UNIVERSITY OF NAIROBI

INSTITUTE OF DIPLOMACY AND INTERNATIONAL STUDIES

A CRITICAL ANALYSIS OF FOOD SECURITY AND POLICY IN EASTERN AFRICA: THE CASE STUDY OF THE MAIZE SUB-SECTOR IN KENYA

BY

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R50/39044/2021

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR AWARD OF MASTERS OF ARTS DEGREE IN INTERNATIONAL STUDIES

2021

DECLARATION

I, **Meltus A Were** hereby declare that this research project is my original work and has not been presented for a degree in any other University.

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This project has been submitted for examination with my approval as University Supervisor;

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ACKNOWLEDGEMENTS

This far I have come, it is Ebenezer. I thank Almighty God for His Divine protection, Guidance and Favour. It was by Grace that He has seen me to the end of this study. I sincerely acknowledge the Ministry of Agriculture, Livestock, Fisheries and Cooperatives particularly the principal Secretary for Crop Development and Agricultural Research for the nomination to the course, technical and financial support. How I appreciate the University of Nairobi Lecturers especially my supervisor Dr. Kizito Sabala for their academic guidance. Finally, I acknowledge the National Defence College Kenya for provision of dedicated technical support and enabling environment for the academic undertaking. Be Mightily Blessed.

DEDICATION

I dedicate this document to the JAMEL Family (Jayne, Emma, Frank, Valentine and Precious) for their fervent prayers, understanding and encouragement during the entire period of the study.

Table of Contents

List of Tables

List of Figures

ABBREVIATIONS/ ACRONYMS

ASAL	Arid and Semi-Arid Land
ASDP	Agriculture Sector Development Programme
ASTGS	Agricultural Sector Transformation and Growth Strategy
CAADP	Comprehensive Africa Agriculture Development Program
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ERS	Economic Recovery Strategy
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GHI	Global Hunger Index
ICT	Information and Communication Technology
IMS	Information Management System
KALRO	Kenya Agricultural and Livestock Research Organization
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
MEAs	Multilateral Environmental Agreements
MLND	Maize Lethal Necrosis Disease
MoALF&C	Ministry of Agriculture, Livestock, Fisheries and Irrigation
MoALF&C	Ministry of Agriculture, Livestock, Fisheries and Cooperatives
MPT	Medium-Term Plan
NCPB	National Cereals and Produce Board
NEPAD	New Partnership for Africa's Development
SDGs	Sustainable Development Goals
SFR	Strategic Food Reserve
SFRTF	Kenya had had Strategic Food Reserve Trust Fund
STI	Science, Technology and Innovation
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
WFP	World Food Program

ABSTRACT

The overall objective of the study was to investigate the role of policy on the attainment of food security and a sustainable development of maize sub-sector in Eastern Africa with special focus on Kenya. The specific objectives of the study were to examine food security and policy status in maize sub-sector in the Eastern Africa Region, critically analyze the food security and policy regime in maize sub-sector in Kenya and discuss the challenges and opportunities in maize sub-sector in Eastern Africa and Kenya. These objectives were anchored on the Complex inter-dependency theoretical framework. The study set three hypotheses upon which the findings of the study were to be gauged for confirmation or rejection. These were; The slow growth of Maize sub-sector in Kenya is occasioned by weakness in the existing agricultural policies in the sub-sector, there are decreasing maize yields in Kenya in spite of development and release of high yielding maize varieties due to climate change and agricultural input affordability challenges and lastly, that there is reduction in consumption of maize in Kenya due to increasing preference of other cereals for foodstuffs by the Kenyan population. Secondary and primary data were utilized. Primary data was collected through individual questionnaires administration, Key informants' interviews and general observations.

The Eastern Africa countries whose food security and maize sub-sector performance was analysed were; Kenya, Malawi, Tanzania, Uganda, Ethiopia and Zambia. The study established that although there are various government policies and strategies in management of food security in the region, there is prevalence of food insecurity and maize insufficiency in the region and particularly in Kenya. The stunting rate of children under 5 years in Eastern African region is 35.2% which is above the global average rate of 21.9%. Maize is indispensable food security commodity in Eastern Africa with Malawi and Zambia recording the highest maize per capita consumption of 129 Kgs and 119 Kgs per year respectively. Kenya has annual maize per capita consumption of 76 Kg. Uganda and Ethiopia has the lowest annual maize per capita consumption of 50 Kgs and 42 Kgs respectively. Various policies and strategies employed by Eastern Africa states to tackle food security and maize sub-sector challenges were critically discussed. The performance of various government Institutions and actors in attainment of food security were also analyzed. The study established that food insecurity in Kenya is mainly due to; Low funding of Agricultural sector, climate change that is leading to low crop production through drought, floods, emerging crop pests and diseases, use of outdated agricultural production technologies and land ownership challenges. Devolution of most agricultural functions to counties was cited as being one of the contributor to slow rate of agricultural growth and attainment of food and nutrition security in Kenya as envisaged in the Big four agenda and ASTGS.

Lastly the study made recommendations that are aimed at addressing challenges established in the research by exploiting the identified opportunities. The recommendations include; Prioritized funding of agricultural projects at national and county levels, promotion of maize flour blending to reduce demand pressure on maize, implementation of 10% commitment of annual government budget to Agriculture as contained in Malabo declaration of which Kenya and most Eastern African countries are signatories, promotion of agricultural mechanization for efficient agricultural operations, reduction of maize post-harvest loses through promotion of grain drying services, warehouse receipt system and aflatoxin control. These recommendations are key in realization of increased maize production, efficient marketing and food safety. Private public partnership and public participation in the formulation and implementation of food security intervention strategies were seen to be vital.

Chapter One

Introduction and Background to the Study

1.1 Background of the Study

The world is currently facing food insecurity as one of its greatest challenges.[1] Since 1974 when FAO started reporting on the state of food security and the extent of hunger in the world, it has been observed that the number of food-insecure people in the world has been on the rise since 2014. The share of undernourished people in the world population – the Prevalence of Undernourishment reached 10.9 percent in 2017. Over 850 million people globally experience the hardship that hunger imposes, a figure which continues to rise even amid the riches of the 21st century. The numbers of undernourished people were however decreasing in the 1974–2013 period.[2]

In majority of sub-Saharan African countries, food insecurity is a bit disturbing, since most of the countries in the region are low-income and food-deficit.[3] Despite overall gains in food security on a global scale, many countries in the Eastern Africa regions have performed dismally with most of the countries producing less food per capita. The affirmation of The World Food Summit (1996) of the right to safe and nutritious food through the reduction of the number of undernourished people remained far from possibility in eastern African countries, even to date. Food production in the region is caused by multifaceted factors such as political, economic, social, and environmental constraints. Despite the constraints, however, East African countries are making some positive progress in food security. Some of the key factors

[1]FAO, Food Security & Nutrition around the World, Retrieved from http://www.fao.org/state-of-food-security-nutrition/2018/en ,accessed on 22 October 2020 at 2030Hrs

[2]FAO, The State of Food Security and Nutrition in the World: Safeguarding Against Economic Slowdowns and Downturns. Food and Agriculture Organization of the United Nations, Rome, 2019, p. 12.

[3]FAO, Knowledge and Information for Food Security in Africa. Retrieved from http://www.fao.org/3/w9290e/w9290e01.htm,accessed on 23 November 2020 at 2343Hrs

for food security in the region include democracy and political stability whose effects are felt through better market development and investment.

Maize is the third most important commodity globally and indispensable cereal crop in the Eastern Africa region for human food and animal feed.[4] Maize, rice and wheat collectively provide at least 30 percent of the food calories to over 4.5 billion people of 94 developing countries.[5] Due to rapid economic growth in highly populated regions in Asia, the Middle East and Latin America, increased demand for poultry and livestock products from more affluent consumers, maize demand as livestock feed has grown tremendously in recent years. The maize feed market is growing especially in countries such as China and India, where economic growth is enabling many to afford milk, eggs, and meat. Rapid development in these countries is also driving up demand for maize as an industrial raw material while maize is a key ingredient in the bioethanol program in the USA.

Maize is an indispensable food security commodity due to its adaptability to varying climatic conditions and traditional utilization acceptance within the region.[6] Owing to its strategic importance, therefore, the maize market is on one hand characterized by relatively high government interventions to not only promote maize productivity but also control the availability, accessibility, utilization, and stability of maize and maize products including the input market for the maize value chain. On the other hand, the policy landscape is characterized by lobbying from farmer organizations, millers and processors, and consumer federations contesting for a fair share of treatment[7] thereby making maize a political crop. Eastern Africa is the eastern region of the African continent, variably defined by geography. According to the

[4] Sitko, N., A. N. Kuteya, B. Chisanga.. Analysis of the Effects of Maize Trade Restrictions in the COMESA Region on Food Prices and Market Development, Technical Report, Indaba Agricultural Policy Research Institute, Lusaka,2014, p. 3.
[5] FAOSTAT. Statistical databases and datasets of the Food and Agriculture Organization of the United Nations. http://faostat.fao.org/default.aspx, 2010, p. 17.
[6] Kornher, L,The State of Agricultural Commodity Markets (SOCO) Background Paper. p. 2. deal with the years in the footnotes please, 2018, p.45
[7] Njagi, Timothy. 2019. "Understanding the Political Economy of Maize in Kenya." The conversation; Academic rigour, journalistic flair, p. 53.

FAO (2017), the eastern Africa region comprised 13 countries namely, Botswana, Ethiopia, Kenya, Malawi, Swaziland, Madagascar, Mozambique, Sudan, South Sudan, Tanzania, Uganda, Zambia and Zimbabwe. Eastern Africa countries in this study will refer to only six countries: Kenya, Uganda, Tanzania, Ethiopia, Zambia, and Malawi. The choice of these countries in this study is informed by how predominant maize is grown. This study will exclude those countries where maize is not grown in significant areas.

Globally, farmers, governments, researchers and input suppliers have been responding to the expanding demand for maize. Their success and failure are attributable to a variety of policies implemented by respective governments worldwide. Over a period of 2003–08, maize production in sub-Saharan Africa has recorded an annual increase of 6.0%, 5.0%, and 2.8% in Asia, Latin America and Africa respectively. This increase is attributed to implementation of various policy interventions by the states.[8] Most of the policies implemented on maize are geared towards controlling prices, increasing the amount of cultivated land, and improving food production without compromising public health, environmental quality, and sustainability of farming systems. [9]

The combined challenges of increasing demand, continuing poverty and malnutrition, natural resource depletion and climate change will require the world to double the productivity and dramatically increase the sustainability and resilience of maize-based farming systems. This requirement can only be met through a concerted engagement of farming communities, international and national researchers, policymakers, the private sector, and many other development partners that intrinsically involves target communities and national governments in designing appropriate and pro-poor solutions.

[8] FAOSTAT, Statistical databases, United Nations, pp.3-4.
[9] Tilman, D., etal Agricultural sustainability and intensive production practices. Nature, 2002, p. 671.

1.2 Statement of the Research Problem

While maize is the cheapest source of calories in Eastern Africa, domestic production has not kept pace with the rising demand which is mainly driven by the rapid population growth and yield stagnation in the region due to among other factors: vulnerability of the crop to climatic shocks and prevalence of pests (e.g. fall armyworm and Desert locust) and diseases (Maize Lethal Necrosis Disease), inadequate extension and use of modern inputs (hybrid seed, fertilizer, and irrigation), uneconomical landholding and declining soil fertility. Consumer preferences have also increased pressure on maize in some Eastern Africa states whereby, high cost of other staples has driven demand for maize as is the case for *matoke* in Uganda.[10]

The gap between domestic/local production and consumption has, therefore, widened overtime despite occasional surplus domestically and within the region's leading producers such as Tanzania and Uganda. This is attributed to market failures and Ad hoc trade restrictions that precipitate poor maize commodity distribution between deficit and surplus region. Due to a complex interplay of factors (among them, governance issues), most Eastern African Countries continue to experience food insecurity at alarming levels.

As a result, Eastern Africa countries have employed various interventions to enhance the stability of maize supplies, improve domestic production and self-sufficiency but with varying degrees of success. With the advent of climate change, deficit and seasonality patterns of maize and maize products have become more frequent and unpredictable. Both consumers and producers are frequently facing large fluctuations in prices which are known to weather down purchasing power at the household level.

Despite the various efforts by the government and other agricultural stakeholders in Kenya to address food insecurity, 10 million Kenyans still suffer from food insecurity, four

[10] Kilimo Trust, Characteristics of Maize Markets in East Africa." Characteristics of maize markets in the EAC, https://www.kilimotrust.org/reacts/files/Maize_markets_X-tisation.pdf. 2017, p. 5

million people are chronically food insecure, 1.5 million perpetually require food aid and 26% children under 5years are stunted.[11] 2020 Global Hunger Index (GHI) report however indicates a reduced hunger index of Kenya of 23.7% compared to 36.9% that was recorded in 2000.[12] Kenya has increasingly become dependent on food imports (30-40%) to bridge the national deficit.[13] This situation is bound to increase if critical agricultural production interventions are not put in place given the current population growth of 2.2% per annum.[14] The Kenyan constitution article 43(1) (c), provides that every Kenyan has the right to be free from hunger, and to have adequate food of acceptable quality.[15]

The study evaluated the role of existing production, marketing, and consumption policies in the maize sub-sector in Kenya and contributes to the body of knowledge on the optimal policy design. The study has shown the significant influence of policies on maize production, marketing and consumption in Kenya and Eastern Africa region and hence their effects on the national food security. The analysis of the effectiveness and shortcomings of the existing policies and strategies during the study has led to the identification of the challenges and opportunities that exist for the improvement of the maize sub-sector in Kenya.

1.3 Research Objectives

The broad objective of the study is to investigate the role of policy on the attainment of food security and a sustainable maize sub-sector in Eastern Africa. The specific objectives of the study are to:

1.3.1 Examine food security and policy status in maize sub-sector in the Eastern Africa Region.

[11]Ministry of Agriculture Livestock Fisheries and Irrigation, Agricultural Sector Transformation and Growth Strategy, 2018, p. 28,
[12]Klaus Von Grebmer Et Al, 2019 Global Hunger Index, 2019, p.15
[13] Ministry of Agriculture, Livestock and Fisheries, National Food And Nutrition Security Policy Implementation Framework 2017-2022, 2017, p 8
14 Kenya National Bureau of Statistics, 2019 Kenya Population and Housing Census: Volume I, 2019, P 5
[15] Republic of Kenya, The constitution of Kenya,2010, Article 43(1)(c)

1.3.2 Critically analyze the food security and policy regime in maize sub-sector in Kenya.

1.3.3 Discuss the challenges and opportunities in maize sub-sector in Eastern Africa and Kenya.

1.4 Research Questions

1.4.1 What is the food security and policies status in maize sub-sector in the Eastern Africa Region?

1.4.2 What is the food security status and policy regime in maize sub-sector and in Kenya?

1.4.3 What are the challenges and opportunities in maize sectors in Eastern Africa and Kenya?

1.5 Justification of the Study

This study has both academic and policy justification

1.5.1 Academic Justification

This study has assisted in generating useful agricultural information on existing production, marketing, and consumption policies in the Maize sub-sector in Eastern Africa and Kenya. The study has shed light on the status (effectiveness and gaps) of existing production, marketing, and consumption policies in the Maize sub-sector in Eastern Africa with specific focus on Kenya. The study has exposed the existing challenges and opportunities for improvement of the Maize sub-sector performance in Kenya. The information and recommendations generated from the study is of vital use to the diverse maize sub-sector stakeholders (Agricultural Producers, government agencies, and development partners) nationally, regionally and internationally. The information contained in study will provide an essential basis in development and implementation of appropriate food security policy guidelines for the realization of the Sustainable Development Goals (SDGs) number two on hunger and malnutrition matters by 2030.

1.5.2 Policy Justification

Research has traditionally played a significant role in shaping policy. Schnabel[16] notes that well-disseminated research provides opportunities for stakeholders to benefit from the generated recommendations. This study has generated knowledge on how production, marketing and consumption policies affect attainment of food security and recommended policy interventions that will assist in improving maize subsector. Maize crop is a suitable target for development policies in all Eastern African countries owing to its immense importance as a source for economic livelihood and energy/calorie source. Maize sub-sector is key for smallholder farmers in Eastern Africa with an average of between 6 and 21of total household expenditure and 5.5 to 21 percent of the income being attributed to maize.

1.6 Literature Review

The selected theoretical and empirical literature review of policy matters relating maize production, marketing, and consumption in Eastern Africa is undertaken this section. It adds to the debate on major theories that informs policies related to food security.

1.6.1 Theoretical Literature

This sub-section reviews theories which in one way or another explain aspects under investigation. The theories are: the Complex Interdependence Theory, the Polyheuristic Theory of Decision, the Impoverishment Risk and Reconstruction Model, and the Rational Choice Theory.

1.6.1.1 The Polyheuristic Theory of Decision

Polyheuristic theory combines elements of rational choice theory with cognitive approaches to decision making. As such, it can account for both the outcomes and the processes of food security policy making. The policy makers use multiple heuristics in response to both cognitive constraints and situational factors, such as time pressure, information overload, etc. The theory

[16] Annabel Schnabel et al, *Researching Conflict in Africa: Insights and Experiences* (New York: UN Press, 2005, p. 29

captures the vastness of the reality that policymakers often face, arguing that policymaking is often non-compensatory and other factors cannot compensate, or override the implemented policy. According to polyheuristic theory, decision-makers tend to process information in two stages, with the first stage focusing on heuristics and cognitive shortcuts, and the second stage being more analytical in nature[17]. Since most of the policymaking for food security is both dimension-based with different options and also involves non-compensatory decision rules, polyheuristic theory will be very key in this study.[18]

Polyheuristic theory suggests that, when facing a decision situation, policymakers first use one or more simplifying heuristics (cognitive shortcuts) to eliminate alternatives that are unacceptable in relation to critical dimension or criterion. As such, the polyheuristic theory assumes that decision making is nonholistic/nonexhaustive.[19] In holistic decision-making, all aspects of all alternatives are compared and evaluated before a decision is made. Such a decision process is both cognitively demanding as well as time-consuming, and polyheuristic theory assumes that factors such as stress, task complexity, incomplete information, and familiarity (or lack thereof) with different situations and policy alternatives mean that a holistic decision-making process is not employed until the set of options have been managed to reasonable levels[20]. In the second stage, policymakers select one of the remaining alternatives seeking to maximize benefits and minimize risks.[21]

[17] Redd, Steven B., and Alex Mintz. "Policy Perspectives on National Security and Foreign Policy Decision Making." The Policy Studies Journal 41. S1, 2013, p. S29
[18] Mintz, Alex, and Nehemia Geva,The Poliheuristic Theory of Foreign Policy Decision making. In Decision making on War and Peace: The cognitive-rational debate, edited by Nehemia Geva and Alex Mintz, 81-101. Boulder, CO: Lynne Rienner. 1997, p.22.
[19] Magu M. S. Explaining Foreign policy in post-colonial Africa, Springer Nature, 2021, p.19
[20] Redd, Steven B., "The Influence of Advisers on,Decision Making, 2002, pp. 336-338
[21] Mintz, Alex. "How Do Leaders Make Decisions?, 2004, pp. 6-7

1.6.1.2 Impoverishment, Risk and Reconstruction (IRR) Model

The IRR model aims at explaining what happens during food insecurity and to create a theoretical safeguarding tool capable of guiding policy, planning and actual interventions to counter the adverse effects. The model point's ways to risk reversals and can guide strategies for the implementation of policies related to food security. The IRR model aims at rendering the cumulative effects of food insecurity analytically understandable both distinctively and in their interconnection.

In the construction of the IRR model, a food security policy development is a multi-faceted process. The food security policy implementation processes have potential risks about their ability to achieve the desired goals. The model, therefore, concludes that food insecurity risks can be counteracted through a policy response, and a strategy message that means, specific plans are required to mitigate food insecurity related risks. The theory embraces the engagement of all stakeholders in the planning and implementation of the programmes.

1.6.1.3 The Rational Choice Theory

The study also makes use of Rational Choice Theory. James Coleman greatly influenced the rational choice sociology. In his work, the foundation of social theory, Coleman argues that sociologists should be concerned with the setting in which actions occur. According to rational choice theory, individuals are seen as motivated by the wants or goals that express their preferences. They act within specifically given constraints and act based on information that they have about the conditions under which they are acting.[22] Rational choice theorists hold that individuals must anticipate the outcomes of the alternative course of action and calculate that which will be best for them.[23] The rational choice theory assumes that actors act rationally

[22] Green, S.L. (2002). Rational Choice Theory: An Overview Retrieved from www.busna.baylor.edu/steve_green/greenasc. pp. 2-4.
[23] Scott, J. Rational Choice Theory from Understanding Contemporary Society: Theories of Present, London: Sage Publications, 2000, p.19.

in abroad sense and focus on aggregate outcomes that an individual actor in interaction with one another is likely to bring out.

With respect to food security and its policy environment, rational choice theory is important in understanding the behavior and actions of policy makers who are motivated by various goals that sometimes may conflict with those of target beneficiaries. In their actions, policy makers in food security are faced by numerous constraints and are therefore forced to act based on the prevailing conditions. By anticipating the outcomes of the alternative course of action, policy makers in food security support those interventions which yield the best outcomes. Policy makers are assumed to be rationally in their decisions.

1.6.2 Empirical Literature

The Mexican government has for many years been involved in farm subsidy programs that benefit most farmers including maize farmers. In its implementation, the Mexican agricultural spending has increased substantially.[24] Chinese government has had several policies implemented to uplift corn farming in the country. In 2004, China switched from taxing corn farmers to providing subsidies for seed and machine purchases. To further boost rural income and ensure national food security, China started a nationwide corn stockpiling program in 2007. The corn support policy led to a drop in domestic corn consumption as well as a substantial increase in the import of corn substitutes. While China's corn production is mainly used for domestic consumption, policy changes in Chinese corn markets have trade implications for the global corn, beef, and pork sectors. In September 2016, the United States filed a complaint with the World Trade Organization over China's excessive subsidies to corn, rice, and wheat farmers.[25] Nevertheless China has introduced a new corn policy.

[24] Jonathan F. and Libby Haight, Subsidizing inequality: Mexican corn policy since FANTA. Woodrow Wilson International Center for Scholars, 2010, p.3.

[25] Office of the United States Trade Representative (OUSTR). "United States Challenges Excessive Chinese Support for Rice, Wheat, and Corn." Office of the United States Trade Representative, Washington D.C. ustr.gov/about-us/policy-offices/press-office/press-releases/2016/september/united-states-challenges,2016,p .13.

In Canada, maize production has been deeply transformed by recent government policies. Export driven agricultural production has significantly increased owing to farmers' targeted policies by the government. Canada total annual payments made to agriculture from government sources per year from 2007–2013 is estimated at $3.1 billion.[26] Canadian government for many years has provided safety net to stabilize farm income and to reduce the negative impacts of production disasters and volatile commodity prices.[27]

1.6.3 Gaps in the Literature

The reviewed literature lacked sufficient evidence on appropriateness of most policies that were implemented in other countries and possibilities of replication in other countries like Eastern African countries (since they possess unique characteristics). There was also minimal literature on countries that had implemented policies that were successful in addressing food security situation through their maize sub-sector. Most policies reviewed had mixed reactions (recording gains on one hand and drawbacks on the other hand). The effects of most policies were also short lived.

1.6.4 Conceptual Review

1.6.4.1 Food Security

Food security is defined as a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.[28] Food security has three main components namely; food availability, access and utilization.

[26] OECD, Producer and consumer support estimates database, OECD, Agriculture and Fisheries, Paris, 2015, pp. 3-4.
[27] Blake, R.B. Rural and regional development strategies in Canada: The search for solutions. Royal Commission on Renewing and Strengthening our Place in Canada, St. John's, Newfoundland and Labrador, 2003, p. 8.
[28] KBNS, Vol. IV KPHC, 2020, p.14

1.6.4.2 Food resilience

As defined by the FAO, this is the ability of a household to keep within a certain level of well-being (i.e., being food-secure) by withstanding shocks and stresses.[29] This definition implicitly considers both (ex-ante) actions that reduce the risk of households becoming food insecure, and (ex post) actions that help households cope after a crisis occurs.

