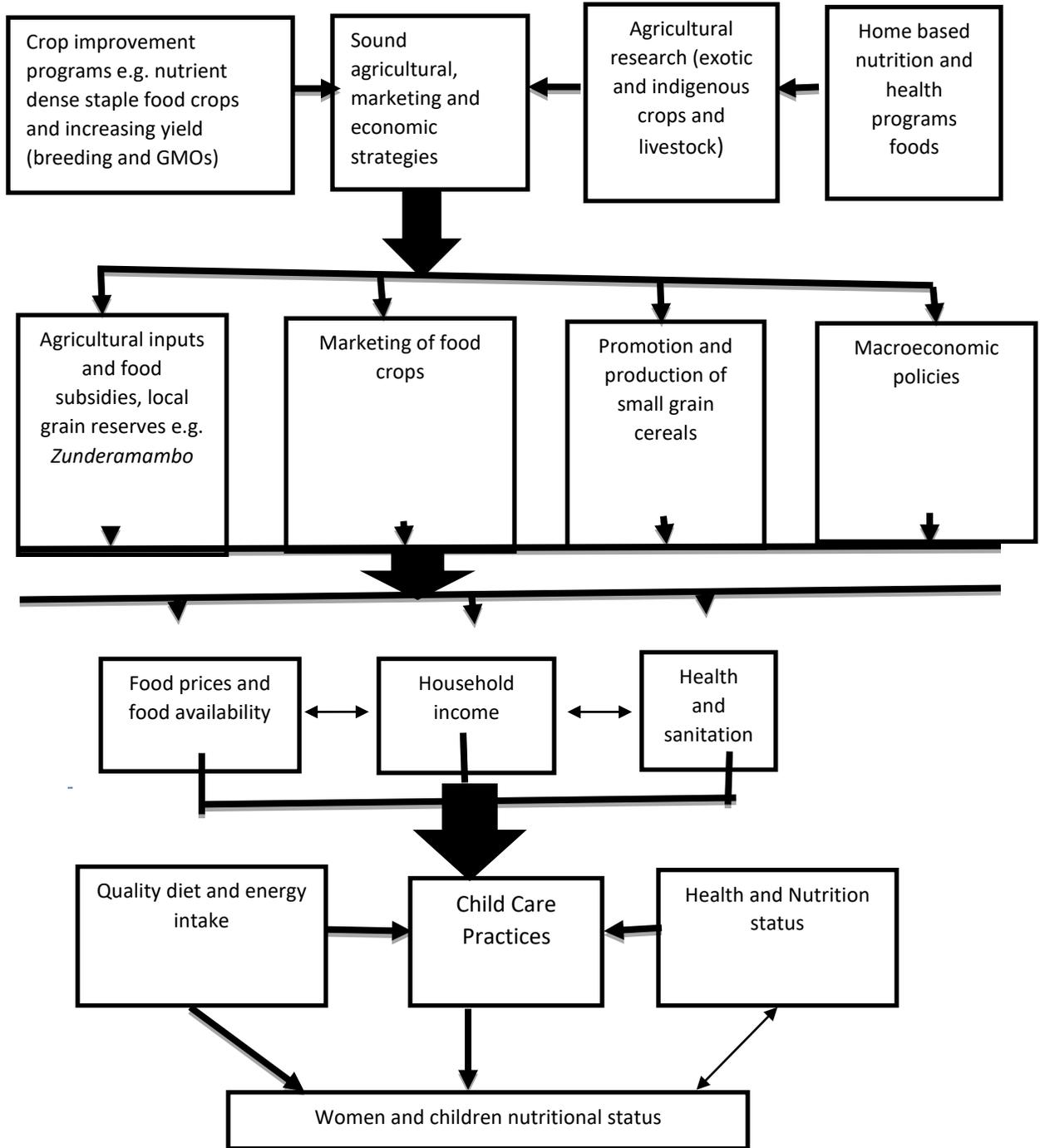


Figure 9: Conceptual Framework for linking agriculture and nutrition

One specific food-based strategy is breeding for higher yield and micronutrient-dense staple food crops (Welch and Graham, 2004). However, Garvin *et al.*, (2006) have shown that breeding for increased yield might decrease the micronutrient levels of some food crops (Figure 10). The so called ‘dilution effect’ was reviewed by Jarrell and Beverly (1981). This is the decrease in nutrient content as yield increases (Fig 10) due to many factors including irrigation, fertilization and crop improvement (Davis, 2009). This phenomenon is inevitable, as roots do not increase uptake of micronutrients, for instance, as the rate of growth increases. In that paper, Davis presented three pieces of evidence for the reported decline in fruit and vegetable nutrient composition over time; 1) the leaching effect, 2) evidence from historical studies of food composition