1.6.4.3 Vulnerable population

With respect to determining targets for the strategic food reserve coverage, this population is defined as the 1.3 chronically million food-insecure Kenyans in ASAL areas and the approximately 4 million Kenyans in need of government support to be food-secure during emergencies (e.g., droughts) based on historical data. For this population, the assumed per capita consumption is 114 kg/capita/year of maize.[30]

1.6.4.4 Global Hunger Index (GHI)

The GHI is a tool for comprehensively measuring and tracking hunger at global, regional, and national levels based on four component indicators.[31] The components are; under-nourishment, child wasting, child stunting and child mortality.

1.6.4.5 Undernourishment

It refers to the share of the population with insufficient caloric intake.

1.6.4.6 Child wasting

Share of children under age five who have low weight for their height, reflecting acute under-nutrition.

1.6.4.7 Child stunting

Share of children under age five who have low height for their age. It reflects chronic under-nutrition.

[29] MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p.11.
[30] Ibid
[31] Concern Worldwide and Welthungerhilfe, 2020 Global Hunger Index- One Decade to Zero Hunger Linking Health and Sustainable Food Systems, 2020, p. 7

1.6.4.8 Child mortality

This refers to mortality rate of children under age five. It partly reflects the fatal mix of inadequate nutrition and unhealthy environments.[32]

Depending on the values of the above indicators, the hunger index can be classified as being Low ($0 \leq 9.9\%$), Moderate (10 to 19.9%), Serious (20 to 34.9%), Alarming (35 to 49.9%) and Extremely Alarming 50% and above.

1.7 Theoretical Framework

This study uses the complex interdependence theory to explain or discuss the problem of food security and policy in eastern Africa The policy environment in most countries in the world is the opposite of realism.[33]The relationship between government policy and agricultural supply requires analysis on multiple levels. The approaches taken by the government to agricultural production are shaped by ideas of economic development, economic interests, the prescriptions and requirements of international agencies (such as the World Bank and the International Monetary Fund) and regimes, local environmental conditions, legacies of national and sub-national institutions among others. Research on agricultural production, policy, and public health requires attention to all of these factors and efforts to piece together this puzzle into a comprehensive understanding of how these factors intersect.

Complex interdependence is characterized by actors who have multiple channels of communication and agenda consisting of multiple issues that are not arranged in a clear or consistent hierarchy (multiple issues with no hierarchy). Most realists assume that actors that are targeted in policies exist and relate as coherently units. This is in most cases far from reality. Most actors present complex inter-relationship and rarely operate as coherent units. There is an absence of hierarchy amongst the actors. Additionally, food security concerns do not

[32] Ibid

[33] Keohane, Robert & Nye, Joseph Power and Interdependence, 4th ed. (London: Pearson), 2011, p.38.

consistently dominate the agenda. Due to complex interdependence, the consensus in policy making is less likely to occur under complex interdependence.

This theory is relevant in this study because holistic policy making in food security is dependent on the functionality of lower-level policies in production, marketing, and consumption. It is not possible to achieve desired outcomes on food security without adequate production from the farmers. The marketing channels must also function efficiently to properly link the producers with the final market (consumers). The actors in the maize value chain (farmers, traders, distributors, processors, consumers, transporters) also often act independently from each other thus leading to complex possible channels of communication leading to a possibility of food insecurity in the country.

1.8. Hypotheses

1.8.1 The slow growth of Maize sub-sector in Kenya is occasioned by weakness in the existing agricultural policies in the sub-sector.

1.8.2 There are decreasing maize yields in Kenya in spite of development and release of high yielding maize varieties in the country due to climate change and agricultural input affordability challenges.

1.8.3 There is reduction in consumption of maize in Eastern Africa and Kenya due to increasing preference of other cereals for foodstuffs by the Kenyan population.

1.9 Research Design and Methodology

1.9.1 Research Design

This study used a descriptive case study research design. The case study is an intensive, holistic description and analysis that explores a bounded system or case over time "through detailed, in-depth data collection involving multiple sources of information-rich in context. Case study

research design is a systematic investigation of a unit or complex phenomena in which a researcher increases understanding by exploring data using variables.[34]

Once a case of Maize sub-sector in Kenya was identified, the study commenced with extensive collection of secondary and primary data. Primary data was gathered through interviews, questionnaire administration (Personal and Online) and observations. The case study method is a very popular form of analysis of modern phenomena through careful and complete observation of issues under investigation. According to Kothari[35] case method is known for its depth rather than breadth. The case study places more emphasis on the full analysis of a limited number of events or conditions and their interrelations.

1.9.2 Data Collection

Primary and secondary data was gathered and used in this study. The Research permit number NACOSTI/P/21/9292 dated 19th March 2021 was sought and received authorizing the researcher (Meltus A. Were) to conduct research on matters relating to the topic of Critical Analysis of food Security and Policy in Eastern Africa: A case study of maize sub-sector in Kenya. Primary data was collected from regional offices in Kenya, National Government and County government offices and Private institutions. Data was collected online and personal interviews, Field visits and participant observation. Online questionnaire administration was predominantly used during the study for primary data collection due to direct contact limitations occasioned by the prevalence of Covid-19 pandemic in Kenya during the study period. Care was taken in choosing data collection method to ensure medical safety, cost-effectiveness and time-saving while not compromising on its ability to capture all aspects of

[34] Twycross, A. and Heale, R., Evid Based Nurs. What is a Case Study? 2018, p.21.
[35] Chakravanti Kothari R, Research Methodology – Methods and Techniques 3rd Ed. (India, New Age International Publishers, 2004, pp 113 - 115

information sought.[36] The interview schedule used consisted of open and closed-ended questions. Mobile phone recorder was used to record and review the interviews at a later time.

The interview schedule was pretested using a smaller sample of respondents that had similar characteristics to the study subjects. The information from the pretest was used to make corrections on the interview schedule in areas such as wording, lack of clarity of instructions among other errors. Necessary changes in the original interview schedule were made to come up with a more efficient data collection tool. Secondary data such as published work was used in discussing the results emanating from this study.

This study used non-probability sampling techniques such as convenience sampling and snowball sampling. Snowball sampling in this particular study was used where a small group relevant to the subject matter was used to reach out widely to the network to make more contacts.

1.9.3 Data Analysis

Both quantitative and qualitative data analytical methods were used in this study by use of computer analysis program. Before data analysis, the data collected from interviews was consolidated. Descriptive statistics was applied, and results presented in form of frequency tables, cross-tabulations and graphs. Data from observations was recorded in a notebook and reported in narration. Qualitative data obtained from key informant interviews was interwoven with results obtained from the analysis of quantitative information from structured interviews to explain the overall trends in the results.

1.9.4 Data Presentation

The research is presented in tables, graphs, pie-charts and diagrams to demonstrate the magnitude of the figures emanating from quantitative data. For qualitative data, a narrative description that connects the findings to the research questions was done.

[36] Kombo DK, Tromp DLA; Proposal and Thesis Writing: An Introduction. (Nairobi Kenya, Paulines Publications Africa, Don Bosco Printing Press, 2009, p. 34.

1.11 Study Limitations

The study was carried out in the Eastern Africa region and in Kenya in particular. The generalization of the findings is done to other areas of Africa and the world with utmost caution since different regions differ from one another to some economic, political and cultural factors. However, due to the prevailing Covid-19 pandemic coupled with financial resource constraints, there was limited geographical coverage and interpersonal interaction during primary data collection.

1.12 Chapter Outline

Chapter one consists of introduction, background to the study, statement of the problem, justification, literature review, objectives of the study, research questions, and methodology. Chapter two reviews maize policies and food security in the Eastern Africa Region. It expounds on the Eastern Africa maize sub-sector, laws and policies in Kenya, Tanzania, Malawi, and Uganda. The study also discusses the contribution of key institutions that are concerned with maize and food security in the Eastern Africa region.

Chapter three and four analyzed the Food security and policy regime in maize sub-sector in Kenya and establish the challenges and opportunities in maize sectors in Eastern Africa and Kenya respectively. Chapter five finally draws conclusions and makes recommendations for improvement of Maize sub-sector in Kenya and Eastern African Region.

Chapter Two

A Review of Food Security and Maize Policies in the Eastern Africa Region

Introduction

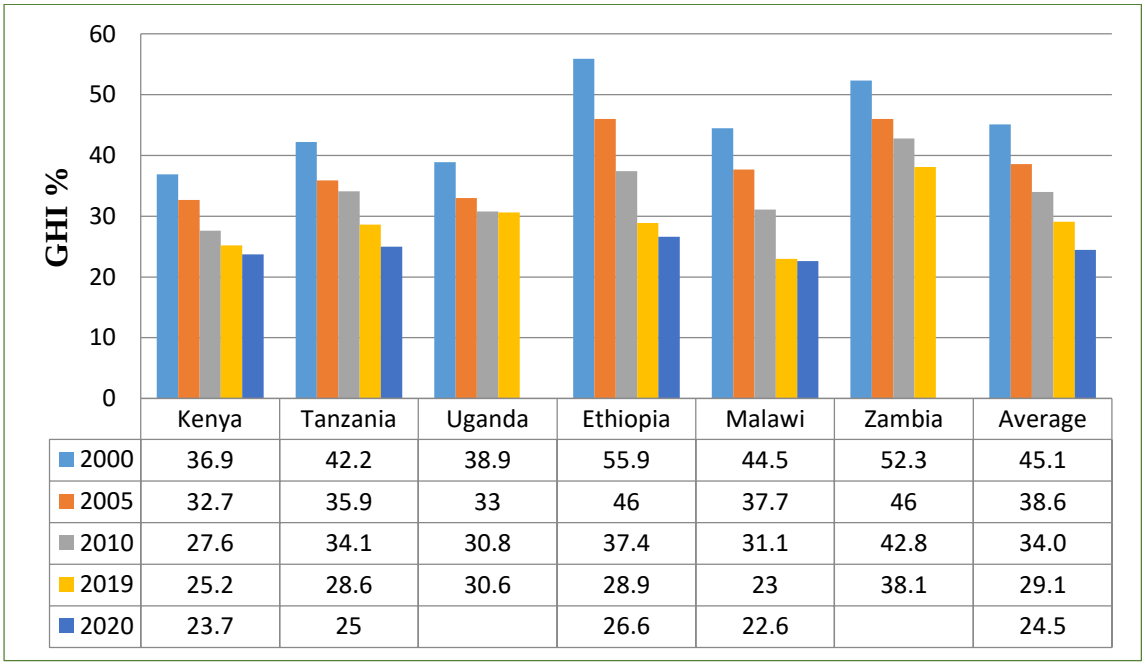
Food insecurity is experienced by most Eastern African countries in various aspects (availability, access, affordability and utilization). Multifaceted factors such as political, economic, social, and environmental constraints are responsible for this unfortunate situation. Maize is an indispensable food security commodity and the most important cereal in the Eastern Africa for human consumption, animal feed, and industrial processing and manufacturing. In the region, Ethiopia and Tanzania are the largest producers of maize in terms of quantity while Malawi and Zambia are the highest in terms of per capita production and consumption. Generally, the region is a net importer of maize. The goal of achieving food security through maize is at the heart of most governments in Eastern Africa. A number of key policies with direct implications on the maize sub-sector have been implemented in the region with various degree of success. This chapter reviews maize policies and food security in the Eastern Africa region. The chapter provides an overview of the status of food security and maize sub-sector in Eastern Africa with special focus on maize sub-sector policies in the region.

2.1 The Status of Food Security in the Eastern Africa

Most Eastern African countries experience food insecurity.[37] Many countries in the Eastern Africa regions perform dismally on food security tenets (access, availability, affordability and utilization). Food security in the region is threatened by multifaceted factors such as political, economic, social, and environmental constraints. The most key environmental constrain is related to climate change (drought, floods, pests and diseases such as fall army worms, desert locust and Maize Lethal Necrosis Disease (MLND). Food security in the region is also affected

[37]FAO,Knowledge and Information for Food Security in Africa". Retrieved from http://www.fao.org/3/w9290e/w9290e01.htm, 2019, pp. 13-15.

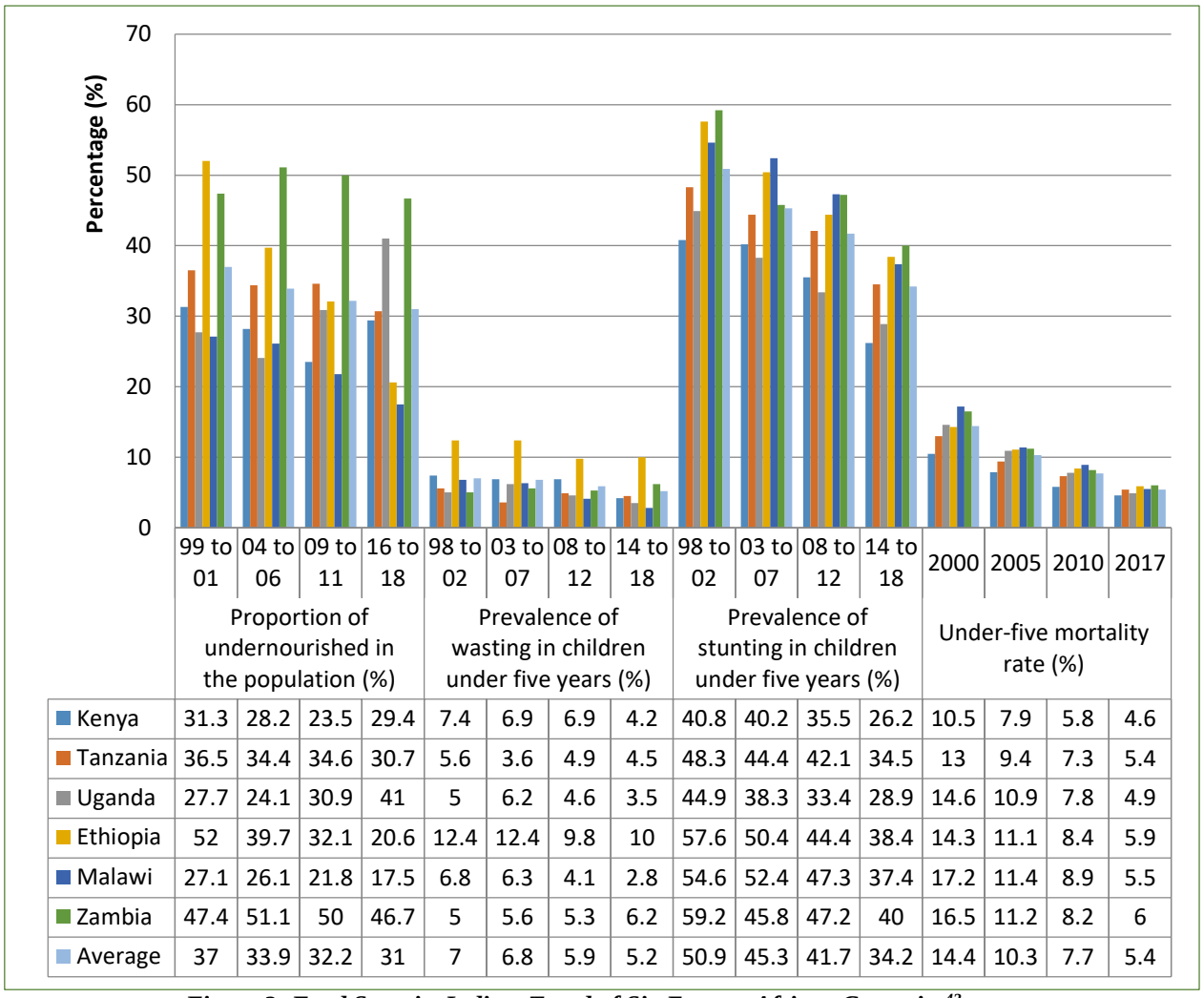
by a number of other factors such as poor storage, post-harvest losses, aflatoxin, poor marketing and distribution systems as well as inappropriate processing and subsidies policies.[38] Millions of people in Eastern Africa region face famine every year, a situation that compels a number of humanitarian interventions on food relief. Some families in South Sudan, Somalia, Kenya, and Ethiopia are often pushed to the brink of starvation– leaving them with no place to turn.[39]The prevalence of stunting in under-fives in Eastern Africa region is 35.2% which is significantly greater than the global average of 21.9%.[40]Conversely, the Eastern Africa sub-region's prevalence of wasting in under-fives of 6% is less than the global average of 7.3%. However, from the 6 Eastern Africa countries food security indices data analyses, it is evident that food security status is averagely improving as shown in figure 1 and 2 below.



	Kenya	Tanzania	Uganda	Ethiopia	Malawi	Zambia	Average
2000	36.9	42.2	38.9	55.9	44.5	52.3	45.1
2005	32.7	35.9	33	46	37.7	46	38.6
2010	27.6	34.1	30.8	37.4	31.1	42.8	34.0
2019	25.2	28.6	30.6	28.9	23	38.1	29.1
2020	23.7	25		26.6	22.6		24.5

Figure 1: Selected Eastern Africa Countries GHI Trend[41]

[38]Global Nutrition Report in "Eastern Africa Nutrition Profile - Global Nutrition Report". Retrieved from globalnutritionreport.org/ resources/eastern-africa/, 2020, p. 1
[39]East Africa Food Crisis (irteams.org), 2020 "East Africa Food Crisis". Retrieved from https://www.irteams.org/project/east-africa-food-crisis
[40]Ibid pp. 2
[41] Helvetas R.M., Global Hunger Index: The Challenge of Hunger and Climate Change, 2019, p. 15.



	99 to 01	04 to 06	09 to 11	16 to 18	98 to 02	03 to 07	08 to 12	14 to 18	98 to 02	03 to 07	08 to 12	14 to 18	2000	2005	2010	2017
	Proportion of undernourished in the population (%)				Prevalence of wasting in children under five years (%)				Prevalence of stunting in children under five years (%)				Under-five mortality rate (%)			
Kenya	31.3	28.2	23.5	29.4	7.4	6.9	6.9	4.2	40.8	40.2	35.5	26.2	10.5	7.9	5.8	4.6
Tanzania	36.5	34.4	34.6	30.7	5.6	3.6	4.9	4.5	48.3	44.4	42.1	34.5	13	9.4	7.3	5.4
Uganda	27.7	24.1	30.9	41	5	6.2	4.6	3.5	44.9	38.3	33.4	28.9	14.6	10.9	7.8	4.9
Ethiopia	52	39.7	32.1	20.6	12.4	12.4	9.8	10	57.6	50.4	44.4	38.4	14.3	11.1	8.4	5.9
Malawi	27.1	26.1	21.8	17.5	6.8	6.3	4.1	2.8	54.6	52.4	47.3	37.4	17.2	11.4	8.9	5.5
Zambia	47.4	51.1	50	46.7	5	5.6	5.3	6.2	59.2	45.8	47.2	40	16.5	11.2	8.2	6
Average	37	33.9	32.2	31	7	6.8	5.9	5.2	50.9	45.3	41.7	34.2	14.4	10.3	7.7	5.4

Figure 2: Food Security Indices Trend of Six Eastern African Countries[42]

Maize is the most important cereal in the Eastern Africa for human consumption, animal feed, and industrial processing and manufacturing.[43]Maize is an indispensable food security commodity in Eastern Africa due to its adaptability to varying climatic conditions and traditional utilization acceptance within the region.[44] Eastern African countries face combined challenges of increasing demand, continuing poverty and malnutrition, natural resource depletion and climate change that calls for rise in productivity, sustainability and resilience of maize-based farming systems.

[42] Helvetas R.M., Global Hunger Index: The Challenge of Hunger and Climate Change, 2019, pp. 50-53.
[43]Sitko, N., A. N. Kuteya, B. Chisanga., Analysis of the Effects of Maize Trade Restrictions in the COMESA Region on Food Prices and Market Development, Technical Report, Indaba Agricultural Policy Research Institute, Lusaka, 2014, p. 3.
[44] Kornher, L. The State of Agricultural Commodity Markets (SOCO) Background Paper, 2018, p. 2.

The Eastern African region faces severe food shortage, hunger and loss of crops as well as livestock mainly due to harsh climatic conditions that is characterized by drought. Rain deficits severely affect crop planting, germination, and overall vegetation conditions in the region. With a rainfall of 40-80 percent below average levels in the region, food security is at a critical risk. Due to water shortage and declining productivity, there has also been a 25-35 percent increase in the 2019 prices of maize compared to 2018. In Tanzania, delayed and below-average rains in 2018-19 affected crops harvest, as vegetation conditions continue to be poor.[45] The prices of staple crops are increasing throughout East Africa with a decline in the export of local agricultural commodities. The challenges of pasture deterioration, water scarcity, declining livestock productivity and milk production, and reduced household income all link back to rainfall deficits in the region. These challenges are further leading to atypical migration patterns and resource-based competition.

2.2 Maize Sub-Sector Status in Eastern Africa

Tanzania and Ethiopia are the largest producers of maize in Eastern Africa by total quantity with Malawi and Zambia having the highest per capita consumption is in the region as shown in figure 3 below. Eastern Africa region is a net importer of maize and relies on exports from South Africa and occasionally from United States and Latin America to meet the deficit.[46] This was confirmed during the interview with 27.8% of the respondents indicating that South Africa was a common source of maize import to Kenya. 5.6% of respondents confirmed that Kenya greatly dependent on Maize imports from Mexico with 33.3% of respondents ranking Mexico as a common source of maize import to Kenya as shown in Appendix 5b. This intra and Extra-regional trade plays an important buffering role to domestic food production shocks.

[45]IFPRI, Food Insecurity in East Africa" Retrieved from https://www.foodsecurityportal.org/blog/food-insecurity-east-africa, 2019

[46] Davids, T., Schroeder, K., Meyer, F., Chisanga, B., Regional price transmission in Southern African maize markets, Invited Paper presented at the 5th International Conference of the African Association of Agricultural Economists, September 23-26, 2016, Addis Ababa, Ethiopia, 2016, p. 12.

Due to low maize productivity, Kenya has mainly depended on maize imports from Uganda and Tanzania to meets its annual maize its deficit. Exports from Uganda and Tanzania often supply deficit regions in Kenya.[47]This fact was confirmed during the study with 66.7% of the respondents stating that Uganda was the most common external source of maize to Kenya while 52.9% of those interviewed asserting Tanzania as being the most common maize import source to Kenya as shown in Appendix 5b. Although Maize is an important food crop in Kenya, its productivity has remained low (only 1.6 tons/ha). Ethiopian maize production is twice as that of Kenya. Currently, Ethiopian maize productivity stands at 3.7 tons/ha. Low productivity is attributable to numerous factors such as low access to extension services, inadequate use of modern inputs, poor rural infrastructure, high land sub-division and adverse effects of unpredictable and unfavorable weather patterns.[48] There also exists market failure which requires government intervention for normalization.

The maize sub-sector in Kenya is dominated by smallholders who are characterized by high vulnerability to climatic shocks due to inadequate investment in irrigation systems, low uptake of modern technologies, the volatility of farm inputs, and competing land uses, poor access to agricultural information leading to yield stagnation. This was confirmed during the interview with the majority of the respondents (81.2%) rating unpredictable weather patterns due to climate change exhibited by drought, floods, emerging pest and disease outbreaks as being the greatest contributor to low maize Sub-sector production and growth in Kenya (Refer to Appendix 5a for details). Inadequate agricultural inputs and Credit access challenges and low agricultural mechanization support were rated as being major contributors to low maize production in Kenya by 73.7% and 64.3% of the respondents respectively. 64.2 % of the respondents attributed low production and growth of maize sub-sector to be only averagely

[47] FEWSNET, Southern African Regional Supply and Market Outlook (August 2017), 2017, p. 5.
[48] Ibid, p. 17.

contributed by low access to Agricultural Extension Service. The success of food security through the maize sub-sector is hampered by misguided policies, weak institutions, and the adverse effect of climate change.[49] There is need from this study for various agricultural development agents to focusing on interventions aimed at addressing climate change, Control of emerging Pest and disease, enhancing access to agricultural inputs, mechanization and agricultural extension services.

Maize trade and marketing policies in Kenya are mainly geared towards dealing with the double challenge of high and volatile prices. On one hand, most smallholder farmers consider the commodity farm prices as not high enough to cover most input costs while at the same time most end consumers find the normal maize prices as generally high and compromising on their food access. Several other policies are aimed at containing food price instability. Kenya has over time formulated policies to militate against food price uncertainties with aim of raising smallholder farm productivity and food affordability.[50]

Policies on maize have always been contested due to their undesirable impact on key stakeholders (farmers, millers, government, and consumers). Although it is expected that farmers and millers are supposed to get reasonable profits while consumers get affordable prices, this is not the case for Kenya. Key policies that have been formulated in the past to address food security include; producer price support, fertilizer and food subsidy.[51]

The production of maize in eastern African countries is marked by volatility. Maize is a major source of energy to the majority of the Eastern Africa population.[52] Other than

[49] Daly, Jack, Danny Hamrick, and Andrew Guinn. "Maize Value Chains in East Africa." Center on Globalization, Governance & Competitiveness, Duke University (October), 2016, pp 1–49.
[50] Nyoro, J.K., Ayieko, M., and Muyanga, M., The Compatibility of Trade Policy with Domestic Policy Interventions Affecting the Grains Sector in Kenya. Paper presented at the FAO's workshop Trade and Policy for Food Products Conducive to Development 1-2 March 2007, Rome, Italy, 2007, p. 4.
[51]Ariga, Joshua and T.S. Jayne. Maize Trade and Marketing Policy Interventions in Kenya. Chapter in A. Sarris and J. Morrison (eds), Food Security in Africa: Market and Trade Policy for Staple Foods in Eastern and Southern Africa. Food and Agriculture Organization of the United Nations and Edward Elgar, Cheltenham, UK, 2009, pp. 6-7.
[52]Chauvin, N. D., Porto, G., Mulangu, F. Agricultural Supply Chains, Growth and Poverty in Sub-Saharan Africa, Springer, Berlin., 2017, p. 8.

consumption of maize may by human, maize is utilized as animal feed, biofuel in the region.[53] Annual per capita consumption is highest in Malawi, Tanzania, Kenya, and Zambia as shown in Figure 3 below.

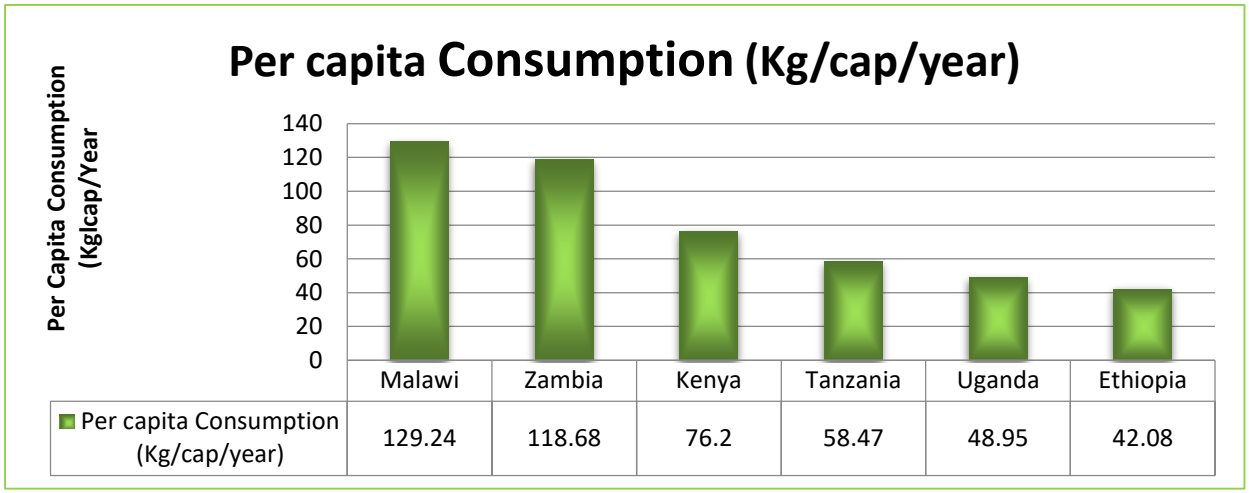


Figure 3: Per Capita Maize consumption in selected countries in 2013

Source (Kornher, Lukas, 2018)

Maize contributes a major share of source of household incomes and expenditures as shown in Table 1. This makes maize an indispensable crop in Eastern Africa and equal to none in terms of household importance in the region.

Table 1: Importance of Maize in the region

Countries	percent of budget share	percent of the income share
Tanzania	15.7	18.2
Malawi	20.9	21.3
Zambia	15.8	12
Uganda	6	5.5
Ethiopia	11.8	8.5

Source: LSMS data

The goal of achieving food security is dearly embraced by most governments in Eastern Africa. Most government interventions are geared towards the need for all people, at all times,

[53] Kornher, Lukas, Maize markets in Eastern and Southern Africa (ESA) in the context of climate change. The State of Agricultural Commodity Markets (SOCO) 2018: Background paper. Rome, FAO, 2018, p. 58.

to have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Good policies can play an essential role in dealing with food insecurity, which is predominantly rooted in aspects of poverty, power, and inequality. According to WFP (2019), a total of 18.7 million people is facing food insecurity requiring humanitarian assistance and the numbers are particularly high in the Eastern African region. Most of the hard-hit members of the Eastern African population live in arid and semi-arid lands, areas with ongoing and protracted conflict.[54]

Food insecurity in Eastern African countries can be attributed to several complex factors, some that can be controlled by the governments and others that are outside their direct control. Governments oversee major institutions, rules and political processes that help in supporting or constraining specific pathways to sustainable food security. Proper management of these institutions, rules and political processes constitute good governance. Good governance in promoting sustainable food security is implemented along with principles such as responsiveness, accountability, transparency, participation, and equality. These principles are key in ensuring that food security programs are effectively implemented, to the greatest benefit of those who most need them[55].

Maize is a cereal crop with multiple uses and serves as the most important staple food crop in Kenya. It is grown as a subsistence and commercial crop on about 2.2 million hectares of land, by both large and small-scale farmers. The current national average production is between 16 and 20 bags per hectare, but with appropriate interventions, production can be doubled.[56]

[54] FAO, ECA and AUC, Africa Regional Overview of Food Security and Nutrition 2019. Accra. https://doi.org/10.4060/CA7343EN, 2020, p. 60
[55] FAO, The State of Food Security and Nutrition in the World: Safeguarding Against Economic Slowdowns and Downturns. Food and Agriculture Organization of the United Nations, Rome. p. 39.
[56] Kilimo Trust, Characteristics of Maize Markets in East Africa, 2017, p. 13.

The current local production levels of maize production in Kenya cannot meet the national demand. Most regions are maize deficient, except the North and Central Rift, parts of Western, Nyanza, and Central Rift. Currently, the national maize deficit stands at 8-10 million 90 Kgs bags per year.[57] Significant food insecurity challenges have been experienced in Kenya since the year 2000. Cycles of severe national food insecurity persist to date, occasioned by population increase and numerous farming constraints. Maize scarcity triggers high food prices, especially of maize and maize products. These maize production constraints include climate change (frequent droughts and erratic rains), outbreaks of disease and pests (Maize Lethal Necrotic Disease, Fall Army Worms); high cost of inputs, post-harvest losses (8 percent-40 percent), unorganized markets, declining soil fertility, price volatility, poor agronomic practices, high post-harvest loses and competition for land with other enterprises.[58]

Some of the key policies that Kenya is implementing that have direct implications on the maize sub-sector include the 'Big 4 Agenda', the 'buy-Kenya-build-Kenya' policy, and the fertilizer subsidy program.[59] With the guidelines from the Constitution of Kenya 2010 and the Vision 2030, the MoALF&C has undertaken numerous reforms in the sector, which culminated in the formulation of and enactment of The Crops Act No.16 of 2013; The Agriculture and Food Authority Act No. 13 of 2013 and the Kenya Agricultural and Livestock Research Act No. 17 of 2013. Further, the review of the Agricultural Sector Development Strategy (ASDS) 2010-2020 and the Agricultural Policy 2011, have been undertaken together with the development of Kenya's new ASTGS 2018-2030, which is anchored in the belief that food security would thrive in a vibrant commercial and modern agricultural sector that sustainably supports Kenya's economic development and commitments to the "Big 4 Agenda". The

[57] Republic of Kenya, Report by the taskforce of Maize industry stakeholders, Nairobi, Government Printer, 2019, p. 1
[58] Wokabi S.M., Sustainability of Maize Production in Kenya. Kenya Agricultural Research Institute, Nairobi, Kenya, 2020, pp. 2-3.
[59] Republic of Kenya, Eye on the Big Four: Budget Watch for 2018/19 and the Medium Term. Retrieved from www.parliament.go.ke, 2018, pp. 17 -22

Malabo Declaration under the Comprehensive Africa Agriculture Development Program (CAADP) and the United Nations SDGs aim at ensuring food security and freedom from hunger at regional and global levels.[60]

In the maize sub-sector, there are various Acts of Parliament, which provide for an elaborate institutional and administrative structure for agriculture in general, and the scheduled crops in particular. Some of the laws enacted following the agricultural reforms include the crops act, the agriculture and food authority act, and the Kenya agricultural and livestock research act, among other existing laws, which support the industry.[61]

2.3 The Maize Sub Sector Policies in Eastern Africa

2.3.1 Kenya

Kenya's food production grew at approximate rate of 2.8 percent annually in the period 1990-2014 with Tanzania growing at the rate of 4.3% over the same period. In the latter years (2010-2014), Kenya National Food production grew at 0.6%, with Tanzania capturing greater share of East Africa's production increases, growing at around 8.9% annually.[62] Maize is the major cereal crop in Kenya. Given the declining Kenya's production growth and average annual population growth of 2.5%, the country required to have increased its maize supply by 27% between the years 2016-2022 to have satisfied its domestic maize needs by 2022.[63]

There have been numerous laws in the country that are geared towards up-scaling maize production and ensuring food security and welfare of citizens through maize farming. The key law in maize sub-sector in the National Cereals and Produce Board (NCPB) Act (1985). NCPB Act was meant to regulate and control the marketing and processing of maize, wheat and scheduled agricultural produce. The role of the Board include: to regulate or to control the

[60] African Commission on Agricultural Statistics, Twenty-Sixth Session: AGENDA ITEM 4 - Alignment of Regional monitoring frameworks and the global SDG indicator framework and inter-agency coordination. Libreville, Gabon, 4 – 8 November 2019, 2019, pp. 1-7.
[61] Republic of Kenya, Report by the taskforce of Maize industry stakeholders, 2019, pp. 8-13.
[62] MOALF&C, ASTGS, 2018, p.98
[63] Ibid

collection, movement, storage, sale, purchase, transportation, marketing, processing, distribution, importation, exportation, disposal and supply of maize, wheat and scheduled agricultural produce; to buy, store, sell, import, export or otherwise acquire and dispose of maize, wheat and scheduled agricultural produce in such manner, such quantities and on such terms as it may, from time to time, deem necessary to fulfil the requirements of producers and consumers in Kenya; to advise the cabinet secretary of the responsible ministry on the proper production of maize, wheat and scheduled agricultural produce in relation to the needs of Kenya, and the extent to which control over the exportation and importation of maize, wheat or scheduled agricultural produce is desirable or necessary; to do any other act which is connected or incidental to the foregoing.[64]

Until this year, Kenya had had Strategic Food Reserve Trust Fund (SFRTF) which was managed by an executive board. Through some ongoing reforms in the agriculture sector, the board was disbanded through a Kenya Gazette notice to enhance food security. The SFR board was merged with NCPB to streamline their operations and weed out cartels. SFRTF was established by the Public Finance Management Act in 2015. It was meant to provide the Strategic Food Reserve (SFR) with physical stock and buy maize, beans, rice, fish, powdered milk, and canned beef.[65]

2.3.2 Malawi

Several recent policies have been implemented to improve the maize value chain in Malawi. The three key agriculture sector policies that have greatly influence the maize value chain in Malawi include the national agriculture policy, the revised national seed policy, and management guidelines for the strategic grain reserve. These policies are collectively are aimed

[64]Ibid, pp. 1-5
[65]MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p. 12.

at transforming the agriculture sector into a high performing one and to improve food security and the fortunes of farmers and the economy as a whole.[66]

The emphasis of the National Agriculture Policy (NAP) is commercialization as one way of promoting sustained growth in the agriculture sector. The policy is aimed at facilitating the transition of farming communities from subsistence production to non-traditional high-value agricultural value chains that would ultimately result in wealth creation. The NAP priority area includes sustainable agricultural production and productivity; sustainable irrigation development; mechanization of agriculture; agricultural market development, agro-processing, and value addition. With NAP, the government hopes for improved management of agricultural resources increased agricultural exports and incomes, and improved food and nutrition security. Other NAP priority areas are empowerment of youth, women and vulnerable groups in agriculture; and institutional development, coordination and capacity strengthening.[67]

For Malawi to realize its goal of crop production and productivity, the quality of seed is an important factor. Before the implementation of the Revised National Seed Policy, the country was operating under the National Seed Policy of 1993 and without a strategy. The new policy has been necessitated by the massive transformation in the seed sector which has seen numerous players coming into the seed industry. The new seed policy provides for the regulation and control of all seed issues, protects consumers and dealers and also promotes a responsible and productive seed industry, and defines the regulatory role of the government. The major focus of the revised seed policy is the availability of adequate high-quality seed and planting materials to the farming community. It, therefore, addresses the challenges in the seed industry in the areas of research, production and quality control, imports and exports,

[66]Government of Malawi Food and Nutrition Security Policy, Fifth Draft. Ministry of Agriculture, Lilongwe: Malawi (mimeo), 2004, p. 2.
[67]Government of Malawi, The National Agricultural Policy: Promoting agricultural productivity for national food security and economic growth and development through value chain development, 2010, p.4

marketing, distribution, all the while underscoring the important role both the public and private sectors could play in accelerating agricultural and forestry development through the seed industry. The policy also provides for the building up of strategic seed reserves.[68]

Maize is the major grain that constitutes food security in Malawi. To cushion the country against maize production deficits, the Malawian government established the strategic grain reserve overseen by the National Food Reserve Agency. Over time, several emerging issues have necessitated the review of guidelines to address gaps in the current system and improve management of the SGR. The revised guidelines aim at enhancing the country's early warning system for better preparedness, early release of funds to procure grain during the harvesting period. A 14-member committee oversees drawing down of maize and has specified circumstances to trigger drawing down both in emergency and non-emergency circumstances. Issues of grain storage, quality control, and recycling of stock are also detailed in the guidelines. These guidelines are reviewed every five years.[69]

2.3.3 Uganda

Uganda's economy is predominantly agrarian with the maize sub-sector contributing heavily. The direct and indirect contribution of agriculture to GDP in the country is 24.7% and 21.9%, respectively.[70] Maize is the third-largest crop cultivated in the country by production volume, trailing only plantains and cassava.[71] Government policies and strategies over the years have emphasized promoting agricultural development as a mechanism for raising rural incomes and reducing poverty.

[68] Ibid. pp. 6-8
[69] COMESA & NEPAD, Malawi, Country Technical Review Report, CAADP Technical Review. Lilongwe, 2010, p. 7.
[70] FAO, National gender profile of agriculture and rural livelihoods: Country Gender Assessment Series – Uganda". 2018, pp 15-16.
[71] Uganda Bureau of Statistics, Statistical Abstract. Retrieved from http://www.ubos.org/onlinefiles/ uploads/ubos/statistical_abstracts/Statistical%20Abstract%202015.pdf. 2015, accessed December,13,2020, pp. 2-3.

Maize is widely grown in Uganda covering about 50 districts. The main production agro-ecological zones are in the West, east, North, and Southeast Uganda. The regional destinations for maize exports include Kenya, Sudan, Rwanda, Burundi, Zambia, and DR Congo. Kenya is Uganda's largest importer of maize. The Kenyan formal and informal market accounts for about 50 percent of the total maize exports from Uganda. The country maize productivity is still very low mainly due to numerous production challenges including soil infertility, lack of improved maize varieties, and unpredictable weather pattern due to climate change. Maize production in Uganda is characterized by low yields resulting in high unit costs and hence low return to investment.[72]

The Ugandan government has recently implemented numerous policies that were targeted to benefit maize farmers in the country. Through the National Trade Policy and the National Bureau of Standards, the Ugandan government has attempted to increase compliance with EAC standards to benefit the farmers who are engaged in export. However, a host of challenges remain at all segments of the value chain, with a lack of farmer awareness and inadequate certification and testing capacity being among the most prominent. Local governments in Uganda have taken the initiative to bridge the compliance gap. Other policies are targeted at influencing important factors such as access to markets; access to finance; access to training; and coordination and collaboration building. Specifically, the Ugandan government has allowed easier access to the Kenyan seed market in a bit to allow Ugandan farmers to reduce the reliance on the informal or fraudulent seed. The government has also enhanced and simplified the institutional environment. The high over-regulation of the seed industry through opaque institutional environments as well as the import controls are now relaxed.[73]

[72] Ibid, p. 9.
[73] Joughin, James, The Political Economy of Seed Reform in Uganda: Promoting a Regional Seed Trade Market. World Bank: Washington DC. Africa Trade Practice Working Paper Series No. 3., 2014.

Also, there are policies geared towards helping to formulate a system that will provide clarity of land ownership through clear land titles—especially in the northern regions of the country where past conflicts have created ownership vacuums—presents challenges with the strategy. The countries policies have also been recently shaped to encourage Foreign Direct Investment (FDI) by providing favourable investment conditions. Other policies have been implemented to improve efficiency in the aggregation segment by enhancing the trading network and improving storage.[74]

2.3.4 Tanzania

Tanzania food insecurity leads to national economic and health major challenges. The country ranked position 62 out of 78 on the 2013 GHI of countries with a score of 20.6 categorized as 'alarming'.[75] In 2019, the GHI of Tanzania was 28.5. There are numerous key public policies that guide maize value chain development including agricultural development in Tanzania. Most policy framework (laws and policies) that guide maize development in Tanzania are largely shaped by the country's strategy for economic growth and poverty reduction contained in its long-term strategy for socioeconomic development, the Tanzania Development Vision 2025, formulated by the Planning Commission and adopted by the Government in 1999 United Republic of Tanzania. 2013.[76]

The ASDS provides a sectoral strategy contributing to the medium-term development objectives identified in MKUKUTA I & II and the long-term objectives outlined in Vision 2025. Established in 2001, the ASDS was a blueprint for the agricultural sector's development

[74]Ibid. Pp. 11-12

[75]International Food Policy Research Institute, Concern Worldwide and Welthungerhilfe. Global Hunger Index. The challenge of hunger, building resilience to achieve food and nutrition security. Washington DC: IFPRI. http://www.ifpri.org/sites/default/files/publications/ghi13.pdf, 2013, p. 3.

[76]National Agriculture Policy. Dar es Salaam: Ministry of Agriculture Food Security and Cooperatives. http://www.faoilo.org/fileadmin/user_upload/fao_ilo/pdf/ICA_MLW_and_TZ/NATIONAL_AGRICULTURAL_POLICY-2013.pdf. p. 9.

and transformation, providing an overarching framework for the implementation of specific interventions or supportive measures to improve the sector's performance. [77]

The ASDP was a framework for implementation of the ASDS and included a local and national component. Development activities at national level were based on the strategic plans of the line ministries and provide financing for agricultural research and extension services, national infrastructure works, policy planning (particularly for irrigation) and capacity building for food security interventions.[78]

Kilimo Kwanza (KK), a Swahili for "Agriculture First" was launched in 2009 as a fundamental step towards achieving the overarching national development goals articulated in Vision 2025. Formulated by the Tanzania National Business Council (TNBC), KK offered a forum for public-private dialogue and partnerships. A first major project under the KK banner is the Southern Agricultural Growth Corridor of Tanzania (SAGCOT).[79]

CAADP/TAFSIP, the Tanzania Food Security Investment Plan (TAFSIP) was an investment plan developed in 2011, following the adoption of its CAADP Compact in 2010. CAADP, the Comprehensive Africa Agriculture Development Programme, is the Africa-owned strategy for agricultural development on the continent and, along with the 2003 Maputo Declaration on Agriculture and Food Security in Africa, aims to increase annual budget allocations for agriculture to at least 10 percent of total public expenditures while ensuring a 6 percent annual agricultural growth rate by 2015. By engaging in the CAADP process, Tanzania has committed itself to these targets.[80]

[77] United Republic of Tanzania. Agriculture Sector Development Programme. Support through basket fund. Dar es Salaam: URT. http://www.kilimo.go.tz/publications/english docs/ASDP FINAL 25 05 06 (2).pdf, 2006, p. 14
[78] United Republic of Tanzania. Agricultural Sector Development Programme (ASDP). Dar es Salaam: Ministry of Agriculture, Food Security and Cooperative. p. 18
[79] Ngaiza, S., Integrated Policy Approach to Commercializing Smallholder Maize Production. Regional Workshop MAFC, FAO and University of Nairobi, 2009, pp. 10-12.
[80] United Republic of Tanzania. 2011a. Tanzania Agriculture and Food Security Investment Plan (TAFSIP) 2011-12 to 2020-21. Dar es Salaam: URT. pp. 1 -2.

The government of Tanzania introduced the new National Agricultural Policy (NAP) in 2013. The main goal of NAP was to develop an efficient, competitive and profitable agricultural industry that contributes to the improvement of the livelihoods of Tanzanians and attainment of broad-based economic growth and poverty alleviation. [81]

2.4 Institutions on Maize and Food Security in the Eastern Africa Region.

Despite maize being important food crop in the region, there's no working framework that bring together Eastern African countries to discuss issues of maize. Some of the notable institutions/bodies that are envisaged in offering policy direction in maize and food security in Eastern Africa include the East African Community (EAC), Common Market for Eastern and Southern Africa (COMESA) and AU Assembly of Heads of State and Government.[82]

The East African Community (EAC) is a regional intergovernmental organization of six Partner States: The Republics of Burundi, Kenya, Rwanda, South Sudan, the United Republic of Tanzania, and the Republic of Uganda, with its headquarters in Arusha, Tanzania. Enhancing food security and rational agricultural development is one of the main objectives of EAC. The Community aims at harmonization of agricultural policies as well as joint programmes for efficient and effective production. The current EAC Food and Nutrition Security Strategy (2018–2022) is aimed at contributing to elimination of hunger, malnutrition, and extreme poverty in the East African region by the year 2022. This is meant to be achieved through three interrelated objectives (Improving sustainable and inclusive agricultural production, productivity, and trade, strengthening resilience among households, communities and livelihood systems and improving access and utilization of nutritious, diverse and safe food).

[81] Africa Lead, 2013. Institutional Architecture for Food Security Policy Change: Tanzania. U.S. Agency for International Development, Washington, D.C. p. 8.

[82] Laibuni, N., Omiti, J. and Natu, H., 2020. Food Insecurity in the East African Region: Policy Dilemma. Retrieved from https://elibrary.acbfpact.org/acbf/collect/acbf/index/assoc/HASH01b7/570d8e1e/2257052a/f2d7.dir/Food%20Insecurity%20in%20the%20East%20African%20Region.pdf. p. 6.