and, 3) plantings side by side of high and low yielding cultivars of broccoli and grains (Fig 11). The evidence suggests that plant breeding and improved food production technology has resulted in crops whose nutrient composition is lower than relatively unimproved cultivars. Thus, food crops may be genetically modified to improve the levels of these micronutrients lost as a result of some breeding methods. However, GMOs are reported to have some potential negative consequences on the environment and health of consumers and therefore their consumption should be minimised.

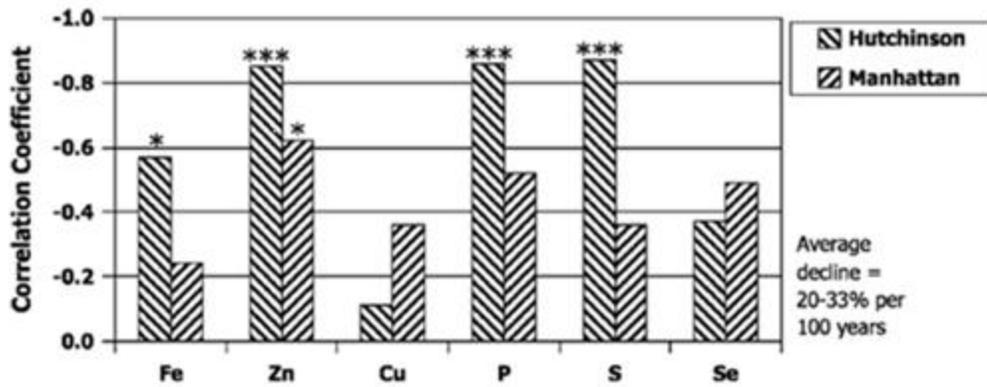


Figure 10: Inverse correlations between yield and mineral concentration in 14 hard red winter wheats grown side by side in two locations in Kansas. The wheat varieties were previously grown in the Great Plains between 1873 and 1995 (Garvin et al., 2006). Correlations differ from zero with statistical significance, * $P < 0.05$, *** $P < 0.001$