However, most countries have numerous laws and policies that work in conflict with policies of EAC.[83]

The Mandate of the Industry and Agriculture Division of COMESA is to promote development of competitive, sustainable, and profitable agriculture and industries that contribute to economic and social prosperity of the COMESA citizens. The specific objectives of Industry and Agriculture Division include: to support increased agricultural productivity and agro-processing; to promote and support competitive and diversified industrial development; to foster linkages between industry, value addition to agriculture and other natural resources; to promote and support compliance with regional and international standards and Sanitary and phytosanitary (SPS) measures; to support development, harmonization and implementation of policies, regulations, strategies and programmes on agriculture and industry development in the region; to promote and support creation of enabling environment for investment and business development in the region.[84]

Established by the AU Assembly of Heads of State and Government through the Maputo Declaration in 2003, the African Union CAADP was developed to improve food security and nutrition and increase incomes in Africa's largely agriculture based economies. The CAADP is a Pan-African framework that provides a set of principles and broadly defined strategies to help countries: critically review their own situations and identify investment opportunities with optimal impact and returns. CAADP champions reform in the agricultural sector, setting broad targets such as: 6 percent annual growth in agricultural GDP, and allocation of at least 10 percent of public expenditures to the agricultural sector. In the CAADP, Africa as a continent has recognized that enhanced agricultural performance is of great

[83] Waithaka, M., Nelson, G.C., Thomas, T.S., Kyotalimye, M., East African agriculture and climate change: A comprehensive analysis. International Food Policy Research Institute (IFPRI), Washington, DC, 2013, pp. 2-3.
[84] Viljoen, W. Addressing climate change issues in eastern and southern Africa: the EAC, COMESA, SADC and the TFTA, 2013, pp. 4.

importance to growth and poverty reduction through its direct impact on food security and improved nutrition.[85]

The 2014 Malabo Declaration made seven specific commitments to achieve accelerated agricultural growth and transformation for shared prosperity and improved livelihoods: recommitment to the principles and values of the CAADP process; recommitment to enhance investment finance in Agriculture; commitment to ending hunger by 2025; commitment to halving poverty by 2025, through inclusive agricultural growth and transformation; commitment to boosting intra-African trade in agricultural commodities and services; commitment to enhancing resilience in livelihoods and production systems to climate variability and other shocks and, commitment to mutual accountability to actions and results.[86]

[85] Benin, S. and B., Yu Complying with the Maputo Declaration Target: Trends in public agricultural expenditures and implications for pursuit of optimal allocation of public agricultural spending. ReSAKSS Annual Trends and Outlook Report 2012, International Food Policy Research Institute (IFPRI), 2013, pp. 4-5.
[86] African Union Commission, Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods, 2014, pp. 1-6.

Chapter Three

Analysis of Food Security and Policy Regime in Maize sub-sector in Kenya

Introduction

Food security concern with respect to food access, availability, affordability and utilization is felt in Kenya in a big way. Multi-sectoral approach to contain the situation has been implemented through numerous government projects, programmes and policies such as Vision 2030, ASTGS and Big 4. Maize is a very important cereal crop in Kenya with consumption of 76.2 Kg/cap/year. Maize production is both from small-scale (70%) and large scale (30%) producers. The production trends have often fluctuated over the years. There has been a significant maize deficit in the country in most of the years due to poor weather that is worsen by inadequate absorption of modern production technologies, lack of access to credit and inadequate extension services to small scale producers, among other challenges. Several policies targeted to benefit the maize crop have been implemented since Kenya's independence. Some of the current key policies include the Big 4 Agenda, the buy-Kenya-build-Kenya policy, and the fertilizer subsidy program. The effectiveness of Kenyan policies that are aimed at improving maize sub-sector has been investigated and several shortcomings pointed out. This chapter highlights the food security status in Kenya, the maize sub-sector status and the policy regime of the maize sub-sector in Kenya.

3.1 Food Security Status in Kenya

Kenya's GHI scores have decreased steadily since 1990 in line with global trends and at 23.7 in 2020 are below Tanzania, Ethiopia and Rwanda, but above Malawi which recorded a GHI score of 22.6 in 2020.[87] Kenya's food and nutrition security (availability, affordability and quality) status is analysed using Global Food Security Index (GFSI) and the Kenyan status are as indicated in Figure 4. Compared to other East Africa Community (EAC) countries, Kenya

[87] MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p.31

fares well in availability per capita, but are behind in affordability and quality/nutrition. Kenyan children of below 5 years get more calories on average than their EAC peers and therefore have lower prevalence of stunting, at 26%, an important CAADP indicator.[88]

Indicators		Unit/Definition	Values	Kenya Comparison to EAC Average	Part of CAADP Indicator
Availability	Depth of food deficit	Kcal/capita/day 2014-16	137 / 177		No
	Prevalence of stunting, height for age	% of children	26 / 34		Yes
Affordability	Per capita food supply Variability	kcal/caput/day	19 / 26		No
	Food consumption as a share of household expenditure	% household expenditure 2010	55 / 58		Yes
	Price volatility	Standard deviation 2016	7 / 4		Yes
Quality and Nutrition	Diet diversification – energy supply from cereals, roots and tubers	% 2011-13	57 / 52		No
	Protein quantity	Grams 2016	43 / 41		No
	Vitamin A supplementation	% coverage 2015 coverage	37 / 67		No
	Dietary availability of vegetable and animal iron	mg/person/day 2016	13 / 14		No
Where					
	KENYA		Better Than EAC Average		
	EAC AVERAGE		Near EAC Average		
			Worse Than EAC Average		

Source: MOALF&C, ASTGS Strategy, 2018

Figure 4: Kenya Food Security Performance compared to EAC

The concerns about food access, availability, affordability and utilization has continued to take central position in Kenya. Food security status has often been addressed in a multi-sectoral approach involving the ministries of Interior and Co-ordination of National Government; Defence; National Treasury and Planning; Industry, Trade & Co-operatives;

[88] Ibid

Health; Agriculture, Livestock, Fisheries, Irrigation and Cooperatives; Devolution and the ASALS; Information, Communication and Technology (ICT); Education; East African Community (EAC) and Regional Development; Water and Sanitation; Lands and Physical Planning as well as Public Service, Youth and Gender. The need to improve the status of food security in the country is engraved in several government projects and programmes such as Vision 2030, ASTGS and Big 4. Most projects, programmes and policies by the Kenyan government are aimed at addressing the major hindrances of food and nutrition security such as storage, post-harvest losses, aflatoxin, marketing, distribution, processing, subsidies/incentives, climate change (drought and floods), irrigation, pests and diseases (fall army worms, desert locust and Maize Lethal Necrosis Disease (MLND).

Since 1986, Kenya changed its goals as a country from just being food self-sufficient to an external strategy aimed at supporting the country's main foods; milk, wheat, horticulture (local consumption and export), tea, and coffee. The strategy was intended to attain several goals including food security at the household and national level, create employment, earn government revenue, and generate an alternative source of income for rural households as well as regional balance.[89] The strategy is still being implemented to date. It is therefore important to note that the main goal of the government in agriculture is national food security and growth of exports.

In rural households, only 30% of food needs are sourced from outside while 70% is obtained from their farms. It was also established that 98% of food needs in urban towns and their environs is bought while only 2% is directly obtained from the farms. The most important income streams from farms are livestock and crop commodities that are produced and sold by households. Half of the rural farmers have other income sources apart from farming while 36%

[89]C.K. Eicher, "Food Security in Sub-Saharan Africa", Michigan State University, International Development Papers. Food Security Policies. 1988.

have at least one member of the household who is working and earning income from off-farm activities.[90] Statistics also show that remittances are being received by a third of households. Most of the income streams for rural households are derived from non-farm income-generating activities. For rural households, 70% of the income is obtained from off-farm activities such as remittances while 30% is obtained from farm activities. These percentages do not apply to the entire country and income from farming activities may become high (60%) in the Rift valley and low (18%) in the Eastern province.

Kenya has since independence worked towards achieving self-reliance regarding food commodities that include beans, maize, milk, wheat, rice, and meat. The country was maize self-sufficient in the 1970s to the extent that the excess was exported. Noteworthy, attaining food self-sufficiency does not mean that food security at the household level is guaranteed. The existing evidence in literature indicates that addressing the supply side of food security while ignoring the demand side of the general population, does not address food insecurity in terms of access to enough food especially by the rural poor.[91]

The deliberations with key agricultural stake holders in Kenya during the study revealed that Kenya is currently not self-sufficient three major cereal crops namely Maize, Rice and Wheat. The country most commonly relies on maize imports from Uganda and Tanzanian as confirmed by the respondents as shown in Appendix 5b. Mexico was cited by those interviewed during the study as a reliable source of import during maize deficit in the country. The Kenyan government has developed policy documents that give direction and promote the strategies used for the country's agricultural sector. The policy documents include Strategy for Revitalizing Agriculture, Ministry of Agriculture's Strategic Plan, and vision 2030 strategy. Vision 2030 affirms that agriculture is a key sector that is poised to contribute towards the

[90] Government of Kenya, "Long rains season assessment report"; Government printer: Nairobi. 2009.
[91] KIPPRA, Kenya Agricultural Sector Data Compendium, 2007.

attainment of a constant GDP growth rate of 10 percent per annum. The ministry of agriculture's main contribution will be the execution of various projects to promote agriculture. These projects include a 3-tiered fertilizer cost reduction project, value addition in the agricultural supply chain passage of agricultural legislation/policies, and Development of an Agricultural Land Master Plan (Vision 2030). Other programs being implemented by the Ministry of Agriculture aiming at attaining food self-sufficiency include a waiver on the duty of maize importation, increase in strategic grain reserves.

The ministry of agriculture in its Strategy to Revitalize Agriculture (SRA) promoted the growth of drought-resistant crops to solve the perennial famine occasioned by drought in ASALS. There is a need for change in eating habits from the current reliance on maize foods as highlighted in the National Food Security and Nutrition Policy. Diversification of the eating habits will boost the nutrition of the general population. This requires that farmers should produce other crops apart from cereals such as maize, wheat, and rice. Such kind of program is guided by the market demand and extension services championed by the farmers. The Government of Sweden in partnership with the Government of Kenya supports the program to a tune of Ksh700 million annually to reach over 1.2 million smallholder farmers.[92]

The reports of the GHI, which ranks hunger levels based on four indicators namely; undernourishment, child stunting, child wasting, and child mortality, have since year 2000 to year 2020 depicted that the Kenya's hunger level to be slightly declining[93] as shown in figure 5 below. In 2020, the country ranked position 84th out of the 107 countries with the GHI score of 23.7.

[92] Government of Kenya, "Long rains season assessment report"; Government printer: Nairobi. 2009.
[93] Concern Worldwide and Welthungerhilfe, Global Hunger Index: 2020 GHI Scores, Retrieved from https://www.globalhungerindex.org/kenya.html, 2020.

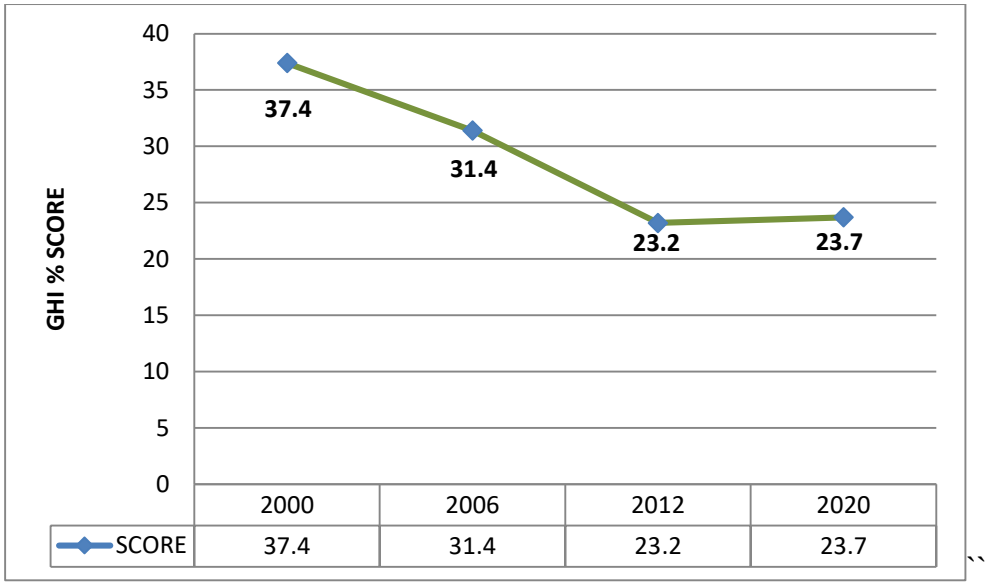


Figure 5: Kenya GHI Score Trend[94]

With a GHI score that is above 20.0 for a period between year 2000 and 2020, Kenya level of hunger is still classified as serious. The trend of specific GHI indices in Kenya is as shown in Figure 6 below.

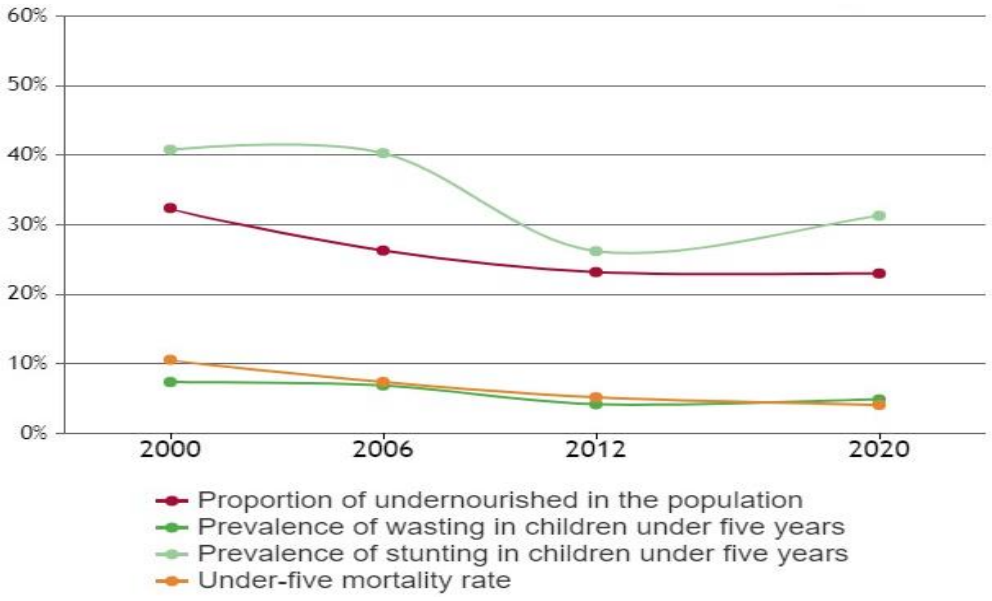
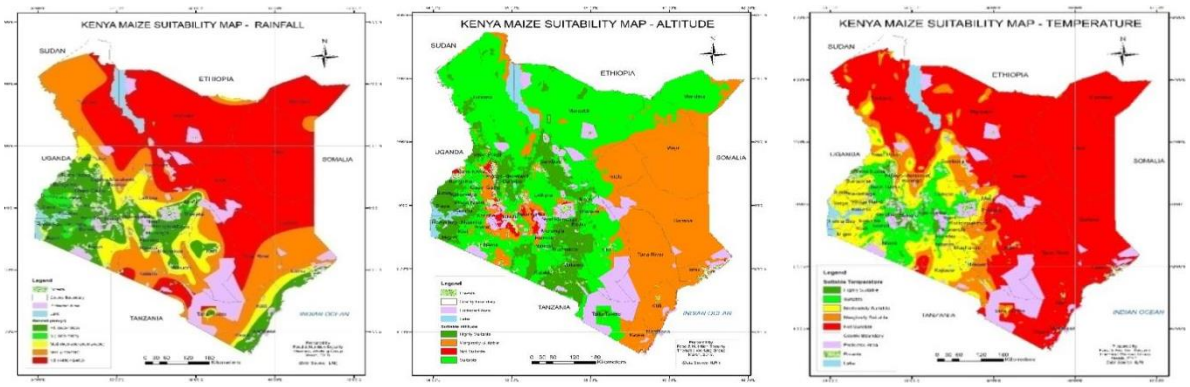


Figure 6: Trends for GHI indicator values – Kenya

[94] Concern Worldwide and Welthungerhilfe, 2020 Global Hunger Index- One Decade to Zero Hunger Linking Health and Sustainable Food Systems, 2020, p. 7

3.2 The Maize sub-sector Status in Kenya

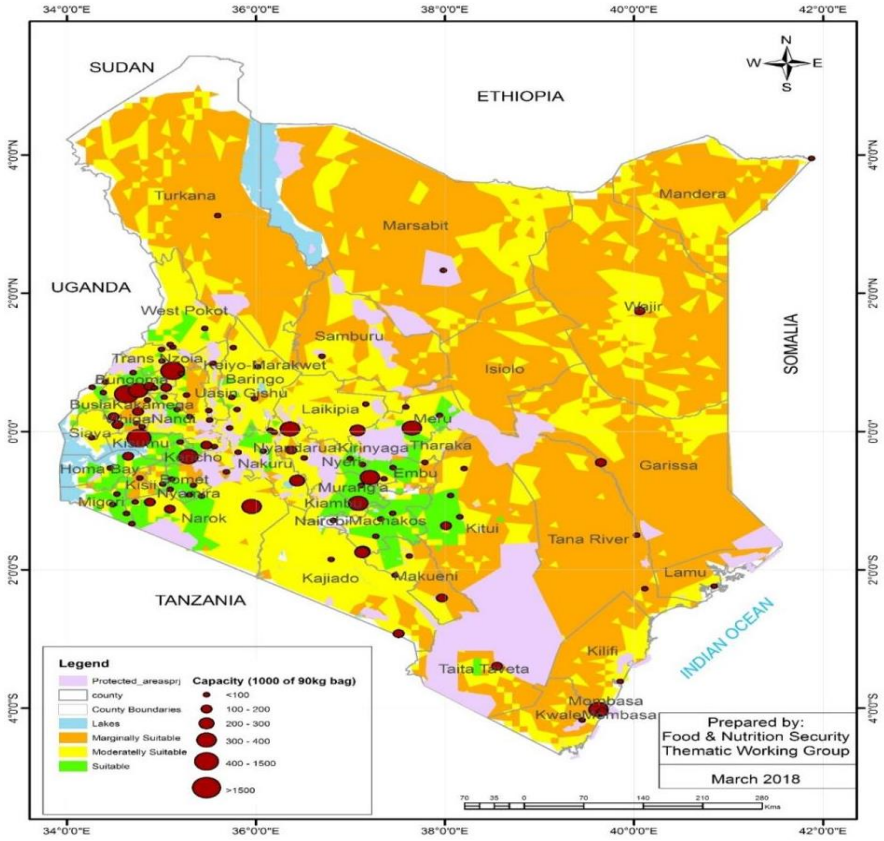
Small scale crop production accounts for about 70 percent of the overall production while the remaining 30 percent of the output is from large scale commercial producers.[95] Small scale producers mainly grow the crop for subsistence, retaining up to about 58 percent of their total output for household consumption.[96] About 40 percent of the food crop producers in Kenya grow maize. [97] Maize is the most important cereal crop in Kenya. It is the main staple food in the country that has a population of 47,564,296 according to the Kenya National Bureau of Statistics.[98] The maize per capita consumption in Kenya is averagely 76.2 Kg/cap/year.[99]Only 5.5% (3.2 Million Hectares) of Kenyan land is suitable for maize production with 32% (18.7 Million Hectares) being categorized as moderately suitable for maize production.[100] The physical factors that determine maize land suitability are; Annual rainfall amounts (800mm-2000mm), altitude (600-1800m above sea level) and Temperature (24˚C).[101]Based on these factors, about 50% of Kenyan Land mass is deemed Marginal for maize production as shown in Figure 8 and Table 2 below.



[95] Export Processing Zone Authority, Grain production in Kenya, Export Processing Zone Authority, Nairobi, 2005.
[96] L.M. Mbithi, "Agricultural policy and maize production in Kenya": Universiteit Gent, Unpublished Ph.D Thesis, 2000.
[97] Republic of Kenya, Strategy for revitalizing agriculture, Government Printer, Nairobi, 2004.
[98] Kenya National Bureau of Statistics, 2019 Kenya Population and Housing Census: Volume I, 2019
[99] Government of Kenya, "Assessment of Costs of Maize Production, Marketing and Processing In Kenya: A Maize Grain-Maize Meal Value Chain Analysis, 2009.
[100] Ministry of Agriculture, Livestock, Fisheries and Irrigation, Food and Nutrition Security Thematic Working Group Report, 2019, p. 146.
[101] Ibid

Source: MOALF&C, Food and Nutrition Security Thematic Working Group Report, 2019

Figure 7: Kenya Rainfall, Altitude and Temperature Maize suitability Maps



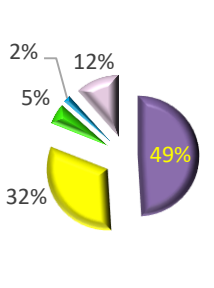
Source: MOALF&C, Food and Nutrition Security Thematic Working Group Report, 2019

Figure 8: Kenya Maize Suitability Composite (Rainfall, Altitude and Temperature) Map

Table 2: Kenya Maize suitability Areas[102]

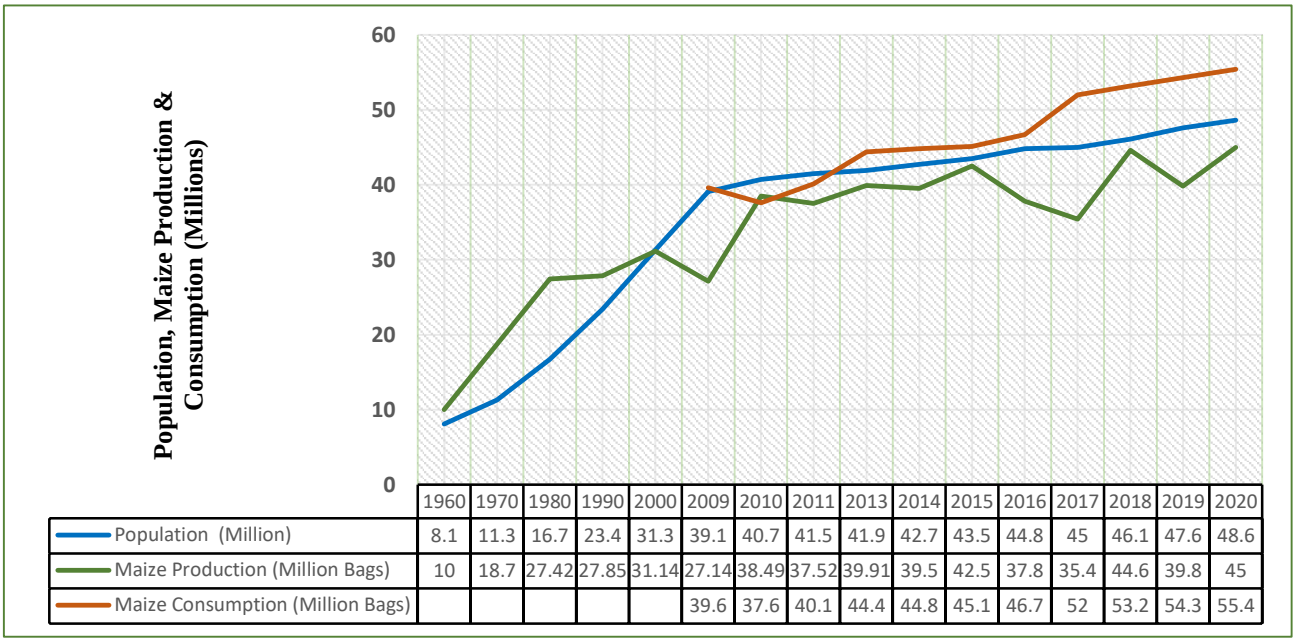
Maize Suitability Available Areas	Area (KM²)	Area (HA)	% Kenya Land Mass
Suitable	32,364	3,236,365	5.5
Moderately Suitable	187,229	18,722,854	31.9
Marginally Suitable	288,063	28,806,278	49.1
Water	11,200	1,120,000	1.9
Protected areas	68,144	6,814,400	11.6
Total Area	587,000	58,699,897	100

Proportions of Kenya Maize Suitability areas



[102] Ibid

The trend in total maize output in Kenya for the period 1960 to 2020, shown in figure 9 below reveals that output has been fluctuating over years though gradually increasing at a slow Growth rate.



	1960	1970	1980	1990	2000	2009	2010	2011	2013	2014	2015	2016	2017	2018	2019	2020
Population (Million)	8.1	11.3	16.7	23.4	31.3	39.1	40.7	41.5	41.9	42.7	43.5	44.8	45	46.1	47.6	48.6
Maize Production (Million Bags)	10	18.7	27.42	27.85	31.14	27.14	38.49	37.52	39.91	39.5	42.5	37.8	35.4	44.6	39.8	45
Maize Consumption (Million Bags)						39.6	37.6	40.1	44.4	44.8	45.1	46.7	52	53.2	54.3	55.4

Source: KNBS, Economic Surveys, 2020

Figure 9: Kenya Population, Maize Production and Consumption Trends

The lowest Maize production in the recent past was recorded in 2019 due to extreme weather phenomenon that was characterized by drought during the first half of the year, followed by high rainfall in the second half of the year. This resulted in reduced production of maize crop. Maize production declined from 44.6 million bags in 2018 to 39.8 million bags in 2019 largely due to drought in several areas coupled with infestation by the fall army worms.[103] This asserts the response of 81.2% of the respondents that Climate Change and pests are greatest contributors to low maize production and slow growth of maize Sub-sector in Kenya as shown in Appendix 5a. Though maize production has fluctuated substantially in recent years,

[103] KNOEMA, Retrieved from https://knoema.com/atlas/Kenya/topics/Agriculture/Crops-Production-Quantity-tonnes/Maize-production#:~:text=In%202019%2C%20maize%20production%20for,3%2C800%20thousand%20tonnes%20in%202019, 2020.

there is overall upward trend of maize production in Kenya since 1970 to date with 45 Million 90 Kgs Bags of maize having been realized in 2020.

There has been steady increase of population and demand for maize as evidenced by the trends shown the figure 9 above. This finding rejects the hypothesis that there is decreasing consumption of maize in Kenya due to consumption preference of other cereals especially rice and wheat. 98% of those interviewed further confirmed that maize is still the main staple food crop in Kenya. In 1962, just before dependence, Kenya's population was 8.9 Million. The Kenya National Population and Housing Census of 2019 established that the Population had increased almost 5 Folds since independence to stand at 47.6 Million people. Consequently, there has been a significant maize deficit in the country in most of the years as indicated in the figure 5 above. The deficits are met through imports. Unfavorable weather contributes to the low output of maize in some years as it was the case in 2019. Maize yields have remained at an average of 2 tons per hectare below the potential of 6 tons per hectare a situation attributed to adoption of modern production technologies such as high yielding maize varieties and fertilizers because of high input costs, lack of access to credit and inadequate extension services to small scale producers.[104] The problem of insufficient storage facilities (at both household level and NCPB) has also contributed to heightened food insecurity situation in the country. The levels of post-harvest losses and aflatoxin in maize have reached unacceptable levels in the recent past. The marketing of maize, being the most important cereal crop in Kenya has constantly been affected by houding that has often created artificial shortages that are aimed at personal gains. The distribution systems of maize as well as other cereals has also been faced with challenges, resulting to inability to deliver food from the surplus zones to the food deficit zones. The level of government success to deal with negative effects of climate change has also remained low amidst the rising incidences of drought, floods, pest and diseases as well as

[104] Government of Kenya, Assessment of Costs of Maize Production, 2009, p. 2

insufficient irrigation programming. Other constraints include poor rural infrastructure, insufficient budgetary allocations to agricultural development, and the private sector's weakness in maize marketing in liberalized markets.[105]

3.3 The Maize Sub Sector Policy Regime in Kenya

Some of the key policies that Kenya is implementing that have direct implications on the maize sub-sector include the Big 4 Agenda, the Buy-Kenya-Build-Kenya policy, and the fertilizer subsidy program. With the guidelines from the Constitution of Kenya 2010 and the Vision 2030, the MoALF&C has undertaken numerous reforms in the sector, which culminated in the formulation of and enactment of The Crops Act No.16 of 2013; The Agriculture and Food Authority Act No. 13 of 2013 and the Kenya Agricultural and Livestock Research Act No. 17 of 2013. Further, the review of the ASDS 2010-2020 and the Agricultural Policy 2011 have been undertaken together with the development of Kenya's new ASTGS 2018-2030, which is anchored in the belief that food security would thrive in a vibrant commercial and modern agricultural sector that sustainably supports Kenya's economic development and commitments to the Big 4 Agenda. The Malabo Declaration under the CAADP and the United Nations SDGs aim at ensuring food security and freedom from hunger at regional and global levels.

The ministry of agriculture in Kenya is bestowed with the responsibility of implementation of agricultural projects and programmes that are geared towards promoting food security in the country. Some of the key projects that have had a significant contribution in the maize sub-sector include a 3-tiered fertilizer cost reduction project, value addition in the agricultural supply chain passage of agricultural legislation/policies, and development of an Agricultural Land Master Plan (Vision 2030). There are various Acts of Parliament that provide for an elaborate institutional and administrative structure for agriculture in general, and the scheduled crops including the maize sub-sector. Some of the laws enacted following the

[105] Ibid pp 3-4.

agricultural reforms include The Crops Act, The Agriculture and Food Authority Act, and the Kenya Agricultural and Livestock Research Act, among other existing laws, which support the industry. Several policies targeted to benefit the maize crop have been implemented since Kenya's independence. During the first two decades after Kenya's independence in 1963, public policy singled out maize as the major food staple. Its production and marketing received budgetary support through a government-controlled marketing board.[106] Policies focusing on subsidizing producer and input prices, credit, research, and extension activities were also implemented. The resettlement programs and increased smallholder production in the late 1960s and early 1970s remarkably expanded maize production to the extent that large surplus production was realized.[107]

Rapid population growth and shortage of unexploited arable land in the high and medium potential areas prevented any marked improvement in maize production and food production in general. Recently, per capita nutritional intake has reduced and some sections of the population have become food insecure[108]. In recent years when the drought was experienced in the country revealed a potential imbalance between the national supply of maize and its demand. The country's first comprehensive national food policy was developed in 1981.[109] The national food policy of 1981, set up guidelines for decision-making on all major issues related to maize production and distribution including marketing, trade, pricing, research and extension, agricultural credit, inputs, land use, food security, and nutrition. The thrust of food security policy was to increase production and distribution of food to all areas, expand production in the semi-arid areas, and accumulate multi-commodity strategic food reserves from domestic surpluses for use during periods of crop failure.[110] From the early 1980s, it was

[106] H. Nyangito, and L. Kimenye, Agricultural development policies in Kenya, 1995, p. 10
[107] Ibid pp 14-19.
[108] Ibid pp 16-18
[109] Republic of Kenya, Sessional paper No. 4 of 1981 on national food policy, Government Printer, Nairobi, 1981.
[110] Ibid p. 36

believed that the intensive state controls had turned the terms of trade against agriculture and the country began to gradually adopt structural adjustment programs (SAPs). The complete liberalization of the production and marketing of maize in the country was realized in 1993. Liberalization was to break the structural rigidities, broaden the role of market signals and align relative prices more closely with those in world markets, to improve agricultural terms of trade for increased agricultural production and economic performance.[111] Upon liberalization, all price controls, import licensing, and foreign exchange controls were abolished. Agricultural prices were left to market forces and marketing to private traders. The role of the National Cereals and Produce Board (NCPB) was to be restricted to maintenance of strategic reserves and buyer and seller of last resort[112]. The provision of government services also changed from the supply-oriented approach to a demand-driven approach. While the government continued to disseminate relevant information to farmers and to support agricultural education, beneficiaries of research and extension services were required to support the activities through levies. The private sector was to research commodities that competitive markets could handle so that direct government involvement could focus on problems of national importance and constraints facing small scale farmers.[113]

Agricultural TOT improved following full liberalization but the production of maize continued to worsen[114] mainly due to inadequate complementary policy measures in rural infrastructure and institutions, and unfavorable weather conditions which are thought to have weakened the price incentives. Public investments in roads, research and extension, fertilizer supply, and water control systems are considered to be complementary to the pricing system in

[111] Ibid p. 38
[112] Ibid pp. 40
[113] H. Nyangito, and L. Kimenye, Agricultural,policies in Kenya, P. 54
[114] Republic of Kenya, "National development plan for the period 1997 – 2001", Government Printer, Nairobi. 1997

influencing private investment in agriculture.[115] Budgetary allocations towards agricultural research and extension, road construction and maintenance, development of irrigation and water systems aimed at improving access to rural areas, and increasing productive capacity of agricultural land are therefore considered important. Research and extension services enhance the provision of new technologies and the information needed for increased productivity in agriculture. The role of the government in the provision of these services is critical because of their public good nature.

From 2003, the government of Kenya initiated macroeconomic, legislative and institutional reforms, infrastructure development to help revitalize the agricultural sector towards the country's economic recovery, creation of wealth and employment, eradication of poverty, and achieving food security.[116] The reforms alongside macroeconomic stability and human development were considered necessary for providing an enabling environment for achieving the goals of Kenya vision 2030, which aims to transform subsistence agriculture into a commercial, market-oriented activity, towards sustainable national food security.[117] Low levels of inflation limited public sector deficits, stable exchange rates, and low-interest rates are also envisaged as important to instill confidence in investors in all economic activities in the country. It is significant to note, however, that despite all these government efforts to provide incentives with a view of enhancing maize production, maize output has remained below domestic requirements in most of the years and the country continues to rely on imports to meet the deficits. This leads us to question the responsiveness of maize production to economic incentives. Earlier studies on the responsiveness of maize production to producer

[115] C.L. Delgado, "Africa's changing agricultural development strategies; past and present paradigms as a guide to the future". Washington D.C.: International Food Policy Institute Dickey, 1995
[116] Republic of Kenya, Strategy for revitalizing agriculture, Government Printer, Nairobi, 2004.
[117] Republic of Kenya, "The first medium term framework: Kenya Vision 2030", Government Printer, and Nairobi. 2008, pp. 6-7.

prices in Kenya revealed inelastic responses to producer prices.[118]This suggests the ineffectiveness of pricing policies in raising maize production. [119]

Kenya has implemented numerous laws in its bid to upscaling maize production and ensuring food security and welfare of citizens through maize farming. National Cereals and Produce Board [NCPB] Act (1985) was implemented to regulate and control the marketing and processing of maize, wheat, and scheduled agricultural produce[120]. Since 2015 and until the year 2020, Kenya had had Strategic Food Reserve Trust Fund (SFRTF) which was established to provide the Strategic Food Reserve (SFR) with physical stock and buy maize, beans, rice, fish, powdered milk, and canned beef.[121]

The Crops Act No. 16 of 2013 provides the legal framework for the development of scheduled crops including maize.[122] The objective of the Act is to accelerate the growth and development of agriculture in general and enhance the productivity and incomes of farmers among others. The Act creates the Commodities Fund, which consists of monies paid as license fees, commission, export or import agency fees, and fees that may accrue to or vest in the Food and Agriculture Authority in the course of the exercise of its functions under the Act. Although the MoALF&C has not developed the regulations required to operationalize the Crops Act, the Act has the potential to address most of the regulatory issues in the maize sub-sector including data management.[123]

Agriculture and Food Authority Act No. 13 of 2013 consolidates[124] the laws on the regulation and promotion of agriculture generally; it establishes the Agriculture and Food

[118] L.M. Mbithi, "Agricultural policy and maize production in Kenya": Universiteit Gent, Unpublished Ph.D Thesis, 2000.
[119] J. Olwande, M. Ngigi, and W. Nguyo, "Supply responsiveness of maize farmers in Kenya: a farm-level analysis", Paper prepared for presentation at the international association of agricultural economists' conference, Beijing, China, 2009.
[120] Republic of Kenya, Report by the taskforce of Maize industry stakeholders, 2019, Pp. 8-13.
[121] MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, P.12.
[122] Republic of Kenya, Report by the taskforce of Maize industry stakeholders, 2019, Pp. 8-13.
[123] Ibid p. 12
[124] Ibid pp. 13-14

Authority, AFA (the authority which is the regulator), and makes provision for the respective roles of the national and county governments in agriculture (excluding livestock), in line with the Fourth Schedule of the Constitution. Regardless of its jurisdictional conflicts and overlaps, the Act also ensures the effective participation of farmers in the governance of the agricultural sector. It also mandates the Cabinet Secretary to make rules to ensure that any agreements entered into between farmers and their organizations are respected.

Most of the agricultural functions especially productions functions were devolved to counties leaving the national government with regulatory, coordination and food security functions. These are vital functions for the realization fast agricultural growth and food security in the country. Effective performance of the National agricultural functions requires establishment of coordination and operation structures at national and county levels while ensuring adequate funding of the planned programmes and activities. The summary of the Kenyan Laws, regulations and the institutions that they have created are outlined in the as shown in Table 3 below.

Table 3: Established Institutions under the Kenyan Law[125]

Act/Legislation		Institutions Established
1.	The Crops Act No. 16 of 2013	Commodities Fund
2.	Agriculture & Food Authority Act (AFA Act 2013)	i. Agriculture and Food Authority ii. AFA Board iii. Directorates
3.	Kenya Agricultural Livestock and Research Act (KALR Act No. 17 of 2013)	i. KALRO Board ii. KALRO Research Institutes & iii. other research institutes e.g. Coffee Research Institute; Tea Research Institute; Dairy Research Institute etc iv. Agricultural Research Fund
4.	Seeds & Plant Varieties Act Cap 326 & The Seeds & Plant Varieties (Variety Evaluation & Release) Regulations 2016	i. Kenya Plant Health Inspectorate Service ii. National Performance Trials Committee iii. National Variety Release Committee

[125] Republic of Kenya, Maize industry stakeholders Taskforce report, 2019, pp. 35-36

Act/Legislation		Institutions Established
5.	Fertilizers and Animal Foodstuffs Act Cap 345 and Fertilizer and Animal Foodstuffs (Amendment) Act 2015	i. Fertilizer and Animal Foodstuffs Board
6.	Kenya Plant Health Inspectorate Service Act 2012	i. Kenya Plant Health Inspectorate Service
7.	Kenya Trade Remedies Act 2017	i. Kenya Trade Remedies Agency
8.	National Cereals and Produce Board Act 1985	i. National Cereals and Produce Board
9.	Strategic Food Reserve Trust Fund Regulations 2015	i. Strategic Food Reserve Trust Fund
10.	Agricultural Finance Corporation Act Chapter 323 of the Laws of Kenya	i. Agricultural Finance Corporation (AFC)
11.	Agricultural Development Corporation Act (AFC)	i. Agricultural Development Corporation
12.	Public Private Partnership Act	i. Public Private Partnership Committee
13.	Consumer Protection Act No. 46 of 2012	i. The Kenya Consumers Protection Advisory Committee
14.	Competition Act No. 12 of 2010	i. Competition Authority ii. Competition Tribunal

Lack of necessary regulations for operationalization of created laws, government interference and inadequate funding are contributing to low performance of established institutions.[126]

[126] Republic of Kenya, Report, of Maize industry stakeholders, 2019

Chapter Four

The challenges and opportunities in maize sectors in Eastern Africa and Kenya

Introduction

Maize, wheat and rice are important sources of human food and account for 94% of all grain consumption in the world. Rice is the main cereal in Asia, while maize (also known as corn) is the preferred cereal in South and East Africa, Central America and Mexico.[127]How maize is processed and consumed varies greatly from country to country with flour and cornmeal being two of the most popular products. The United States, China and Brazil are the top three maize producing countries in the world, with approximately 563 of the 717 million tons / year.[128]

With the maize sub-sector continuing to dominate in Eastern African region and Kenya several challenges and opportunities can be identified. The most pronounced challenges that face the sub-sector in Kenya include high production cost, price volatility, adverse climatic conditions (droughts, floods, pests, and diseases), and commodity flooding in the country with cheap maize from other countries, post-harvest losses, and poor storage. As far as the Eastern Africa region is concerned, the problems are more or less the same. Some of the key opportunities in the sub-sector include an expanded local market, an attractive trade environment (low tariff and non-tariff barriers), conducive export policies, a flexible exchange rate policy regime, and increased government support.

4.1 Challenges and Opportunities in Eastern Africa

Kenya is a member state of the East African Community (EAC) which came into being in 1999. The other EAC Member countries are; Uganda, Tanzania, Burundi, Rwanda, and most recently South Sudan.

[127]Maria N Garcia-Casal, Global maize production, utilization, and consumption, New York Academy of Sciences, 2019, p. 105
[128]Ibid

The sequential happenings around the East African Community found out that, under the EAC treaty implemented officially in 2001, the first entry point to the community was the establishment of a customs union, then a common market, subsequently a monetary union, and ultimately a political federation of the East African States. Rwanda and Burundi were officially admitted into EAC in July 2007 and South Sudan in 5th September 2016. The protocol establishing the East African Common Market was signed in 2009 and came into force on July I, 2010.[129]

The establishment of the customs union and the common market has continued to pave way for free movement of goods (including maize) and services, and labor within the region. Results from all the countries show effects of trade creation, with that of Uganda and Burundi being statistically insignificant, while the coefficients of EAC (trade creation dummy) are found to be highly significant at a 1% level of significance and with the right positive sign for both Kenya and Tanzania. This implies that Kenya and Tanzania on average tend to export more agricultural products to the EAC region as a result of the regional trade agreement. More specifically, the results show that there is a 14.3% increase in Kenyan agricultural exports to EAC as a result of being a member of the RTA, while Tanzania realized a 20.5% increase in the agricultural exports to EAC as a result of being a member of the RTA.[130]Eastern Africa region has numerous challenges and opportunities in its maize sub-sector as discussed below:

4.1.1 Uganda

The maize sub-sector that was introduced in Uganda in 1861 has continued receiving attention in the country due to its relative importance (ranking third in importance among the main cereal crops) and need to solve the sub-sector's challenges (USAID, 2010). Most interventions that

[129] Ouma, D., Effects of East African Community Regional Trade Agreement on Member's Agricultural Exports. Paper presented in Kenya International Conference on Dynamics of Rural Transformation in Emerging Economies, Kenyatta University, Nairobi, 2014, pp. 27-28
[130]Ibid, pp. 6-7

are aimed at providing support to the maize industry target a strategy to strengthen the country's position in regional and world markets.

Some of the key opportunities within the maize sub-sector include customs tariff and non-tariff barriers: After ratification of the Customs Union, some tariffs were reduced while others were abolished as a step towards harmonizing trade policies and taxes within the EAC region. Uganda, Kenya, and Tanzania have all adopted zero rate VAT on maize imports from within the EAC. This has enhanced the maize trade in Uganda[131]. There are conducive export policies on maize in Uganda. Consistent with its commitment to all liberal trade policy, Uganda has emphasized that its maize export sector remains as open as possible. Uganda has no maize export taxes, charges, or levies. Given this observation, it is imperative to argue that exporters of Uganda's maize grain are largely regulated by the importing countries. The flexible exchange rate policy regime pursued by the Bank of Uganda (BOU) intervenes in the foreign exchange market primarily to dampen short-term volatility in the exchange rate.[132] Dampening short term volatility is important to avoid its possible adverse impact on trade.

Some of the key challenges of the maize sub-sector in Uganda include lack of incentives for farmers, lack of minimum farm-gate price (price regulation was abandoned), and weak price controls (no export duty on maize).[133] Though generally, the Government of Uganda has been implementing private sector friendly policies, its specific policy on agriculture remains unclear. There are no known incentives for farmers to increase production and no attempts to ensure farmers receive an economic return for their efforts. This results in wildly fluctuating prices for farmers. Since the majority of producers are small scale farmers, maize is often sold by

[131] FEWSNET, Uganda. http://www.fews.net/Pages/marketflowmap.aspx?gb=ug&l=en.
[132] BOU, Report on the Domestic Resource Cost ratios for Selected Export Commodities 2009/10. Bank of Uganda, Kampala, Uganda, 2012.
[133] USAID, Market Assessment and Baseline Study of Staple Foods, Country Report-Uganda. USAID, 2010.

producers in small quantities of poor quality at low prices.[134] This is attributed to poor condition and lack of adequate storage facilities (resulting in significant post-harvest losses at various stages of the supply chain), dominance by large scale traders and exporters at high levels of the value chain (monopolistic behavior and concentration of market power), and high transportation costs (due to poor rural roads and the presence of non-tariff measures).

With the progressive liberalization of Uganda's economy – a process which included trade – among others, price regulation was abandoned as a trade policy tool. Both domestic and international trade in all agricultural products has since remained in private hands. No state trading companies are operating in competition with the private sector or acting as major buyers and guarantors of a minimum farm-gate price.[135]Similarly, price control as a development and trade policy measure is no longer practiced by the government. There is no export duty on maize (as well as other agricultural products), nor the government instituted any bans or other restrictions on trade in food commodities. As such, all prices are determined by the market but this does not imply well-functioning markets.[136]

4.1.2 Malawi

Malawi is a low-income country with a relatively vibrant maize sub-sector in the eastern Africa region. Considering that the agriculture sector accounts for nearly 75% of the economic growth, the maize sub-sector, just like other sub-sectors in the country has for years suffered from fiscal and monetary mismanagement, public sector scandal, poorly targeted and inefficient public spending plus an investment climate that discourages private investment.

Agricultural production, policy and politics in Malawi is driven by the maize sub-sector. Sixty percent of the national caloric consumption comes from maize, nearly all farmers grow maize,

[134]PMA Secretariat, Maize Value Chain Study in Busoga Subregion. Plan for Modernization of Agriculture (PMA). Kampla, Uganda,2009
[135] Ibid, p. 3.
[136] World Bank, Eastern Africa: A Study of the Regional Maize Market and Marketing Costs. Report No. 49831 – AFR. Agriculture and Rural Development Unit. World Bank. Washington, DC, 2009.

and over 50% of the farmers only grow maize. Therefore, the maize sub-sector drives volatility in Gross Domestic Product. With her characteristic of being densely populated and landlocked, maize is majorly consumed at household level.