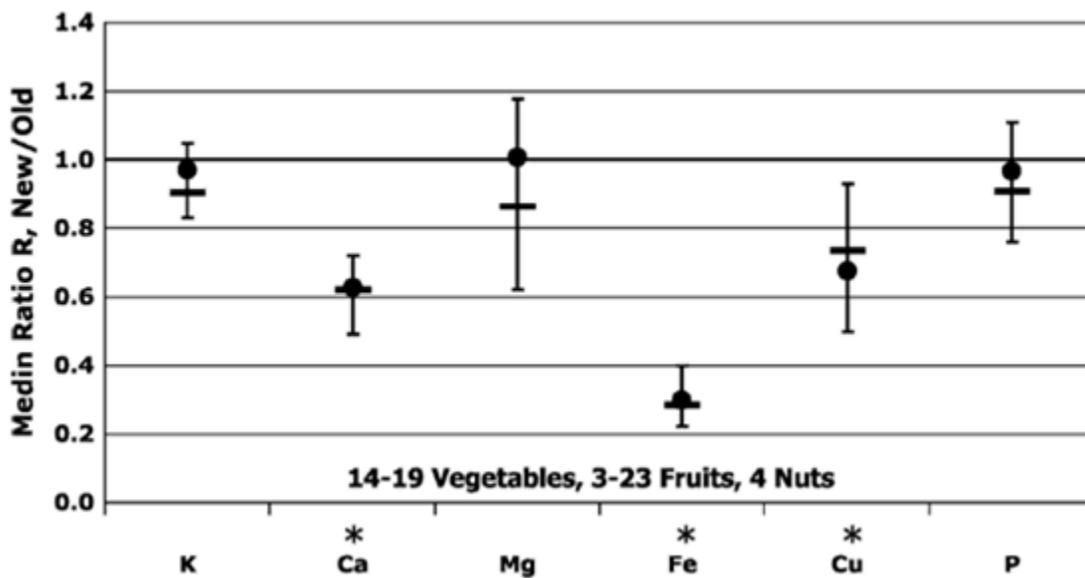


Figure 11: Apparent changes in nutrient concentrations in 16 to 50 vegetables, fruits, and nuts with 95% confidence intervals, dry weight basis (White and Broadley, 2005; U.S data, 1930s to 2004). • Originally published geometric mean R values. *Originally published geometric mean $R < 1$ by t test, $P = 0.0009-0.0000$, confirmed by median $R < 1$ sign test ($P = 0.0007$ for calcium, 0.0000 for iron, and 0.019 for copper)

Another food-based strategy that might be used at the household level to improve nutritional status is the consumption of traditional fruits and vegetables. These foods were found to be rich sources of macronutrients and micronutrients (Table 4) compared to exotic vegetable species. Fruits and vegetables are also rich in some phenolic compounds. Phenolic compounds are strong antioxidants and contribute to prevent diseases such as diabetes, cardiovascular diseases, degenerative diseases and cancers.

Table 4: Nutrient content of some indigenous and exotic vegetables commonly found in Zimbabwe (Chipurura, 2010; Chitsiku, 1991).

Nutrient	Amaranthus hybridus (<i>mowa</i>)	Bidens pilosa (<i>tsine</i>)	Brassica oleracea (Cabbage)	Brassica napus (Rape)
Crude protein (g/100g)	4.7	4.4	1.2	4.1
Crude fibre (g/100g)	1.5	1.7	1.8	NI
Carbohydrate (g/100g)	8.7	8.8	5.43	6.2
Fat (g/100g)	0.4	0.5	0.2	0.4
Potassium (mg/100g)	550	600	233	NI
Calcium (mg/100g)	798	370	219	330
Magnesium (mg/100g)	440	600	21	NI

Conclusion

The problems of malnutrition prevalent in some parts of Zimbabwe during this period when agricultural production is declining showed that there is an apparent link between agriculture and nutrition. Food access challenges created by an underperforming agricultural industry have resulted in poor nutrition that increases the prevalence of stunting and micronutrient deficiencies among populations in Zimbabwe. On the basis of declining crop yields, increasing levels of food insecurity, prevalence of under nutrition which may point to limited access to food by all people, it may be concluded that the country is partially food secure. High rainfall experienced during the 2016-2017 season and agricultural input support scheme provided by the government is expected to improve the food and nutrition security status of the country, provided proper grain storage is practiced.

Recommendations

In view of the possible link:

1. Consumers are advised to utilize agricultural produce and agro forestry products like fruits and vegetables to enhance food and nutrition security in the SADC region.
2. Members need to consider inclusion of traditional or indigenous fruits and vegetables in their diets because some are better sources of protein, carbohydrates, vitamins and minerals than exotic vegetables and are important for prevention of malnutrition.
3. Consumers should use traditional cereals like finger millet and pearl millet in their diets since they contain higher concentrations of proteins, minerals and fibre than cereals like maize.
4. Nutrition education programmes need to be conducted among communities to increase awareness on the importance of traditional foods and diversity in prevention of all forms of malnutrition.
5. Environmental education programmes should be implemented to increase awareness of the significance of conservation and sustainable utilization of wild fruit trees and indigenous leafy vegetables.
6. Policies and funding for research on locally adapted crops, fruits and vegetables are needed in order, not only to address nutrition problems, but also to hedge the population against deleterious effects of climate change.
7. Agronomic trials focusing on these crops would help to support their development and commercialization.

8. Reforestation is fundamental to counteracting some of the effects of climate change that the country is facing.
9. Indigenous seeds can be preserved through establishing local community seed banks and shared on annual platforms like food fairs and agricultural shows.
10. A policy on Agriculture is important for successful implementation of coordinated agricultural activities.

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