Some of the opportunities in the maize sub-sector of Malawi include low transaction costs, well-organized farmers groups/cooperatives, improvement in macroeconomic management, and a well-organized extension delivery system.[137]Malawi has a well-organized extension delivery system despite its human capacity problems. This is coordinated through the Department of Agricultural Extension Services (DAES). Its mandate is to provide quality agricultural extension services to enhance the adoption of improved technologies for farmers of all gender categories and vulnerable groups.[138]

Smallholder farmers are advantaged in their participation in maize farming, export opportunities, and new technologies since their involvement does not jeopardize the welfare of their households due to low transaction costs. The real and opportunity costs of market participation are relatively lower in Malawi. This can be made even lower through improved rural roads, less bureaucratic red tape, more open markets, and smart, beneficial, and sustainable government interventions for commercialization opportunities.[139] Well organized farmers groups and cooperatives (many that started as tobacco and maize clubs) have illustrated the benefits of competing in markets through a producer-based organization. Individually, most Malawian farmers do not have the wealth, knowledge, and resources to compete favorably in international, or even urban, markets. Leadership support in promoting this hybrid of social and private entrepreneurship in the agricultural sector is essential for maize sub-sector's success. There is also an improvement in macroeconomic management. Disbandment of

[137] Mangisoni, J.H., Characterization of Maize Producing Households in Balaka and Mangochi Districts in Malawi, Country Report-Malawi. CIMMYT. Nairobi, Kenya, 2011.
[138] GoM The Agriculture Sector Wide Approach (ASWAp) - Malawi's prioritised and harmonized Agricultural Development Agenda, 2010
[139] Takane, T., African Rural Livelihoods under Stress: Economic Liberalization and Smallholder Farmers in Malawi. Occasional Paper Series No. 42, Institute of Developing Economies, Chiba, Japan, 2008.

overvalued or undervalued exchange rates, low inflation, reduced scandals in governance and transparency all contribute to a potentially competitive environment.[140]

The interacting and binding constraints that mitigate growth in Malawi include inadequate access to credit; high-interest rates and interest rate spreads; lack of savings; inefficient and ineffective financial sector; poor, small market neighbors limiting the possibility for lower-cost export growth; high transport costs; unreliable electricity (power outages); dependence on rain-fed agriculture with limited investments in irrigation; poor quality of education; land fragmentation; government failures (e.g. exchange rate and fiscal mismanagement) and market failures (e.g. lack of competition within supply chains).[141]

4.1.3 Tanzania

In Tanzania, maize is the most important crop, grown by 60% of total farming households and accounting for 40% of calorie consumption in the country.[142] Although the majority of maize production is consumed locally, about 10-15% is exported. One of the major challenges in the sub-sector is low productivity. The yield level is about 60% of that of the average across East African countries.[143] The average yield was about 668 kilograms per acre[144]. Available data indicates potential of realizing a yield of 1814 kg/acre[145] for rainfed maize in Sub-Saharan Africa under good agricultural practices. The low yields are attributed to limited input use (fertilizer and certified seeds).[146] There is also major crop loss due to pests and diseases (on

[140]Cammack, D., "The Politics of Chameleons Revisited: The Burden of Malawi's Political Culture" Democracy in Progress: Malawi's 2009 Parliamentary and Presidential Elections, (Eds.) M. Ott and E. Kanyongolo, Kachere Book Series No. 48, Montfort Media: Balaka, Malawi, 2010.
[141] Wood, B., C. Nelson, T. Kilic, and S. Murray, Up in Smoke? Agricultural Commercialization, Rising Food Prices and Stunting in Malawi. Policy Research Working Paper 6650, Washington, D.C., 2013
[142] Bill & Melinda Gates Foundation, Multi Crop Value Chain Phase II- Maize Tanzania, 2014
[143] FAOSTAT
[144] The AGRA report gathered data from 380 smallholder maize producing households in Kilimanjaro, Arusha, Iringa, Ruvuma, Manyara, Dodoma
[145] Hillocks, R.J, Addressing the yield gap in Sub-Saharan Africa, Outlook on Agriculture Vol 43, No 2, 2014, pp 85-90
[146] R. Trevor Wilson and J. Lewis, The Maize Value Chain in Tanzania: A report from the Southern Highlands Food Systems Programme, Food and Agriculture Organization of the United Nations, 2015

average, only 50% of the maize farmers use crop protection to fight pests and diseases and most farmers experience pest and disease losses averaging to about 15%).[147]

There is also limited knowledge to improve soil health (soils are depleted and untested). As farmers tend to seek new land by cutting trees as the major way to find more fertile virgin soils, this problem remains unaddressed. Other problems include limited incentives (farmers are not encouraged to invest in the inputs that would improve yields given unstable markets, alongside limited access to finance for investment), lack of transformational leadership whereby the sector has a history of out-growers, warehouse receipt, and storage schemes.[148]

4.2 Challenges and Opportunities in Maize sub-sector in Kenya

Maize accounts for 65% of total cereals production in the EAC region and about 85% of total cereals production in Kenya. The average Kenya national yield of maize is 8 bags per acre with agronomic yield potential of 56 Bags per acre in High Rainfall Areas in Kenya.[149] Maize is the most important cereal crop in Kenya. It is the main staple food in the country that has a population of 47,564,296. The per capita consumption takes an average of 76.2 Kg/cap/year.[150]

About 40 percent of the food crop producers in Kenya grow maize. [151] Small scale production accounts for about 70 percent of the overall production while the remaining 30 percent of the output is from large scale commercial producers.[152] Small scale producers mainly grow the crop for subsistence, retaining up to about 58 percent of their total output for

[147] Bill & Melinda Gates Foundation, Multi Crop Value Chain Phase II- Maize Tanzania, 2014.
[148] CCAFS is a cross-system initiative of the Consultative Group on International Agricultural Research (CGIAR), funded by a variety of donors and with a large number of partner research organizations both within the CGIAR and outside.
[149] http://kenyaseed.com/gallery/maize/ Accessed 10th November 2020
[150] Government of Kenya, Assessment of Costs of Maize Production, 2009.
[151] Republic of Kenya, "Strategy for revitalizing agriculture", Government Printer, Nairobi, 2004.
[152] Export Processing Zone Authority, "Grain production in Kenya", Export Processing Zone Authority, Nairobi, 2005.

household consumption.[153] An estimated area of 2.2 Million Hectares is annually put under maize in Kenya.[154]

Kenya's maize annual long term average production is 40 Million 90 Kg Bags with an estimated annual consumption of 52 Million 90 Kg Bags.[155] This leaves an annual deficit of 12 Million Bags of Maize which is unreliably met through importation from mainly East Africa region and occasionally from Mexico.[156] In order to realize the envisioned Big Four Agenda of producing 67 Million 90 Kgs bags by the year 2022, there's urgent need for judicious implementation of appropriate agronomic, economic and infrastructural interventions most of which are contained in the Vision 2030 and ASTGS

4.2.1 Challenges in Maize sub sector in Kenya

Several challenges face maize sub-sector in Kenya. The most pronounced challenges that face the sub-sector include high production cost, price volatility, adverse climatic conditions (droughts, floods, pests, and diseases), and commodity flooding in the country with cheap maize from other countries, post-harvest losses and poor storage[157]. The national maize production levels have been declining.[158] Key agricultural reforms in Kenya have been implemented recently to focus on removing government monopoly in the marketing of agricultural commodities and associated price controls which were vested in parastatals, and removal of government controls on importing, pricing, and distribution of purchasable farm

[153] L.M. Mbithi, "Agricultural policy and maize production in Kenya": Universiteit Gent, Unpublished Ph.D Thesis, 2000.
[154]USDA, World Economic Forum 2015 https://www.weforum.org/agenda/2016/12/this-map-shows-how-much-each-country-spends-on-food/18.8.2020
[155] Ministry of Agriculture, Livestock, Fisheries and Irrigation, Food and Nutrition Security Big Four Agenda, 2018
[156] Ibid
[157] FAO, IFAD., & WFP., The State of Food Insecurity in the World 2012. Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition. Rome, FAO, 2012.
[158] Mediamax. (2018). Proposed flour blending law to curb food shortage. Retrieved on 20th November, 2018. http://www.mediamaxnetwork.co.ke

inputs.[159] Another major challenge in the sub-sector is the reduction in government involvement and expenditure on agriculture, resulting in low investment and support for farmers[160]. Limited government support in the agriculture sector has heavily affected the maize sub-sector and subsequently contributed to increased poverty in the country.[161]

The Agricultural Cost of production in Kenya is high compared to other Eastern Africa States. This can be attributed to high cost of land lease and high input costs. The average cost of producing 90-kilogram bag of maize in Kenya in 2017 was Ksh. 2150.[162] The increased application of agrochemicals in maize farming due to emerging pests and diseases has also increased the cost of maize farming in Kenya[163]. Recently, maize production in Kenya has been highly affected by climate-related shocks and stress such as droughts which have increased the price of maize flour. In the year 2007, the price of a 2-kilogram flour packet more than doubled.[164] The country had to import the commodity to feed its population from Mexico, Malawi, South Africa, and Ethiopia. A shortfall of five million bags was projected to cab the food insecurity until the next season's crop of maize was ready. As a result of the Government decided to import over 51 million bags of cheap maize with importers taking advantage of the Government's decision to open its borders under the maize subsidy program to import extra maize. This resulted in the Government silos being full and unable to accommodate the harvest[165] thereby leading to massive post-harvest losses due to infestation by insects, molds, birds, and rodents.[166]In the year 2017, about 12% of maize (translating to about 4.5 million

[159]Tarus, CBT (2019). Maize Crisis: A Position Paper on Strategies for Addressing Challenges Facing Maize Farming In Kenya. East African Scholars Publisher, 2(3), pp. 149 – 158.
[160] Oluoch-Kosura, W. (2011). Maize farming in Kenya: where did it go wrong? IDS Institute of Development Studies.
[161]USAID, Kenya maize programme. Retrieved from http://www.usaid.gov/our_work/humanitarian_assistance/foodcrisis, accessed on March 3, 2021.
[162] Tarus, CBT, Maize Crisis: A Position Paper on Strategies for Addressing Challenges Facing Maize Farming In Kenya. East African Scholars Publisher, 2019, pp. 149 – 158.
[163] Ibid, Pp 146,147.
[164] The Star, Maize production remains high in 2017. Retrieved on 19th November 2020. http://www. The star co.ke
[165] Ibid p. 27
[166] FAO, Global Information and early Warning Systems, 2018.

bags) was estimated to have been lost. Maize storage is important because it bridges the gap between surplus at harvest time and scarcity during the post-harvest period. Maize producers in many parts of the country encounter a lot of losses as a result of poor storage. With an estimated loss of 20%-30% of harvested crops, post-harvest management has been a major challenge in Kenya's agricultural sector.

One of the major challenges in maize marketing and trade policy in Kenya has been the 'food price dilemma' whereby the issue is how to keep farm prices high enough to satisfy the farmers while at the same time keeping them low enough to avoid making maize unaffordable to the poor.[167] Kenya's maize marketing and pricing system have undergone several reforms beginning from the late 1980s. Until that time, the Government would set producer and into-mill prices for maize and also set maize meal prices to be sold by millers and retailers to consumers. These prices were pan-territorial and pan-seasonal, whereby they were adjusted once per year at the beginning of the marketing season. The government marketing board, known as the National Cereals and Produce Board (NCPB), had a longstanding monopoly on internal and external trade. Informal private trade across the country was illegal, as was cross-border trade. Traders were required to apply for movement permits to allow them to transport grain across the country. The Cereal Sector Reform Program began in 1987/88. The European Union supported the program as part of the country's overarching structural adjustment policies. At first, the GoK and donors agreed to legalize intra-country maize trade, with the maximum volume of maize trade to be progressively raised over time. The reform process intensified in late 1993, when, under pressure from international lenders, the government eliminated movement and price controls on maize trading. Before market liberalization in the late 1980s, the NCPB purchased between 5-8 million bags of maize per year. Even during the

[167] Flour blending secretariat, Flour blending initiative for food security, Nutrition and Employment report, Kenya, 2018.

early years of liberalization, the NCPB received enough public funds to purchase between 3 to 6 million bags per year, which was more than half of domestically marketed maize output. Thus, the NCPB remained the dominant player in the maize market even six to seven years into the liberalization process. This is not surprising considering that the NCPB set its maize purchase prices considerably higher than prevailing market prices. In the maize breadbasket areas of Western Kenya, the incomes and living standards of many farmers, especially large-scale farmers, depended on the NCPB continuing to offer support prices for maize. In this way, by offering above-market support prices, the NCPB used its market power and access to treasury subventions to discourage private sector investment in maize wholesaling and storage.[168]

Starting in the 1995/96 marketing year, and under pressure from external donors, the government dramatically reduced the NCPB's operating budget. This forced the NCPB to scale back its purchases substantially to about 1 million bags per year between 1995 and 2000. The reduction in NCPB maize purchases from 3-8 million to 1 million bags led to intensive lobbying by commercial maize farmers for increased purchases. The NCPB's maize purchases have been on upward trend with some years recording no purchases.[169] Since the major withdrawal of the NCPB in 1995, most small farmers in Kenya sell their maize to private traders. The 2007 National Food and Nutrition Programme (NFNP), a draft government document that attempts to address the shortcomings in earlier policy documents[170], acknowledges that high staple food prices, while favorable to farmers who can produce a surplus, directly hurt not only urban consumers but also a large portion of rural small-scale

[168] CIMMYT, Maize in Kenya: Chance for Getting Back to Former Glory? DT MAIZE. A Quarterly Bulletin of the Drought Tolerant Maize for Africa Project, Vol 4, No.3, 2015

[169] Nyoro, J.K., etal, The Compatibility of Trade Policy with Domestic Policy Interventions Affecting the Grains Sector in Kenya. Paper presented at the FAO's workshop Trade and Policy for Food Products Conducive to Development 1-2 March 2007, Rome, Italy, 2007.

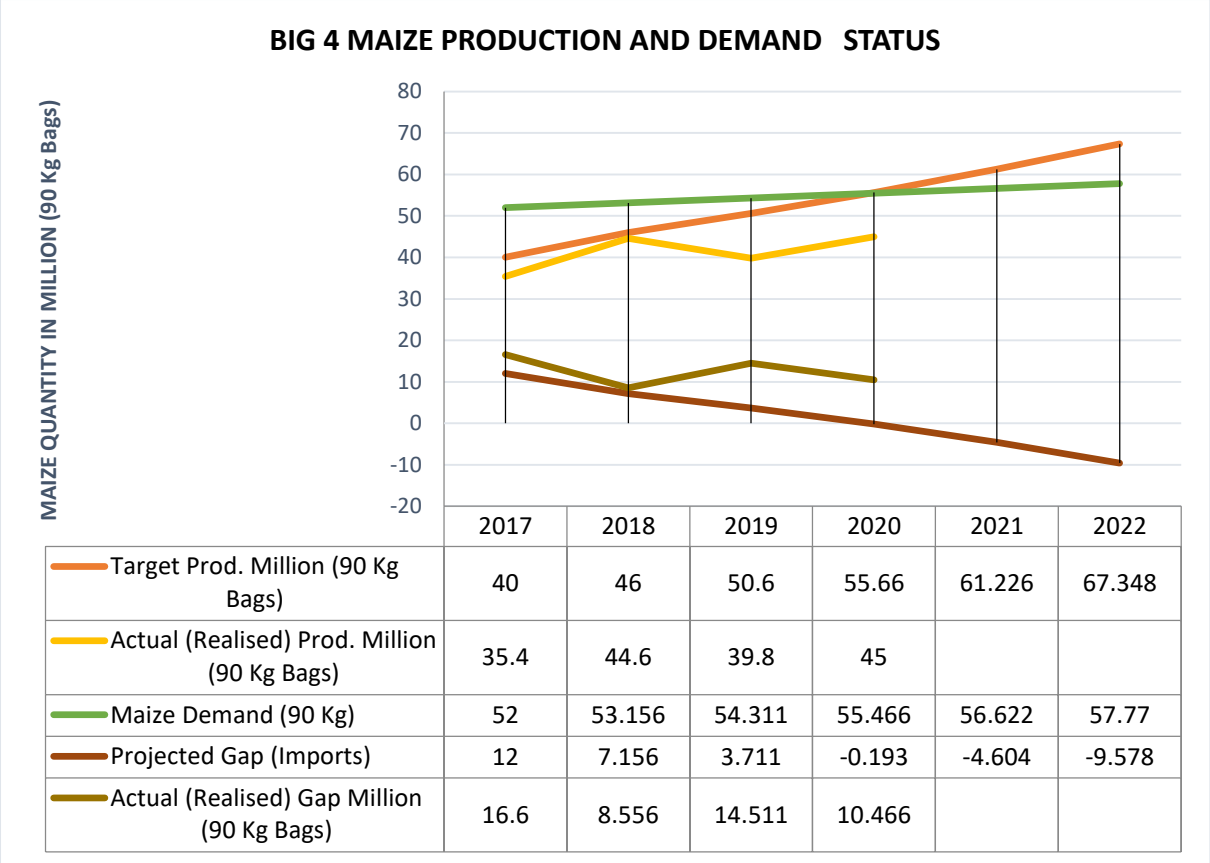
[170] Government of Kenya, Ministry of agriculture strategic plan (2008-2012), Nairobi, Kenya, Government Printers, 2008.

farmers who are net buyers of staple food. The NFNP emphasizes increased availability and accessibility to diverse foods to meet the basic minimum food nutritional requirements. It proposes a gradual removal of import duties on maize, wheat, and rice, promotion of cross-border trade in food items, control importation of subsidized foods, and educating local authorities and administrators on the importance of the free movement of food items. By proposing appropriate reforms in domestic and external trade policy, the NFNP brings into perspective the importance of perceiving food security in the broader context of regional market integration and globalization rather than just as a localized issue.[171]

Maize remains the staple food crop in Kenya and consumption is expected to continue increasing despite the diversification of Kenyan diets. Demand for maize in the manufacture of animal feeds is also expected to increase due to recent major private sector investment in the sub-sector. Kenya will therefore remain a maize deficit country and the need for imports will remain into the foreseeable future.[172]

The Government of Kenya has initiated various Agricultural promotion projects and initiatives that are aimed at addressing agricultural production challenges. The agricultural interventions include; Big four Agenda on Food and Nutrition Security, Agricultural input subsidy and Crop and Livestock Insurance program with varying levels of success. For example, Big Four Agenda on Food and Nutrition Security which launched by National government in 2017 to address the chronic problem of food and nutrition security by 2022 is yet to achieve most of its targets as indicated by the case of maize production shown in figure 10 shown below

[171] National Food and Nutrition Security Policy Implementation Framework 2017-2022, Agricultural Information Resource Centre.Nairobi, 2017
[172] Rugalema, G., Maize Farming in Kenya, unearth untapped white gold, 2018.



	2017	2018	2019	2020	2021	2022
Target Prod. Million (90 Kg Bags)	40	46	50.6	55.66	61.226	67.348
Actual (Realised) Prod. Million (90 Kg Bags)	35.4	44.6	39.8	45		
Maize Demand (90 Kg)	52	53.156	54.311	55.466	56.622	57.77
Projected Gap (Imports)	12	7.156	3.711	-0.193	-4.604	-9.578
Actual (Realised) Gap Million (90 Kg Bags)	16.6	8.556	14.511	10.466		

Figure 10: The Big Four Agenda Food and Nutrition Security Maize Status[173]

The Big 4 Agenda on Food and Nutrition Security had anticipated achieving maize self-sufficiency by 2020 where the targeted production of 56 Million Bags of maize was anticipated to be equal to the demand of maize at the time as indicated in figure 10 above. However, due low funding of planned project activities, climatic and biological challenges occasioned by drought, floods and fall army worms, the maize deficit of 10 Million bags still persists.

[173] Source: KNBS Economic Survey 2020 and G.O.K, Big four Immediate Priorities and Actions, December 2017

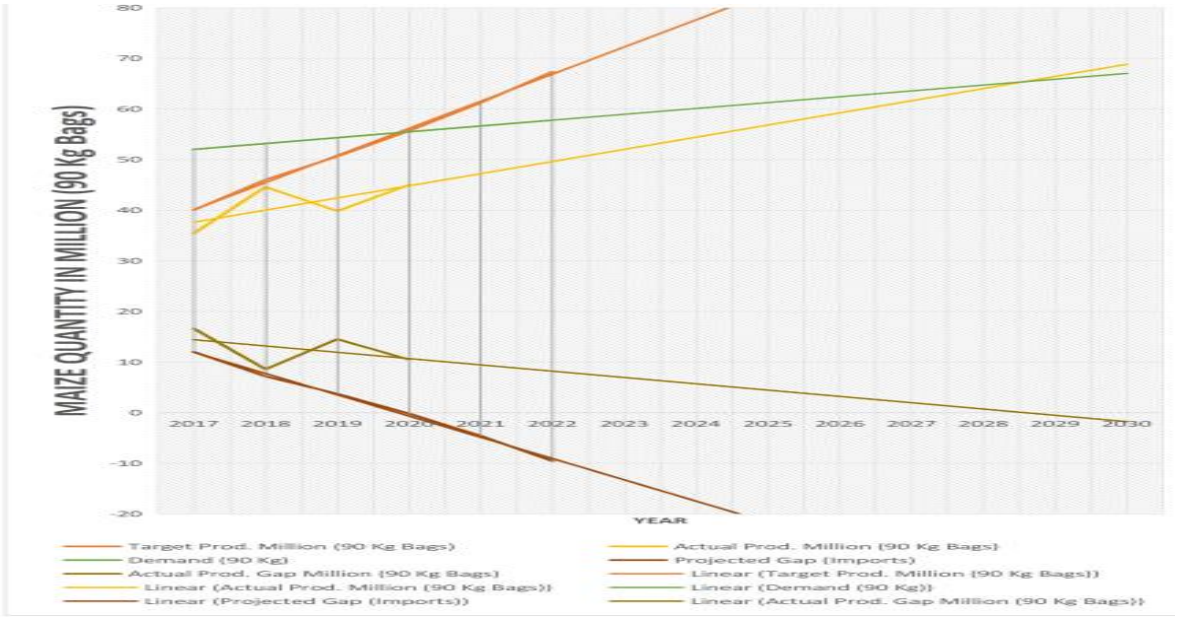


Figure 11: **Big Four Agenda Food and Nutrition Security Maize Projected Maize Situation**

From the graph in figure 11 above, it is projected that if no aggressive agricultural production interventions by identified key agricultural stakeholders which includes timely supply of quality farm inputs, improvement of agricultural mechanization, effective pest control and supplementary irrigation, the desired maize self-sufficiency will be delayed by 10 years until 2029 when the national demand of maize is likely be met by domestic production.

As much as resources are mobilized from various sources including Private sector, development partners and farmer organizations, there is need for the National and county governments to allocate adequate resources to Agricultural sector. Despite agricultural sector contributing over 33% annually to the National GDP, there has been low National budgetary allocation to the sector. For example, in year 2016/2017, Kenya government spent only 2.6% of its national budget on agriculture which is significantly below the 10% minimum allocation advocated for in Malabo declaration.[174]This may explain the reason for lower agricultural

[174] MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p. 25

employment growth rate compared to other sectors that is 2.3% for agriculture 3.8% for manufacturing and 4% for services.[175]

4.2.2 Opportunities in Maize sub sector in Kenya

This research has identified various agricultural interventions by government in collaboration and or partnership with private sector for improved maize sub-sector and food security in Kenya. Some of the key opportunities are discussed below:

4.2.2.1 National Input Subsidy System Reform

The government of Kenya has for many years endeavoured to support small scale and large-scale maize farmers through provision of subsidized fertilizers with varying annual and regional success. This subsidy programme has been undertaken by the national government over time with aim of rendering fertilizer affordable to farmers. The program has involved procurement of 650,000MT of Fertilizer (30-40% of the national fertilizer requirement) annually and selling it at subsidized prices to registered farmers. To date, a total of 1,106,030.5 MT of fertilizer worth Kshs 29.61Billions has been subsidized since 2008 when the programme was initiated and 3,659,947 farmers have ever since benefited.[176] The impact of the subsidy programme has been in the increase of average maize yields from 15 bags to 20 bags per hectare and price stabilization of fertilizer to about Kshs. 3,000 from Kshs. 6,500 that was recorded in 2008. Subsidized fertilizers are sold at Kshs 1,800 and Kshs 1,500 per bag for the planting and topdressing fertilizers respectively. [177]

Despite this increased uptake of fertilizer and improved seeds, average maize yields have declined from 2.2 MT/hectare in the 1990s to 1.74 MT/hectare in 2012 and are still well below potential.[178]

[175]ibid P. 26
[176] Maize Retreat Report, Ministry of Agriculture, Livestock and Fisheries, 2017, p. 13
[177] Government of Kenya, Agricultural Sector Transformation and Growth Strategy, 2019, p. 82
[178] Ibid, p.82

The ASTGS proposes a nationwide shift in Agricultural subsidy focus so as to reach 1.4 million registered resource poor farmers to enable them access a wide range of subsidized (40%) agricultural inputs.[179] Digital E-voucher system is employed in the procurement and dispatch of the farm inputs to the vetted beneficiaries in selected counties. Soil testing & liming of acidic soils should be made a mandatory requirement before issuance of any subsidized input support to the beneficiaries. This will help in addressing the low soil PH occasioned by repeated use of acidifying fertilizers especially Diammonium Phosphate (DAP) and Urea in maize producing counties. The maize production decreases significantly when the soil becomes acidic due to inappropriate fertilizer use that leads to fixation of plant soil nutrients. The reformed input subsidy should have a package on subsidized crop insurance as projected in the Big Four Agenda on Food and nutrition security. Crop insurance package is critical in maize production due to high dependence on rain-fed agriculture coupled with unpredictable weather patterns occasioned by climate change. Farmers with crop insurance cover will confidently venture into maize Production in spite of weather and pests' risks.

4.2.2.2 Embracing Warehouse Receipts System (WRS)

Maize farmers face a myriad of production, storage and marketing challenges occasioned by lack of access to credit facility, organized Market and storage facilities. This will be a thing of the past upon embracing Warehouse Receipt System (WRS) in Kenya. The WRS provides a framework for efficient produce storage service and facilitate price stabilization. Owners of commodities (producers) will deposit their commodities (Produce) in certified warehouses and will be issued with a Warehouse Receipt (WR) as proof of ownership. The receipt so obtained will be able to use as collateral in accessing loans from a commercial bank pending sale of the produce at a later stage when prices are good. This will help address the low agricultural

[179] Ministry of Agriculture Livestock Fisheries and Irrigation, Agricultural Sector Transformation and Growth Strategy 2020-2030, 2019, p. 11

produce prices that the farmers earn due to panic selling of maize in case of urgent financial challenge or at harvest due to market glut. Loan could also be obtained from a commercial bank for timely purchase of farm inputs (especially seeds and fertilizer) before the sale of the previous harvest.

The WRS will also provide standard stores for maize storage thereby reducing the annual post-harvest loses which is currently estimated at 12%.[180] Warehouse receipt System will promotes aggregation of produce by small scale farmers enabling them to access large traders, processors and government for sale of their produce at a better price. Much has to be done by the government to improve the contribution of WRS to the maize sub-sector for it is currently low with only 5.3% of the interviewed respondents perceiving the initiative as currently greatly contributing to the maize sub-sector growth. 42.1% of those interviewed viewed WRS as averagely contributing to the current performance of the Maize sub-sector as shown in appendix 5d.

4.2.2.3 Reduction of Maize Post-Harvest Losses

The average post-harvest loss of cereals in Kenya is estimated at 20 -25 % with that of Maize standing at 12% (Approximately 4 Million Bags).[181] The maize post-harvest challenges are aggravated by existence of inadequate post-harvest grain handling and drying facilities, high cost of storage materials, equipment and chemicals in rural areas among others. Timely provision of fixed and mobile grain drying services by County and national Government have great potential of reducing the high Post-harvest loses witnessed especially during the rainy season. Production and use of Aflasafe for prevention of aflatoxin build up and food poisoning is a vital opportunity in addressing food safety.[182]

[180]Ministry of Agriculture Livestock and Fisheries, Maize Retreat Report, 2017, p. 10
[181] MOALF&I, ASTGS, 2019, p.32.
[182]A.E. Alakonya, Fumonisin B_1 and Aflatoxin B_1 Levels in Kenyan Maize, Journal of Plant Pathology, Vol. 91, No. 2, Springer, 2009, pp. 459-464

4.2.2.4 Promotion of Use of High Yielding and Adoptive Maize Seed Varieties

By end of the year 2020, Kenya Plant Health Inspectorate (KEPHIS) had tested and certified for release 389 maize varieties since the first release in 1970.[183] The Seed varieties are bred by both local and international seed companies and are subjected to though suitability tests by KEPHIS. The seeds are majorly bred for high grain yields (which currently are at 56 bags of 90 Kg Bags) per acre. The other desired characteristics bred for are; high tolerance to pests and diseases, drought and striga weed tolerance, wind lodging resistance and good husk cover among others. Kenya Agricultural and Livestock Research Organization (KALRO) has been a major player in the breeding works in Eastern African Region alongside other private maize seed companies. The seed companies in Kenya that have over the years actively participated in promotion of development of new maize seed varieties include but are not limited to; Kenya Seed (major domestic government owned seed company), Western Seed Company, Pioneer Hybrid Seed company, Pannar Seed Company and Monsanto Seed Company. Kenya boasts of the best Seed development industry in the Eastern African region and this is a great potential that can be tapped for the increased production in the country. In spite of the existence of variety of seeds to choose from, it is ironical that some farmers are still cleaved to the old Maize varieties such as H614 are still planted by farmers in spite of their low yield potential of 38 Bags of maize per acre compared to a new variety like H6218 with yield potential of upto 56 bags of maize per acre.[184] Such old varieties which have been grown for over 7-8 years need to be replaced with new superior varieties which have been developed by the Kenya Agricultural and Livestock Research Organization (KALRO). The developed maize varieties are of desirable attributes including high yield Potential. These varieties include Highland and Medium-altitude maize hybrid varieties such as H6218 with yield potential of 56 bags per acre, Coast Hybrids, Eastern Kenya (dryland hybrids), Striga Resistant Maize (KESTP94 & GAF4),

[183] KEPHIS, Kenya, National Crop Variety Lis-Kenya, 2020, pp.36-96
[184] http://kenyaseed.com/gallery/maize/ Accessed 20th December 2020 at 1212hrs

Quality Protein Maize, MLND (NPT2) & Aflatoxin resistant Variety, Drought Tolerant Varieties and BT maize. Aggressive promotions of these new and high yielding varieties need to be done by the national and county governments for adoption by the farmers. There is need to lift the ban on genetically engineered insect pest and drought tolerant maize varieties to increase productivity amid climate change.

4.2.2.5 Utilization of Idle Public Land for Maize Production through Public Private Partnership

Public institutions in Kenya have large tracts of land that is not utilized due to inadequate Institutional funding. The Land situated in suitable agro-ecological zones can profitably be utilized for maize production. The institutional lands include land owned by Agricultural Development Cooperation (ADC), KALRO and National Irrigation Board (NIB).[185] Approximately 60,000 acres lies idle at ADC farms and KALRO while 40,000 acres exist at NIB schemes.[186]Legally binding lease mechanism need to be developed to enable utilization of the idle public institutional land by private investors for production of maize. This will increase the area under maize production and hence reduce the current national maize deficit.

4.2.2.6 Reduction of Pressure on Maize

Increasing the volume of blended maize flour in the market from 5% to 50% by 2029 will help in reducing pressure on demand for Maize**.** Six flour blending standards have so far been developed and approved by KEBS. The blends are attained by mixing maize, sorghum, millet and cassava in various approved proportions and combinations. It is projected that upon full adoption and utilization of blended maize flour products, there will be a reduction in the demand for maize by over 20 million bags per year.[187] Controlled import of yellow maize in

[185] Ministry of Agriculture, Livestock, Fisheries and Irrigation, Food and Nutrition Security Big Four Agenda, 2018
[186] Ibid
[187]Ministry of Agriculture Livestock and Fisheries, Maize Retreat Report, 2017, p. 15

case of anticipated maize deficit for animal feed processing mentioned above will reduce demand on white maize annually.

4.2.2.7 Increase Irrigated Land through Construction of New Dams and Smallholders Water Pans

Kenya has not fully developed its irrigation potential estimated at 1.342 million hectares.[188] This irrigation potential is based on surface and underground water including water harvesting and storage. By the end of 2015, approximately 180,503 ha of irrigation had been developed. This represents about 13.5% of the potential leaving more than 80% of Kenya's irrigation potential untapped.[189]The rate of irrigation development in Kenya has been very low at about 0.5 percent per annum.[190] There is therefore need to increase investment in irrigation development to ensure its accelerated growth and sustainable development hence leading to food and nutrition security. Construction of dams in parts of the country that have continually experienced disasters caused by drought and floods (e.g. in Kano Plains, Budalang'i and ASAL areas) will reduce water insecurity and vulnerability of families inhabiting those areas.[191] Supplementary irrigation is essential in high and medium rainfall areas to avoid total crop loss that is occasioned by prevalence of dry spell at critical stage of maize growth especially during the first weeks after germination, at flowering and grain filling. This will increase the land suitable for maize production in Kenya from the current 5.5% to upto 37.4% through supplementary irrigation and/or conservation agriculture. ASTGS advocates for Promotion of water harvesting, conservation and small-scale irrigation.[192] The Irrigation Act was formulated and was assented to by the President of the Republic of Kenya on 29th July 2019 with a commencement date of 16th August 2019.[193] The act provides sustainable framework for

[188] Ministry of Agriculture Livestock Fisheries and Irrigation, National Irrigation Policy, 2017, p.4
[189] Ibid P.5
[190] Ministry of Agriculture Livestock Fisheries and Irrigation, Deep dive Workshop Report,2019, p. 1
[191]Government of Kenya, Vision 2030, 2007, p.117
[192] Ministry of Agriculture Livestock Fisheries and Irrigation, Agricultural Sector Transformation and Growth Strategy, 2018
[193] Government of Kenya, The Irrigation Act 2019 Kenya Gazette Supplement No. 136 (Acts No. 14), 2019

expanding irrigation area under crop production. The Big Four Agenda on Food and Nutrition Security aims at expanding irrigated land under maize production by over 10,000 Hectares in Bura, Hola, Perkerra, and Turkana Irrigation schemes. The Maize produced in these schemes will be harvested for use as Certified Maize seed and for consumption by the communities living in the schemes.

4.2.2.8 Increased Mechanization through Machinery and Accessories Access Support

Agricultural mechanization is of great importance in improving agricultural farm operation timeliness and efficiency. Agricultural mechanization in Kenya is currently very low at 25 %. This scenario leads to delayed farm operations and reduced efficiency and hence low productivity. The study established that Agricultural mechanization is considered by 64.3% of those interviewed as being a major contributing factor to low maize sector growth (Refer to Appendix 5a). The use of motorized, manual and animal drawn power stands at 30 %, 50% and 20% respectively[194]. It is estimated that the country has about 10,000 tractor units and require an additional 11,000 units of tractors to meet its targeted 50 % mechanization threshold from current 30%. This will increase maize production operation efficiency and timeliness. Machinery and accessories access support initiative will involve engaging private mechanization service providers through private sector partnerships. In Kenya, where majority of farmers are the aged, agricultural mechanization will attract youth into active agricultural production.[195]

4.2.2.9 Development of Single Source High-Quality Verifiable Agricultural Data

The agricultural enterprises in Kenya are agro-ecological zones dependent due to over reliance on rain-fed agriculture. Accurate and detailed information about farmers in Kenya is vital in

[194] Wawire W. N, et al, The Status of Agricultural Mechanization in Kenya, 2016, p. 3.
[195] Ministry of Agriculture Fisheries and Irrigation, Agricultural Sector Transformation and Growth Strategy,2018 p.72

Agricultural planning and transformation.[196]Currently Agricultural data is scattered with each organization hosting separate data not known to the other. There is need for creation of a single source of high-quality verifiable data by developing a frame work of maize data capture, curation and use. The data captured will include that on daily weather data, food balance sheet for maize, Market information (Stocks, demand and Prices). Currently there is Kenya Agricultural Observatory Platform (KAOP) developed by KALRO in partnership with World Bank and Government of Kenya. The weather platform provides real time and historical records of all relevant weather data and weather forecast. The KAOP system provides actionable information and predictions that help farmers make better decisions.

4.2.2.10 Employment of Agricultural Extension Workers and Creation of National Coordination and Monitoring Agricultural structures

Employment of more extension service providers for effective transfer of new Agricultural technologies is urgently required. This will increase the maize yields and returns to investment through value addition and reduced post-harvest losses. Following devolution of most of agricultural functions to the county, creation of national coordination and monitoring offices at county levels is ideal for effective coordination and monitoring of food security situation.

[196]MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p. 36

Chapter Five

Summary, Conclusion and Recommendations

Introduction

This chapter is the last section of this study on critical analysis of food security and policy in Eastern Africa: a case study of maize sub-sector in Kenya. The chapter provides a summary of the contents of chapter two, three and four. The key findings of each of the three study objectives are highlighted in summary and recommendations made for the improvement of food security and maize sub-sector in Kenya.

5.1 Summary

Most Eastern African countries experience food insecurity.[197] Food security in the region is affected by various factors such as political, economic, social, and climate change.[198]The prevalence of stunting in under-fives in Eastern Africa region is 35.2%; this is significantly greater than the global average of 21.9%. [199]Conversely, The Eastern Africa sub-region's prevalence of wasting in under-fives of 6% is less than the global average of 7.3%. Millions of people in Eastern Africa region face famine every year, a situation that compels a number of humanitarian interventions on food relief. The East African region faces severe food shortage, hunger and loss of crops as well as livestock mainly due to harsh climatic conditions that is characterized by drought. Rain deficits severely affect crop planting, germination, and overall vegetation conditions in the region. With a rainfall of 40-80 percent below average levels in the region, food security is at a critical risk. [200]

[197]FAO,Knowledge and Information for Food Security in Africa". Retrieved from http://www.fao.org/3/w9290e/w9290e01.htm, 2019, pp. 13-15.
[198] Global Nutrition Reportn"Eastern Africa Nutrition Profile - Global Nutrition Report". Retrieved from globalnutritionreport.org/ resources/eastern-africa/, 2020.
[199] Ibid, p 2
[200] IFPRI, "Food Insecurity in East Africa" Retrieved from https://www.foodsecurityportal.org/blog/food-insecurity-east-africa, 2019

Maize is the most important cereal crop in Eastern Africa for food, animal feed and industrial use.[201] Maize is an indispensable food security commodity in Eastern Africa due to its adaptability to varying climatic conditions and traditional utilization acceptance within the region.[202]

The eastern Africa region is not maize self-sufficient and relies on exports from South Africa and other continents. The region buffers its domestic production deficit shocks through international trade.[203] There is low maize productivity in the region attributed to numerous factors such as low access to extension services, inadequate use of modern inputs, poor rural infrastructure, high land sub-division and adverse effects of unpredictable and unfavorable weather patterns.[204]

The success of food security through the maize sub-sector is hampered by misguided policies, weak institutions, and the adverse effect of climate change.[205]

According to WFP (2019), a total of 18.7 million people are facing food insecurity requiring humanitarian assistance and the numbers are particularly high in the Eastern African region. Most of the hard-hit members of the Eastern African population live in arid and semi-arid lands, areas with ongoing and protracted conflict.[206]

Several recent policies have been formulated and implemented by eastern Africa countries to improve food security. The policies are aimed at increasing access to improved agricultural inputs, facilitating agricultural produce marketing domestically and

[201] Sitko, N., A. N. Kuteya, B. Chisanga, Analysis of the Effects of Maize Trade Restrictions in the COMESA Region on Food Prices and Market Development, Technical Report, Indaba Agricultural Policy Research Institute, Lusaka, 2014, P. 3.
[202] Kornher, L., The State of Agricultural Commodity Markets (SOCO) Background Paper, 2018, P. 2.
[203] Davids, T., Schroeder, K., Meyer, F., Chisanga, B., Regional price transmission in Southern African maize markets, Invited Paper presented at the 5th International Conference of the African Association of Agricultural Economists, September 23-26, 2016, Addis Ababa, Ethiopia, 2018, P. 12.
[204] Ibid P. 17
[205] Daly, Jack, Danny Hamrick, and Andrew Guinn, "Maize Value Chains in East Africa." Center on Globalization, Governance & Competitiveness, Duke University (October), 2016, Pp 1–49.
[206] FAO, ECA and AUC. Africa Regional Overview of Food Security and Nutrition 2019. Accra. https://doi.org/10.4060/CA7343EN, 2020, p. 60

internationally, increasing agricultural budget funding, capacity building of agricultural producers through strengthening of agricultural Extension Service delivery service. Eastern African states have created programmes and institutions to at national, sub-regional and national levels to promote food security and maize sub-sector. These institutions include the East African Community (EAC), COMESA and AU Assembly of Heads of State and Government. [207]The current EAC Food and Nutrition Security Strategy (2018 –2022) is aimed at contributing to elimination of hunger, malnutrition, and extreme poverty in the East African region by the year 2022. However, most countries have numerous laws and policies that work in conflict with policies of EAC.[208]

The mandate of the industry and agriculture division of COMESA is to promote development of competitive, sustainable, and profitable agriculture and industries that contribute to economic and social prosperity of the COMESA citizens. CAADP champions reform in the agricultural sector, setting broad targets such as: 6 percent annual growth in agricultural GDP, and allocation of at least 10 percent of public expenditures to the agricultural sector. In the CAADP, Africa as a continent has recognized that enhanced agricultural performance is key to growth and poverty reduction through its direct impact on food security and improved nutrition.[209] The GHI, which ranks hunger levels based on four indicators (undernourishment, child stunting, child wasting, and child mortality), reports since year 2000

[207] Laibuni, N., Omiti, J. and Natu, H., Food Insecurity in the East African Region: Policy Dilemma. Retrieved from https://elibrary.acbfpact.org/acbf/collect/acbf/index/assoc/HASH01b7/570d8e1e /2257052a/f2d7.dir/Food%20Insecurity%20in%20the%20East%20African%20Region.pdf, 2020, p. 6.

[208] Waithaka, M., Nelson, G.C., Thomas, T.S., Kyotalimye, M., East African agriculture and climate change: A comprehensive analysis. International Food Policy, 2020. Research Institute (IFPRI), Washington, DC. 2013 pp. 2-3.

[209] Benin, S. and B. Yu, Complying with the Maputo Declaration Target: Trends in public agricultural expenditures and implications for pursuit of optimal allocation of public agricultural spending. ReSAKSS Annual Trends and Outlook Report 2012, International Food Policy Research Institute (IFPRI), 2013. pp. 4-5.

to year 2020 have depicted the Kenya's hunger status to be slightly declining though still high at 23.7.[210]

Maize is the main staple food in the country with average per capita consumption rate of 76.2 Kg/cap/year.[211] The deliberations with key agricultural stake holders in Kenya during the study revealed that Kenya is currently not self-sufficient in three major cereal crops namely Maize, Rice and Wheat. This was confirmed by over 90% of respondents stating that Kenya was not self-sufficient in major cereals as shown in appendix 5c. In order to address food security and agricultural production challenges in Kenya, the government has formulated various policies and regulations and initiated several government projects and programmes such as Vision 2030, ASTGS (2018-2030), Big 4 Food and Nutrition security initiatives, Agricultural Subsidized input support projects and Warehouse Receipt System in management of food stocks.

Kenya formulates its national Constitution, Regulations, Policies and Strategies in conformity with Sub- regional, Regional and international organization treaties of which it is a signatory. These organizations include; EAC, COMESA, CAADP under East African Community and United Nations that has Sustainable Development Goals especially Goal number 2 that aims at attainment of zero hunger by 2030.

5.2 Findings and Conclusions

5.2.1 Findings

The study established that most of Eastern African countries experience food insecurity.[212] Food security in the region is adversely affected by political, economic, social, and environmental constraints. The key environmental constrain that affect agriculture are related

[210] Concern Worldwide and Welthungerhilfe, "Global Hunger Index: 2020 GHI Scores". Retrieved from https://www.globalhungerindex.org/kenya.html, 2020.
[211] Government of Kenya, Assessment of Costs of Maize Production, 2009.
[212]FAO,Knowledge and Information for Food Security in Africa". Retrieved from http://www.fao.org/3/w9290e/w9290e01.htm, 2019, pp. 13-15.

to climate change that leads to drought, floods, emerging pests and diseases such as fall army worms, desert locust (that are currently witnessed in the Africa) and Maize Lethal Necrosis Disease (MLND). Food security in the region aggravated by high post-harvest losses, aflatoxin, poor marketing and distribution systems as well as inappropriate processing and subsidies policies. [213]

The prevalence of stunting in under-fives in Eastern Africa region is 35.2% which is significantly greater than the global average of 21.9%. [214]However, the regions wasting percentage of under-fives is 6% which is lower than the global average of 7.3%.

Maize is an important cereal crop in the Eastern Africa utilized as human food and feeds for livestock.[215] Maize is an indispensable food security commodity in Eastern Africa due to its adaptability to varying climatic conditions and traditional utilization acceptance within the region.[216]The study therefore rejects the hypothesis that holds that there is reduction in demand for maize in Eastern Africa and Kenya due to increasing preference of other cereals for foodstuffs by the Kenyan population. The data accessed during the study has shown steady demand for maize years across the region. This can also be attributed to the high annual population growth rate which is currently at 2.2% in Kenya. The study established that there exist opportunities for addressing food security and ensuring faster growth of maize sub-sector in Eastern Africa. Establishment and utilization of sub-regional and regional custom union and common market is vital in facilitating free movement of maize and other agricultural foodstuffs across the borders. This has enhanced the maize trade in Uganda.[217]

[213] Global Nutrition Reportn"Eastern Africa Nutrition Profile - Global Nutrition Report". Retrieved from globalnutritionreport.org/ resources/eastern-africa/, 2020.
[214] Ibid pp 2
[215] Sitko, N., A. N. Kuteya, B. Chisanga, Analysis of the Effects of Maize Trade Restrictions in the COMESA Region on Food Prices and Market Development, Technical Report, Indaba Agricultural Policy Research Institute, Lusaka, 2014, P. 3.
[216] Kornher, L., The State of Agricultural Commodity Markets (SOCO) Background Paper, 2018, p. 2.
[217] FEWSNET, 2012. Uganda. http://www.fews.net/Pages/marketflowmap.aspx?gb=ug&l=en.

Ethiopia and Tanzania are the largest maize producers but Malawi and Zambia have the highest per capita consumption in Eastern Africa of 129 and 118 Kg/ Person/Year. The region is a net importer of maize from other South Africa and other continents. This buffers it from the maize internal deficits of maize.[218]

Individual states, sub-regions, and African region have over time put in place policies, Strategies, programmes and regulations to help in addressing low Agricultural productivity and food insecurity in their areas of jurisdiction. For instance, Malawi is implementing National Agriculture Program (NAP).[219] Tanzania is implementing Agricultural Sector Development Program in line with CAADP. ASDS provides a sectoral strategy contributing to the medium-term development objectives identified in MKUKUTA I & II and the long-term objectives outlined in Vision 2025. [220]The government of Uganda has recently implemented numerous policies that were targeted to benefit maize farmers in the country. Through the National Trade Policy and the National Bureau of Standards, the Ugandan government has attempted to increase compliance with EAC standards to benefit the farmers who are engaged in export. [221] Uganda is promoting Foreign Direct Investment (FDI) for increased investment in Agricultural, Trade and industrial development sector.

Implementation of COMESA, East African Community (EAC), the Malabo Declaration under the CAADP and the United Nations SDGs by African states is aimed at ensuring food security and freedom from hunger at regional and global levels. [222]

[218] Davids, T., Schroeder, K., Meyer, F., Chisanga, B., Regional price transmission in Southern African maize markets, Invited Paper presented at the 5th International Conference of the African Association of Agricultural Economists, September 23-26, 2016, Addis Ababa, Ethiopia, 2016. p. 12.
[219]Government of Malawi, 2010. The National Agricultural Policy: Promoting agricultural productivity for national food security and economic growth and development through value chain development. p. 4.
[220] United Republic of Tanzania. 2006. Agriculture Sector Development Programme. Support through basket fund. Dar es Salaam: URT. http://www.kilimo.go.tz/publications/english docs/ASDP FINAL 25 05 06 (2).pdf. p. 14
[221]Ibid, pp. 11-12
[222] African Commission on Agricultural Statistics, Twenty-Sixth Session: AGENDA ITEM 4 - Alignment of Regional monitoring frameworks and the global SDG indicator framework and inter-agency coordination. Libreville, Gabon, 2019, pp. 1-7.

Despite all these policies by the states to address food security, food insecurity still prevails in Eastern Africa states rejecting the hypothesis that the food insecurity exists because of lack of policies and strategies. What lacks as confirmed by the study is the political will and adequate resource allocation to the planned activities. This holds true in the case of big four agenda for attainment of 100% food and nutrition security by 2022. The Agenda was technically planned and realistic activity targets set but the resources were not allocated for the realization of goals as shown in figure 10 and 11.

Food security in respect to food access, availability, affordability and utilization is felt in Kenya in a big way.[223]However, the GHI which ranks hunger levels based on four indicators (undernourishment, child stunting, child wasting, and child mortality), reports since year 2000 to year 2020 have depicted the country's hunger level to be slightly declining.[224] This can be attributed to multi-sectoral approaches to contain food insecurity which has been implemented through numerous government projects, programmes and policies such as Vision 2030, ASTGS and Big 4.

Maize is the most important cereal crop in Kenya with per capita consumption of 76.2 Kg/cap/year.[225] Maize production is both from small-scale (70%) and large scale (30%) producers. The production trends have often fluctuated over the years. There has been a significant maize deficit in the country in most of the years due to poor weather that is worsen by inadequate absorption of modern production technologies, lack of access to credit and inadequate extension services to small scale producers, among other challenges.

Due to its low productivity, Kenya has a structural maize deficit, which is compensated by food imports. Exports from Uganda and Tanzania often supply deficit regions in

[223] Ibid, pp. 1-2
[224] Concern Worldwide and Welthungerhilfe, "Global Hunger Index: 2020 GHI Scores". Retrieved from https://www.globalhungerindex.org/kenya.html, 2020.
[225] Government of Kenya, Assessment of Costs of Maize Production, 2009.

Kenya.[226]Despite the importance of maize in Kenya, its productivity has stagnated (only 1.6 tons/ha). Ethiopia, for example, is twice as productive, with a productivity of 3.7 tons/ha. Low productivity is attributable to numerous factors such as low access to extension services, inadequate use of modern inputs, poor rural infrastructure, high land sub-division and adverse effects of unpredictable and unfavorable weather patterns.[227] This confirms the hypothesis of the study that there are decreasing maize yields in Kenya in spite of development and release of high yielding maize varieties in Kenya due to climate change and agricultural input affordability challenges.

Kenya is undertaking key policies reforms that are in line with the 2010 Constitution of Kenya. The reforms are aimed at attainment of food security to all as a constitutional human and as provided for in the United Nation Strategic Development Goal 2. The reforms that the government is implementing that have direct implications on the maize sub-sector include the 'Big 4 Agenda', the 'buy-Kenya-build-Kenya' policy, and the fertilizer subsidy program.[228] In line with the Constitution of Kenya 2010 and the Vision 2030, the MoALF&C has undertaken numerous reforms in the sector which have culminated in the formulation and enactment of The Crops Act No.16 of 2013, development of Kenya's new ASTGS and Growth Strategy (ASTGS) 2018-2030. Kenya has implemented numerous laws in its bid to upscaling maize production and ensuring food security and welfare of citizens through maize farming. Since 2015 and until the year 2020, Kenya has had a Strategic Food Reserve Trust Fund (SFRTF) which was established to provide the Strategic Food Reserve (SFR) with physical stock and buy maize, beans, rice, fish, powdered milk, and canned beef.[229]

[226] FEWSNET, Southern African Regional Supply and Market Outlook (August 2017). Famine Early Warning System Network (FEWSNET), 2017, p. 5.
[227] Ibid, p.17.
[228] Republic of Kenya, Eye on the Big Four: Budget Watch for 2018/19 and the Medium Term. Retrieved from www.parliament.go.ke, 2018, pp. 17 -22
[229] MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p.12.

The Crops Act No. 16 of 2013 provides the legal framework for the creation of the Commodities Fund, which consists of monies paid as license fees, commission, export or import agency fees, and fees that may accrue to or vest in the Food and Agriculture Authority in the course of the exercise of its functions under the Act. Although the MoALF&C has not developed the regulations required to operationalize the Crops Act, the Act has the potential to address most of the regulatory issues in the maize sub-sector including data management.[230]

Agriculture and Food Authority Act No. 13 of 2013 consolidates[231] the laws on the regulation and promotion of agriculture generally; it establishes the Agriculture and Food Authority, AFA (the authority which is the regulator). The act provides for the effective participation of farmers in the governance of the agricultural sector. It also mandates the Cabinet Secretary to make rules to ensure that any agreements entered into between farmers and their organizations are respected.

Most of the agricultural functions especially productions functions were devolved to counties leaving the national government with regulatory, coordination and food security functions. These are vital functions for the realization fast agricultural growth and food security in the country. Effective performance of the National agricultural functions requires establishment of coordination and operation structures at national and county levels while ensuring adequate funding of the planned programmes and activities.

Maize, wheat and rice are important sources of human food and account for 94% of all grain consumption in the world. Rice is the main cereal in Asia, while maize is the preferred cereal in South and East Africa, Central America and Mexico.[232] The United States, China and

[230] Ibid, pp. 12
[231] Ibid pp. 13-14
[232]Maria N Garcia-Casal, Global maize production, utilization, and consumption, New York Academy of Sciences, 2019, p. 105

Brazil are the top three maize producing countries in the world, with approximately 563 of the 717 million tons / year.[233]

With the maize sub-sector continuing to dominate in Eastern African region and Kenya several challenges and opportunities are evident. The most pronounced challenges that face the sub-sector in Eastern Africa and Kenya include; high agricultural input costs, limited and unaffordable agricultural credit facilities, land ownership and subdivision challenges, adverse climatic conditions experienced through droughts, floods, emerging pests, and diseases such as Desert Locusts and Maize Lethal Necrosis Disease (MLND), market unpredictability, Low Agricultural mechanization Levels, high and high post-harvest losses, low agricultural extension service outreach, uncoordinated food security and reporting structures.

Agricultural subsidy in Kenya targets to reach 1.4 million registered resource poor farmers to enable them access a wide range of subsidized (40%) agricultural inputs.[234] Currently, digital E-voucher system is employed in the procurement and dispatch of the farm inputs to the vetted beneficiaries in selected counties in Kenya. The study established that Warehouse Receipt System (WRS) provides a framework for efficient produce storage service and will facilitate price stabilization. The warehouse receipts obtained can be used as collateral in accessing loans from a commercial bank pending sale of the produce at a later stage when prices are good. The WRS is set to provide standard stores for maize storage thereby assisting in reducing the annual post-harvest loses of maize which are currently estimated at 12%(Approximately 4 Million 90 Kilogram Bags). Timely provision of fixed and mobile grain drying services by County and national Government have great potential of reducing the high Post-harvest loses witnessed especially during the rainy season. Production and use of Aflasafe for prevention of aflatoxin build up and food poisoning is a vital opportunity in addressing food

[233]Ibid
[234] MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p. 11

safety.[235] Promotion of adoption of new maize variety like H6218 with high yield potential of upto 56 bags of maize per acre is required.[236] Such maize varieties are bred for desirable agronomic attributes which includes; high yield Potential, Drought Tolerance and striga weed resistance.

Public institutions in Kenya have large tracts of land that is not utilized due to inadequate Institutional funding. The Land situated in suitable agro-ecological zones can profitably be utilized for maize production. The institutional lands include land owned by Agricultural Development Cooperation (ADC), KALRO and National Irrigation Board (NIB).[237] Approximately 60,000 acres lies idle at ADC farms and KALRO while 40,000 acres exist at NIB schemes.[238]

Flour blending is advocated for reduction of pressure on maize demands. The study established that upon full adoption and utilization of blended maize flour products in Kenya, there will be a reduction in the demand for maize by over 20 million bags per year.[239] Kenya has not fully developed its irrigation potential estimated at 1.342 million hectares.[240] By the end of 2015, approximately 180,503 ha of irrigation had been developed. This represents about 13.5% of the potential leaving more than 80% of Kenya's irrigation potential untapped.[241]The rate of irrigation development in Kenya has been very low at about 0.5 percent per annum.[242] It has therefore been established by the study that there exists opportunity for increasing investment in irrigation to ensure its accelerated agricultural growth and hence leading to food

[235]A.E. Alakonya, Fumonisin B_1 and Aflatoxin B_1 Levels in Kenyan Maize, Journal of Plant Pathology, Vol. 91, No. 2, Springer, 2009, pp. 459-464
[236] http://kenyaseed.com/gallery/maize/ Accessed 20th December 2020 at 1212hrs
[237] Ministry of Agriculture, Livestock, Fisheries and Irrigation, Food and Nutrition Security Big Four Agenda, 2018.
[238] Ibid
[239]Ministry of Agriculture Livestock and Fisheries, Maize Retreat Report, 2017, p. 15
[240] Ministry of Agriculture Livestock Fisheries and Irrigation, National Irrigation Policy, 2017, P.4
[241] Ibid, p.5
[242] Ministry of Agriculture Livestock Fisheries and Irrigation, Deep dive Workshop Report,2019, P.1

and nutrition security. Construction of dams in parts of the country that have continually experienced disasters caused by drought and floods (e.g. in Kano Plains, Budalang'i and ASAL areas) will reduce water insecurity and vulnerability of families inhabiting those areas.[243] Agricultural mechanization in Kenya is currently very low at 25 %. This scenario leads to delayed farm operations and reduced efficiency and hence low productivity. The use of motorized, manual and animal drawn power stands at 30 %, 50% and 20% respectively.[244]

There is need for the employment of more extension service providers for effective transfer of new Agricultural technologies. This will increase the maize yields and returns to investment through value addition and reduced post-harvest losses. Following devolution of most of agricultural functions to the county, creation of national coordination and monitoring offices at county levels is ideal for effective coordination and monitoring of food security situation.

5.2.2 Conclusion

The study established that in spite of numerous efforts by Eastern Africa region states in collaboration with international organizations like Food Agricultural Organization (FAO), food insecurity is still experienced in the region. Food security is witnessed in form of food availability that is normally associated with low production, food access which is highly dependent on food distribution within the region and food affordability and insecurity due to food utilization and safety of which aflatoxin is posing a major threat. Given the critical importance of maize sub-sector in Eastern Africa region in ensuring food security, there is urgent need for unreserved technical and financial resource allocation to the sub-sector for realization of its sustainable growth. Involvement of all stakeholders including farmers in

[243]Government of Kenya, Vision 2030, 2007, p.117

[244] Wawire W. N, et al, The Status of Agricultural Mechanization in Kenya, 2016, p. 3.

planning and implementation of the intervention strategies is of great essence to the success. This is in line with the Complex Interdependence Theory.

5.3 Recommendations

The study makes the recommendations below following the study findings. The recommendations are meant to provide insight to the policy makers in making specific actionable regulations and interventions in addressing food security and sustainable development of maize sub-sector.

5.3.1 Increase the Proportion of National Annual Agricultural Budgetary Allocation

The study recommends that Eastern Africa states including Kenya, to allocate at least 10% of their annual budgets on Agriculture. This is informed by the great contribution of Agriculture to the Gross Domestic Product of the East Africa Countries that are signatories to the CAADP Malabo declaration of 2014.[245] Increased funding of agricultural programmes will help in addressing production and marketing challenges currently facing maize sub-sector in the region as envisaged in their respective government policies and strategies. This in the long run will ensure fast development of maize sub sector and hence improve the food security status of the states given the important role the crop play in Eastern Africa[246]and Kenya.[247]

[245] African Union Commission, 2014. Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods. Pp. 1-6.
[246] Sitko, N., A. N. Kuteya, B. Chisanga, Analysis of the Effects of Maize Trade Restrictions in the COMESA Region on Food Prices and Market Development, Technical Report, Indaba Agricultural Policy Research Institute, Lusaka, 2014, p. 22.
[247] Government of Kenya, Assessment of Costs of Maize Production, 2009

5.3.2 Enhance Coordination and monitoring of Food Security and Maize Sub-sector functions

The study established that in spite of the great importance the constitution of Kenya places on food security[248] and the importance of maize in provision of food security in Kenya[249], the food security functions are performed at a lower ministerial administration unit level. It is strongly recommended that food security functions at national level be elevated to a directorate level thereby ensuring effective participation at policy level and adequate resource (Human and Financial) allocation. It is further recommended that Maize sub-sector be accorded a sectional status at the ministerial level for effective planning, coordinating and monitoring. For effective food security co-ordination and monitoring at the county level, food security liaison offices be established and housed at the County commissioner's premises. The Food security liaison offices will be key in coordinating and monitoring of various National food security initiatives in the counties while undertaking capacity building.

5.3.3 Embrace Flour Blending for Increased Nutrition and Reduced Pressure on Maize

Implementation of compulsory blending of maize flour with other cereals and legumes at the Kenya Bureau of Standards (KEBS) approved and legislated ratios will help to reduce the demand pressure on maize. [250]Blending will also promote the production of drought tolerant crops such as Cassava, Millet and sorghum and thereby increasing adaptability of farmers to climate change and maize price volatility. Blending will promote the utilization of the less consumed legumes such as soya beans and thereby promote their production and nutrition of the households.

[248] Republic of Kenya, The constitution of Kenya,2010, Article 43(1)(c)
[249] Government of Kenya, Assessment of Costs of Maize Production, 2009

[250] Flour blending secretariat, Flour blending initiative, report, 2018

5.3.4 Reduction of Post-Harvest Losses through Promotion and use of Grain Driers, Warehouse Receipt System and Aflasafe

The current post-harvest loss of cereals in Kenya is estimated at 20 -25 % with that of Maize standing at 12% which translates to a loss of approximately 4 Million Bags annually.[251] The study recommends timely provision of fixed and mobile grain drying services by County and national Government under Private Public Partnership arrangement in order to address the prevailing high Post-harvest loses witnessed especially during the rainy season. The study further recommends promotion of Warehouse Receipt System (WRS) for provision of standard stores for maize storage thereby reducing the annual post-harvest loses. Production and promotion of use of Aflasafe for prevention of aflatoxin build up should be undertaken by various stakeholders in order to address the post-harvest loses and food safety.[252]

5.3.5 Promotion of Agricultural mechanization for efficient and timely farm operations

Given the current low agricultural mechanization status of 25% in Kenya and with majority of farmers being aged as established in the study, agricultural mechanization is recommended for attraction of the youths into agriculture.[253]Increased agricultural mechanization will also ensure timely farm operations thereby granting timely utilization of the season especially the rains.

5.3.6 Provision of Timely Subsidized Agricultural Support Services

The current Kenya Agricultural E-voucher system subsidy targeting 1.4 million registered resource poor farmers to enable them access a wide range of subsidized agricultural inputs at 40%[254] be timely processed for prompt access and utilization of the inputs. This will ensure realization of the desired increased production.

[251] MOALF&I, ASTGS, 2019, p.32
[252]A.E. Alakonya, Fumonisin B_1 and Aflatoxin B_1 Levels in Kenyan Maize, Journal of Plant Pathology, Vol. 91, No. 2, Springer, 2009, pp. 459-464
[253] MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p.72
[254] MOALF&I, Agricultural Sector Transformation and Growth Strategy, 2019, p. 11

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APPENDICES

Appendix 1: NACOSTI Research License

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Appendix 2: Research Questionnaire Link -https://ee.kobotoolbox.org/x/vlbyVt0q

Appendix 3: Key informant Guide

CRITICAL ANALYSIS OF FOOD SECURITY AND POLICY IN EASTERN AFRICA: THE CASE STUDY OF THE MAIZE SUB-SECTOR IN KENYA

Introduction

Dear Sir/Madam,
I am a student at University of Nairobi conducting a study on ***CRITICAL ANALYSIS OF FOOD SECURITY AND POLICY IN EASTERN AFRICA: THE CASE STUDY OF THE MAIZE SUB-SECTOR IN KENYA****. The purpose of this exercise is purely academic and is carried out for partial fulfillment for award of MA (International Studies). You are therefore kindly requested to provide information by freely answering the questions asked. Please note that the information given will be treated as confidential*

MELTUS A. WERE

Respondent Profile:

Name of the Respondent
.....
Country
.....
Title
.....
Organization/Station/Place
.....
Email/Phone
.....
Date of Interview: DD…….MM……..YY Time: ……

A. Food security and policy status in maize sub-sector in the Eastern Africa Region

1. Describe the food security status in the Eastern Africa region
2. What are the key drivers of the food security status in the Eastern Africa region?
3. How does maize sub-sector contribute to food security status in the Eastern Africa region?
4. Citing relevant examples, describe the food security policies status in maize sub-sector in the Eastern Africa region
5. Describe policy regime in maize sub-sector that have helped to improve food security in an Eastern African country.

6. What are the key issues of food security policies in Eastern Africa region?

B. Food security and policy regime in maize sub-sector in Kenya

1. Describe the food security status in maize sub-sector in Kenya
2. What are the key drivers of the food security status in Kenya?
3. What is the contribution of maize sub-sector to food security in Kenya?
4. Citing relevant examples, describe the food security policies status in maize sub-sector in Kenya.
5. Describe any policy regime in maize sub-sector that that have exemplary helped to improve the food security status in Kenya.
6. What are the key policy issues in food security in Kenyan maize sub-sector?

C. Challenges and opportunities in maize sub-sector in Eastern Africa and Kenya

1. Describe the challenges available in maize sub-sector in your Region/Sub-Region/ country/County.
2. Explain the efforts underway to address the challenges in maize sub-sector in eastern Africa and specifically in Kenya.
3. How do you assess the success of some of the interventions (cited above) in solving problems in maize sub-sector in your country/County?
4. Describe the opportunities available in maize sub-sector in your Region/Sub-Region/ country/county.
5. Illustrate the stakeholders' specific benefits to the opportunities (cited above) in your Region/Sub-Region/ country/County.
6. Do you see any scope of major improvement in food security situation through maize value chain in your Region/Sub-Region/ country/County? Explain.

D. Food Security and Policy recommendations for improvement of Maize sub-sector

1. What are your key recommendations for improvement of Maize Availability in
    a. Eastern Africa
    b. Kenya
2. What are your key recommendations for improvement of Maize Access in
    a. Eastern Africa
    b. Kenya
3. What are your key recommendations for improvement of maize utilization and Safety in?
    a. Eastern Africa
    b. Kenya

Appendix 4: Research Individual Word Questionnaire

CRITICAL ANALYSIS OF FOOD SECURITY AND POLICY IN EASTERN AFRICA: THE CASE STUDY OF THE MAIZE SUB-SECTOR IN KENYA

Questionnaire

Introduction

Dear Sir/Madam,
I am a student at University of Nairobi conducting a study on CRITICAL ANALYSIS OF FOOD SECURITY AND POLICY IN EASTERN AFRICA: THE CASE STUDY OF THE MAIZE SUB-SECTOR IN KENYA. The purpose of this exercise is purely academic and is carried out for partial fulfillment for award of MA (International Studies). You are therefore kindly requested to provide information by freely answering the questions asked. Please note that the information given will be treated as confidential

MELTUS A. WERE

Respondent Profile:

Name of the Respondent Mr. /Mrs. /Prof/Dr. ……

Contact: Tel……..…Email……...……...…

Title/ Position……

Organization/Institute……

Region/ Sub-Region/Country/County……

Station/Office Location……Country……....

Date of Interview/Response: ……. Time: ……

1. Name (In Order of Importance) 3 main food security Cereal crops/commodities in this Region/Sub-region/Country/County/Area?

   1…… 2……... 3……...……

What is the self-sufficiency status of the above named Cereal Crops?

Cereal Crops		Self-Sufficiency status (Tick One)		Main External Sources of the Commodity in case of insufficiency (In Order of Importance)
		Yes	No	
a.		❑	❑	1……2……3……
b.		❑	❑	1……2……3……
c.		❑	❑	1……2……3……

2. Is Maize produced in this Region/Sub-region/Country/County? **1. Yes ❑2. No ❑**

a) If **yes**, what is the average yield per Acre in 90 Kg Bags? .....

b) What is the Average total annual maize production/Supply in 90 Kg Bags or ❑Tons (Tick Appropriately) in your mandate area? .....

c) What is the Annual Maize demand for Region/Sub-region/Country/County/Firm? .....

d) What is the Annual Maize Surplus/deficit? .....

e) In case of deficit, how is the deficit met? Tick Appropriately **(Ones in each Row)**

External Sources of Maize		1=Most Common	2= Common	3=Rarely	4= Never	Don't Know
i.	Imports from Uganda	❑	❑	❑	❑	❑
ii.	Imports from Tanzania	❑	❑	❑	❑	❑
iii.	Imports from Other East Africa Countries	❑	❑	❑	❑	❑
iv.	Imports from Ethiopia	❑	❑	❑	❑	❑
v.	Imports from South Africa	❑	❑	❑	❑	❑
vi.	Mexico	❑	❑	❑	❑	❑
vii.	Other sources (Specify)……	❑	❑	❑	❑	❑
		❑	❑	❑	❑	❑

f) In Case of surplus, where is the surplus maize sold?

External Market for Maize		1=Most Common	2= Common	3=Rarely	4= Never	Don't Know
i.	Exports to Sudan	❑	❑	❑	❑	❑
ii.	Exports to Somalia	❑	❑	❑	❑	❑
iii.	Export to East African Countries	❑	❑	❑	❑	❑
iv.	Exports to COMESA Countries	❑	❑	❑	❑	❑
v.	Exports to SADC Countries	❑	❑	❑	❑	❑
vi.	Other Markets (Specify) ……..	❑	❑	❑	❑	❑
		❑	❑	❑	❑	❑

3. What are the key contributors to low production and growth of maize Sub-sector in the Region/Sub-region/Country/County?

Key Contributors to low production and growth of Maize sub-sector		Scale of Contribution (Tick Appropriately)				
		1=Greatest	2=Major	3=Average	4=Minor	5-Least
i.	Low access to Agricultural extension Services	❑	❑	❑	❑	❑
ii.	Inadequate access to agricultural inputs and Credit	❑	❑	❑	❑	❑
iii.	Poor rural infrastructure	❑	❑	❑	❑	❑
iv.	Land subdivision into uneconomical land sizes	❑	❑	❑	❑	❑
v.	Unpredictable weather patterns due to climate change evidenced by Drought, Floods, Emerging Pest and disease outbreaks	❑	❑	❑	❑	❑
vi.	Weak Storage and Market infrastructure	❑	❑	❑	❑	❑
vii.	Others (Specify)……					

4. What is your rating of the implementation of the under-listed strategies in addressing Food Security and maize value chain Challenges in Kenya?

Interventions		Implementation Rating (Tick Appropriately)				
		1=Greatest >71%	2=Major 51-70%	3=Average 31-50%	4=Minor 11-30%	5-Least < 10%
i.	Vision 2030	❑	❑	❑	❑	❑
ii.	Big Four Agenda on 100% Food and Nutrition Security	❑	❑	❑	❑	❑
iii.	National Food and Nutrition Security Policy Implementation Framework	❑	❑	❑	❑	❑
iv.	Input E- Voucher System	❑	❑	❑	❑	❑
v.	Warehouse System	❑	❑	❑	❑	❑
vi.	Crop and Livestock Insurance	❑	❑	❑	❑	❑

5. What policies, institutional and legislative reforms do you recommend for improvement of maize value chain in the under listed areas:

a) Maize Availability

i) ……

ii) ……

iii) ……

iv) ……

b) Maize Access

i) ……

ii) ……

iii) ……

iv) ……

c) Maize Utilization

i) ……

ii) ……

iii) ……

iv) ……

Appendix 5: Tables of the Summaries of the Interview Responses

a) Factors that contribute to low production and growth of maize Sub-sector in Kenya

Key Contributors to low production and growth of Maize sub-sector	Scale of Contribution					
	Greatest	**Major**	**Average**	**Minor**	**Least**	**Total**
Low access to Agricultural extension Services	0.0%	26.5%	**64.2%**	9.3%	0.0%	100.0%
Inadequate access to agricultural inputs and Credit	**18.7%**	**73.7%**	5.9%	1.7%	0.0%	100.0%
Poor rural infrastructure	0.0%	0.0%	33.3%	**66.7%**	0.0%	100.0%
Land subdivision into uneconomical land sizes	0.0%	11.3%	**75.3%**	13.4%	0.0%	100.0%
Unpredictable weather patterns due to climate change evidenced by Drought, Floods, Emerging Pest and disease outbreaks	**81.2%**	17.3%	1.5%	0.0%	0.0%	100.0%
Weak Storage and Market infrastructure	0.0%	9.7%	31.8%	**58.5%**	0.0%	100.0%
Low prices and poor market Infrastructure	0.0%	28.6%	**59.6%**	11.8%	0.0%	100.0%
Low Agricultural mechanization services	**4.4%**	**64.3%**	26.4%	4.9%	0.0%	100.0%

b) External sources of Kenyan maize during deficit

External Sources of Maize	Frequency				
	Most common	**Common**	**Rarely**	**Never**	**Don't Know**
Imports from Uganda	**66.7%**	**33.3%**	0.0%	**0.0%**	**0.0%**
Imports from Tanzania	**52.9%**	**41.2%**	5.9%	**0.0%**	**0.0%**
Imports from other East Africa Countries	11.1%	33.3%	38.9%	5.6%	11.1%
Imports from Ethiopia	5.9%	29.4%	**41.2%**	5.9%	17.6%
Imports from South Africa	0.0%	**27.8%**	**61.1%**	5.6%	5.6%
Mexico	**5.6%**	**33.3%**	**55.6%**	5.6%	**0.0%**

c) Self Sufficiency status of named cereal crops

Cereal	Not sufficient	Sufficient	Totals
Maize	89.5%	10.5%	100.0%
Rice/paddy	94.7%	5.3%	100.0%
Wheat	94.7%	5.3%	100.0%

d) Rating of the implementation of strategies in addressing maize value chain challenges

Policy, Program, Strategy or Intervention	**Greatest**	**Major**	**Average**	**Least**	**Minor**	**Total**
Vision 2030	5.3%	26.3%	**57.9%**	5.3%	5.3%	100.0%
Big 4 Agenda on 100% Food and Nutrition Security	10.5%	26.3%	**47.4%**	5.3%	10.5%	100.0%
Input E- Voucher System	5.3%	36.8%	**52.6%**	5.3%	0.0%	100.0%
Warehouse Receipt System	5.3%	21.1%	**42.1%**	10.5%	21.1%	100.0%
Crop and Livestock Insurance	5.3%	26.3%	**47.4%**	5.3%	15.8%	100.0%